

Roadmap 2030

Financing and implementing the Global Goals in Human Settlements and City-Regions





Roadmap 2030: Financing and implementing the Global Goals in Human Settlements and City-Regions by 2030

Version 1.0

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The Rockefeller Foundation provided their Bellagio Centre from 2nd to 4th March 2016 for UNSDSN and The Ecological Sequestration Trust to convene a high-level meeting to create a Roadmap for Financing and Implementing the Global Goals in Human Settlements and City-Regions by 2030. The meeting was facilitated by Future Earth Ltd. This Roadmap was produced collaboratively with Peter Head CBE FREng as lead author and editor.

Habitat III is creating a concise, focused, forward-looking and actionoriented outcome document, which should reinvigorate the global commitment to and support for sustainable urban development and housing, and the implementation of the transformative New Urban Agenda.

The first aim of this Roadmap is to provide a very practical action plan to support the Habitat III process into implementation. It shows how all municipal and city governments, citizens, civil society, academia, faiths and the private sector could work in partnership, with the support of nation states, at the required speed and effectiveness, to mobilize, redirect and unlock the transformative power of trillions of dollars of private funding resources and expertise to deliver on sustainable development objectives and the Sendai Framework for Disaster Risk Reduction and Paris Agreement targets in urban areas and build the New Urban Agenda. It also provides an action plan for national governments to create the enabling environment for this plan to succeed. It is written to apply to every urban area in the world.

The second aim for this Roadmap is to be a comprehensive resource to provide links to existing programs, networks and support resources which can enable progress to be made more quickly in collaboration in all countries. The aim is to keep this Roadmap updated live online up to and beyond Habitat III as valuable new work emerges. It is aligned with the Habitat III New Urban Agenda Zero Draft. ¹¹³ The authors who convened in Bellagio in March 2016 wrote the Roadmap 2030 document collaboratively as individuals and also invited some colleagues to contribute subsequently. The contents of the document do not represent the views of the organisations they represent.

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Preface

Jeff Sachs

Director Earth Institute, Columbia University

The Sustainable Development Goals are indeed complex and they are universal. Rather than the fight against extreme poverty in low income countries this is a fight for sustainable development in all economies, rich and poor alike. When the 193 members states adopted the Sustainable Development Goals on September 25th 2015, they adopted those goals for their own countries.

Everywhere - the United States, European Union, Japan, the richest countries have to make major changes in their energy systems for example to avoid the catastrophe of the runaway human induced climate change. This is not a simple agenda, sustainable development means a holistic framework that embraces three goals, not only one: economic development, social inclusion, and environmental sustainability. For most countries, it's hard enough to achieve one of the three, but now the idea is to achieve three out of three by taking an integrated strategy.

It's pretty tricky to have all these objectives together and to be expected to meet not just one or two goals but 17 goals. We need new data systems, new ways of planning, new ways of thinking, new ways to diffuse best practices across countries. It's a great agenda. I think a lot of young people around the world are going to be excited to be a part of it. They're going to come up with a lot of breakthrough ideas.

I think the Sustainable Development Goals are also important because they tell governments you have to think differently, you have to get organized differently, you need to make plans. Many governments these days don't make plans, their plan is to the next election perhaps but what the Sustainable Development Goals say you have to think ahead a generation – what's going to happen with the energy system, what's going to happen with the quality of education, what's going to happen with health care. And governments are going to have to get organized to pursue ambitious stretched goals for the year 2030.

Cities need to take on an approach that is "deeply transformative" and guided by the Sustainable Development Goals. Mayors are poised to address the challenges of daily life at a time when change must be transformational and complex. In doing so, cities must connect with companies leading in information technology, public transit and energy technologies and work closely with scientists and engineers.

The Sustainable Development Goals now give us a pathway and we have to make sure our lending, our strategy, our national strategies, our regional strategies, our analytics are all geared towards success of sustainable development.



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Global Goal 17

"A successful sustainable development agenda requires partnerships between central and local governments, the private sector, academia and civil society. These inclusive partnerships built upon principles and values, a shared vision, and shared goals that place people and the planet at the centre, are needed at the global, regional, national and local level.

Urgent action is needed to mobilize, redirect and unlock the transformative power of trillions of dollars of private funding resources and expertise to deliver on sustainable development objectives. Long-term investments, including foreign direct investment, are needed in critical sectors, especially in developing countries. These include sustainable energy, infrastructure and transport, affordable housing, water and sanitation as well as information and communication technologies. The public sector will need to set a clear policy direction and rules. Review and monitoring frameworks, regulations, accountability and participatory mechanisms, including incentive structures that enable such investments, must be retooled to incentivize, and thus attract. investments and reinforce sustainable development. National oversight mechanisms such as supreme procurement, audit institutions and oversight functions by legislatures should be strengthened".¹

PARTNERSHIPS For the goals

solutions to be discovered and delivered The Roadmap covers all the dimensions of Goal 17 for urban areas and aims to include locally. This can be informed and accelerated and reference output from over 50 existing by existing knowledge networks. global initiatives aimed at supporting parts of the 2030 Sustainable Development Agenda in The Roadmap addresses the necessary retrofit urban areas. The discovery research shows of existing urban areas and the planning, that a large capacity and network is already in design and management of new urban place and the hope is that this Roadmap will developments in all countries. help to empower everyone to move forward quickly. The report has no Executive Summary since

The Roadmap focuses on framing collaborative, inclusive mobilization to enable

The document is divided into the following key sections, to include three general introductions and a fourth section which is the Roadmap action plan itself: 1. The new global bargain and new urban social contract; 2. Urban landscape, its challenges, objectives and opportunities for innovation; 3. Phasing and scale-up of actions to 2030 and beyond; 4. Roadmap, dedicated to an action plan for delivery of Global Goals in the world's urban settlements with community participation across local, regional and national government, using research, science, modelling and data, supported by civil society and faiths and enabling private sector partnerships.

The authors who convened in Bellagio in March 2016 wrote the Roadmap 2030 document collaboratively as individuals and also invited some colleagues to contribute subsequently. The document was then made available publicly for comments which have been incorporated. The contents of the document do not represent the views of the organisations the contributors represent.

it is envisaged that the Roadmap sections will develop and evolve into thematic pathways of their own.

1. A New Global Bargain Towards and a New Urban Social Contract

A Moment of Commitments : the New **Global Bargain**

The 2015 agreements establishing the Sustainable Development Goals (SDGs) and the COP21 commitments for climate change mark a historic moment and an opportunity for transformational global change. Coming after the UN Sendai Conference on Disaster Risk Reduction and the UN Addis Ababa conference on development finance, together these demonstrate an historic consensus among UN member states and national governments to address urgent global challenges. The UN Habitat III conference to be held in Quito in October 2016 is the next step in this process. The time has arrived when there is wide recognition of the critical role the population of cities and regions have for the future of human development and of the responsibility they have in leading the process of change to a more resilient world. There is a need for a radical paradigm shift in the way cities and human settlements are planned, developed, governed and managed. The decisions we make today will shape our common urban future and in this, community participation in the process is critical.

The Global Context for Global Change

Several key economic conditions establish a new context for this process. Today, it is widely understood that cities contribute a large share of global and national GDP. Contributions have grown steadily with recent estimates that 600 cities account for 65 percent of global GDP and this trend is continuing. This transformation of national economies has continued for the last 40

years despite the changes and volatility in the global economy. Indeed, even though the short- to medium- term prospects for the growth of the global economy are slowing down, as noted by the OECD and the IMF, cities and their economies are projected to grow. This economic transformation has been accompanied by a shift in the centre of manufacturing from Europe, the United States and Japan to countries like China, India, Vietnam, Bangladesh and Indonesia. As one of the consequences of this shift, China is now the locus of a huge quantity of global savings ready to be deployed, yet many of the needs for investment are elsewhere amongst the developing countries.

A second major shift in the global economic context is the growing shift away from investment in fossil fuels by the financial sector, in particular by institutional investors. As a consequence, enormous magnitudes of financial resources have already moved to new sectors. It is a moment of new priorities and new financial opportunities, with daily announcement of changes by stock markets, pension funds, insurers, and many other financial entities.

On the other hand it is recognised that we need to recover the essential and unique role of the city as a meeting place and a space for culture, entertainment, business and opportunities for the development of people, in which plurality and diversity can be expressed from those who inhabit it, and where the free interchange of ideas promotes innovation and development; and where heritage plays a significant role in the processes of conservation and urban regeneration. ¹¹⁴

Contents of Commitment: Towards a New Urban Social Contract

national and local governments, with a clearer recognition of the role of cities in the achievement of national development goals, but also a more effective division of labor at the In this context, it is also apparent that local level which can strengthen the efficiency the achievement of the SDGs at national and integration of urban public services government level depends heavily on the by municipalities and local governments. enhanced role and performance of cities, not Strengthened urban management by the public just for Goal 11 which focuses on cities, but sector can create new incentives for private also in the delivery of the services required by sector investment towards the provision of the other goals. critical infrastructure and provide business The Global Goal objectives cover the full range continuity for investors, and management of human and ecological and economic activity and operations companies in order to support and how to enhance their combined impacts. citizens' wellbeing and resilience, the bedrock of the Global Goals.

Cities are human creations, places in which we aspire to enable inhabitants to lead peaceful, Stronger local governance includes more healthy, prosperous, and free lives with full explicit attention to the metropolitan and respect of human rights for all. They are places regional levels and policies to make ruralin which we aim to achieve gender equality, urban linkages work effectively. Prosperous empower women and girls, reduce poverty, cities and prosperous rural areas depend and create jobs and generate equitable on each other. This broader perspective prosperity. Cities present an opportunity considers the metropolitan and regional levels for us, the inhabitants, to commit to share not only as administrative jurisdictions, but resources and space in a way that ensures also as economies, ecologies, and cultural the lasting protection of the planet and its and natural landscapes. It requires new tools natural resources. Human settlements are the for analysis, decision making, evaluation and embodiment of the human spirit, where we better urban and regional data to provide a determine our rights and responsibilities, both much improved enabling environment for as individuals and collectively. efficient and effective collaboration.

Beyond Goal 11, other goals cover how the next unprecedented wave of development can be achieved while regenerating our damaged planet. Addressing all these requires a collaborative integrated systems approach at both national and municipal level, often across local and national boundaries.

Enhanced performance in turn requires a new relationship, or 'smart partnership', between

The core of new investment to achieve urban and urban-related SDGs is sustainable infrastructure and improved service delivery. There is growing international support for financing infrastructure, but infrastructure itself requires a stronger policy framework and more effective and integrated rules for planning, design, construction, operation, and maintenance if it is to deliver its promised benefits.

Infrastructure "structures" urban areas and creates the context for achievement of dynamic agglomeration economies and productivity which are the basis of urban employment, private and fiscal household incomes, and the creation of opportunities in which no-one is left behind. Without urban incomes there is no fiscal revenue.

Urban areas are thus the platform for change in the 21st century and the locus for achieving productivity, sustainability, realization of human rights, combating discrimination in all its forms, and empowering all individuals and communities, while enabling their full and meaningful participation.

Recent practice shows that completely unregulated private sector investment in urban land, infrastructure, and housing, and misdirected housing policies has led to a massive waste of both public and private resources, e.g.. vacant housing in cities in Mexico, China, Brazil, Egypt, the Gulf area, Cameroon, Malawi and the United Kingdom. Research has shown that new technologies can disrupt urban land use patterns and can contribute to further wasteful de-densification.

The influx of large numbers of displaced people into towns and cities poses a variety of challenges and for future resilience, the social, economic and cultural contribution of migrants to urban life needs to be recognized.

Regulation is needed to create optimised "urban density" which should be considered a public good, and therefore requires an active role for national and local urban policy. Good urban form can then be developed within this policy framework. Changing demographic patterns across countries, both ageing populations and increasing shares of youth in the population, also affect settlement patterns and will create opportunities for new uses of fixed physical assets.

Digital technology needs to be recognized as a benefit and opportunity and future smart cities will blur the lines between the physical and the digital domains. These domains now represent two separate systems which together form the holistic urban environment: physical structures and the "wired data streams" which together enable functionality within the city but which are also a disruptive force to historic spatial patterns and seriously changing service systems like the role of traditional banking in financing urban assets. Both systems exhibit security vulnerabilities from internal and external vectors. A dependency on the digital domain by the inhabitants of the city will exist to a degree that has not previously been experienced and so security must now be included at the earliest stages of design thinking.

This "New Urban Social Contract" needs to be planning-led, experimental and focused on learning from experience and cultural heritage, using much improved, technology enhanced support tools. New forms of urban settlement throughout the hierarchy of urban places need to be explored to learn about the diverse forms of social and cultural sustainability, as it happens, for example, in the new urban communities of the Amazon region.

Thinking Inside Out

A New Urban Agenda is a critical instrument for the achievement of the SDGs. It must be

normative and general in its objectives, yet markets, driven by two key phenomena: (i) allow different pathways for the achievement of the relatively recent decentralization of power the SDGs at both the country and city levels. away from central government towards sub-It must encourage broad social and political sovereign levels and (ii) the rapidly increasing participation including faith communities, while urbanization found in the world's least insisting on transparency and accountability, developed countries. thus reducing corruption. It must convey the urgency of action required to address the The growth of cities and towns through deprivation faced by the millions of urban poor urbanization makes functional and fiscal on a daily basis and be sensitive to the rights decentralization more viable and more necessary and needs of women, children and youth, older and, in many countries, local autonomy is persons and persons with disabilities, and growing. Increasing the capacity of local officials other people in vulnerable situations such as can not only improve urban resilience and refugees, migrants, and displaced persons. quality of life, it empowers cities and towns to The New Urban Agenda is not just about cities. contribute in important ways to national social It should be framed in relation to its agendaand economic development goals. setting for cities to allow them to contribute to the achievement of the SDGs at national and While the responsibilities delegated to local global level.

We must think inside out. If cities are important instruments for achieving the SDGs, they are also the political and economic space where the New Global Bargain should take shape and where a "New Urban Social Contract" must be implemented by the public and private sectors and by civil society, including faith communities. Most of all, cities are spaces in which people live. New collaborative platforms are essential to allow city communities to create new forms of sustainable futures that enable their dwellers to flourish and contribute to regeneration of natural systems on the planet, on which human life depends.

Municipal Finance in Emerging Markets

While no country is free from the challenges of municipal finance, the dangers of a failure to act are more pressing in emerging While the responsibilities delegated to local governments by law vary considerably from one country to the next, cities in developing markets often have mandates to provide: (i) local basic services and infrastructure, including water, sanitation, public transportation, public lighting, and solid waste management, among others; (ii) resilience building and climate mitigation and adaptation, including energy efficiency, flood management and public building retrofitting, among others; and (iii) local social services and infrastructure, including health, education, and childcare facilities, among others.

In the past, most cities in the emerging economies would not have had the autonomy, information technology, or knowledge of trends in the urban sector worldwide to embark on significant development projects or to prepare multi-year investment plans. This has changed more recently due to the increasing interconnectedness of cities around the world and the growing competition between them.

Addressing the adaptation and mitigation needs of developing countries

Advanced economies have formally agreed to jointly mobilize USD 100 billion per year by 2020, from a variety of public and private sources, to address the pressing mitigation and adaptation needs of developing countries ^{106.} Governments also agreed that a share of new multilateral funding should be channeled through the newly established Green Climate Fund GCF which plans to invest USD 2.5 billion in 2016. GCF pays particular attention to the needs of societies that are highly vulnerable to the effects of climate change, in particular Least Developed Countries (LDCs), Small Island Developing States (SIDS), and African States. An analysis has been done using Roadmap 2030 to show how this money might be enabled to flow.

First Roadmap 2030 data has been used to summarise population and USD GDP figures for these countries.

	Total Pop m	Urban pop 2014 m	Urban Pop 2030 m	GDP per cap \$USD	GDP 2014 bn \$USD
Africa	1,100	435	728	2249	2,469
Asia	1,329	628	859	4605	6,120
Europe	30	19	19	6133	184
Oceania	9	2	3	2890	26
Latin America/ Caribbean	281	210	256	8064	2,266
Total	2749m	1294m	1865m	\$4025	\$11,065bn

The estimated cost in Roadmap 2030 of taking urban areas forward to meet the SDG's, including climate mitigation and adaptation, is 4.8% GDP per year of which 30% is estimated to be able to be provided from green bonds ie 1.6% GDP. Taking the urban population in 2014, the total urban GDP for the countries being targeted by GCF is USD 9,000bn (using average USD 5000 per capita). The infrastructure funding needed per year to meet SDG's is 4.8% of this which is USD 430bn per year.

The money that advanced economies plan to mobilise for these countries by 2020 is USD100bn, which is 23% of the money estimated to be needed to deliver SDGs in urban areas of those countries.

The Roadmap 2030 analysis has shown that with a smart partnership with National Government to create the enabling environment and frameworks, tools and capacity building for municipal finance, urban areas of these countries could attract private capital, for example through green bonds, of more than USD 100bn per year to support resilience in urban areas. If effort is made up front by GCF and other agencies to help municipal governments improve enabling environments and capacity for sound financial management and transparency in the target countries, then reaching the target USD 100bn per year from advanced economies will be made possible.

"Our Struggle for Global Sustainability Will Be Won or Lost in Cities"

Even so, while needs and aspirations may The conditions required to provide local grow, the financial options available to cities governments with capital market access in most emerging markets have not kept pace are understood. The critical challenges are with the growth and increasing complexity of bringing borrowers and lenders together in a the cities themselves. Cities are stuck in a market relationship, and managing the risks vicious cycle of limited resources leading to a inherent in this type of financing. There are constrained response, while the population of countries where creating market access to the city and the demand for services continue investment capital for cities is not feasible. Where risks are too high, or financial markets to grow. lack liquidity or are too underdeveloped, raising Ironically, many local government capital local funds for municipal investments may be investments have high economic and social impossible (this situation prevails, for example, returns, and therefore should be prioritized. in states in crisis).

For instance, transportation improvements that reduce congestion, free people's time for more productive purposes and investments in drainage that reduce flooding in commercial areas reduce trading days lost to post-flood recovery. In these cases, domestic private capital should be available to finance municipal investments that cannot be financed through grants.

Mobilizing resources to finance investments education and training these actors can be and improve services at the municipal level empowered and brought together to define is one of the most challenging aspects of such strategies. This Roadmap aims to provide local development, especially if the goal is to practical guidance on how to move forward. provide resources on market-like conditions in a sustainable manner, for instance from Sector Challenges and Gaps in loans or bonds. Even when government **Emerging Markets** transfers are predictable and generous (which tends to be the exception), they are rarely Emerging markets display a predictable adequate to finance major infrastructure set of conditions that undermine municipal improvements in growing cities. The capital financing. Addressing all of them is a longinvestment financing that is available to local term process that cuts across many sectors governments is often provided by national and the Roadmap is designed to help address agencies whose own access to capital is highly them. This is further complicated by election constrained. Winning funding allocations from cycles and political party differences at national national budgets requires local governments to versus sub-national levels of government. compete with line ministries and other priorities of the government in power.

Ban Ki-Moon

In other countries, such financing may be feasible, especially as investors seek new investment options. It is also highly likely that, throughout the emerging economies, viable municipal projects can be developed. Public officials and the private sector may have little familiarity with strategies to raise funds for local development projects, but through

Lack of an Enabling Environment for Investment

The establishment of a transparent and sound regulatory framework for investment is a prerequisite for attracting capital flows. Such a framework ensures that contracts are upheld, that local governments are protected from expropriation, and that commercial disputes can be arbitrated. In the absence of this framework there is a lack of confidence in municipal capital investments among institutional and individual investors with negative implications for domestic debt markets. Unlocking the transformative power of financial resources requires a key which can be found in the untapped potential of human and social capital. This key unlocks constraints which hinder the flow and development of human talent, creativity and innovative capacity, which is seriously needed to shift away from financing business as usual.

Apart from a legal enabling environment for investment, societal institutions need to provide incentives which stimulate and reward creativity and innovation, protect patent, enable value articulation, facilitate societal decision making processes, and encourage new partnerships.

Municipal Legal and Regulatory Framework

The policy, legal and regulatory framework of the municipality determines how feasible it is for local governments to borrow and to mobilize resources to repay credit, and establishes other conditions that lower risks for investors. In many developing countries, the municipal law either does not contemplate borrowing, or limits it to a very short term (1-2 years). The law may not prevent newly elected local officials from repudiating the borrowing of their predecessors, which creates repayment risks for investors.

A framework needs to be put in place that: (i) allows local governments and other local entities to raise private funds; (ii) provides the means to repay the funds, using user fees, tariffs, or other charges and/or tax revenues; (iii) sets standards for the preparation and reporting of financial information; and (iv) provides adequate stability over time in all these dimensions.

Capital/Financial Markets Legal and Regulatory Framework

The legal and regulatory framework for the financial sector and/or capital market establishes the rules that permit the origination, sale (in the case of securities), and structuring (in the case of Public-Private Partnerships) of financial transactions, and governs the handling of funds repaid by the local government. Regulations also establish the recourse in the event local governments default. These rules create certainty for both investors and borrowers, and are likely to need some reform before sustainable marketbased municipal financing mechanisms can be established.²

The market must: (i) mobilize adequate resources to invest in local governments' or other local entities' investment needs; (ii) create risk/return trade-offs agreeable to both investors and borrowers; (iii) provide a yield curve that permits the pricing and re-pricing of securities and loans; (iv) include a means for the secondary trading of securities; (v) include capable intermediaries, analysts, and trustees; and (vi) ensure adequate stability over time in these dimensions. Emerging financial markets rarely satisfy all these conditions.

Mismatch between Investment Needs and Available Finance

Whether the investor is a bank or a bond buyer, the risks and returns requirements of the investor and the risk and cost conditions for the borrower have to match up. Establishing an effective demand depends also on: (i) investor familiarity with the municipal investments; (ii) investor ability to evaluate return and risk; and (iii) availability of appropriate funds. These conditions are often absent in developing countries due to the nascent nature of the financial markets, lack of investor confidence, and lack of tools to mitigate risks. Until market players gain experience, municipal projects in developing markets also have high transaction costs that reduce returns.

Domestic private finance in developing countries without capital markets is dominated by banks that are risk averse and either do not have funds, or are reluctant to lend long-term. As a result, lenders are unlikely to consider investing in city infrastructure projects without guarantees or the provision of funds for onlending from development banks.

Identifying sustainable bankable projects, as part of capital investment plans from creditworthy local governments, means building the local capacity to: (i) provide accurate information about the operational and financial activities of In developed countries, institutions such as the local government; (ii) identify and prepare sustainable bankable projects with good evidence credit rating agencies and investment banks help to develop municipal markets by helping to of their impact and useage; (iii) provide a strong match up investor and borrower requirements. repayment stream and demonstrate or mobilize These entities either do not exist in many local willingness to pay; and (iv) manage the developing countries, or where they do, they do financed projects during the life of the bond issue not work with municipal governments. Public/ or other financing to ensure continued operation private collaboration in market development can and maintenance of the investments, and help to overcome these gaps. collection of associated revenues, where relevant.

Lack of Creditworthy Local Governments and Bankable Plans/Projects

For most cities, achieving access to capital financing at a reasonable cost from sources other than transfers and own revenues will require sustained attention to improving the policies and practices underpinning their creditworthiness. A World Bank study found that only a small percentage of the 500 largest cities in developing countries could be deemed "Creditworthy" - about 4 percent in international financial markets and 20 percent in local markets. ³

Municipal transactions can either finance specific investments (such as a sewage treatment plant or commercial center), or finance an investment plan or a program of investments that vary in size and sector. With the former, local governments would often repay the transactions from revenues associated with the investment itself (sewerage fees or commercial rents); while in the latter, repayment would be from all municipal taxes, fees, tariffs, or other sources. Often, local governments have only a laundry list of investment projects. What is required is to assist local governments to prepare a list of projects that supports a medium- to long- term development plan for the city in an integrated way, that has been risk assessed and reviewed by key stakeholders to ensure their support and willingness to invest in these projects, and to seek formal approval of the plan with the city council or corresponding legislative body. Providing this support will need new tools and the provision of training to develop local skills in areas such as municipal accounting, local government strategic, land use and financial planning, investment/project preparation and cost recovery strategies.

Lack of Capacity to Accurately Assess Financing Options

Even if a city is successful in creating the template for a bankable project (either independently or with technical assistance from an outside agency), municipal leaders are often at a disadvantage when considering the most appropriate financial instrument to use to deliver their long-term financing goals. Approached from all sides by development finance institutions, investment banks and other well-meaning but often contradictory advisors, cities are challenged by the need to make swift and responsible decisions without being accused of corruption or other undue influence.

With collaboration and technical assistance, experience shows that national governments, local governments, and private market actors can work together to create the enabling conditions, prepare projects for financing, and mobilize financial resources. It is hoped that this Roadmap will help considerably.



2. Urban landscape, challenges, objectives and innovation



Urban Landscape

- There is no universal definition of what constitutes a city or urban area; different countries apply different criteria. The Roadmap employs the definition of urban population used in the UN's World Urbanization Prospects of 2014⁴, which is based on national statistics from population censuses, population registers and administrative statistics. There are recent attempts to develop an internationally comparable definition of an urban area. ⁵
- **Population** tables in Section 6 show the population in urban areas in most countries of the World in 2015 (total 4bn) and likely population in each in 2030 (average growth 1.6 % per year to a total of approximately 5bn). This provides the approximate population numbers in existing urban areas (for retrofit) and numbers expected to move to new areas (new urbanization) by 2030 in each country. Also current GDP per capita is listed in each country to enable some estimate of the investment needs to

be calculated from later guidance provided. The regional numbers are totaled for urban population and growth as well as by country. References are given for the data sources.

It should be remembered that there is a difference globally between average urban GDP per capita and national GDP per capita. The approximate average global GDP per capita is \$16,000 urban and \$10,720 national. Cities generate around 80% of global GDP which is 80% of \$78trillion i. e. \$62trillion per year in 2014. 6

Challenges and Objectives

- A key objective is to reduce urban poverty in all its forms, to end slum formation, increase productivity, and promote conditions for global environmental and social sustainability. Cities and urban areas will need to ensure universal access to basic physical and social infrastructure and services - affordable serviced land, housing, safe water, sanitation, waste management, mobility, low-carbon energy, green infrastructure and information and communication technologies. As these investments go ahead, urban areas must also invest in a way that increases resilience to disasters, extreme weather events and other threats of climate change. New tools will be needed to model climate impacts at regional scale.
- The economic performance of a city is influenced by a complex set of policies at the national and local level. For example, large cities raise their workers' productivity and wages, offer a large set of opportunities and can allow for an

unrivalled access to amenities of all types to all including those with disability. The benefits that larger cities provide, however, come with increased costs of living, as well as non-pecuniary cost such as congestion, long commutes and air pollution. These non-pecuniary costs are significantly driven by urban form and transport infrastructure, and hence reflect policy decisions (or the lack thereof).7

- Levels of liquidity in the financial markets are at a record high and interest rates are currently at record lows, hence availability of finance per se is not an issue. The real issue is creating viable structures and environments in which people wish to **invest**, creating project pipelines of viable and well planned, manageable urban projects, as well as a full understanding of the holistic nature of the projects in which they are investing. Investment propositions need to be clearly defined with specific parameters and urban areas need to demonstrate a responsible plan for managing assets to include operation and maintenance.8
- There needs to be a commitment to mobilizing investment into infrastructure, from the public side, and collectively with the private sector, to boost demand in a region while remaining on a fiscally sustainable path. Infrastructure investment spending generally has a highmultiplier and, with appropriate quality, such investment will trigger substantial overall future economic growth, making up for the shortfall in investment following the cuts imposed on public spending across advanced countries in recent years.9
- There needs to be a commitment to better manage public investment across

levels of government, since the impact of public investment depends critically on this dimension. Given that public budgets are likely to remain tight for some time to come in many countries, all levels of government will have to do better with less by investing smarter. This requires notably to better articulate national and subnational investment planning strategies, to strengthen the capacities of cities and regions to design multi-year investment strategies, connected to the budget process and to reduce overlaps by investing at the relevant scale.¹⁰

• The world is spending \$3 trillion a year on **infrastructure**, with 80% of this spent inside or outside cities to support inclusive resilient development. This is only half of the \$6 trillion a year estimated to be required from 2015 to 2030 to meet urban and rural resilience needs (\$5 trillion of which would be urban spending based on the figures above). To meet the Global Goal objectives most of this will need to be investment for transformation to a sustainable low carbon infrastructure for energy, transport, water supply, sanitation and waste management, flood management, communications and information technologies and/ or geospatial data infrastructures. It will also need to go into the necessary social infrastructure of affordable housing, schools, hospitals, community and leisure facilities and green public spaces. It is crucial to set aside public space within the logistics network, utility corridors and parklands, before the surrounding private space is occupied. Such proactive planning arrangement could drastically reduce the infrastructure cost.¹¹

- The high quality of urban water services is threatened by aging/lack of water infrastructure, due to investment backlog. Public investment issues should be addressed through multi-level coordination, capacity building, crosssectoral approaches to infrastructure; rural and urban area coordination for managing trade off; stable regulatory frameworks to catalyse finance and enhance efficiency.¹²
- Given the scale of investment requirements and limits to public-sector financing capacity, increased private-capital mobilization for long-term infrastructure investment, especially in developing and middle-income countries, will be critical. Right now, private investment accounts for \$1 trillion to \$1.5 trillion of annual global spending on infrastructure, with 65 to 75 percent from corporate actors and the rest from institutional investors. There is potential for private-sector investment to close more than a third of the sustainable infrastructure investment gap if players choose the right initiatives and if they can identify enough bankable projects. Governments, development banks and ODA could reasonably take care of the rest.13
- It is possible for up to 30% of all sustainable infrastructure investment to be financed by **bonds**, both directly through Green Bonds 14 and indirectly through corporate bonds, bank bonds and municipal bond issuance. It is important that infrastructure is then delivered through performance-based procurement with the aim to maximize value for money in delivering the Global Goal outcomes.¹⁴
- Pension funds want to play a more active role in the financing of long-

term, productive activities that support sustainable growth, such as infrastructure projects, and their investments are now increasing rapidly. However, there need to be transparent, long-term, clear and certain regulations to govern this sector.15

- Of the total annual demand for infrastructure approximately 43% is for energy, 29% is for transport, 21% for water, flood and waste management and 7% for communications/data to upgrade existing urban areas and build new ones. It is estimated that the demand is split into 46% high income, 52% middle income and 2% low income countries.¹³
- · Cities use 78% of the world's energy and produce over 60% of carbon emissions and, as such, can play a big role in reducing emissions by adopting clean energy and using it efficiently. Global CO2 emissions from power generation are predicted to remain broadly flat through to 2030, while global electricity demand will increase by more than 40%. At the global level, the link between rising electricity demand and rising related CO2 emissions is broken and needs to be pushed further to meet the Paris Climate Agreement outcomes and Global Goal 13. It is critically important that cities address demand reduction and de-carbonization up to 2030 as part of a national decarbonization strategy. Green infrastructure and soils can play a significant role in accelerating urban carbon sequestration.¹⁶
- Compact city and integrated public transport policies provide important opportunities to reduce CO2 emission from transport. Urban policies can lead to reductions at relatively low cost thanks to complementarities with other policy

objectives such as lower local pollution and health benefits, and the enhancement of city attractiveness and competitiveness through lower local pollution levels.^{17 18}

- Rather than investing in costly new projects, governments can address some infrastructure needs by getting more out of existing capacity, and in consequence they may even be able to remove some infrastructure like major elevated highways. Maintenance planning can be optimized by using a total cost of ownership (TCO) approach that considers costs over the complete life of an asset and finds the optimal balance between long-term renewal and short-term maintenance.
- Development of cities, and the consumption patterns within them, has had a profound impact on the earth's biophysical systems. In 2005, a landmark study by the Millennium Ecosystem Assessment estimated that approximately 60% of the ecosystem "services" examined, from regulation of air quality to purification of water, are being degraded or used unsustainably due to human action. There is growing evidence that these environmental changes are already having a significant impact on the health and well-being of many people and that these impacts will become increasingly severe over time.¹⁹
- The interconnected nature of people and the planet mean that solutions that benefit both the planet and human health lie within reach.¹⁹ Human and ecosystem health are building blocks for creating sustainable places. Clean air and fresh water, access to fuel and nourishing food, good quality housing, education, income, safe communities,

"Shared global goals are essential for social mobilization, public awareness, accountability of governments, and for mobilizing networks of expertise around complex challenges"

Jeff Sachs

social justice and equity are essential for good health¹¹⁰ .A focus on sustaining ecosystems that resource cities, whilst actively crafting conditions for health, is central to good urban planning. There are now unparalleled opportunities to harness new knowledge and exploit a range of technologies that can improve health and reduce environmental damage and these must be central to the New Urban Agenda. The way materials and resources, including construction materials, energy, water and food are sourced in the transition to, and in life within, the New Urban Agenda must support ecosystems and soils becoming less polluted and ecology being given a chance to recover, inside and outside the urban area. This presents one of the greatest challenges but the rewards will be huge.

- Urbanization and urban policy need to be based on systemic understanding of processes that drive or are driven by urbanization, urban system structure and processes (social, cultural, economic, ecological, institutional) and that are present in an urban system (obvious or hidden, short or long term), their interactions, feedbacks and feed forwards. Systems approaches can inform a more comprehensive and integrative way of viewing urban systems (including social, ecological, economic, technological and institutional), and help extract the patterns and typologies of an urban system.²⁰
- The New Urban Agenda must embrace 'circular economy' policies and principles to move away from dumping waste in favour of recycling and reusing it. The circular economy offers national and local governments and businesses a clear

opportunity for long-term growth that is less • dependent on cheap materials and energy and which can restore and regenerate natural capital. The Roadmap also enables critical ecological systems to be fully included in the circular economy.21

- It has been shown in practice by the International Resource Panel that it is possible to decouple urban development from rising rates of resource consumption. 'Urban decoupling' is included in the Roadmap as a complement to the circular economy.22 It is essential for economic success that feasibility, planning and design of projects is done using an **integrated approach** in which the amount of infrastructure required is optimized through appropriate density, mix of uses, energy efficiency and integrated water and flood management connected to green infrastructure.
- New tools which are becoming available will enable smart selection of projects and improved design planning and maintenance which can reduce finance demand by 40%. The Roadmap proposes innovative approaches that enable these tools to be put in place quickly, so that the finance demand between 2015 and 2030 for sustainable infrastructure can be reduced to a more manageable total of around \$45trillion, a target of \$3trillion per year at 2014 prices.¹³
- Urban green growth is increasingly becoming a concept as important as an integrated approach. It is easier on a local scale to identify environmental and economic policies that are complementary. as activities related to environmental protection and economic development are more integrated than at the national level.²³

- The economic multiplier effect of investment in essential public infrastructure is at somewhere between 1.3 and 2.0. If private sector investment is mobilized, this Roadmap has the potential to address Global Goal 8 and have a substantial positive impact on the creation of jobs and private household income, with the achievement of inclusion and improved well-being, without an unmanageable increase in public debt. Poverty reduction needs additional jobs in all sectors, predominantly in manufacturing, service industries and in the infrastructure sector.9 The program outlined here requires a very large increase in design and construction of the built environment above current levels. It is approximately equivalent to building all the current global infrastructure again by 2030 but in a different way. Unprecedented education and training programs will be essential to ensure that adequate resources are available to deliver Global Goal outcomes in all urban areas by 2030.
 - Future skill demands in all sectors need to be anticipated and then the required education and skills training programs created within a national, regional and local skills partnership.13 24
- Currently 4 billion people live in urban areas. With some agglomeration, this can be envisaged as 57,000 communities of 70,000 people. In 2030, the number will grow to 5 billion or 70.000 communities of 70,000 people, so new urban areas to be built are equivalent to 13,000 new settlements of 70,000 people. Informal settlements currently house 900m people. The goal by 2030 is that slum formation will be ended for the 1 billion new dwellers estimated to come in the future, with better

quality affordable housing available for the 900m by 2030. This is a huge challenge in only 15 years.9

- The expansion of adequate and affordable central banks to lower interest rates to housing is central to achieving inclusive, safe, resilient, and sustainable cities in consumption has a major drawback, which a world where rapid urbanization has is to incentivize enterprises to invest in exacerbated housing shortages. An efficiency; namely by reducing the local investment of \$9 trillion to \$11 trillion labor content of produced and exported for construction is required if today's goods by introducing automation. This in substandard and slum housing is to be turn generates strong inequality problems replaced and additional affordable units and aggregates into an issue of lack of built by 2025. With land, the total cost demand, which can have deflationary could be \$16 trillion, which is \$1.6 trillion effects. This complex situation needs careful analysis in urban development per year at 2014 prices. Four ways to reduce the cost of delivering affordable policies if inclusion is to be supported. • The total global GDP (2014) of urban areas housing by 20% to 50% are to: (i) unlock land at the right location at the right price is \$62trillion, meaning that the investment using public sector levers (the most in sustainable infrastructure of \$3trillion important lever); (ii) reduce construction per year averages at 4.8% GDP (\$768 per capita) per year. The investment into costs through a focus on value for money; (iii) increase operations and maintenance affordable housing at \$1.6trillion per year efficiency; and (iv) reduce financing costs averages at 2.6% GDP (\$416 per capita) for buyers and developers. Recycling and per vear. reusing materials will be essential to reduce . Equitable and efficient urban land and the environmental impact of this program resource use is essential, as is nurturing as part of urban decoupling.25
- An integrated economic analysis of job creation, asset values and infrastructure impacts is vital to achieve long-term equality in cities including gender equality as per Global Goal 5. Since 2007, the economics of the banking sector have demonstrated a growing difficulty in providing finance for urban investment, something which is crucial in an environment where the capacity to create value through traditional infrastructure investment continues to be restricted. What has been observed is that the value chain is increasingly characterized by

"The world has before it an unprecedented opportunity to keep the planet safe while also advancing human development"

Helen Clarke

much lower growth of urban asset values as compared to the trends characterizing overall urban liabilities. The necessity for create so called 'wealth effects' to stimulate

- urban ecological integrity and its linkages to rural and regional systems if human health and food production are to be maintained as climate change gets worse. The attainment of Global Goals 2. 14 and 15 is becoming more critical. As part of this, accessibility of public space and its inherent ecological and communal character needs to be guaranteed and its privatization avoided. Its inclusive design, sufficient provision and adequate distribution across urban areas (formal and informal) will increase productivity and prosperity while reducing social exclusion.
- All countries have agreed to develop

and implement holistic disaster risk management to deal with climate change impacts at all levels in line with the Sendai Framework on Disaster Risk Reduction 2015-2030. The aim is to support and build national and local capacity for prevention, adaptation and mitigation of external shocks and risk management for the benefit of all stakeholders. This requires connections to be made between national, regional and local systems risk models, Earth systems models and catastrophic risk models, making extensive use of Earth Observation and geospatial data. It is highly desirable that the same platforms and data specifications are used across these models at national, regional and local scales to enable this to be done more easily.26

- To harness the potential of sustainable urbanization and help to attain Goals 9 and 16, city governance and municipal finance will have to be improved and developed. Metropolitan areas and urban local governments will be at the centre of decision making and therefore need to be empowered, but they must coordinate with many actors, e.g. national governments, local authorities, businesses, knowledge institutions, communities and civil society. In order to do so, city governments will have to be equipped with new legal and fiscal capacities and new institutions may be needed to facilitate this, in order to reinforce or recreate a national system of governance with stronger coordination between different governmental tiers. ¹⁰
- Metropolitan areas with fragmented governance structures tend to have lower levels of productivity. For a given population size, a metropolitan area with twice the number of municipalities is associated

with around 6% lower productivity, but this effect can be mitigated by almost half if a governance body exists at the metropolitan level.^{27 28}

- Citizens need to be actively involved in the decisions that affect their future including Indigenous people. "Effective, accountable and transparent institutions" and "responsive, inclusive, participatory and representative decision making at all levels" require a clear institutional framework, reinforced management and planning capacities, participatory mechanisms and regular financial negotiations between all levels of government and local communities to define priorities and move to action. 29 People are at the centre of Roadmap 2030 but care needs to be taken lest people be treated primarily as passive objects to be developed, rather than as protagonists of development "in and of themselves". Efforts to achieve goals of the magnitude envisioned in Roadmap 2030 will need to ensure that the contributions of those who have traditionally been regarded as passive recipients of aid are meaningfully integrated into global processes of development.
- Religious faith institutions are the oldest social service providers known to humankind. As such, they are the original service deliverers of health, education, nutrition, farming, sanitation, and energy. Moreover, religious communities are increasingly coming under the limelight for another critical capacity – resourcing human development. Faith communities are also the oldest 'fund raisers', 'community mobilizers' and human and social capital builders. Their ability to convene people, voluntarily, to resource critical endeavors, particularly at times of

are often community leaders as well, can play critical roles as mediators in conflict situations. This political capital is a role that is as old as it is vital to contemporary geopolitical dynamics. Faiths have unparalleled convening capacity and infrastructure to help make the SDGs a reality for people "in and of themselves". Billions of people rise to prayer and worship every day, sustained by such beliefs and practices. Faith institutions have an enduring and extensive network of congregations, affiliates, organisations, and individuals. These horizontally and vertically organised networks across scales constitute highly effective channels of communication as well as human and financial resources. These large national constituencies (social networks) offer the potential to work powerfully in advocacy and reconciliation.¹⁰⁵ • Together all these actors must mobilize the

risk, continues. Also faith leaders, who

- needed financial, institutional and human resources across a broad range of urban issues, such as jobs, housing, mobility, services and infrastructure.³⁰
- Global initiatives such as the Global Partnership for Sustainable Development Data (GPSDD) and the intergovernmental Group on Earth Observations (GEO) are evolving to support data-driven decision making by initiating more open, new, and usable data to help end extreme poverty, combat climate change, and ensure a healthy life for all through implementation as set out in Goal 17. ³¹

Innovation - New tools for scaling and delivering transformation

• One of the main barriers to delivering the transformational change required by

the Global Goals is the lack of capacity and tools to bring forward 'bankable' projects in a collaborative, forwardlooking and participative way. This requires project preparation, a suitable enabling environment created by national government and sufficient financial resources with which to fund projects.

- Transfers of knowledge, best practices and human and ecological resource data are needed at different scales - from local communities and regions, cities, entire nations and at global scale. Such practice is being established and needs to be accelerated and made open-source.⁸
- Local data and systems modelling tools and technologies, embedded in a generic platform, are needed for real collaboration to enable integration of human and ecological systems with economics, all centred around improving human wellbeing. These innovative, open-source tools which enable the use of local opendata in such models are now being developed for this purpose. They model resource flows in different scenarios for development and can therefore be used to steer urban decoupling and a circular economy. They can also enable different policy and tax regimes to be assessed and associated revenues to be calculated for these scenarios, and these calculations can be linked to municipal finance tools. Models can be set up at national, regional and local scales, used to assess financial relationships between them and can then inform project selection frameworks developed by the banking community for designing sustainable infrastructure. In this way, national infrastructure planning can be integrated with regional planning and forms of monitoring. ³²



resilience.io Integrated systems resource model

In a systems model, such as resilience in which is being developed for the 'public good', the temporal and spatial economics of any region of the world are operationalized by simulating a functioning society, its relevant building blocks, dynamic entities, and transfers.

The entire model is centred on depicting all relevant natural and human-operated processes in an economy (or a sector) as a computation of material and energy balances, driven by labor inputs where appropriate, such that the resource basis of societies becomes fully transparent.

By representing the economy in such a resource-based manner, the economy is captured as a system of systems, to assert interrelations between all economic sectors, including the population as a driver of processes, as well as exploring the benefits of alternative interventions (technology, policy, economic). This is inclusive of activities normally not captured in economics including the informal or 'not registered' economy, which can be identified on a similar basis of resource flows with inputs and outputs driven by humans and their activities. This enables the transition to a circular economy ²¹ to be explored and transition policies and strategies to be put in place. Urban decoupling ²² and exposure to climate and disaster risks can be assessed and implemented in every investment decision. This approach is being demonstrated with the resilience io platform in the Greater Accra Metropolitan Area, Ghana³³ and is registered as a Partnership for SDGs with UNDESA 34



 resilience.io is an example of a new generation of modelling tools which are part of a new Collaborative - Human -Ecosystems - Economics - Resource systems (CHEER) approach at national and municipal level. This means collaboration vertically and horizontally across sectors, claiming neutral ground between government, academia, private and community sectors; placing human wellbeing at the centre of systems; providing inclusive valuation of ecosystems in value chain assessments and planning for their

preservation; multi-hazard risk assessment; and developing an economic system based on equality and a circular economy approach to resources. CHEER is a new overarching concept in which multiple stakeholders, including communities and micro-, small- and medium- sized private enterprises, collaborate for best possible ecological-social-economic systems health outcome and it incorporates systems modelling, academia, policy, regulation and governance structures.⁸



Figure 1: CHEER system

- Clear pathways for building local capacity for the use of modelling and systems tool platforms is vital so that all stakeholders can collaborate to design and select smart, 'bankable', sustainable infrastructure and housing projects which are also climate and disaster risk sensitive.
- Analysis of project impacts on human and ecological systems will reduce the cost of mitigation and adaptation and support human well-being. With these metrics included in the modelling, projects can be taken forward more reliably using, for example, the Public Private Partnership (PPP) aggregator model ³⁵ with the platform used to support planning, design, delivery and ongoing maintenance with better measurement. Procurement contracts can have performance goals built in.⁸
- Local capacity for planning, modelling and project development needs to be developed urgently in city-regions, so that there are the tools and training required to plan, design and implement risk assessed

projects with appropriate governance arrangements.

- Urban areas will need financial and technical help to set up the necessary platform, train stakeholders to use it, gather data and get the CHEER approach operational with the support of local universities. One suggested innovation, to provide funding, to enable rapid scaling across a whole country, is a revolving Resilient Infrastructure Investment Fund (RIIF). The RIIF would take an agreed small fixed revenue 1-2% from project investments in the first regions to go ahead with the model, and use this to grant-fund other urban areas to set up the CHEER approach. These urban areas would in turn generate funding for the next wave in the same way, and so on until all urban areas in the country are using the approach.
- Expert, guality-assured Urban Development and Investment Funds (UDIF) are proposed for city-regions to support the investment in sustainable infrastructure, using the

integrated systems platform to model service delivery and impact. This type of fund has been used successfully in Brazil.8

- The collective New Urban Agenda challenge, from an accounting perspective, is clear. An elegant equation expresses the goal on a planetary scale: DR = CR (debits equal credits). To put this another way, externalities do not exist within the earth's closed system, and national and municipal governments must now work with actors in the financial system to balance the ledger globally through changing the tools, to reverse the ecological debt we have accumulated.
- The CHEER approach includes visibility, testing, scaling and encoding of decision

making amongst all the New Urban Agenda partners. The tools of accounting standards, stress tests, risk assessment, pricing externalities and transparent disclosure are all supported and evolved to support the changing objectives towards the Global Goals. This will enable International Financial Reporting Standards to evolve (in relative short time horizons) through the Roadmap achieve Integrated Systems Health Accounting which will enable measurement, reporting and disclosure of natural, economic and social systems health, including interdependencies and amplifications, over long periods to optimise decision making to begin to balance the debits and credits at a planetary scale.



Figure 2: Towards integrated systems health accounting



PROCIDADES, Brazil An example of an Urban Development Fund for integrated urban investment ²¹

Procidades was a facility set up by the IDB in 2006 to finance integrated urban interventions lending directly to municipalities. It was approved for the amount of \$800 million, making available up to \$50million per municipality to cover up to 50% of project costs. The goal of the facility was to address fast growth of the population and the gap in infrastructure supply in middle sized cities (200,000 to 1,000,000 inhabitants) and thus improve quality of life in cities and prepare for future growth. It proposed an innovative mechanism with integrated urban development and municipal strengthening, to reach a market in need, while maintaining profitability through a substantial reduction in operational costs.

Procidades helped develop an innovative and streamlined approach for MDBs to work at the city level, with a multi-sectoral approach (incorporating different aspects of urban development such as transport, water and sanitation, fiscal management and local economic development). It also deliberately sought to impact quality of life and helped increase community involvement in infrastructure sustainability.

Based on the lessons learned from Procidades, the IDB developed its Emerging and Sustainable Cities initiative, aimed at working with mid-sized cities across Latin America and the Caribbean.



3. Phasing and scale-up

The following phases outline the vision and actions necessary if the overall objectives are to be achieved by 2030. Many countries and cities will initially be skeptical about this level of innovation and will need to see it working in practice, thus it is, vital that one or two countries show quickly, through pilots, that this approach is practical and scalable. Ghana has offered to be one such country and to lead demonstration in Africa. A CHEER approach scale-up is included in this section in Box 3a to detail the necessary steps to incorporate a new generation of tools to support this effort.

2016 – 2018: Prepare- Establishing tools and demonstrating effective partnerships

Demonstration on pilots with enhancement of existing standards, guided by science and universal agreements. Investment will be made in regions ready to address the difficulty of learning and internalizing the new processes (these are inevitable through the fast scale-up and transformation phases) and increase awareness and education through participation.

2018 – 2021: Scale Up - Moving tools and partnerships to demonstration in all Countries

Scale-up pilots to all activities at city/country/ regional level in each of 197 countries (2020 post-COP21 assessment). There will be multiple-dimensions of scale-up such as:

- Financial systems change
- Open data world
- 'Education' (de-learning and relearning, integration of past and future holistic and critical thinking) and increasing access to information on systems health
- Elimination of subsidies not aligned with global agreements
- Global tax reform
- Focus on soils and oceans
- Transition to a circular economy
- Potentially change from a global reserve currency to a representative basket of currencies appropriately representing ecological-human-economic value

2021 – 2025: Transform- Global scale up through every country

Global scale-up resulting in transformation across all thematic areas of focus by 2025.

2025 – 2030: Review- Feedback, improvement

Comprehensive review of phases 1-3 (1st 10 years) utilizing pilots and dynamic learning system approaches to rapidly apply exportable insights at scale and to prepare for post-2030 (Global Goals 2 period and Habitat IV).

2030 – 2050: New Goals- Optimized integrated decision making

Global Goals 2 period and Habitat IV: Qualityof-life-as-usual/ optimized, integrated-systems decision making applied and accountable across all policy and investment decisions at all scales. Continuous, dynamic monitoring and learning systems facilitating a new global collaboration for 2050 and beyond.

CHEER approach phasing



Figure 3a: phased development of the CHEER approach.

			David				New Global
orm			Rev	lew			Goals
23	2024	2025	2026	2027	2028	2029	2030 - 2050
							1
Fa	icilitate						
y enh ata, m ntegr eratic essibi	ancement nodelling & ration on user ility	k					
I	mpact						
nt flo ons low- effici nent 1 pipeli & inve	ows to carbon, ent trajectorie ines of estment	s					

An illustrative scale-up trajectory covering the whole world for infrastructure and affordable housing is also illustrated to show the number of communities of 500,000, agglomerated from 70,000 as necessary, that could be funded and engaged in the transformational change process and the possible financing and support funding available to support scaleup, if the RIIF model is adopted with a 1% contribution from project funding. This overall program can be evolved by the Habitat III process.

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
UDIF	1	2	4	10	20	200	2800	5000	7700	0000	10000	104	104	104	104
No's	1	2	4	10	28	280	2800	5600	//00	9000	10000	TOK	TOK	TOK	TOK
% total	0	0	0	0	0.3	3	30	56	77	90	100	100	100	100	100
UDIF															
\$cash	0	142m	285m	1.5bn	15bn	150bn	1.5tn	2.8tn	3.85tn	4.5tn	5tn	5tn	5tn	5tn	5tn
/yr															
RIIF															
\$cash		1.4m	2.9m	150m	150m	1.5bn	15.0bn	28.0bn	38.5bn	45.0bn	50bn	50bn	50bn	50bn	50bn
/yr															
People	0	2	Em	0m	1.4 m	140m	1 4bn	2 Ohn	2 0hn	4 Ebo	Ehn	Ehn	Ehn	Ehn	Ehn
Benefit	0	5111	5111	9111	14111	140111	1.4011	2.6011	5.9011	4.5011	וועכ	5011	100	100	וועכ
	Prepare Scale-up		Transform			Review			New Globa I						

Figure 4: Scale up trajectory

Phasing and scale -up | 35

Ghana: the pathway to resilient development

Commence of DfID Future Cities Africa Project - tools for resilience being developed by Cities Alliance, The Ecological Sequestration Trust and Gaiasoft

Accra becomes a <u>C40</u> megacity

Ghana is member of SDG Open Working Group of 70 countries

- Ghana Inter-ministerial Technical **Steering Committee**
- Ghana High-level Interministerial Coordinating Committee on SDGs

2012



National Consultation on SDGs and participation in:

- Regional review conferences of the ICPD+20, Beijing+20, and Post 2015
- Open Working Group and intergovernmental negotiations on the SDGs
- Finance for Development Conference
- UN Framework Convention on Climate Change



- Quito Habitat III

High Level Committee on the Implementation of the SDGs in Ghana is constituted and the SDGs are officially launched.

His Excellency John Dramani Mahama, President of Ghana appointed Co-Chair of SDGs Eminent Advocates Group by the Secretary-General of the UN



Urban Forum on Resilience and Land Value Capture

National Planning and Development Commission, under Constitution Article 87(2) developing 40-year plan 2018-2057 including the SDGs and 50-year Agenda to 2063 of the African Union.

Study on Municipal Finance

Inter-jurisdictional Coordination and Metropolitan Management Ghana

Urbanisation Review with World Bank

Accra joins the *Rockefeller 100 Resilient* Cities and appoints Resilient Cities Officer

UN Habitat III Sylvanus Adzornu appointed to Expert Group on Policy Unit 5 on Municipal Finance and Local Finance for New Urban Agenda and Expert Unit on Social Culture.

Deputy Minister Nii Lantey Vanderpuye elected Vice President of Governing Council **UN Habitat**

Urban Forum on Roadmap to Quito Habitat Country Report 2015 Kenya Platform 2 Surabaya Platform 3

2016

4. Roadmap for delivering the Global Goals in the world's urban settlements

This Roadmap sets out an action plan, starting from current initiatives, to deliver the agreed Global Goal objectives and targets, putting people and the planet at the heart, through mobilizing and including existing partnerships

and using recent recommendations from leading studies and organizations, which are all referenced in Section 6.



Figure 5: Roadmap for delivering global goals

Drawing from many key texts and authors and stepping away from traditional silos, the Roadmap actions are listed for 16 cross cutting themes and in relation to four critical user groups which are represented by icons throughout the document.



development.



Academia - Use of using research, science, modelling and data to unlock the potential of territories to promote sustainable economic and environmental development



Private Sector - Enabling private sector partnership financing and expertise for creation and distribution of ecological, social and economic value in urban environments



Faiths - the broad common commitments and action plans for development that is both sustainable, inclusive and just, to support implementation of the SDGs including mainly multi-faith initiatives. ¹⁰⁶

The 16 cross-cutting thematic areas of focus for the roadmap are:

- 1. Financing, debt management and innovative funds
- 2. High quality data and statistics
- 3. Science and systems modelling to support collaboration
- 4. Economics
- 5. Disaster risk management, prevention and adaptation
- 6. Transparency and accountability
- 7. Policy, codes of practice, law, governance, procurement and capacity building

Municipal Governments - actions to build a stronger and accountable local and regional government to drive inclusive and sustainable urban

National Governments - Actions to drive bottom up national development

- 8. Land use planning, cadastre and housing
- 9. Ecology, soils, water and urban agriculture 10. Cultural heritage
- 11. Community Participation, social mobilization and inclusion
- 12. Public awareness and education
- 13. Knowledge sharing
- 14. Co-design and co-production
- 15. Infrastructure, transport and utilities
- 16. Security

theme 1 Financing, debt management and innovative funds





- Set up an Urban Development Investment Fund (UDIF) to connect funding sources to urban development. This is a financing vehicle, supported by a collaborative systems platform, which can support every community of 70,000 people and it is believed it could be grown to support larger cities many times this size. In order to reduce transaction costs, the most appropriate set-up could be a pooled fund, serving a number of adjacent communities. These funds can include finance for climate adaptation, green growth, social impact and bonds on risk assessed assets. The average size of communities served by a UDIF is envisaged to be around 500,000 and so around 10,000 UDIF's would need to be set up by 2030 to cover all the world's urban areas.⁸
- Work to strengthen debt management and financial accountability so that it is possible to establish or strengthen creation of municipal bonds as part of a UDIF. Establish creditworthiness through independent assessments completed by, either global or regional, well-respected credit ratings agencies. Work to improve quantification of risks included in credit ratings so that more investment can be attracted.
- Use the Urban Development Investment Fund (UDIF) for sustainable infrastructure investment and into this fund issue municipal bonds and green bonds against

existing infrastructure to kick start new investment. Attract investment from pension funds, sovereign wealth funds, development banks and government treasury. Work with utility companies and transport providers on issuing green bonds. Securitization can be used to aggregate small-scale green projects to enable them to be suitable for a green bond. ¹⁴

- Work with national governments to ensure quality urban development integrating current and future risks, from for example climate change, and develop green standards for the built environment and its performance to underpin future green bond opportunities. ³⁷
- Work with national governments and ratings agencies to help to develop municipal markets by matching up investor and borrower requirements, particularly in developing countries either where these entities do not exist or where they do, they are not working effectively for municipal governments.
- Work with national governments to overhaul the tax system so that it incentivizes the Global Goal delivery strategy and enables successful delivery and improved quality of life. Obtain clarity on where different taxes are set whether at national, state or provincial government level. Test different policy and tax scenarios at national and local level using the collaborative CHEER platform and use that to consult the community.



- Ministry of Finance facilitates the creation of a new commercial funding model, **Resilience Implementation Investment** Fund (RIIF), to provide grant funding to urban areas to enable them to establish the CHEER approach with platforms, tools, training, data collection, setting up a land registry cadastre and associated UDIFs. The RIIF would receive approximately 1-2% of the capital flow from the UDIFs across the country when operating, to be agreed with funders to suit the urban area needs. The platforms are estimated to reduce project implementation costs by more than 2% and so there will be no net increase in cost from the 1-2% levy and funders will have the benefit of more project pipelines of bankable projects.
- Ministry of Finance creates a "Green Infrastructure Planning Agency" tasked with translating existing high-level climate and infrastructure strategies into a pipeline of investable climate-aligned sustainable infrastructure projects. A systems approach using an integrated planning platform would support project design and testing of business cases. ¹⁴
- Ministry of Finance can use The Green Infrastructure Investment Coalition,³⁸ who provide support to start collaboration with investors and development banks, on a project pipeline.
- Ministry of Finance can consider issuing sovereign green bonds.



- Ministry of Finance can consider providing green bond tax incentives.
 - Ministry of Development to create a National Urban Policy and urban development plans which create an enabling environment and support pathways for municipal and city authorities to successfully deliver objectives.
 - Ministry of Construction to develop green standards for utilities, transport, basic services and housing to underpin future green bond issuance.
 - Ministry of Finance can consider public credit enhancement, such as guarantees, subordinated debt and insurance to provide cover for private sector investors to help kick start the green bond market. ³⁷
 - Ministry of Finance develops programs to reduce financing costs for affordable housing by reducing developer risk and capital cost e.g. the Housing Authority committing to buying finished units or finding renters for them or the developer being allowed to pay for the land after the units are sold. Consider providing subsidized interest rates (via tax-exempt bonds) or tax incentives, such as a Low Income Housing Tax Credit Programme. ²⁵
 - Ministry of Finance to support capacity building at national and municipal level to create an enabling environment for private finance and investment if it is lacking.
 Whether the investor is a bank or a bond buyer, the risk and returns requirements of the investor and the risk and cost conditions for the borrower have to match up. Establishing an effective demand depends also on: (i) investor familiarity with the municipal investments; (ii) investor ability to evaluate return and risk; and (iii) availability of appropriate funds. These

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conditions are often absent in developing countries due to the nascent nature of the financial markets, lack of investor confidence, and lack of tools to mitigate risks. Until market players gain experience, municipal projects in developing markets also have high transaction costs that reduce returns.

- Ministry of Finance, working with international financial institutions such as development banks, to provide guarantees or provision of funds for on-lending to stimulate investment in infrastructure projects where domestic private finance, common in developing countries without mature capital markets, is dominated by banks that are risk averse and either do not have funds, or are reluctant, to lend long term.
- Ministry of Housing to set up systems to reduce permitting times for affordable housing development, articulated to better urban planning and design and the development of transformative interventions such as Planned City Extensions and Planned City Infills. ²⁵
- Ministry of Finance to overhaul the tax system so that it incentives the Global Goal delivery strategy and enables successful delivery and improved quality of life. Give clarity on where different taxes are set, whether at national, state or provincial government level, legislate for them and incentivize tax collection. Use the CHEER approach and systems models to test different policy and tax scenarios at national and local level. Incentivize collection of tax, using land value capture and other local mechanisms.
- Ministry of Energy considers introduction of feed-in tariffs for the promotion of electricity

and heat production from renewable energy resources. The feed-in tariff levels are normally reviewed each year in the light of energy production costs and take up of the subsidy. Match this approach with associated green building standards, because of the opportunity to put solar devices on building fabric. Also consider removal of subsidies not aligned with the achievement of the Global Goals, such as fossil fuel power generation subsidies.

- Ministry of Health fully integrates Planetary Health aspects into health budgeting and purchasing processes. For example, current epidemiological and expenditures trends show an increasingly rapid expansion of health spending to respond to the epidemic of noncommunicable diseases. Also ensure complementary funding is provided to environmental health, sanitation, hygiene, indoor and outdoor air pollution. 19
- Legislature creates legal structures which frame the responsibility and operational objectives of regional collaborative laboratories or Collaboratories and the national government's role in them, so that collaborative action can begin with community participation. These are new independent organisations supporting the CHEER approach.
- Legislature changes pension fund investment regulation to allow the development of infrastructure investment, for example through an investment regulatory framework for pension funds using instruments such as the Certificates of Capital Development (CKDs), opening the door to financing of the infrastructure project located in the country. ³⁸ Legislature supports ongoing

implementation of the new package of global banking sector reforms known as Basel III 39 issued in September 2010 with new rules already being phased in through to January 2019. The implementation of the rules effectively triples the size of capital reserves that the world's banks must hold against losses. Together capital standards are considered critical for preventing another financial crisis and to ensure long term macro-financial stability.



- In addition to traditional sources of funding from national government and the private sector, new funding for research in Collaborative - Human - Ecological -Economic - Resource systems (CHEER) can be generated from the Resilience Implementation Investment Fund (RIIF). The allocation proposed for Academic Research on CHEER development and effectiveness is 25% of the RIIF, which would be 0.25-0.5% of the capital flow through UDIFs in each country. If just 50% of capital flows for infrastructure and affordable housing were channeled through UDIFs in urban areas, this could be an additional global fund for research of \$6billion per year to kick start the process. This could enhance further national program funding.
- · The extra funding for engagement of universities with local communities, support to collaborative public-private partnership projects and having a key role in capacity

"To harness the potential of sustainable urbanization, city governance will have to be improved in virtually every country"

Aromar Revi & Cynthia Rosenzweig

building, teaching and associated research, would create an environment for rethinking the business models for tertiary education to enable teaching to be more inclusive and diverse.



- Private sector makes use of the systems modelling platform, locally and globally to access innovation and project development capital through the UDIFs and as an innovation platform to test new business models and technologies. This will align the inherent private sector long-term business goals and objectives with the sustainable development goals to finance and invest in sustainable economic and financial returns which in turn provides greater certainty over macro-financial stability of urban areas
- Private sector to collaborate with municipal ٠ and national governments to, in turn, build capacity and enhance the understanding, primarily at municipal level, of the drivers that influence the various actors in the investment chain to shift their investments towards sustainable areas and help create a conducive enabling environment and regulatory framework for this shift to happen
- Private banks can apply to be Implementing Entities for the Green Climate Fund (GCF) and then manage local UDIFs which attract GCF funding for bankable project pipelines. Work with development banks,

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municipalities and national governments to set this up.

All private and development banks agree with national government that 1-2% of project investment and 1-2% of green bonds are provided as revenue income to regulated National Resilience

Implementation Investment Fund (RIIF) to support capacity building, data gathering, systems modelling, research and land registry development. Banks also help to set up and run the national RIIF.



Figure 6: The Investment Chain

Mary Shapiro, Boards of Directors of London Stock Exchange and former Chairwoman of the Securities and Exchange Commission

Explanation of the investment chain

- behalf of their beneficiaries. Institutional investors
- through investing in sovereign and municipal bonds.
- sensitive investment principles.
- projects.
- societal benefits.

"This time it's different. Investors are now demanding action, we have the moral imperative and momentum to act"

 Institutional investors (asset managers and investment managers) connect with sustainability issues through the projects and companies in which they invest by providing capital and by engaging as active owners. Pension funds, insurance companies and mutual funds hold over US\$87 trillion in assets. Institutional investors, together with banks, constitute the financial system upon which consumers, savers, pension and insurance holders depend for financial services and products. Institutional investors drive growth in the private sector by investing the assets that they manage on

Own and finance companies, infrastructure and property, which in turn generate economic growth and development, jobs, products and services. Institutional investors also provide financing for governments, for example

Banks can provide "green" or "sustainable" lending - not just in the context of large infrastructure projects, but across the spectrum of economic activity. Banks and similar financial institutions can also play an important role in promoting access to finance by providing financial services to micro entrepreneurs and small enterprises, which are typically the drivers of most employment and new job creation in a given spatial context.

Insurance companies can provide risk transfer services and insurance solutions at the macro, meso and micro level, protecting governments, companies, and individuals from unforeseen adverse events. In addition to providing protection, the role of pricing risk across an urban system also allows for more effective identification of bankable projects driven by risk-

Stock exchanges represent the link between the financial economy and the real economy by providing transparent and regulated markets, and help channel domestic and foreign capital towards productive enterprises and

Companies in the real economy, the providers of goods and services, have a direct effect on sustainability areas such as climate, gender equality, jobs, infrastructure, and social services through both their direct operations as well as their supply chains and interactions with customers .

Foundations and philanthropic initiatives provide capital for social enterprises and civil society organizations aimed directly at delivering

"Supporting decision making that is coordinated across policy domains and across scales to realise people-centred urbanisation and sustainable urban systems that deliver human well-being and health in the long-term"

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Long-term investors and asset managers support the Green Infrastructure Investment Coalition (GIIC) agenda which is bringing together key actors in the financial system via investor-government global and regional dialogues to promote "green" infrastructure investment opportunities: 40

(i) The GIIC agenda will include examining barriers to capital flows, identifying infrastructure project pipelines and facilitating capital market participation in "green" infrastructure development and financing, including working with national and municipal governments to raise green bonds as part of the UDIF program.

(ii) GIIC members, including the UN-supported Principles for Responsible Investment (PRI), the Climate Bonds Initiative (CBI) and the International Cooperative and Mutual Insurance Federation (ICMIF), are committed to responsible investment, which includes seeking investments that support long-term sustainability of their own portfolios.

(iii) The GIIC encourages all governments to identify and prioritize development of lowcarbon, resilient infrastructure projects, ready for institutional investor funding.

Institutional investors to continue to assess their portfolios for carbon intensity in line with commitments made at the UN Climate Summit, including adjusting risk weightings for green investments that monitor performance using integrated systems platforms.¹⁴ For example, in November 2015 Allianz AG announced that they will stop investing into companies that generate more than 30% of their turnover in coal or

generate more than 30% of their energy from coal, meanwhile Warren Buffet has sold his holdings in Exxon Corporation. Insurance industry to support the UN A2R Initiative, focused on Small Island Developing States (SIDS) and Least Developed Countries (LDCs) and Africa. Eight Lloyd's syndicates are already participating in the initiative and have a committed capacity of \$400million towards solutions that address natural catastrophe risks in emerging and developing countries. The membership is open to the entire Lloyd's market. 41

Insurance industry to support funds such as the Climate Insurance Fund (developed by KFW, the German Development Bank) to contribute to adaptation to climate change by improving access to and the use of insurance products and risk-transfer mechanisms in developing countries.

Investor Networks

 Rapidly evolving investor networks seek to generate and secure long-range financial returns while also contributing to sustainability solutions. ^{42 43} Examples include:

(i) The UNEP Finance Initiative, with over 200 institutions, including banks, insurers and fund managers.

(ii) The UN-supported Principles for Responsible Investment, representing almost 1500 asset owners and investment managers with almost US \$60 trillion in assets under management.

(iii) The Equator Principles, a coalition of banking and similar financial institutions incorporating environmental and social risk into project finance transactions, covering over 70 per cent of all international project finance debt in emerging markets. (iv) The Principles for Sustainable Insurance, a sustainability framework for the development of innovative risk management and insurance solutions. (v) The UN Global Compact, a voluntary initiative based on CEO commitments to implement universal sustainability principles and to take steps to support UN goals with over 8,000 company members in 86 countries. (vi) The Sustainable Stock Exchanges Initiative, a peer-to-peer learning platform for exploring how exchanges, in collaboration with investors, regulators, and companies, can enhance corporate transparency - and ultimately performance - on ESG issues and encourage sustainable investment.

(vii) The Institutional Investors Group on Climate Change (IIGCC), which provides investors with a collaborative platform for over 120 institutional members, with more than \$15 trillion in assets under management, to encourage public policies, investment practices, and corporate behavior that address long-term risks and opportunities associated with climate change

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- In 2005, Alliance of religions and Conservation, ARC launched an independent body, the International Interfaith Investments Group - 3iG. 3iG members consist of faith institutions representing the world religions, which are committed to the principle of faithconsistent and socially responsible investing (SRI). 3iG members agree that interfaith dialogue and collaboration supports them to accomplish their SRI goals. Associate members are organisations that actively support the mission of 3iG. These may include faith investor groups, pension funds, institutions investing responsibly or interfaith and development institutions. ¹⁰⁶
- 3iG works with faith communities all over the world, assisting them in exploring the issues behind ethical investing in order that faith held investments can be used in the most environmentally sustainable and socially just way.
- One area in which faith institutions express a common concern is the environment. The interlocking challenges of industrial pollution, resource depletion, biodiversity reduction, climate change, and population growth have stirred a formidable urgency for action as these issues threaten human survival. The world's religions have been called to participate in the development of solutions, especially related to water supply and availability of agricultural land.

- The moral imperative of faiths is indispensable and willing to contribute locally in mobilizing corporate structures towards protecting the environment and improving society for future generations.
- Faiths are increasingly willing to use a cluster model which offers the possibility of faiths collaborating with each other while still retaining their full autonomy. It enables groups to identify key issues for themselves and then to seek allies and partners to work on this. So for example, Islamic, Daoist and some Christian investors might work together on microfinancing for poor communities developing sustainable products, and they would do so on a non-usury (ie no-interest) basis as this reflects their shared values. Other faiths might cluster around water investment in India - a development project which might bring together Hindu, Jain, and Zoroastrian investors.

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theme 2 High quality data and statistics



- Support and advance all ongoing policy and advocacy efforts towards broad, open data sharing for global environmental transparency, education, capacity building, and economic development. 44
- Build the capacity to collect and manage data and to collaborate with national and international data bodies. Create a data specification development plan which includes data needs, data collection strategies, data handling (cleaning, formatting and testing) and data brokerage as well as demonstrating functionality. This can be supported by the national development of open data and an infrastructure for spatial information to enable all stakeholders to implement the CHEER approach, which can be made common across the wider region through multi-lateral agreements.
- Advance the development of a CHEER systems platform so stakeholders have access to all available Earth Observation data and information. The European Copernicus programme is putting in place a lot of the hardware and infrastructure which can be used for supporting models. This programme is adopting a free and open access data policy for its imagery and basic underpinning products ¹¹². Set up the platforms with a monitoring framework dashboard for Goal 11 and other relevant SDG indicators so that stakeholders can steer their decision making, like having a resilience compass. The platform can also

include planning support indicators such as UN-Habitat's City Prosperity Initiative (CPI). The CPI offers the possibility to organize a systemic approach to the city, incorporating new analytical tools based on spatial indicators. The CPI works as a support for multi-scale decision making, connecting the city with the region and the overall country. This global monitoring framework has been adapted to promote integration of what can constitute the New Urban Agenda with the SDGs to address the environmental, social and economic components of sustainability⁴⁵

- Advance the development of the OECD/ EU's methodology to define functional urban areas (FUAs) and the metropolitan indicators based on the FUAs. Such an internationally comparable definition of an urban area has been useful to monitor policy performance of OECD metropolitan areas. In light of the increasing needs for monitoring the progress of the Goal 11 and the New Urban Agenda, such methodology and data collection could be extended to non-OECD countries, collaborating with other relevant international partners. ⁵
- Improve transparency, providing easily accessible public data on provision of infrastructure and services, and link those public expenditures to increased taxes/fees collection.
- Ensure that social data is disaggregated by age, gender and disability.
- Move towards creating a smart city approach which mobilizes pervasive sensing, real-time data and analytics, and e-governance to support very short time step city system optimization and engagement. In this way people can be better informed and make better decisions

to reduce costs and improve their wellbeing and that of their family or business. Encourage building of Apps, and support innovative new businesses to help the community to accelerate towards the Global Goals ⁴⁶

Develop the strategies and enabling processes by which innovative use of technology and data, coupled with organisational changes will lead to smart city approaches that incorporate the integrated and systemic solutions known to be necessary. Use the BSI Smart City Framework to do this in a way that helps to develop new city operating models which drive innovation and collaboration across sectors and traditional silos and that create connected services for citizens and businesses and integrate data and information.¹¹⁵



- National governments work with local authorities and other stakeholders to reinforce national statistical systems to produce country reports with coherent mechanisms to integrate city data.
- Provide technical support towards the preparation of national reports including data collection, analysis and compilation, with a special focus on new indicators and spatial data.
- Advance the development of the OECD/ EU's methodology to define functional urban areas (FUAs) and the metropolitan indicators based on the FUAs. Provide technical support to collect data at the scale



of FUAs. 5

- Consider adopting the Open Data Charter for accepting and implementing open data principles, standards and good practice. ⁴⁷
- Develop and implement broad, open data policies for spatial and statistical data collected at taxpayer expense and with the participation of various public and private partners.
- Move to an Open Data system for all country-wide data to serve the open source systems platforms and to support the transparency needed to attract capital into area UDIFs. Make the data available in a convenient and modifiable form for loading into the systems platform for use in the Collaboratories. Provide data under terms that permit reuse and redistribution including intermixing with other datasets and making the data machine-readable. In full open data, everyone must be able to use, reuse and redistribute, without discrimination against fields of endeavor or against persons or groups.
- It is recognized globally that full and open access to Earth Observation data, information and knowledge is crucial to manage the New Urban Agenda. The intergovernmental Group on Earth Observations (GEO) comprised of more than 100 member governments and Participating Organizations is committed to the coordination of Earth Observation systems and building the Global Earth Observation System of Systems (GEOSS) and is available to support setting up open data programs for CHEER approaches in each country ^{48 49}
- Work with other Countries in different regions to establish common Implementing Rules (IR) to be adopted in specific

High quality data and statistics

areas needed for open data input to support CHEER approaches (metadata, data specifications, network services, data and service sharing and monitoring and reporting). This will establish an infrastructure for spatial information to support all stakeholders to implement the CHEER approach. It is vitally important that there is full interoperability between open datasets. A leading example is the INSPIRE program in the EU for community environmental data.50

- The International Centre for Earth Systems (ICES) can, where necessary, support the appropriate access to models of Earth systems and their behaviors, and in partnership with GEO, can help deliver easier access to Earth Observation data and other geospatial information, adapted to the different SDGs and New Urban Agenda strategic areas.49
- Ensure that data systems, articulated to city monitoring mechanisms, such as CPI, produce accurate, timely and disaggregated information by age, sex, disability status, social groups, income levels, migratory status and locations, to ensure that "no one is left behind", as stipulated by the New Data Revolution. Good data does not only help to track progress towards the SDGs and the New Urban Agenda, but it can help governments during implementation.45
- As part of IR, create a data specification development plan which includes data needs, data collection strategies, data handling (cleaning, formatting, validating and testing) and data brokerage as well as demonstrating functionality.
- Strengthen national statistical and reporting systems where necessary to disaggregate

social data by age, gender and disability. Create a national data brokerage system to enable access to, and inter-operability between, a wide variety of data sources, including space based Earth Observation and location data, national, regional and local open datasets, proprietary datasets, ground based sensors and crowd-sourced data. In order to achieve this level of data access, a defined cataloguing and data processing service will be required so that models can access these datasets.



 The development of a CHEER approach includes creation of open sourced data brokerage systems to enable access to, and inter-operability between, a wide variety of data sources, including space-based observations and location data, national, regional and local open datasets, proprietary datasets, groundbased sensors and crowd-sourced data. In order to achieve this level of data access, every effort is required to link with ongoing existing efforts to discover and access any observations in, on or around the earth. A defined cataloguing and data processing service will be required to build an integrated view of these datasets. Collaboratories (collaborative laboratories for the development of collective intelligence) will turn collected data into useful evidence, increasingly in real time, to support day-to-day decision making and risk assessed investments. Crucially, capacity building in data policy

and technical processing is needed at a local level.

- Support the creation of an Open Data system for all country-wide data to serve the CHEER approach. Collect data and set up and test a data processing system which ensures data is reliable and trusted by the Collaboratory.
- Support setting up access to Earth Observation data.48 The International Centre for Earth Systems (ICES) is able support, where needed, the appropriate access to scientific findings and models of geospatial Earth Observation data, as well as the International Space community alongside the intergovernmental Group on Earth Observations (GEO) and its numerous partners.39
- Help write a data specification development plan for the CHEER approach which includes data needs. data collection strategies, data handling (cleaning, formatting and testing) and data brokerage as well as demonstrating functionality.
- Help create a national data brokerage system to enable access to, and interoperability between, a wide variety of data sources, including space based Earth Observation and location data. national, regional and local open datasets, proprietary datasets, ground based sensors and crowd-sourced data. In order to achieve this level of data access, a defined cataloguing and data processing service will be required for successful CHEER approaches so that a variety of models can access these datasets.

"Resilience isn't just about bouncing back, it's about bouncing back better"

Judith Rodin, Rockefeller Foundation



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- Companies contribute to setting up the local CHEER approaches and in return, by working through the local Collaboratory, access will be made available to capital if investment criteria are met for ongoing developments. 47
- Companies use advanced information technology to trace material through the supply chain, identify products and material fractions, and track product status during use - this is equally applicable to minerals and agriculture supply chain inputs. Use social media platforms, in conjunction with Collaboratories to mobilize millions of customers around new, more sustainable products and services through the increased transparency of consumption decisions.
- Insurance industry work with developers to • enable automated data transfer between catastrophic risk models and regional models to enable insurance products, that rely on information from these models, to be more accessible in municipalities.



- Faith groups can contribute valuable social records of the present and also going back in history. Increasingly these are being made available online. In making these contributions Faith communities can join the collaboratories and get involved in decision making.
- Faith group's community parish records are one of the most useful sources of historic data. For example old English manuscripts date from the 1500s, including records from London, when civil registration only began in 1837. In China jai pu, Chinese family records, date back before AD 1. Overall the data the Mormons have gathered is equivalent to thirty-two times the amount of information contained in the Library of Congress—and the church adds a new Library of Congress's worth of new data every year. The process continues and the Christian Church has 220 data-gathering teams in forty-five countries that are making digital copies of new records. They are also converting 2.4 million microfilm records into a digital format. 107

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Science and systems modelling to support collaboration





theme 3

- Use the RIIF grant funding to set up the integrated systems platform for the aggregated urban area and rural hinterland using an appropriate grid scale to enable the regional economic, urban and rural development, infrastructure, social and environmental plans, policies and strategies to be developed in an integrated way.
- RIIF grants could also be used as a mechanism to offset some of the costs incurred by local, regional and/or national organizations who are currently selling data collected at taxpayer expense. These offsets would allow the public entities to provide these data at no cost to the user, and would cover any unmet costs to distribute the data.
- Use the RIIF to engage national and local universities to support the creation and operation and maintenance of the systems platform and carry out research to improve performance over time.
- Facilitate the setting up of an operational Collaboratory with communities including Indigenous people, private sector, faith communities and NGOs to support the CHEER approaches.



- Ministry of Economic Development creates a national systems platform using a grid scale of around 50km to enable national economic, urban and rural development, infrastructure, social and environmental plans, policies and strategies to be developed in an integrated way to better respond to the 2030 Development Agenda and the New Urban Agenda.
- Support urban areas and city-regions in setting up systems platforms, using a national RIIF and enable these to be linked to the coarser grid national CHEER approaches supported by data compatibility across the geographic boundaries.
- Use the RIIF to engage national universities to support the creation and operation and maintenance of systems platforms in partnership with local authorities.
- Implement national research programs, using additional funding from RIIF, into the effectiveness of policy solutions to halt and reverse damaging environmental trends and protect health including:
- (i) the complex links between health and environmental change including interactions between trends.
- (ii) the understanding of potential nonlinear 'state shifts' in the ecosystems underpinning human health and potential adaptation strategies for vulnerable populations.
- Inter-sectoral research is of key importance
 as there is currently little tradition of

collaboration between health researchers and researchers from other sectors and there are significant methodological challenges which need to be addressed. Use the CHEER approach and regional data to establish interactions between different environmental stressors and how integrated policies can address a range of challenges simultaneously, developing strategies and policies that establish a better connection between planned urbanization and environmental sustainability.¹⁹

 Fund a program of social science research, using additional funding from RIIF, to understand social, economic and cultural drivers of Planetary Health ¹⁹, and inform sustained communication and engagement efforts to increase awareness of natural systems and their value to human health. Such research can improve insights into the barriers to changing policy and how to address them. There is a pressing need to develop and evaluate more effective behavior change strategies to improve health and environmental sustainability.



- Systems approaches are recognized in academia as crucial in urban science, policy and decision making.²⁰
- Support the development and demonstration of a Collaborative - Human
 Ecosystems - Economics - Resource systems CHEER approach, including open-source integrated systems platforms that as accurately as possible model the



temporal and spatial economics of an urban area and its hinterland, to create visibility on interconnected cross-sector and industry use of energy, material, and water resources, and the impacts of policy, planning, and technology decisions to improve the management of resource use and flows, inclusive of environmental, social, and economic value.

- The open source platform needs to meet the following functional specification:
- (i) open source and available globally to be tailored to local conditions. Supported globally by an NGO.
- (ii) a 'system of systems' approach which can gain insights across sectors, industries and ecology represented as a human ecosystem of complex interconnections.
- (iii) the capture of inclusive value and resource and financial cost expressed in indicators across human, ecological and economic domains.
- (iv) an approach which is operationalized to be effective in the evaluation of onthe-ground decisions, taken by local stakeholders in the context of strategic issues, societal challenges, and the Global Goals, with an end result of transformational change.
- (v) the availability of knowledge generation to all stakeholders globally, not just to a selected group of decision makers in high income countries, or to those who can afford costly knowledge procurement.
- (vi) a set of 'cockpits' or user-interfaces which enable easy and intuitive use of the platform on remote devices for day to day decision making. Purpose designed 'cockpits' will be needed in different sectors in different countries to suit local culture and language.

Science and systems modelling to support collaboration

- The systems model needs to provide a representation of the human ecosystem inclusive of its environment based on human behavioral drivers combined with resource flow algorithms, as a Collaborative - Human - Ecosystems - Economics -Resource systems model. The purpose is to provide insight into how urban areas can develop with user-defined sets of technology investment, procurement, policy, and planning decisions, allowing users to explore through scenario testing which decisions can lead to a resilient prosperous economy. It should not be a 'black box' model that predicts the future, without any information given on the internal workings that led to a particular outcome.
- In 2011, research was conducted on the development of systems models in the private sector and by universities. There were 17 models analysed at that time. It was found that broader well-being indicators were currently excluded and there was limited provision for simulating socio-economic dimensions within human agent behavior. The macroeconomy when represented was only simulated at the level of aggregate sectors restricting ability to measure income distributions at the individual level. No model simulated complete supply chains of goods or commodity markets necessary to understand the impact of disruptions and resource cost changes. No model simulated complete supply chains and their technologies to simulate changes in their material & energy inputs-outputs over time. No city model linked urban economic activity to agricultural provisioning in or outside the city, or to ecosystems qualities (biomass, hydrology, soils). This led to the development over the last 5 years of the

resilience.io platform which includes all these aspects. ⁵¹

 Stronger science-policy-capital-society linkages are needed and the following actions are planned in a global program by ICSU-Future Earth:

(i) Convening dialogues between scientists and urban study communities (architecture, infrastructure, construction, city planning, disaster recovery, civic authorities, etc.) to develop knowledge about the interactions and linkages between sectors and actors as well as to respond to the challenges of local governments and managers.

(ii) Examining interface, interactions, interdependencies between urbanization and other sectors/ knowledge-action areas such as health, oceans, natural assets / biodiversity, food-water-energy, finance and transformations.

(iii) Engaging professional bodies on accreditation norms and standards.

(iv) Fostering an interdisciplinary community of scholars who are able to engage global policy makers on urban issues.

(v) Support to develop open-source tools for decision makers based on the latest scientific developments e.g. new modelling approaches, behavioral theory.

(vi) Support from academia to help with learning from practice. Innovative practices have the potential to be up scaled to change systems, and an effective mechanism to extract and share learning is proposed with full support of the first demonstration regions. ^{20 52}



- The insurance industry has brought together public and academic communities to support the development of resilience modelling tools and systems through the commitment to the Resilience Modelling and Mapping Forum (RMMF) including the World Bank GFDRR, UNISDR, and national governments. The RMMF is a collaboration between the global re/insurance industry and other partners, set up to enable the tools and techniques of insurance risk modelling and stress testing to be shared with wider business and society, to increase risk understanding and resilience. 53
- Private sector businesses to adopt science based targets aligned with the Global Goals and other universal agreement outcomes and work towards adoption of integrated systems modelling as part of strategy development and investment planning processes.



Some faith communities have used the study of systems thinking to better understand the interconnections of systems and ethnicity, class, gender, age, and disability and have more recently explored systems thinking in relation to social

media and non-hierarchical organizational systems.

• Many faith groups are likely to be able to make a valuable input into understanding the the local family and community systems and how collaboration and progress can best be made.Some useful research has been carried out. ¹⁰⁸





Roadmap for delivering Global Goals in world's urban settlements

theme 4



- Use the CHEER platform to develop an economic development strategy which embraces urban decoupling in resource use and aims to achieve a circular economy by 2030. This will bring human, ecological, mineral, chemical, product, water and energy systems together within an integrated economic model. ^{54 55}
- Develop a cross-departmental urban green growth strategy that can promote urban activities that reduce negative environmental externalities and promotes local innovation and entrepreneurship.
 Strong focus should be placed on policy complementarities across sectors, as such lowering the long-term costs to the economy of national environmental policy implementation and leading to benefits across multiple sectors in cities. ⁵⁶
- Create an enabling and fair business environment and support innovations and entrepreneurship with strategies that are able to increase and harness the capacity of both the formal and informal economy, as well as the opportunities offered by the diverse creative potential of cities, while protecting labor rights, and environmental and health standards. Identify and address the challenges faced by local business communities and promote and support homebuilders and small, medium, and micro enterprises, and social enterprises that work in the formal and informal sectors and collaborate in the co-production of

- cities, their spaces, and their economies.
 Address standardization and publication of permitting, registration, and taxation processes along with labor and environmental standards in partnership with National Government. Support anti-corruption programs, performance evaluations linked to processing time, and create a culture of contract enforcement through use of performance based contracting.
- Develop economic inclusion policies and strategy for urban development, affordable housing provision, education, healthcare and access to drinking water and sanitation.
- Develop an Urban Development Plan with affordable housing in locations that boost the city's productivity, including supporting development in-situ, by integrating lowerincome populations into the economy and reducing costs to provide shelter and services. This will enable labor mobility, opening a path to rising incomes, giving households more to spend on goods and services in their neighborhoods and, over time, enabling them to move up the income pyramid. ²⁵
- The Urban Development Plan can aim to place housing 'at the centre' of national and local urban agendas. The aim should be for a shift from simply building houses to a holistic framework for housing development that responds to the fundamental principles of sustainable urban development. This new approach re-establishes a critical role to housing, stimulating the economy, reducing poverty, promoting inclusion, and responding to climate change challenges. ²⁵



- Address standardization and publication of permitting, registration, and taxation processes along with labor and environmental standards in partnership with Municipal Governments. Develop anti-corruption programs, performance evaluations linked to processing time, and encourage a culture of contract enforcement through performance based contracting.
- Create an Urban Development Strategy recognizing the economic primacy of cities and build a strategy, with all the support tools, to create the enabling environment to allow appropriate financing of urban development to proceed in order to support delivery of the Global Goals.
- Support the creation and adoption of a CHEER resource systems modelling approach to develop an economic plan which moves towards a circular economy model with urban decoupling of resources. This will bring human, ecological, mineral, chemical, product, water and energy systems into the economic model. ^{54 55}
- Set out to model the entire integrated Encourage and support policies and "economic system" using agent based incentives for 'circular economy' information and associated resource flows, development to help businesses and with all relevant exchanges and processes, consumers to make the transition to a to the level of detail required to capture stronger and more efficient economy the majority of resource flows. In order to where resources are used in a more correctly represent the long-term viability of sustainable way. The aim is to 'close cycled systems, the economy needs to be the loop' of product lifecycles through modelled on physical interactions between holistic, integrated approaches to design



participants and systems – which can be complemented with a monetary component. The systems model enables strategies and investments for a circular economy to be tested and to evolve over time. The entire 'economy' is modelled on a non-monetary basis using a labor hour based value of exchange between agents. The model can include at least five different markets, a labor market, a skills and capabilities training market, a market for health services, a goods and services market, and an infrastructure market for ownership including articulation of asset values. In a CHEER systems model, the entire ecosystem is modelled so that money exists as a facilitator of transactions, based on economic theories of supply and demand, such that at any stage all elements can be supplemented with a monetary component. Equally, credit is possible in the system, shifting accumulated resource/inputs/ processes capabilities from participants who have accumulated beyond their needs to those who might derive more incremental benefit. This approach enables a clear understanding of the impacts certain policy or investment measures may have on a city's metabolism and critically how to facilitate inclusion and actively supports optimization of resources including finance.

Economics

and greater recycling and reuse. This will bring benefits for both the environment and the economy and will extract the maximum value and use from all raw materials, products and waste, fostering energy savings and reducing Greenhouse Gas emissions. Policies and incentives must cover the full lifecycle: from design to production and consumption to waste management and the market for secondary raw materials. An integrated solid waste management system will be strongly connected to urban environmental health, environmental sustainability and resource management, including fostering urban agriculture and food production . 54



Support the development of the CHEER model and the systems platform so that it can enable even better decisions over time. Also research new algorithms that can improve its performance. Support the assembly of a global open-source library of processor models that drive the resource and economics modelling.

- Develop new business models, to be ready for the switch from ownership of products to performance-based payment models based on services (the sharing economy), taking advantage of the use of the CHEER approach to accelerate the circular economy transition and the use of performance-based procurement 54 55
- Improve cross-cycle and cross-sector performance factors by working with national and municipal governments and other private sector partners at a systems level with higher transparency, alignment of economic incentives and performancebased procurement. 54
- Share understanding of the creation of value in urban environments, particularly within the land markets. In analyzing urban economies, the features and distribution of job markets are crucial. Substantial shifts in the composition of job markets have affected many developed cities suppressing aggregate economic opportunities.
- Originally, urban areas were prevalently seen as centres for the production of goods and services for export to other cities or markets abroad. In a pure 'corporate' approach to urban economics and development, the value of the city is strictly connected to its capacity to generate (discounted) cash flows in terms of exports of goods and services. Use the systems platform to monitor the transition of the job markets and the employability and skills of the human capital over time and provide

input to the National Skills Council. Use the systems platform to provide an integrated systems view on financing and investment risks and opportunities associated with land development and other urban development.



Communities inspired by faith measure the global economy on much more than its wealth. Funded through centuries of accrued land assets, stocks, and shares; the faiths manage significant economic assets, and thus, have a major impact on the global economy, social standards, and the environment. Faith communities around the world value the protection of all creation, and support integrity as a fundamental part of the economy and can make a valuable contribution to economic policy through the collaboratories.

"Increasingly, companies are understanding that they must collaborate and co-invest in solutions to shared, systemic challenges"

UN Global Compact of Businesses

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theme 5

Disaster risk management, prevention and adaptation



- Create disaster risk management, prevention and adaptation policies which are aligned with national policies. Build the capacity and resources to carry out disaster risk management, prevention and adaptation.
- Develop an Urban Growth Strategy that decreases urban risk exposure, and ensure that existing and future developments take due account of prevailing disaster risks. Develop policy tools which include risk-sensitive urban planning, avoiding the increase of assets and lives in areas exposed to known risks, as well as the use of adaptation tools, such as protective infrastructure and risk-sensitive building codes.
- Develop an effective risk governance system. To build urban resilience against future natural disasters, embrace and encourage a whole-of-society approach to disaster risk management, where all public and private actors contribute to reducing their own exposures to risk through Collaboratories.
- Take advantage of Climate Bonds which are being developed to help ease the burden on countries affected by increasingly devastating climate disasters. Also known as CAT-bonds, these are paid out toward recovery efforts if certain disaster scenarios are met. If disasters are averted, investors get their money back, plus interest. ¹⁴

- In least developed countries (LDCs), make use of the Local Climate Adaptive Living Facility (LoCAL) of the UN Capital Development Fund to integrate climate change adaptation into planning and budgeting systems, to help increase awareness of and response to climate change at the local level, and increase the amount of finance available for climate change adaption. This can be accessed through UNCDF, by the national government. This funding could be used to build an integrated systems decision making and risk assessment platform that will also support an Urban Development Investment Fund UDIF. 57
- Look into increasing both adaptation, protection and insurance against disasters through 'Resilience Bonds'. These bonds link insurance coverage that public sector entities can already purchase (such as catastrophe bonds) with capital investments in resilient infrastructure systems (such as flood barriers and green infrastructure) that reduce expected losses from disasters. (This connection between insurance and infrastructure is important because just as life insurance doesn't actually make you physically healthier, catastrophe bonds do not reduce physical risks and only pay out when disasters strike). This bond can be included in the UDIF portfolio. 58
- Use integrated systems models to enable all investments by public and private sector to be risk assessed against future scenarios which are predicted by Earth systems models through data links to organizations including GEO and the International Centre for Earth Simulation (ICES). Modelling platforms should link by data exchange to open source catastrophic risk modelling platforms so that insurance

can then be brought to the region. ⁴⁹

- Test and evaluate strategies that employ ecosystem approaches and green infrastructure to reduce vulnerability and engage local communities, particularly in resource constrained settings. Use this approach to reflect the range of potential benefits and potential unintended consequences following a systematic impact assessment.
- Build resilience through planning and preparation based on assessments of risks and developed capacity to restore functions quickly and effectively in the face of disruptions and the capacity to grow and revitalize after a shock.
- Resilient health systems are critical, and encouraging awareness, diversity, selfregulation, integration and adaptability will help to build them. This can be done through the Health Service and the Collaboratories.
- Effective surveillance and early warning systems should be put in place for all natural hazards and to give an indication of prevailing disease patterns and permit early detection of disease outbreaks or changes in food security. The vulnerability of specific subgroups can be assessed through the Collaboratory and plans put in place
 - for example heat wave early warning systems - to permit rapid intervention particularly for young, elderly, disabled and vulnerable people living alone or in highrisk institutions. ¹⁴
- Join the almost 3000 cities that have signed up to the UNISDR "Making Cities Resilient" Campaign and implement the 'Ten Essentials' for resilient cities including safeguarding natural buffers and strengthening infrastructure resilience. ⁵⁹





- Ensure that disaster risk management, prevention and adaptation policies are aligned with national policies, while equipping urban governments with the capacities and resources to carry out their disaster risk management, prevention and adaptation responsibilities.⁶⁰
- It will be crucial to ensure that future urban growth does not translate directly to urban risk exposure, but that existing and future developments take due account of prevailing disaster risks. The set of policy tools should include risk-sensitive urban planning, avoiding the increase of assets and lives in areas exposed to known risks, as well as the use of adaptation tools, such protective infrastructure, and risk-sensitive building codes.⁶⁰
- To ensure urban resilience against future natural disasters, it is crucial to embrace and encourage a whole-of-society approach to disaster risk management, where all public and private actors contribute to reducing their own exposures to risk, including young, elderly, disabled and vulnerable people. An effective risk governance system is crucial to make this happen.⁶⁰
- The most vulnerable countries, Small Island Developing States, Least Developed Countries and African countries can take advantage of UN A2R (Anticipate, Absorb, Reshape) Framework launched at COP21 to help build resilience to disaster and

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climate risks. The new initiative aims to provide funds to strengthen capacities in: (i) early warning systems;, (ii) insurance and social protection; and (iii) resilience of infrastructure. 41

- The government ministry responsible for disaster risk reduction (DRR) and disaster risk management (DRM) will develop and implement holistic disaster risk management at all levels in line with the Sendai Framework. In this regard, support is needed to build national and local capacity for prevention, adaptation and mitigation of external shocks and risk management The progression to the safer. resilient and sustainable component of urban SDGs will facilitate implementation, monitoring and reporting.²⁶
- Put in place robust risk-based regulatory frameworks for all financial intermediation, from microfinance to international banking. This needs to acknowledge that some risk-mitigating measures could potentially have unintended consequences, such as making it more difficult for micro-, smalland medium-sized enterprises to access financial services. Work to ensure that the policy and regulatory environment supports financial market stability and promotes financial inclusion in a balanced manner, with appropriate consumer protection. Design national policies, including capital market regulations where appropriate, that promote incentives along the investment chain that are aligned with long-term performance and sustainability indicators, and that reduce excess volatility.
- National governments will benefit from empowering cities as part of an Urban Development Strategy to adjust their budgeting so that it accurately values

positive and negative climate risks and impacts and allocates cash flows accordingly. The use of integrated planning and decision making platforms, that allow risk evaluation and preparedness to be carried out on all investments, will allow this and roll out of these can be supported by a National Resilience Implementation Fund (RIIF). 61

- The Local Climate Adaptive Living Facility (LoCAL) of the UN Capital Development Fund serves as a mechanism for LDC's to integrate climate change adaptation into local government planning and budgeting systems, increase awareness of and response to climate change at the local level, and increase the amount of finance available to local governments for climate change adaption. LoCAL combines performance-based climate resilience grants (PBCRGs), which ensure programming and verification of climate change expenditures at the local level, with technical and capacity-building support. It is designed to reinforce existing national and subnational financial and fiscal delivery systems, and it uses the demonstration effect to trigger further flows for local adaptation, including national fiscal transfers and global climate finance for local authorities. Through central governments LoCAL can also support programs in LDC's to build sustainable and resilient buildings utilizing local materials as proposed by SDGs. 57
- Work with local municipal governments to create Climate Bonds to help ease the burden on regions affected by increasingly devastating climate disasters. Known as CAT-bonds, these are paid out toward recovery efforts if certain disaster scenarios

are met. If disasters are averted, investors get their money back, plus interest. 62

- Risk assess all investments by public sector against future scenarios which are predicted by Earth systems models, using data links to organizations such as International Centre for Earth Simulation. These can also link by data exchange to open source catastrophic risk modelling platforms, so that insurance can then be brought to the region more easily and auickly. 44
- Test and evaluate strategies that employ ecosystem approaches to reducing vulnerability and engaging local communities, particularly in resource constrained settings. Outcomes aim to reflect the range of potential benefits and potential unintended consequences following a systematic impact assessment.¹⁴
- Work with other countries in the region to establish regional risk pools which can be backed by private-sector reinsurance and capital markets solutions. Regional risk pools such as the Caribbean Catastrophe Risk Insurance Facility (CCRIF), the African Risk Capacity (ARC) and the Pacific Catastrophe Risk Assessment and Financing Initiative (PCRAFI) have enabled smaller nations to secure a payment post-disaster to cover more urgent early recovery financial needs. A number of initiatives are providing additional funding for these risk pooling mechanisms (e.g., InsuResilience and the A2R)⁴¹

"A person should not go to sleep at night until the debits equal the credits"

Luca Bartolomeo de Pacioli (1447-1517) in Summa de arithmetica. geometria. Proportioni et proportionalita (Venice 1494)



- Prioritize sharing and disseminating scientific information, including technological advances and translate them into practical methods that can readily be integrated into policies, regulations and implementation plans concerning disaster risk reduction.
- Carry out cross-disciplinary exchange to identify interdependencies and synergies which can help to support systems modelling.
- Support capacity development at all levels of society with comprehensive knowledge management and dissemination.
- Invite institutions and individuals at risk of disasters to participate in scientific research (surveys, vulnerability assessments) and technology to collect local knowledge and use the information in Collaboratories to tailor initiatives locally while enabling global comparisons and assessments.
- Use a multidisciplinary approach to support creation of an all-hazard, riskbased, problem-solving, results-oriented approach to address the multifactorial and interdependent nature of the disaster risk chain and to identify relevant solutions and optimize the use of resources using systems platforms.

theme **5** Disaster risk management, prevention and adaptation



 Implement the Sendai Framework for Disaster Risk Reduction (2015-2030) and plan for the Paris Agreement (from 2020), to facilitate stronger multisector collaborations, partnerships and cooperation with:

(i) an integrated multi-sector approach to national planning underpinned by a comprehensive, systems approach to climate and disaster risk management.
(ii) the implementation of comprehensive risk management schemes that include risk assessment, early warning systems, preventive measures, and risk financing and insurance.

The CHEER approach provides the opportunity to act more creatively to understand the risks, actively participate in defining the role of the private sector and other global financial system actors and consider new markets, products and strategies working through Collaboratories. Active engagement in relevant publicprivate partnerships, such as the ARISE Initiative ⁶³, and closer cooperation with policy makers, governments, regulators and other stakeholders can then be more effective in integrating climate and disaster risk information into decision making.



- Faiths increasingly support the principle of working with nature, rather than working against nature, for example the Shinto Great Forest Wall project in Japan that will not hold back a tsunami, but it will significantly reduce its force, and block the outflow out to sea of houses/boats/people as the tsunami recedes. It is planned that it will significantly limit the destructive power of even the most massive tsunami.
- The World Council of Churches (WCC) was first alerted to the imminence of climate change affecting communities in the early 1990s when a group of Christian women in the Pacific Islands approached them and asked for help because their islands were sinking. Since then the WCC has worked with those communities to tackle climate change and, pastorally, to help the people adapt psychologically to the changes that are affecting – and will affect – them.
- Many faith communities have rapid response team in place that can be mobilized as part of climate disaster risk management plans.



Image by: Asian Development Bank, Typhoon Ketsana in the Philippines Roadmap for delivering Global Goals in world's urban settlements

theme 6 Transparency and accountability



- The 'deep plumbing' ⁱ of the global financial system continues to encode the absence of responsibility for the consequences of decisions made. The invisibility of key risks and opportunities in core regulation, valuation, accounting and reporting of assets, liabilities and related transactions resulting in a mis-pricing of risk, a misallocation of capital and sub-optimal use of resources from a human, ecological and economic perspective.ⁱ
- The collective New Urban Agenda challenge, from an accounting perspective, is simple. An elegant equation expresses our goal on a planetary scale: DR = CR (debits equal credits). To put this another way, externalities do not exist within the earth's closed system and national and municipal governments now must work with actors in the financial system to balance the ledger, globally.
- It is critical that the challenges in implementing the SDGs in urban and city-regions are solved at the level of the 'rules of the game' if capital is to flow at the level of the trillions demanded by estimated needs for infrastructure and

other investment by 2030. In other words, until tomorrow's problems are integrated into today's accounting, change will be incremental and slow.

- Collectively, through both industry practice and regulation we have largely managed earlier threats to urbanization, such as urban fire in the 19th century and motor vehicle accidents in the 20th century. The scale and complexity of the challenge of the New Urban Agenda is at a different order of magnitude to previous urbanization challenges, but the thinking required is similar, a shift from risk-blind to risksensitive decision making, standards, regulations and incentives. ⁶⁴
- The absence of consistent global accounting, reporting and disclosure standards complicates the challenge of improving transparency and accountability. As does the scarcity of systems-level data and information. However, with International Financial Reporting Standards (IFRS) for companies now adopted, either partially or fully, in more than 100 countries, the incumbent accounting infrastructure, whilst no longer fit-for-purpose for the new challenges, is operating at scale and does contain elements that can be leveraged to accelerate the transition.
- To achieve systemic transparency and accountability it is necessary to ensure that disaster and climate risks are revealed in all financial transactions and encoded in

relevant banking, securities, insurance and accounting operations. This will create the economic rules necessary to recognize the value of proportionate, fair and consistent investments and interventions within the public, private and mutual sectors at local, regional and global scales. This is a necessary precursor to the realization of the overall outcomes of this Roadmap to prevent the increase of the stock of risk within the global financial system and with it, the likelihood and magnitude of potential losses and macro-level instability in core provisioning and infrastructure systems through to 2030 and beyond.

- The process of revealing, and ultimately encoding, the necessary information has begun but much more is required to build a fit-for-purpose systems health accounting framework for decision making before 2030.
- Continuing support is required for the broad set of initiatives working towards integrating risk into the financial systems. These have been publicly and privately discussed in a series of forums including both the UN Abu Dhabi Ascent in May 2014 and the UN Climate Summit in September 2014, resulting in commitments to the 1:100 Initiative and the development of the Smart Risk Investment principles.⁶⁵
- Other related discussions to socialize the integration of risk information have been held at:

(i) the launch of the R!SE Initiative in May 2014.

(ii) the World Bank Understanding RiskForum in July 2014.(iii) the WEF Annual Meetings in Davos in January 2015 and 2016.

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(iv) Further dialogues with national governments were held at the First and Second Sessions of the Preparatory Committee to the 3rd UN World Conference on Disaster Risk Reduction in July and November 2014. This resulted in the inclusion of relevant language on the responsibilities of key financial system actors in the text of the Sendai Framework (subsequently adopted by UN General Assembly resolution on 3 June 2015). ^{66 67 68}

 A coalition of investors, ratings agencies, insurers, accountants and regulators, collectively made a commitment at the UN Climate Summit (reference: UN Climate Summit commitments) to integrate risk into the financial system. This is the start of the transition from accounting for stocks and flows of elements of the natural and social systems impacted by the resource conversion decisions, to accounting for the health of those systems over the next 15 years, with four phases of related activity:

(i) Visibility – 2016-2018 – continuation of efforts designed to reveal the risks and opportunities we already know about by increasing the visibility of data, science and modelling, for example GIS data and natural catastrophe modelling. It is important to go back to, and share, agreed primary sources including existing relevant practice, such as the risk modelling used by insurance companies to satisfy the 1-in-200-year solvency testing required by the Solvency II EU Directive, and existing standards and regulations, including financial accounting standards.

The process of increasing the visibility

i. The term "deep plumbing" refers to the structural elements of the global financial ecosystem which together provide the information sets on which investing and financing decisions are made. They include accepted measurement approaches, accounting standards (including International Financial Reporting Standards and national generally accepted accounting principles), the use of valuation methodologies (including discounted cash flow analysis, options valuation models), reporting and disclosure frameworks (including corporate reporting, listing rules mandated by stock exchanges, EU and other national directives), and other types of capital requirements such as Solvency II and Basel III. The primary actors within the global financial ecosystem includes accountants and auditors, businesses, banks, investors, asset managers, insurers, ratings agencies, regulators and central banks

"CALPERS will transition to full integration of risk information into investment decision making across all asset classes"

Transparency and accountability

of risks (and opportunities) is necessary to overcome the challenges to the incorporation of new information in decision making by actors in the global financial system currently incentivized to achieve short-term, financial outcomes without due consideration for longer-term (decadal or multi-decadal) macro-social or environmental impacts.

As noted in several systems-level assessments and review processes either in progress or recently completed, such as the UNEP inquiry into the design of a sustainable financial system, the "change in complex, adaptive systems such as finance can be triggered by the development of new behavioral norms anchored in a renewed sense of purpose." 69

The International Integrated Reporting Council. on behalf of its institutional members, committed to reflect material risks related to climate and natural disasters as part of their overarching International Integrated Reporting Framework at the Sendai World Conference in March 2015.

Further evidence of the value of increased visibility comes from recently published findings based on the extensive Carbon Disclosure Project global database of carbon reporting and disclosure by listed corporations that a commitment to enhanced disclosure does result in increased strategic focus and investment on de-carbonization and consideration of a broader set of risks and opportunities. ⁷⁰

(ii) Testing – 2018-2021- revisiting existing

accounting standards definitions and interpretations to broaden the range of accepted information required to be considered by preparers of regulated financial reports, and therefore by providers of finance. Some of the critical elements that include specific requirements to prioritize for reinterpretation in the context of the universal agreements currently include:

- Materiality whether the inclusion or exclusion of information impacts on the decision made by a user of the information, e.g. whether the inclusion of regional climate change modelling would impact on whether an investor would invest in new road infrastructure).
- Impracticable whether the information is accessible in a form that management can use to make estimates and judgments of the impact on the financial position or performance of their business. With significant recent improvements in availability of data and measurement of uncertainty over that data there is potentially more information which is practical to be considered by management than is currently being utilized.
- Impairment whether the value of an asset is correctly stated, e.g. given the below 2°C target included in the Paris Agreement the percentage of known fossil fuel reserves able to be burnt in the future is significantly less than the 100% represented as assets on the balance sheets of fossil fuel companies and on the balance sheets of their investors.

- Discount rates which assign a price to the future value of money based on the inclusion of a range of risk factors (which could be expanded to include quantified natural disaster risk information or expectations of ecosystem functioning) which would change the balance between current and future value of cash flows associated with a given investment.
- Going concern which currently only requires a company, and its auditors, to provide a statement as to whether the company will remain solvent over the next 12 months, but which could be

IAS1 Presentation of Financial Statements - relevant in context of improved data, better understanding of materiality of natural system and social system implications and the expanded view of management's responsibility for "the resources entrusted to it'

paragraph 7 definitions of materiality and of impracticable, and paragraph 9 which states that the "Financial statements also show the results of the management's stewardship of the resources entrusted to it"

IAS36 Impairment of assets - relevant in context of consideration as to whether the combination of the adoption of the post-2015 universal agreements together with the overwhelming scientific consensus on key system destabilization constitute a trigger or "indication that an asset may be impaired", such as the value of the fossil fuel reserves of an oil and gas or coal company paragraph 12, "in assessing whether there is any indication that an asset may be impaired, an entity shall consider, as a minimum, the

following indications: External sources of information

(a) during the period, an asset's market value has declined significantly more than would be expected as a result of the passage of time or normal use.

(b) Significant changes with an adverse effect on the entity have taken place during the period, or will take place in the near future, in the technological, market, economic or legal environment in which the entity operates or in the market to which an asset is dedicated. (c) Market interest rates or other market rates of return on investment have increased during the period, and those increases are likely to affect the discount rate used in calculating an asset's value in use and decrease the asset's recoverable amount materially.

(d) The carrying amount of the net assets of the entity is more than its market capitalization. paragraph 13 continues by stating that "the list in paragraph 12 is not exhaustive. An entity may identify other indications that an asset

may be impaired and these would also require the entity to determine the asset's recoverable amount.

IAS37 Provisions, contingent liabilities and contingent assets - relevant in the context of the visibility and incorporation of a wider range of natural and social system risks including the shift towards quantification of natural hazard risk in sovereign bond ratings by S&P and other ratings agencies, as well as the now expected development and ratification of national disaster risk management plans, INDCs and sustainable development plans and legislative instruments

paragraph 47 states that "the discount rate (or rates) shall be a pre-tax rate (or rates) that reflect(s) current market assessments of the time value of money and the risks specific to the liability. The discount rate(s) shall not reflect risks for which future cash flow estimates have been adjusted

paragraph 48 states that "future events that may affect the amount required to settle an obligation shall be reflected in the amount of a provision where there is sufficient objective evidence that they will occur"

paragraph 50 continues by stating the "the effect of possible new legislation is taken into consideration in measuring an existing obligation when sufficient evidence exists that the legislation is virtually certain to be enacted. The variety of circumstances that arise in practice makes it impossible to specify a single event that will provide sufficient, objective evidence in every case. Evidence is required both of what legislation will demand and of whether it is virtually certain to be enacted and implemented in due course.

Betty Yee

expanded, in line with consideration of a longer timeframe beyond a single year associated with insurance coverage, to include consideration of decadal or multi-decadal threats to the ongoing viability of a business).

- Stress-testing complement this process of utilizing existing standards with pilot work on stress-testing public and private balance sheets 3, research and testing of more transparent disclosure requirements.
- Quantification of ratings as evidenced by pilot work already performed by Standard & Poor's on the quantification

Transparency and accountability

of natural hazard risk on sovereign credit ratings, the use of systems models can accelerate the process of incorporating a wider set of quantified inputs into ratings calculations for a range of financial system indicators and products. ⁷¹

- Fiduciary duty reconsider fiduciary responsibility, i.e. what are the responsibilities and drivers of behavior for the management of companies. As an extension to the visibility of risk noted above, in the context of the implementation of the SDGs, a systematic reconsideration of fiduciary responsibility, from simply returning profit to financial stakeholders, to optimizing the use of all entrusted resources.
- Engagement with central banks (both directly and through the Financial Stability Board), financial system regulators (such as BIS, IAIS and IOSCO) and standards setters (such as IASB and FASB). Agreement on evidence requirements through the scaling phase to ensure successful encoding and transformation of the

global financial system to appropriately price risk and allocate capital to achieve the New Urban Agenda.

(iii) Scaling - 2021-2025 - building on the testing phase, scaling can be achieved with sequential engagement, together with asset managers and investment managers, of the asset classes (infrastructure, equity, fixed income) and expansion of pilots both geographically (particularly at a city-region level) and at sector level (particularly lifeline infrastructure sectors such as telecommunications, power/ energy, water and sanitation, mobility etc.).

Broader uptake of the use of sector specific broader accounting standards is an important part of the scaling phase, such as the standards being developed by the Sustainability Accounting Standards Board and the guidelines developed by the Global Reporting Initiative as well as the WBCSD led process to develop broad consensus on Natural Capital and Social Capital Protocols (refer to SASB, GRI, WBCSD, Natural Capital Protocol and Social Capital Protocol).

iii. Including the stress-tests already included in the Solvency II directive which is a new regulatory framework for the European insurance industry that establishes new capital requirements, effectively requiring insurance companies to make an assessment of the ability of their balance sheet to withstand a 1-in-200-year event. It is a dynamic risk-based approach that requires insurers to focus on managing all of the risks facing their organization. Whilst it specifically covers the EU only, its impact is to create a new global default approach to managing risk by the critical risk aggregation actors, i.e. insurance and reinsurance organisations, within the global financial ecosystem. Compliance and enforcement has already commenced. The application of this regulated approach to making risks visible to improve the understanding and management of risks across other stocks of capital beyond the re/insurance sector using a 1-in-100 year event threshold has been proposed by the 100 Initiative (http://www.preventionweb.net/publications/view/39698). For flows of capital, i.e. annual income and cash flows, a stress-test at a 1-in-20 or 1-in-50 year event threshold has been proposed. The testing of these techniques and the pilot application across other parts of the global financial system in both developed and emerging markets is an important transition towards risk-sensitive capital allocation for cityregion development and re-development

iv. Including the Task Force on Climate Related Disclosure being established by the Financial Stability Board under the leadership of Mark Carney and Michael Bloomberg. The FSB hopes that the recommendations from this taskforce will raise awareness of market participants concerning climate risks. Access to high-quality financial information will allow market participants to better manage these risks which will only grow over time

The use of systems models for the provision of enhanced systems-level data, science and modelling can build the evidence base necessary for the transition to encode systems-level risk and systems health into the global financial system.

(iv) Encoding -2025-2030 – using the evidence base established through the testing and scaling phases, and the demonstrated will of the parties as evidenced by the universal agreements, to shift from disparate International Financial Reporting Standards (IFRS), and other Generally Accepted Accounting Principles (such as US GAAP), to a globally consistent



Figure 7: CHEER phasing

"Data must be accessible and available to empower citizens"

Helen Clark, UNDP

framework of Integrated Systems Health Accounting (ISHA). This transformation can consider the interdependencies and interconnections across the humanecological-economic systems and, supported by the widespread use of the CHEER approach, accelerate the transition to full transparency and accountability for resource conversion decisions and value creation activities of businesses, noted as essential for optimized allocation of resources in the Integrated Reporting (IR) framework.

theme **6** Transparency and accountability



- Improve the accessibility of GIS data and other Earth Observation data (from below the ground, above ground, in the oceans and from the sky) for inclusion in core information sets used by preparers (mainly companies) and users (mainly investors) of financial information.
- Provide enhanced systems-level data, science and modelling to build the evidence base necessary for the transition to encode systems-level risk and systems health into the global financial system.
- Develop transparency and openness in catastrophe risk model building, use and validation of methods, including by private sector risk modellers and the insurance industry. Also build a community that will increase the supply of catastrophe risk models and information. ⁷²



 Faiths believe that the problem we face is as much spiritual as economic, scientific and political, because the roadblock to effective action relates to basic existential issues of how human life is framed and valued: including the competing moral claims of present and future generations, human versus non- human interests, and how the lifestyle of wealthy countries is to be balanced against the basic needs of the developing world. Faiths can bring a moral compass to local decision making ¹⁰⁶.

- Faith institutions and organizations around the globe also hold great power and influence in numerous businesses.
 Positive engagement is of high importance regarding the task of shifting the attitudes and policies of decision makers in corporations.
- There is also a movement amongst faith groups to better understand how their money is being invested in order to take positive action and act as a leader in communities.
- In addition to shareholder advocacy, faiths have shown great interest in high social impact investments. An increasing number of different types of investment funds focused on financial return as well as positive social impact have attracted faith-consistent investors. The emerging industry of high social impact investing has the potential to become a potent force for addressing global challenges. Faith communities are investing in clean energy, healthcare, and infrastructure to generate social and environmental value as well as a financial return ¹⁰⁶.



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- Work with national governments to define national targets of urban SDGs, including the creation of specific benchmarks and standards at national and country level.
- Work with national governments to strengthen and align institutions and policies to respond to urban SDGs and also in the preparation of country and city implementation plans to ensure the delivery and maintenance of critical infrastructure. Link this to municipal plans.
- Support the development of a National Urban Policy (NUP), by providing diagnostics, facilitating high-level policy dialogues and knowledge sharing among countries. A NUP is both a process and an outcome that harnesses the dynamism of cities and urbanization. Although a very wide range of national policies can have a profound effect on urban development, national government rarely review this impact systematically. Seeing such national policies through an "urban lens" and aligning them for sustainable urban development is required. A successful NUP can strengthen the alignment of national and local policies affecting urban development; empower local authorities and communities; and foster co-operation and collaboration across jurisdictions, for instance by overcoming metropolitan fragmentation. 73
 - Where existing local governments are too small to have a coherent long term

vision (particularly a long term economic vision) and do not have sufficient financial leverage to achieve their visions, bring authorities together into a larger Metropolitan Authority which can have its own pooled fund UDIF with a unified development strategy. This should be framed to include the local rural areas so that urban decoupling and improved resource flows can be achieved.

- Work with national government to create the area's own Urban Development Investment Strategy that can amalgamate the disperse energy and potential of urban centres within a national system of cities and as part of strategic territorial regional planning.⁷⁴
- Work with national government to set a target low carbon pathway to 2030 and then on to 2050 as discussed at COP21.
 Support from SDSN Deep Carbonisation Project is available.⁷⁵
- Work with national government to create the legal structures around the setting up of a land registry system 25 and other rules and regulation systems that respond to real needs, actual capacities and available resources that can provide a solid, forward looking framework, to guide urban development.
- Work with national government to develop and adopt broad, open data policies and practices for any data (spatial, statistical, etc.) collected at taxpayer expense, respecting personal privacy conditions.
- Develop policies to put informal settlements and slums into the overall CHEER modelling, and model the informal economy, so that no-one is left out, taking full account of these areas as engines for economic growth, prosperity, and job creation.

- Create conditions for increased security of tenure, recognizing the plurality of tenure types, and to develop fit-for-purpose gender-responsive solutions within the continuum of land rights. Strengthen programs and institutions to address security of tenure to foster housing improvement and planned urbanization, while innovating strategies to cater to groups that have lagged behind the most, with particular attention to women's tenure security as a cornerstone to their empowerment and gender equality and the realization of human rights. Include innovations such as proximity of services, adequate financing schemes, and technical, legal, and financial assistance to those who produce their own housing.
- Set land use rules that lower the land area per housing unit and allow smaller affordable units, particularly around new transport hubs. This will enable more affordable houses to be built close to urban centres.
- Consider automating the building approval process as far as possible to speed up permitting and reducing the finance costs of affordable housing.
- Adopt performance based procurement for all municipal projects including publicprivate-partnerships PPP's and align performance with strategic performance goals. This is described further in Theme 15, Infrastructure, transport and utilities.
- Support implementation of national pricing mechanisms to support sustainable development including externalities such as GHG emissions, local air pollution and traffic congestion. Pricing mechanisms may include: Carbon prices (carbon taxes and cap-and-trade systems), fuel and vehicle
 Support implementation of national pricing that responds to environmental health, environmental sustainability and resource management issues.⁷⁷
 Use the Collaboratory to enable local communities to decide on the level of access to safe water and hygienic living conditions, the need to produce more



taxes, reform of fossil-fuel subsidies.

- Implement congestion charging, other road user charges and parking levies as approved by national government and which have been found to be effective in delivering global goals.
- Develop a regional energy strategy, for heat and electrical energy, which includes demand reduction as well as decentralized energy supply, energy storage and a transition to increased renewable energy as a proportion in the supply mix. Use the CHEER approach to test different scenarios and assess their costs and benefits. Integrate the energy strategy with those for water, transport, waste, urban agriculture and housing.
- Develop a waste strategy for waste processing and waste recycling, which could involve public-private partnerships which aim for waste minimization - driven at the community level, and using low energy/low technology resources. Use the Collaboratory for deeper community participation, understanding economic benefits/recovery of waste, focusing on life cycles (rather than end-of-pipe solutions), decentralizing administration of waste, minimizing environmental impacts and reconciling investment costs with long-term goals. ⁷⁶
- CHEER can contribute to produce evidence-based information to create an integrated solid waste management system that responds to environmental health, environmental sustainability and resource management issues. ⁷⁷

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food the need to create more sustainable livelihoods per unit of water and the need to manage human water use to conserve

the quantity and quality of freshwater and terrestrial ecosystems.



- Carbonisation Project is available.⁷⁵ Where relevant, support the service provision of local governments so as to generate investments in communities and places that are affected by recurrent and protracted humanitarian crises.
- Develop a set of strategic national policies, to be aligned at the municipal and local level which address the coherence between structural and organizational protection measures with regard to urban planning.
- Create national housing policies which are implemented through subnational and decentralized structures in order to ensure the coherence between national and local urban development strategies, land policies, and housing supply. Develop policies that promote a wide range of alternative housing options, considering shifting from a predominantly private ownership to other rental and tenure options, including cooperatives solutions such as co-housing and community land

trust, in order to improve the supply of affordable housing, as well as to adopt policies that support incremental housing and slum/informal settlements upgrading programs.

- Integrate cross-sectoral policies at the cabinet level to address key trends and drivers influencing planetary health and communicate these to the public through the regional Collaboratories.14
- Create and maintain legislation for a land registry cadastre for all urban areas. ²⁵
- Create legislation to allow Real Estate Investment Trusts (REITs) to operate to support investment in commercial green property developments meeting the required sustainability standards. REITs typically pay out 90% of their property income to shareholders every year and dividends from REITs are treated as property income to the investor. 78
- Encourage industrial construction of housing through public procurement, uniform building codes, and design standardization guidelines, which encourage innovation and lower waste in building materials and during construction, but also using local and renewable resources.
- Set energy efficiency standards for new homes and commercial buildings, and consider providing subsidies for retrofitting existing ones.
- Set guidelines for maintaining major public housing assets and common areas and create enforcement mechanisms for collection of maintenance and other fees.
- Create a range of legal protections for renters, including minimum maintenance standards and regulations to ensure

security of tenure. Consider subsidies to the poorest people.

- Create legislation for shared ownership schemes in which households can either build equity gradually through rent payments (a rent-to-own model), or they can own only the structure and lease the land (which is often owned by a land trust), thereby removing the cost of land from the unit purchase price.
- Adopt performance based procurement for all contracts including public-private partnerships (PPP)s, using systems modelling at national scale for evidence, and align the performance requirements with the national strategic goals. See also Theme 15 Infrastructure.
- Enact public-private partnership (PPP) (v) a legislative proposal on minimum law or a concession law to give priority to requirements for the reuse of wastewater. a process of developing, procuring and (vi) a plan to promote and incentivize reviewing PPP projects that will take priority over sector laws, or to establish a clear products, in addition to energy efficiency. institutional framework for developing, procuring and implementing PPPs. PPP Create legal requirements with targets to laws could be used to close gaps in existing reduce landfill of waste: laws to allow for successful infrastructure (i) improving recycling of municipal waste PPP projects, such as enabling the grant of and packaging. (ii) promoting and incentivizing re-use and step-in rights to lenders and requiring open and fair procurement processes. These industrial symbiosis. modifications may be embodied in sector-(iii) create economic incentives for 'greener' specific law, or in the case of procurement, products and support recovery and a procurement or competition law, or they recycling schemes (e.g. for packaging, can be included in a general concession or batteries, electric and electronic equipment, PPP law. 79 vehicles).
- Create a national waste strategy (integrated with the circular economy) for waste Create legal requirements to tighten limits processing and waste recycling, involving to pollution of air, fresh water, sea and soils public-private partnerships which aim for over the period to 2030, with the CHEER waste minimization. Use systems modelling approach being used to demonstrate to better understand the economic benefits/ overall economic benefits for health, well-

"The importance of the Habitat III moment for how we think and act collectively in, on, and through cities should not be underestimated for development thinkers and practitioners"

Sue Parnell, University of Cape Town

recovery of waste, focusing on life cycles (rather than end-of-pipe solutions), decentralizing administration of waste, minimizing environmental impacts and reconciling investment costs with long-term goals. 77

Create the following policies and strategies to support moving towards a circular economy:

(i) actions to reduce food waste.

(ii) set quality standards for secondary raw materials extracted from waste.

(iii) a plastics strategy addressing issues of recyclability, biodegradability and the presence of hazardous substances in plastics.

(iv) a strategy for reducing marine litter. reparability, durability and recyclability of all

theme **7** Policy, codes of practice, law, governance, procurement and capacity building

being and productivity. This may include progressive tightening of vehicle emission standards, as vehicle technology improves, because of air pollution in urban areas and the health impacts of this.

- Implement taxes and subsidies to benefit planetary health to achieve two objectives
 to contribute to supporting earth systems and to increase the human health benefit to those most exposed to the consequences of environmental degradation, namely poor and vulnerable sections of society. ¹⁴
- Work with the Global Ocean Commission 80 to articulate strategies to protect coastal zones, control overfishing, reduce plastic pollution and tackle harmful subsidies.
- Harmonize health and environmental policies e.g. to ensure that dietary recommendations to increase fish consumption because of the health benefits do not lead to further overexploitation of fisheries.
- Develop pricing mechanisms to support the global goal transition including pricing externalities such as GHG emissions, local air pollution and traffic congestion. These pricing mechanisms include: (i) Carbon prices (carbon taxes and cap-and-trade systems); (ii) fuel and vehicle taxes; (iii) reform of fossil-fuel subsidies; and (iv) supporting urban areas to use congestion charging and other road user charges and parking levies.
- The Ministry of Education creates a 'National Skills Council' to build a common understanding of the problems and actions at hand using the CHEER approach for employers to communicate their skills needs. Require regions to develop their own skills strategies which will input to this understanding. ²⁴



Carry out the necessary research to support national and regional policy development for infrastructure by enabling the setting up of CHEER platforms and sourcing and managing data. Research the impact of infrastructure investment and feed this back into long term policy making. Guidance on creating policy briefs is available from United Cities and Local Government (UCLG). ⁸¹



- Investors and companies to develop internal externality pricing policies and support implementation of national pricing mechanisms to support sustainable development including externalities such as GHG emissions, local air pollution and traffic congestion. Pricing mechanisms may include: (i) Carbon prices (carbon taxes and cap-and-trade systems); (ii), fuel and vehicle taxes; (iii), reform of fossil-fuel subsidies.
- Establish new industry standards for better cross-chain, cross-sector and cross-border collaboration.⁵⁴
- Measure the impact of business activity, both negative and positive, through Collaboratories, across the entire value chain and operations footprint of companies, using guidance and standards used in broader information sets such as

the Global Reporting Initiative (GRI), the Sustainability Accounting Standards Board (SASB) and related approaches. Through this process help to review and update the metrics to improve understanding and disclosure of corporate impacts on overall planetary systems health, in line with the proposed transition to an Integrated Systems Health Accounting framework discussed in Theme 6: Transparency and accountability. ¹⁴

- Many faiths and indeed many secular Support the UN Climate Resilience Initiative organizations as well - recognize that - with its three areas of focus to anticipate, the environmental and development absorb and reshape. The A2R Initiative is a crises we face are a spiritual issue, an natural fit for, and is supported by insurers external sign of deep malaise. And that (as specialists in risk identification, risk therefore its solution can only be found prevention, risk mitigation and post event through exploring the root causes of this recovery) and partnering with governments degradation. In particular, in fostering an and civil society in many areas to help ethos or an atmosphere of compassion and make urban development more resilient.⁸² care for the natural world ¹⁰⁶.
- Insurance industry continues to develop Smart Risk Investment principles to increase volume of 'smart-risk invested' assets from \$42 billion in 2014 to \$420 billion by 2020 as part of the transition to redefine 'green finance' as 'smart risk investing' to bring in all investable asset classes and overlay the risk management and pricing knowledge from the underwriting side of the insurance sector balance sheet to the asset side. ⁸³
- Theological foundations for sustainable development action and care have been balance sheet to the asset side.⁸³ around, in every major faith, for a long time. · Create a framework and a community with In addition, all faiths have a tradition of care insurance industry asset managers around for those who are going through suffering Smart Risk Investing and normalize longor crisis, and they have tried and tested term risk management across the asset ways of teaching their future leaders to management industry globally. pass on the wisdom of the ages, adapted The Insurance Development Forum to the requirements of the present day. ¹⁰⁶
- The Insurance Development Forum (IDF) brings together the three areas of the A2R Initiative. The forum is includes leading actors from the insurance industry, government, civil society and international

"Words are good, deeds are better"

Angela Merkel

institutions and has the unifying mission to "understand risk and to create resilient platforms for sustainable growth and human dignity"



 While many wish to legislate our way out of these crises, the faiths wish to guide, not with ethics and codes but by example and mindfulness, care and companionship rooted in their experience down the centuries and even millennia, and are willing to bring this approach into governance, underpinned by evidence.

theme 8 Land use planning, cadastre and housing



- The CHEER approach can be used to assist in the monitoring of land use efficiency as part of the SDG indicators by measuring the relationship between land consumption and population growth to enable decision makers to track and manage urban growth to promote orderly urban expansion. Use CHEER to develop urban spatial frameworks that promote efficient use of land, compactness, mixed uses and appropriate density, through infill or planned extension strategies, to trigger economies of scale and agglomeration, increase accessibility, reduce travel needs and the costs of service provisions, enable a cost-effective public transport system, enhance resource efficiency, and ensure environmental sustainability. Minimizing urban expansion and sprawl dynamics can contribute to produce cities that are more compact, walkable and sustainable.
- In land use planning, give a central role to universally accessible, safe and quality public space. Open areas such as streets, sidewalks, squares, gardens and parks, are multi-functional areas for social interaction, economic exchange, and cultural expression among a wide diversity of people, and can be designed and managed using CHEER to ensure human development, building peaceful and democratic societies and promoting cultural diversity.
- Put in place a land registry with clear titles

and formalize informal land use through legal structures that facilitate individual or collective ownership. The CHEER approach can be used for this process with crowd-sourcing of data, ensuring the data are available for other applications. The RIIF will provide grants to support the cost. Creating an efficient land-registration system will establish clear ownership rights that enable transactions to move ahead more quickly. The land-registration system provides a database of all parcels, their value, land use restrictions, and any encumbrances (such as mortgages or easements) so buyers have certainty of ownership. Land registration and other legal processes to formalize ownership of informal land also can facilitate transfer of ownership to individuals or groups that have occupied the land. 25 Housing provision can be supported by systemic and institutional reforms, long-term policies and finance and adequate infrastructure provision. This can guide the growth of cities and support territorial transformations that maximize affordability, increase the prospects of closer employment, and facilitates spatial inclusion; all fundamental elements of the sustainability agenda.⁸⁴

 Create a policy on what is "affordable housing", including the share of household income (typically 30-40%) devoted to housing, and create a standard for what constitutes minimum socially acceptable housing with a clear definition of what income groups are affected, and at what income level households should be eligible for housing assistance. The definition can accommodate a range of sizes, tenure options (purchase vs. rental), and affordability thresholds that take into account households of different sizes and incomes in the area. These strategies can take the form of Planned City Extensions or Planned City Infills. They can optimize the use of land, create sufficient public spaces and streets, and generate economies of agglomeration that are needed for job creation and economic growth. They contribute to prevent slum formation, reduce unplanned development, and minimize the social, economic and environmental costs of urban sprawl.

- Develop a land use strategy and policy to make use of idle land for housing through adjustment of uses and pooling, particularly close to new transport hubs. ²⁵
- Create a housing strategy linked to infrastructure strategy using a 'ladder of housing aspirations', with rising standards for floor space per unit and amenities, which can be met over time. Projects could be planned where residents can reach jobs in reasonable commuting times, families have access to schools, leisure, retail, vital services and people can connect with the society around them. Use systems model data to assess the current stock of housing and the new flow of units and to consider the needs of each income segment. Consider refurbishment and self-improvement of existing units and also invest in infrastructure and social services in informal settlements to improve conditions in the short term. Affordable rental options and transitional housing can be part of the ladder.
- Prioritize partnerships with organized communities of the urban poor in order to promote the co-production of in situ, incremental slum upgrading as an effective alternative to evictions and the default



approach to dealing with inadequate, unsafe housing, infrastructure and basic services

- Consider land-value capture as a way to fund housing programs and other public needs. When rezoning areas in the Urban Development Plan, allow more square feet of building on a parcel near public transport, and offer a "density bonus" to developers in return for the right to build more units(substantially raising the value of the property-developers), then provide land for affordable housing or finished units. Land value rises as a result of investments in infrastructure, such as new transit routes. These value capture strategies benefit the public good, since they can provide funding for additional infrastructures and public facilities.
- Support near- and medium-term plans for housing, using a rigorous analytical approach. This can include householdlevel data on income, housing standards (land and floor-space utilization), and the distribution of housing occupied by different income groups across the urban land area, as well as locations of centres of employment and a precise inventory of existing housing stock and planned new supply, including prices.
- Develop urban development strategies to promote a healthy city by design, offering inclusive access to active and healthy living,for example, protecting individuals from pollutants through green areas and smoke-free spaces. Educate citizens to enable easy understanding of the benefits of these choices and reduce the risk of lschemic Heart Disease, obesity and diabetes. This approach can include mental and physical health measurements. ¹⁴

theme **8** Land use planning, cadastre and housing

 Integrate land use and transport planning in urban development to evaluate co-benefits, to reverse the trend toward automobilebased urban sprawl. Encourage the creation of "compact cities" with dense, mixed-use development patterns in urban areas, well connected to public transport. ⁸⁵ Public transport solutions including walking and cycling make cities more inclusive, safe and sustainable, contributing to the reduction of urban poverty and inequalities, and enhancing economic development.



- Set up systems to reduce permitting times for affordable housing development.²⁵
- Integrate sustainable transport goals within national strategies, infrastructure plans and disaster risk management plans.
- Support the regional government to create an enabling environment which helps deliver affordable housing, including land rights, tenancy and management legislation.
- Prioritize local partnerships between national and municipal government and organized communities of the urban poor in order to promote the co-production of in situ, incremental slum upgrading as an effective alternative to evictions and the default approach to dealing with inadequate, unsafe housing, infrastructure and basic services

Carry out ongoing research to analyze the effectiveness of the urban development policies and suggest improvements that can be made in data gathering and policy development.



- Affordable housing provides an opportunity for the finance sector. Mortgage issuance of \$300 to 400 billion per year could be needed by 2025 to fund purchases of affordable housing (not including the financing required to redevelop current substandard units). This would be equivalent to about 7% of global new mortgage origination volume in 2025. ²⁵
- Make use of the improved data gathering through the city Collaboratory (valid property appraisals, credit ratings, use of non-traditional credit rating data) and put in place controls to reduce underwriting costs and safely lower rates for low-income borrowers. Also provide and incentivize savings programs to help borrowers build down-payments.
- Build up collective, community savings programs to reduce individual mortgage size and to fund low-interest rate loans to program participants. Contractual savings programs create pooled savings by requiring members to make contributions.

The savings build up at relatively low interest rates and are used to fund lowrate mortgages for members. Provident funds can be helpful, particularly those with experience in administering mandatory savings such as pensions to fund housing loans, including for low-income households.



- The faiths own around seven to eight percent of the habitable land surface of the planet, and more than five percent of the forests ¹⁰⁶.
- Many faiths support a model of communitybased environmental development through creation of an enabling environment for the dialogue between authorities on communal, regional, central levels on one hand and civil society on the other hand which is at the heart of the CHEER approach.
- Faiths have many plans to reduce energy use throughout their places of worship, associated buildings, offices, homes and schools. Many are also also encouraging the use of energy produced from renewable sources in line with National targets. Faiths also have plans to make their building stock sustainable through sustainable lighting, water, energy and waste management and the promotion of best practice ¹⁰⁶.
- Faiths have always led extensive tree planting programs inside and around the edges of cities and can become partners in such programs.
- During festivals and religious ceremonies, temples can use significant amounts of

flowers, fruits, vegetables and grains and produce emissions. Faiths are increasingly looking to use local sources for these resources as part of a circular economy and are looking towards new technology to reduce pollution.

 Pilgrimage is a key part of global life and now the faiths are working to scale the participant of green travel for pilgrimage for example to enable the "Green Hajj Lifestyle" free of plastic bottles and with energy efficiency, water conservation and carbon offset of transport with planting trees ¹⁰⁶.

theme 9 Ecology, soils, water and urban agriculture





- Use the UDIF to fund projects to preserve and enhance ecosystems and also lower flood and landslide risk within the urbanrural land system. Also to develop urban agriculture.
- Model the rich biodiversity of the urban area and develop policies to preserve and enhance ecosystems and the services and benefits shown to be provided. Develop underused land to increase biodiversity and adjacent affordable housing. For example, natural areas can provide catchment for stable and cheap drinking water, slow down water run-off in flooding and sequester carbon. Green spaces in or near cities deliver services such as reducing air pollution, temperature regulation, groundwater recharge and cultural services including recreation, all contributing to health of the urban population. Urban food production is an evolving development which creates jobs and can be integrated into the circular economy resource cycles, including aquaponics, rooftop and intensive . vertical farming.¹⁴
- Develop an urban forestry strategy to maintain the health of trees, their numbers and diversity.
- Set up management of urban water supply, wastewater and storm-water in an integrative manner by looking at urban areas as watersheds. Incorporate issues such as pollution of water resources, surface run-off, rainwater harvesting from urban structures.

- A functional approach to water management would help to combine multiple scales (e.g. local, metropolitan, basin) within integrated basin governance systems, going beyond cities administrative perimeters. It would foster greater cooperation between cities and their hinterlands/rural areas, neighbouring cities, and upper levels of government, efficient use of water resources, information sharing and cost savings. ¹¹
- Design the urban area to hold, clean, and drain water in a natural way using an ecological approach combined with engineering storage solutions and sustainable urban drainage. This can reduce flood risk and provide water supply for irrigation in dry periods. Intact and restored ecosystems can contribute to resilience through improving coastal protection, for example through wave attenuation. ^{86 87}



- Include in the urban development strategy the need for protection and regeneration of ecology and the need to meet natural environmental laws and standards.
- Develop a standard for the introduction of green roofs in urban areas to slow water run-off and cool the areas in high temperatures.
- Develop a national flood protection strategy which integrates protection of natural systems to limit flash flooding and requires

porosity to be maintained in cities so that flood risk is mitigated. Develop strategies to protect urban areas against sea level rise.

 Develop a national weather forecasting service which can support resilient urban life and give warnings of extreme local weather events to municipal authorities.



- Support the ability of national and regional systems models to connect with Earth systems models so that future climate change scenarios can be tested and adaptation investments targeted better.
 Complete water catchments will need to be modelled so that risks in urban areas within them can be reduced and mitigated. The International Centre for Earth Simulation (ICES) has been created to support this if needed. 49
- Support further research into urban agriculture including co-benefits from improved community cohesion, mental health, movement and physical health, air quality, reduction of greenhouse gas emissions from shorter supply chains.





 Businesses in cities need productive healthy workers and therefore have an interest in ensuring that the city maintains an attractive safe green environment. Businesses can engage in working with other stakeholders through the collaboratory to input into planning and development to ensure biodiversity and green spaces thrive.

Ecology, soils, water and urban agriculture



- Every major faith has developed a statement about its relationship with nature. The world, despite all its problems, is still a beautiful place. Sometimes it is the role of faiths, within all the doom and gloom of ecological predictions, to remind people to celebrate the beautiful, good, heroic and brave things about the world and about life. Celebrate good new developments, the potential for better protection of habitats and eco- systems ¹⁰⁶.
- Faith, NGO and community groups are often ready to play a leading role in the restoration and conservation of the environment
- The faith's places of worship contain a wealth of biodiversity of national importance for which most recognize its responsibility for sustainable management. For example a Shinto shrine is a place for children to play in nature. By touching lives of animals, insects and other living things in a shrine forest directly, children learn what life is. And as children grow up, they learn the significant role that the forest plays as a part of environment, and they gradually recognize that human beings are a part of nature. Some faiths plan partnerships which will be developed to monitor and record this biodiversity and extend the use of its own - and partners - land for mental and physical recreational treatment activities and community use ¹⁰⁶.
- Eco developments are being planned around historic religious cultural sites.



theme 10 Cultural heritage



- Include culture and heritage in integrated urban policies and invest adequate budget to safeguard and promote cultural and natural heritage, cultural infrastructures and sites, museums, as well as traditional knowledge and the arts, highlighting the role that these play in the rehabilitation and revitalization of urban areas through tangible and intangible benefits, as a way to strengthen social participation and the exercise of citizenship.
- In setting up the GIS based systems platform, engage the community and stakeholders through recording the cultural history of the aggregated urban area, its buildings, industry, infrastructure, natural and intangible assets and its people in using pictures, aural history, film and text. Use the platform to assess the tangible and intangible benefits of this history to the economy and use this to justify investment in maintenance and protection of the assets, particularly against the impacts of climate change. ⁸⁸

museums, as well as traditional knowledge and the arts, highlighting the role that these play in the rehabilitation and revitalization of communities through tangible and intangible benefits, as a way to strengthen social participation and the exercise of citizenship.

 Make the cultural history of urban areas available to the community from national, community, Indigenous people and faith archives so that all the data can be loaded into the GIS platform. This can include the cultural history of buildings, industry, infrastructure, natural assets and its people in digital form using pictures, aural history, film and text. ⁸⁸



• Carry out research into the intangible benefits of cultural heritage to feed into the value to the urban economy, so that heritage protection can be justified.



- Develop national policy for culture and heritage and invest adequate budget to safeguard and promote cultural and natural heritage, cultural infrastructures and sites,
- Businesses can benefit from making a contribution to the success of urban areas by supporting art, culture and protection of cultural heritage, which their customers including tourists can enjoy. The Collaboratory can be turned into an art and cultural centre with business support to encourage more participation.
- Art and culture should also be utilized as

an effective engagement approach that allows for alternative ways of expression. Ref: "The City We Need" - World Urban Campaign



- UNESCO plays a leading role in the The term "Sacred site" embraces areas development and promotion of the of special spiritual significance to peoples protection of cultural and natural heritage in and communities: and the term of "Sacred all its forms. A number of research studies natural site" corresponds to the areas and analyses of religious heritage and of land or water having special spiritual sacred sites have been carried out by the significance to peoples and communities," Advisory Bodies - ICCROM, ICOMOS and as proposed by the UNESCO/IUCN IUCN. There were a number of conclusions *Guidelines for the Conservation and* and recommendations drawn from previous Management of Sacred Natural Sites, 2008 meetings and activities on religious and According to ICCROM, living religious sacred heritage, such as the ICCROM heritage has characteristics that distinguish 2003 Forum on the conservation of Living it from other forms of heritage. Sacred Religious Heritage, the 2005 ICOMOS sites, which, according to the UNESCO General Assembly resolution calling for the MAB Programme, "are indeed the oldest "establishment of an International Thematic protected areas of the planet", and "have Programme for Religious Heritage", a vital importance for safeguarding cultural and 2011 ICOMOS General Assembly and biological diversity for present and *Resolution* on Protection and enhancement future generations." Collectively, the of sacred heritage sites, buildings and religious and sacred properties capture a landscapes, as well as the UNESCO MAB/ range of cultural and natural diversity, and IUCN Guidelines for the Conservation and each can singularly demonstrate the spirit Management of Sacred Natural Sites. of a particular place. Several recommendations directly or
- indirectly concern the safeguarding of the spirit of place, namely their living, social and spiritual nature, in particular the <u>Nara</u> <u>Document on Authenticity</u> adopted at the Nara Conference on Authenticity in relation to the World Heritage Convention held in 1994 and the <u>Quebec Declaration on the</u>



<u>Preservation of the Spirit of Place</u>, adopted at the 16th General Assembly of ICOMOS in 2008.

 The term "Religious property", as used in the ICOMOS study "*Filling the Gaps - an* <u>Action Plan for the Future</u>", defines "any form of property with religious or spiritual associations: churches, monasteries, shrines, sanctuaries, mosques, synagogues, temples, sacred landscapes, sacred groves, and other landscape features".

theme 11

Community Participation, social mobilization and inclusion





- Facilitate effective participation and collaboration among all stakeholders in a collaboratory, including local government, the private sector, civil society and indigenous people, including professionals, academic institutions, trade unions, employer's organizations, grassroots communities, and others, in identifying the opportunities for urban economic development as well as in identifying and addressing existing challenges. In this consider the empowerment of women and their full and equal participation in the economy to enhance economic growth and productivity.
- Use this collaboration and participation to adopt and implement integrated regional policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, and resilience to disasters.
- Develop visible, substantial and sustainable strategies and policies aimed at older people and people with disabilities to "leave no one behind".
- Hold "hackathons" to invite the community to improve the systems platform to meet their needs and use the Collaboratory to help entrepreneurs start new businesses.
 Foster stakeholder engagement in cities for more inclusive and transparent urban management. This would help to raise awareness on current and future challenges; ensure the accountability of city managers and service providers to end

users and citizens; manage conflicts on service allocations e.g. water allocation, develop dynamic integrated approaches bringing together urban planners, civil society, as well as property developers and long-term institutional investors. ¹¹



- Encourage the participation of local communities in decisions affecting their communities, such as in improving drinking water and sanitation management. By 2020, increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change and resilience to disasters in accordance with the agreement made at the Third International Conference on Financing for Sustainable Development in Addis Ababa. This can be done by creating a National RIIF to scale up the use of integrated systems platforms and UDIF's.⁸⁹
- Give support to effective, efficient and coherent funding approaches for the design, implementation and extension of social protection floors and health coverage to "leave no-one behind".
- Ensure transparency and accountability to older citizens and persons with disabilities to guarantee the equitable environment for people of all ages and abilities to be active contributors and participants in development.



- Support setting up integrated systems platforms using an open-source cloud based model. Help to host each platform on a dedicated local cloud and support the population of data from public sector agencies, private sector and civil society organizations, within a trusted independent collaborative laboratory or Collaboratory. Carry out research to improve performance over time using RIIF funding.
- The CHEER approach can support collaborative decision making with communities having appropriate and inclusive access. Grant funding from the RIIF can enable this to proceed without delay.
- Support the Collaboratory with data and improved modelling so that it becomes trusted and owned by all the community. The Collaboratory may have a crosssector Steering Board, established with representation from local government to develop and support the delivery of agreed strategies and objectives. This governance structure will have to be evolved to suit local circumstances.
- Communities can be mobilized to crowd source data and provide real time feedback.





- Companies develop new business models in which products, or components of products, are returned to the manufacturer as part of the transition to a circular urban economy. This will require a new customer relationship with 'consumers' becoming 'users'. Within leasing or performance contracts, use customer insights and feedback for improved personalization, customization, waste reduction and customer retention. Use the Collaboratories to test new product ideas and develop user relationships. ⁵⁴
- The CHEER approach can support collaborative decision making with communities having appropriate and inclusive access. Grant funding from the RIIF can enable this to proceed without delay.
- Support the Collaboratory with data and improved modelling so that it becomes trusted and owned by the community.

Community Participation, social mobilization and inclusion



theme

- Faith groups are ready to support social mobilization at global, national, regional and local village scale. They are unique in having the structures in place to do this and support smart partnerships that can be developed across the scales.
- GreenFaith ¹⁰⁹ are creating high-quality, well-run multi-faith national hubs in at least fifteen countries spread across North and South America, Europe, Asia, Africa and Australia/Oceania and over 1,000 well- established local GreenFaith Circles across the globe. The hubs will function as centers of policy advocacy and campaign coordination, and as clearinghouses of information and resources for local faithbased environmental efforts. These Circles are being tested in several US locations, and there is a plan to launch Circles in several other countries.
- Faith groups are experts in convening and organizing events, consultation meetings, workshops, interfaith meetings, establishing records and producing documents. They have often established an environmental and conservation ethos and demonstrated the values of energy conservation, environmental management and increased focus on poverty reduction strategies. In many places they have amassed a working knowledge of the operation of many stakeholders and partners in communities, and are in a great position to move collaborative action forward.

- Faith groups often work with constituencies that have suffered exclusion and marginalization with a focus particularly on communities or societies where exclusion or oppression exists along dimensions such as ethnicity, race, gender, class, religion, sexual identity, age, physical disability, or ideology.
- Faith communities focus on intergenerational programs to learn, to act and to celebrate with people of all ages and help transfer knowledge from the old to the young ¹⁰⁶.





Image by: Wu. The Shadow Play Boy, Chengdu

theme 12 Public awareness and education



- Contribute to the national strategy for continuous education and training to provide for effective and flexible options for all people in the region, irrespective of their labour market status, to upgrade their skills throughout life, involving formal and nonformal sectors. ²⁴
- Strengthen the evidence-base on current and projected skills imbalances across occupations and regions and, from this, develop a regional skills strategy. Make sure that this information is used by policy makers, public officials and heads of agencies or institutes at different administrative levels.
- Contribute to the high-quality lifelong career guidance system to provide youth and adults with personalised advice on labour market opportunities, education and training options. Apply a whole-oflocal government approach to setting up a lifelong career guidance system, involving all relevant institutions.
- Require education institutions to publish information on employment outcomes of graduates by field of study, to improve market signalling on the performance of institutions.
- Redirect public investment towards skills development that meets labour market demand for strong foundation skills, technical skills and 'soft' skills across the lifecycle.

- Help the Ministry of Education and cities to develop "best practice" for regional and local skill development and support a pilot in some urban areas and regions.
- Appoint regional facilitators to coordinate with employers and the education system (these facilitators can be, for example, knowledge parks, study centres, business gardens or other skills groups that are already established in the regions and can then become Collaboratories). Regional facilitators can: (i) identify the local labour market needs by having regular meetings with employers from different sectors; (ii) cooperate and have regular meetings with Universities and skill-suppliers and negotiate on behalf of the companies to get relevant studies and courses delivered locally; (iii) proactively recruit sufficient numbers of participants for local courses.



- Set up a national strategy for continuous education and training in partnership with regional government to provide for effective and flexible options for all people, irrespective of their labour market status, to upgrade their skills throughout life, involving formal and non-formal sectors. ²⁴
- Strengthen the evidence-base on current and projected skills imbalances across occupations and regions. Make sure that this information is used by policy makers, public officials and heads of agencies and

institutes at different administrative levels.

- Establish a high-quality lifelong career guidance system to provide youth and adults with personalised advice on labour market opportunities, education and training options. Apply a whole-ofgovernment approach to setting up a lifelong career guidance system, involving all relevant institutions.
- Require education institutions to publish information on employment outcomes of graduates by field of study to improve market signalling on the performance of institutions.
- Work with regional facilitators to coordinate • with employers to facilitate a flow of applicants for courses (these facilitators can be, for example, knowledge parks, Use the CHEER approach to redirect public investment towards skills development that study centres, business gardens or other skills groups that are already established meets labour market demand for strong foundation skills, technical skills and 'soft' in the regions and can then become skills across the lifecycle. Collaboratories).
- Develop a national system and "best practice" for regional skill development starting with a pilot in some regions.



- Contribute to the national strategy for continuous education and training to provide for effective and flexible options for all people in the region, irrespective of their labour market status, to upgrade their skills • throughout life, involving formal and nonformal sectors. 24
- Contribute to the high-quality lifelong career guidance system to provide youth and adults with personalised advice on labour market opportunities, education



and training options. Support whole-oflocal government approach to setting up a lifelong career guidance system.

- Publish information on employment outcomes of graduates by field of study to improve market signalling on the performance of institutions.
- Help the Ministry of Education develop • "best practice" for regional skill development and support a pilot in some regions.



- Contribute regularly to the evidence-base on current and projected skills imbalances across occupations and regions so that education can be targeted.
- Offer apprenticeships to all members of the community to support inclusive development.
- Actively promote equality in employment.
- Contribute to the high-quality lifelong • career guidance system to provide youth and adults with personalised advice on labour market opportunities and education and training options.

theme Public awareness and education



- Faith groups are increasingly distributing educational resources on climate change, climate justice and the ethical and practical principals of sustainable living in global and local contexts. They also have many education programs in which ecological issues are addressed including scientific, ethical, spiritual and action. Some collect good practice from all over the world covering biodiversity, natural resources, energy, water, food, global climate change 106
- Some groups also focus on teaching • entrepreneurial skills and economic enterprise development as part of support to job creation and community-led development.
- Faiths have many guidelines on diet and • lifestyles and these are gradually being changed to support promotion of healthy living and built into community learning systems.

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theme 13 Knowledge sharing



- Work with one or more of the learning and sharing networks for urban areas and cityregions such as UCLG, C40, 100 Resilient Cities, R20 and ICLEI.
- Cities Alliance have a platform for members, called the CDS Sub-Group, to increase collective know-how on city development strategies and are trialling this approach within the Future Cities Africa Programme. ⁹⁰
- The Medellin Collaboration on Urban Resilience (MCUR) and Cities Alliance have brought together 17 international development partners, under a Cities Alliance Joint Work Programme on Resilient Cities, to facilitate the flow of global knowledge and resources on a global level. The aim is to help cities become more resilient by fostering harmonisation of resilience approaches and diagnostic tools, catalysing access to innovative finance mechanisms and supporting institutional capacity development of cities by facilitating direct sharing of good practice. ⁹¹
- The World Bank and Global Economic Forum (GEF) "Global Platform for Sustainable Cities" is mobilizing \$1.5bn through to 2020 with a focus on translating knowledge into action and investment. This is a part of the "Sustainable Cities Integrated Approach Pilot". ⁹²
- The Green Growth Knowledge Platform (GGKP) is a global network of international

organizations and experts that identifies and addresses major knowledge gaps in green growth theory and practice. By encouraging widespread collaboration and world-class research, the GGKP offers practitioners and policymakers the policy guidance, good practices, tools, and data necessary to support the transition to a green economy. ⁹³



 Global Green Growth Institute provides an open, global platform for the sharing of experience and insight among countries that are pursuing rigorous green growth strategies. ⁹⁴



- Interdisciplinary collaboration is now being organised by ICSU-Future Earth across the fields of natural and social sciences, humanities, economics and technology development to find and share the best scientific solutions to multi-faceted global challenges. ⁹⁵
- Information generated is being made available to support policy makers in making global, national and regional integrated assessments.



- The Global Cities Business Alliance provides a forum where business and municipal leaders come together to define, shape and implement initiatives for jointly improving city performance. The first two initiatives of the GCBA focus on citybusiness knowledge sharing and dialogue, and secondly, housing for inclusive cities. This is focused on addressing the impact of access and affordability of housing in cities.⁹⁶
- The CE100 Initiative brings together private companies with the objective of innovating, developing and implementing circular economy opportunities. It provides opportunities to collaborate, capacity build and network, as well as opportunities for research and insight, that could be further enhanced with the Collaboratories to accelerate circular economy transitions in urban contexts.
- Banks and insurance companies use their customer base to create labs or networks of labs to identify catalytic instruments and pilot new funding models in demonstration regions. These labs focus on using development bank and concessionary capital to identify, pilot and evaluate new instruments, models and mechanisms for financing infrastructure for the New Urban Agenda.





Faith institutions strongly recognize the role of learning and capacity building through their community. For example the Bahá'í community has built systems of learning and capacity building into its operational processes. They working at levels ranging from the national to the neighbourhood, they contribute to a global system of learning in which experiences around a particular line of action can be systematically collected from local communities, aggregated at the national or global level, and analysed to identify significant trends and emerging patterns. Insights that arise from this process can then be disseminated back to the grassroots through these same channels, thereby informing future planning and action. This can be very helpful in supporting smart partnerships that are needed across different scales ¹⁰⁶.

theme 14 Co-design and co-production



- Computer-assisted modelling, simulation, visualisation, monitoring, and assessment platforms, can be adopted to supervise and measure the overall performance of city development efforts. These also help to support the choosing of the right design for investment in new developments, recognising the trade-offs between competing interests and goals. This represents a new approach that pursues guantitative and gualitative improvements at all points in a city, with scientific monitoring, recording, and verification processes to track the successes and setbacks. The combination of the CHEER approach with systems modelling and local monitoring systems, such as the City Prosperity Initiative, currently implemented in more than 400 cities, will reinforce evidenced-based decision making.84
- Urban land use planning can be fully integrated, with sectorial design teams working collaboratively to integrate all aspects of the built environment, ecology and natural systems.
- This enables performance based procurement to be used, with platforms being used as tools to compare the performance of different design proposals and to run policy simulations of possible impacts.
- Building Information Management (BIM) and Infrastructure Information

Management (IIM) systems can interface with the regional data platform to enable construction and operation phases to be monitored and to support overall municipal management efforts.



 The systems platforms, linked to Earth systems models, can be used at national scale to enable integrated planning and design of national infrastructure and its interface with urban systems. This will speed up the development and upgrading of national economic and development plans and enable different ministries to work together with common data. The platform will be valuable in carrying out resilience assessments for future climate scenarios in line with disaster risk management plans.



 Co-production is underpinned by six principles. These are common features of much co-produced support, and where all of them come together in one organisation such as a "collaboratory" they can represent truly transformative coproduction .¹¹¹

(i) Assets: transforming the perception of people from passive recipients of services

and burdens on the system into one where they are equal partners in designing and delivering services.

(ii) Capacity: altering the delivery model of public services from a deficit approach to one that recognises and grows people's capabilities and actively supports them to put them to use at an individual and community level.

(iii) Mutuality: offering people a range of incentives to engage with, enabling them to work in reciprocal relationships with professionals and with each other, where there are mutual responsibilities and expectations.

(iv) Networks: engaging peer and personal networks alongside professionals as the best way of transferring knowledge.
 (v) Blur roles: removing tightly defined boundaries between professionals and recipients, and between producers and consumers of services, by reconfiguring the ways in which services are developed and delivered.

(vi) Catalysts: enabling public service agencies to become facilitators rather than central providers themselves.

 Co-design and co-production research ⁵² is needed to develop a better understanding of:

(i) urbanisation and urban systems as complex processes of coupled urban- (or town-)rural systems with multi-dimensional regional and global impacts, including their institutional and governance drivers.
(ii) the multi-dimensional (e.g. climate, resource use, social, cultural) costs and benefits of different urban-rural arrangements in different contexts.
(iii) how people value nature, culture



and social inputs and outcomes in the urbanisation process.

(iv) how to include natural, social, cultural and economic values, including 'hidden' costs/benefits/footprints, into the monitoring and assessment of alternative urbanisation pathways at different scales.

(v) to help identify solutions.

(vi) technical, social and institutional innovations to resolve potential conflicts among values, e.g. environmental (e.g. resource use efficiency, circular economies), social (e.g. health, jobs, social support) and cultural outcomes, with a special focus on air pollution, human health and low carbon development.

(vii) developing policy tools for promoting particular urban-rural configurations (e.g. size of cities and urban clusters, rural productivity, and their connectivity).

- (viii) determining how an understanding and prioritizing of different values can promote transformations in consumption patterns.
- (ix) assessing and applying traditional and local knowledge in urban design at all scales.
- Research focus is also needed on process development for:

 (i) approaches to 'collective intelligence' by understanding how to carry out codesign and co-production for sustainable urbanisation, including developing 'living Collaboratories' for "learning by doing".
 (ii) exploring the potential of big data, social media, robust integrated systems modelling tools and collaborative platforms for supporting urban decision making.
 (iii) engaging with humanities and psychology to bring cultural and spiritual

theme 14 Co-design and co-production

considerations more deeply and openly into urban systems, and their relationships to their rural counterparts.

(iv) linking beyond government only, to communities, the private sector, and industries such as the services and e-commerce sectors.



New business models based on co-design and co-production principles, using the Collaboratories to drive innovation, will lead to less product complexity and more manageable product life cycles. The aim in developing the circular economy is to provide stable product platforms, sometimes reusable product kernels or skeletons, and treating other components or parts of the product as add-ons (such as software, casings, or extension devices), enabling shorter product life cycles and providing highly customized solutions whilst keeping product portfolio complexity low. ⁵⁴



- Co-production means delivering public services in an equal and reciprocal relationship between professionals, people using services, their families and their neighbours. Where activities are coproduced in this way, both services and neighbourhoods become far more effective agents of change.
- A co-productive research process is based on bringing academic research and community life, together. Authenticity has been proposed as a means of gleaning wider community voices in decision-making and research, exploring non-elected forms of representation to give the potential for deeper roots to the community, expertise and special credentials, and opening up to wider interests and voices such as the faith groups.

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theme 15 Infrastructure transport and utilities



- Assist in the adoption and implementation of national urban policies and in the development of long term strategies for sustainable infrastructure development in the region to enable access to basic services for all.
- It is critical that regional and local strategies are linked with the National Infrastructure Plan so that an integrated approach is possible, particularly with regards to the key areas of the urban SDGs, such as lowering greenhouse gas emissions, mobility and public transport, disaster risk, access to clean water, waste management and the internet, among others.
- Infrastructure developments are still significant in many urban agglomerations. It is critical to conceive and implement new and existing infrastructure with a view to their potential exposure to disaster risks. Infrastructure damage in urban areas has been proven to be causing not only the highest direct economic damages, but also triggers the disruption of business operations. 60
- Critical infrastructure facilities, especially health, transport, education, energy and water, have to be identified and their resilience improved. The destruction or disruption of critical infrastructure services not only has economic impacts, but also puts vulnerable people at high risk. Addressing these issues will, in many

countries, require crucial coordination between public authorities and private operators.⁶⁰

- A significant proportion of demand for infrastructure services comes from urban areas. National urban policies can aim to integrate demand reduction per capita as the urban population grows, so that infrastructure costs per capita are reduced.
- Infrastructure developments are still significant in many urban agglomerations. It is critical to conceive and implement new and existing infrastructure with a view to their potential exposure to disaster risks. Infrastructure damage in urban areas has been proven to be causing not only the highest direct economic damages, but also triggers the disruption of business operations. 97
- The average global investment in infrastructure required to meet Global Goal objectives is estimated to be 4.8% GDP per annum using the figures referenced in the introduction. Of this, transport is estimated to be 1.4% GDP per annum, energy 2.1% GDP per annum, water supply, waste and flood management 1% GDP per annum and communications 0.3% GDP per annum. Some of the investment might be used to take out existing infrastructure in urban areas and replace it with more sustainable solutions.
- The energy investment can be broken down into average global proportions of maintaining oil and gas supply, 57%, transmission, 18% and power generation, 25% (including new and replacement power stations). These costs and the ratio to GDP will vary enormously from place to place and country to country but they

are a useful guide. These investment costs can be reduced significantly by reducing demand through energy efficiency programs in urban areas. 98

- In the 2°C trajectory of global warming it is estimated that by 2030, 70% of all new power generation globally will be renewable with a small amount of nuclear. Integrating renewable energy generation and storage in the fabric of urban areas will be a useful way to contribute to this change.
- services; also enabled by an integrated Energy is a critical part of housing, commercial, industrial, transport, water spatial and transport planning through and waste strategies, and so by integrating Sustainable Urban Mobility Plans these, significant changes can be made (c) Better and coordinated transport-land in reducing the energy infrastructure investment needs both regionally and nationally. Globally, investments in energy and small island developing states. are usually made at the national level, Create frameworks for the organization, with 50% of energy investments made procurement, and regulation of transport by national governments. Changes to and mobility services for people and investment in renewables can move energy goods in urban and metropolitan areas, including new technology that enables infrastructure investment into urban areas shared mobility services, as well as through incorporation of renewable energy the development of clear contractual into private sector building projects and can therefore reduce overall costs and the need for subsidies. For example, designing the transport and mobility providers which skins of buildings (which are private sector defines mutual obligations. funded) to generate electrical energy for Integrate mobility plans for goods heat and cooling, and designing buildings into overall urban plans with focus on to include energy storage, can reduce consolidation centres at transport hubs energy demand and the need to invest to promote efficient and safe multi-modal in all aspects of energy infrastructure by transport systems with low pollution, low government. Centralized power stations congestion deliveries from the hubs. and oil and gas supply can be transitionally . Evidence from cities with good public replaced by energy generation and storage transport systems, where most people in buildings in urban areas. 99
- Plan for access for all citizens and visitors to safe, affordable, accessible and sustainable transport systems, we need a



massive transformation from the current pattern of "car-oriented" development towards people-oriented development that improves urban access for all delivered through:

(a) A massive increase in public transport, walking, and cycling;

(b) Equitable Transit-Oriented Development (TOD) that minimizes displacement of the poor and features affordable housing and a mix of jobs and use planning, including waterways and for transport use, especially for coastal cities relationship between local authorities and

use them for commuting to work, that around 1.4% GDP is spent on transport infrastructure per year, with around 1% GDP being spent on average every year

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on mass transport solutions like Bus Rapid Transit (BRT) and metro rail throughout their development. The rest is spent on walking, cycling and highway infrastructure. 100

- New forms of procurement contracts are available for global use which are suitable for delivering an integrated set of projects supported by a UDIF. The new Framework Alliance and Term Alliance both govern long-term relationships with joint working by a multi-party integrated team, and include collaborative governance, improved performance systems and agreed measures of success. The Framework Alliance can be used with any standard form project contract, while the Term Alliance is a refreshed version of the successful "TPC Term Partnering Contract". The Project Alliance is a streamlined and refreshed version of the successful "PPC2000 Project Partnering Contract". All three new forms set out clear processes for the early conditional appointment of a main contractor and key subcontractors, with clearly defined activities and shared information which can be generated through the systems platform. ¹⁰¹
- Use integrated urban water resource management (IUWRM) to develop a strategy for the entire urban water cycle, including rainwater, desalination, ground and surface water etc., as well as storage and distribution, treatment, recycling and disposal and the protection, conservation and exploitation of water resources at their origin.
- Integrate demand management into IUWRM and water infrastructure planning - understanding water usage in urban areas, developing tools and strategies for

a deeper and broader reduction, reuse/ recycle of water for different purposes.

- Co-ordinate water issues across policies to strengthen policy coherence for an integrated urban water policy. A strategic vision across sectors (e.g. agriculture, energy, finance, solid waste, transport and land use) can allow a more efficient allocation resource, and foster horizontal and vertical co-ordination ¹¹
- Enable fast and efficient internet • services and connected communication technologies to be available to the population so that everyone can participate in public decision making, businesses can work efficiently and to enable the sustainable use of natural resources using CHEER modelling.

National Infrastructure Plan.

- A significant proportion of demand for infrastructure services comes from urban areas. National urban policies can aim to integrate demand reduction per capita as the urban population grows, so that infrastructure costs per capita are reduced.
- It is critical that regional strategies are linked with the National Infrastructure Plan so that an integrated approach is possible, particularly for lowering greenhouse gas emissions, mobility, disaster risk and access to clean water, sanitation and the internet.
- The average global investment in infrastructure required to meet Global Goal objectives is estimated to be 4.8% GDP per annum using the figures referenced in the introduction. Of this, transport is estimated to be 1.4% GDP per annum, energy 2.1% GDP per annum, water supply, waste and flood management 1% GDP per annum and communications 0.3% GDP per annum. Experience shows that continuous investment at these levels each year for new and maintaining existing infrastructure is desirable. If levels of investment fall away, there is then a need to catch up later which is more difficult.
- The energy investment can be broken down into average global proportions of maintaining oil and gas supply, 57%, transmission, 18% and power generation, 25% (including new and replacement power stations). These costs and the ratio to GDP will vary enormously from place to place and country to country but they are a useful quide. Subsidies are usually made by national government to cover the investment costs for oil and gas. 98



- Create a national infrastructure plan which clarifies the integration and phasing of national infrastructure projects with cityregion and urban area infrastructure plans and projects. This is particularly important with respect to decentralization in energy, water and transport systems, the role of green infrastructure, protecting natural systems that provide services and with providing clarity over changing governance.
- The systems platform can be used to develop long term national strategies for sustainable infrastructure development to enable access to basic services for all the

"To harness the potential of sustainable urbanization, city governance will have to be improved in virtually every country"



Aromar Revi & Cynthia Rosenzweig, UNSDSN

- Energy is a critical part of housing, commercial, industrial, transport, water and waste strategies, and so by integrating these, significant changes can be made in reducing the energy infrastructure investment needs both regionally and nationally. Globally, investments in energy are usually made at the national level with 50% of energy investments made by national governments. Changes to investment in renewables can move energy infrastructure investment into urban areas through incorporation of renewable energy into private sector building projects and can therefore reduce overall costs and the need for subsidies. For example, designing the skins of buildings (which are private sector funded) to generate electrical energy for heat and cooling and designing buildings to include energy storage, can reduce energy demand and the need to invest in all aspects of energy infrastructure by government. Centralized power stations and oil and gas supply can be partially replaced by energy generation and storage in buildings in urban areas. 99
- The integration of airport planning with intercity rail networks can have a big benefit on reducing overall congestion and greenhouse gas emissions. 102
- Making high speed internet available to all city communities is a very important part of enabling participation, inclusion and business efficiency.
- The OECD Principles for Private Sector Participation in Infrastructure is available to assist governments that seek private sector involvement in infrastructure development, in attracting investment and mobilising private sector resources for the benefit of society, to achieve sustainable

theme **15** Infrastructure transport, utilities

development. The Principles cover five important sets of challenges for national authorities. ¹⁰³

- The use of integrated systems platforms, which generate information on the impact of investment, will enable the service level of infrastructure per unit cost to be improved during procurement, which is very desirable if the Global Goals are to be reached. Engineering, Procurement, and Construction Management (EPCM) contracting can be considered for this, where the government selects a head contractor who manages the whole project on their behalf.
- New forms of procurement contracts are available for global use which are suitable for delivering an integrated set of projects supported by a UDIF. The new Framework Alliance and Term Alliance both govern long-term relationships with joint working by a multi-party integrated team, and include collaborative governance, improved performance systems and agreed measures of success. The Framework Alliance can be used with any standard form project contract, while the Term Alliance is a refreshed version of the successful "TPC Term Partnering Contract". The Project Alliance is a streamlined and refreshed version of the successful "PPC2000 Project Partnering Contract". All three new forms set out clear processes for the early conditional appointment of a main contractor and key subcontractors, with clearly defined activities and shared information which can be generated through the systems platform. 101



Knowledge of the actual infrastructure in cities and what is needed for resilient living is surprisingly limited, so a lot of research and knowledge sharing is needed. Investment will be necessary to research the full impact of infrastructure investment across human, ecology and economics compared to that predicted by scenario tests using the CHEER platform. The results can then be fed back into improving the modelling and refining the decision making. It will also be valuable to compare the long term investment rates for different classes of infrastructure as a proportion of GDP.



- Institutional investors, companies and foundations provide a large source of private capital available for investment and will be an integral part of the design and implementation of the strategy to finance the urban development agenda, particularly infrastructure.
- The use of integrated systems platforms, which generate information on the impact of investment, will enable the service level of infrastructure per unit cost to be improved during procurement. It will therefore be important to develop skills in the integration

of design, construction and maintenance of infrastructure with increased use of Engineering, Procurement, and Construction Management (EPCM) contracting, where the client selects a head contractor who manages the whole project on behalf of the client.



Some faith groups now have training workshops on sustainable living in urban environments. The groups work with local environmental associations, forming partnerships to further their work in energy, water and waste management ¹⁰⁶.



Image by: Jerry and Pat Donaho, Idaho Wind Farm

theme 16



- Recognise that security within a smart city requires a systems approach in the same manner as other systems present in the environment: Transport, power and health for example.
- Plan for a safe and secure environment so that everyone can live, work, and participate in urban life without fear of violence and intimidation. Integrate measures for urban safety and violence and crime prevention into all urban planning efforts, including informal areas, through resilience building, disaster prevention and mitigation, safer public places and working places, and transportation systems, while supporting community awareness around safety.
- Develop a cross theme risk management model that recognises the interdependencies and vulnerabilities that exist between all of the systems existing within the city.
- Deliver preventive security policies in respect of all systems upon which the city relies and the necessary regulatory framework to ensure their compliance.
- Develop an urban security strategy that integrates with national security strategy in respect of both the physical and the digital domains.
- Establish a multi-agency forum through which security events and threats can be managed coherently across the entire

urban environment.

- Establish the necessary funding mechanism to support identified security structures.
- Provide the necessary capabilities to allow an integrated multi-agency response to security events and threats.
- Establish citizen "buy-in" to securing the city in support of a national approach.
- Localise responsibility for security through the establishment of formal local government structures.



- Develop a whole of society approach to security and obtain the "buy-in" of the State's population.
- Develop a national security regulatory framework.
- Collaborate with Regional and International partners to develop joint mechanisms through which coordinated responses can occur in mitigation of security threats and events.
- Establish a framework through which national security capability can be deployed in support of municipal agencies in response to a security event or threat.



- Develop the concept of the "Safe City" to inform Public/Private Sector development.
- In partnership with the Private Sector design secure physical and digital systems for use in smart cities.
- Develop risk management theory and practice that integrates the physical and the digital domains within the urban environment.
- In conjunction with the National Government develop a national security education framework.

- Establish a strong partnership with the Municipal Government and Academia in delivering the philosophy of a secure urban environment.
- In conjunction with Academia, develop and employ integrated modelling systems to enable investment by the Public and private Sectors to be risk assessed against current and future security challenges.
- Adopt a "security through design" approach to the construction of the smart city that includes the mitigation of legacy capability issues.





- Much of the conflict in the world today can be perceived to be triggered by religion, but there are many more people from the different faith traditions promoting peace who are available to be strong voices in the collaborative transformation toward resilient, sustainable cities.
- Many faith groups have a history of conflict resolution and have tracking records of peace and conflict issues. They have networks which are often active in flashpoint areas of cities. They are also often prepared to share information and provide rapid response to local needs ¹⁰⁶.

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6. Population and GDP Figures¹⁰⁴

Africa

Country	Total Population 2014 (million)	Urban Population 2015 (million)	Projected Urban Population 2030 (million)	GDP per capita 2014 (\$ USD)	Total GDP 2014 (USD \$ millions)
Algeria	38.93	28.74	37.57	5484.10	213520
Angola	24.23	10.05	18.91	5900.50	142955
Benin	10.60	4.78	7.95	903.50	9576
Botswana	2.22	1.18	1.46	7123.30	15813
Burkina Faso	17.59	5.35	10.90	713.10	12543
Burundi	10.82	1.30	2.83	286.00	3094
Cabo Verde	0.51	0.33	0.42	3641.10	1871
Cameroon	22.77	12.72	20.49	1407.40	32051
Central African Republic	4.80	1.92	2.93	358.50	1722
Chad	13.59	3.06	5.55	1024.70	13923
Comoros	0.77	0.22	0.33	810.10	624
Congo	4.50	3.05	4.80	3147.10	14178
Côte d'Ivoire	22.16	11.54	18.42	1545.90	34253
Democratic Republic of the Congo	74.88	30.28	52.25	442.30	33118
Diibouti	0.88	0.70	0.85	1813.60	1589
Egypt	89.58	36.54	47.86	3198.70	286538
Equatorial Guinea	0.82	0.32	0.50	18918.30	15530
Eritrea	5.11	1.53	2.95	544.50	2783
Ethiopia	96.96	19.27	36.91	573.60	55616
Gabon	1.69	1.53	2.12	10772.10	18180
Gambia	1.93	1.18	2.02	484.10	933
Ghana	26.79	14.58	22.06	1441.60	38616
Guinea	12.28	4.59	7.82	539.60	6624
Guinea-Bissau	1.80	0.88	1.44	567.80	1022
Kenya	44.86	11.98	21.77	1358.30	60938
Lesotho	2.11	0.58	0.86	1034.20	2181
Liberia	4.40	2.24	3.60	457.90	2013
Libya	6.26		6.10	6573.40	41143

Madagascar	23.57	8.51	15.96	449.40	10593
Malawi	16.70	2.82	5.31	255.00	4257
Mali	17.09	6.49	13.09	704.50	12037
Mauritania	3.97	2.44	3.77	1275.00	5061
Mauritius	1.26	0.50	0.52	10016.60	12630
Morocco	33.92	20.44	26.26	3190.30	108219
Mozambique	27.22	8.74	14.83	585.60	15938
Namibia	2.40	1.12	1.79	5408.20	12995
Niger	19.11	3.61	8.47	427.40	8169
Nigeria	177.48	87.68	159.24	3203.30	568509
Rwanda	11.34	3.58	7.38	695.70	7890
Sao Tome and Principe	0.19	0.13	0.20	1810.70	337
Senegal	14.67	6.54	11.00	1067.10	15657
Seychelles	0.09	0.05	0.06	15543.20	1423
Sierra Leone	6.32	2.52	3.77	766.00	4838
Somalia	10.52	4.40	7.98	542.60	5707
South Africa	54.00	34.66	41.45	6482.80	350084
South Sudan	11.91	2.29	4.08	1115.10	13282
Sudan	39.35	13.39	21.39	1875.80	73813
Swaziland	1.27	0.27	0.35	3477.10	4413
Тодо	7.12	2.87	4.78	635.00	4518
Tunisia	11.00	7.51	8.87	4420.70	48613
Uganda	37.78	6.46	13.95	714.60	27000
United Republic of Tanzania	51.82	16.53	33.26	955.10	49496
Zambia	15.72	6.35	12.04	1721.60	27066
Zimbabwe	15.25	4.87	6.85	931.20	14197
TOTALS (billion)	1.155	0.465	0.768	2138.475	av 2,470

Country	Total Population 2014 (million)	Urban Population 2015 (million)	Projected Urban Population 2030 (million)	GDP per capita 2014 (\$ USD)	Total GDP 2014 (USD \$ millions)
Afghanistan	31.63	8.55	14.79	633.60	20039
Armenia	3.01	1.87	1.89	3873.50	11644
Azerbaijan	9.54	5.25	6.26	7884.20	75198
Bahrain	1.36	1.21	1.48	24855.20	33851
Bangladesh	159.08	54.98	83.16	1086.80	172885
Bhutan	0.77	0.30	0.43	2560.50	1958
Brunei Darussalam	0.42	0.33	0.40	40979.60	17104
Cambodia	15.33	3.25	4.90	1094.60	16778
China	1364.27	779.48	998.93	7590.00	10354809
China, Hong Kong SAR	7.24	7.31	7.89	40169.50	29089
China, Macao SAR	0.58	0.58	0.70	96038.10	55501
India	1295.29	419.94	583.04	1581.50	2048503
Indonesia	254.45	137.42	184.91	3491.90	888530
Iran	78.14	58.32	72.54	5442.90	425328
Iraq	34.81	24.85	36.88	6420.40	223509
Israel	8.22	7.30	8.97	37208.00	305674
Japan	127.13	118.57	116.92	36194.40	4601459
Jordan	6.61	6.44	8.10	5422.60	35827
Kazakhstan	17.29	8.93	10.36	12601.70	217872
Kuwait	3.75	3.52	4.76	43593.70	163612
Kyrgyzstan	5.83	2.04	2.75	1269.10	7404
Laos	6.69	2.71	4.48	1793.50	11997
Lebanon	4.55	4.44	4.63	10057.90	45730
Malaysia	29.90	22.90	30.18	11307.10	338104
Maldives	0.40	0.16	0.25	7635.50	3061
Mongolia	2.91	2.11	2.72	4129.40	12016
Myanmar	53.44	18.47	25.10	1203.80	64327
Nepal	28.17	5.29	8.24	701.70	19770

Oman	4.24	3.23
Pakistan	185.04	72.92
Philippines	99.14	45.17
Qatar	2.17	2.33
Republic of Korea	50.42	41.03
Saudi Arabia	30.89	24.85
Singapore	5.47	5.62
Sri Lanka	20.64	3.97
Tajikistan	8.30	2.31
Thailand	67.73	33.95
Timor-Leste	1.21	0.38
Turkey	75.93	56.29
Turkmenistan	5.31	2.69
United Arab Emirates	9.09	8.19
Uzbekistan	30.76	10.80
Vietnam	90.73	31.37
Yemen	26.18	8.84
TOTALS (billion)	4.26	2.06

2.69	6044.5	av	2,577
16.68	1408.10		3689
43.74	2052.30		186205
13.96	2036.70		62644
10.92	43962.70		399451
3.47	9031.50		47931
68.84	10515.00		798428
0.64	1169.00		1416
43.14	5977.40		404825
3.47	1114.00		9241
4.87	3819.20		78824
6.58	56284.60		307859
30.60	24161.00		746249
44.11	27970.50		1410383
2.75	96732.40		210109
59.22	2872.50		284775
107.88	1316.60		243629
4.08	19309.60		81796

Europe

Country	Total Population 2014 (million)	Urban Population 2015 (million)	Projected Urban Population 2030 (million)	GDP per capita 2014 (\$ USD)	Total GDP 2014 (USD \$ millions)
Belarus	9.47	7.10	6.91	8040.05	76139
Bulgaria	7.22	5.26	4.87	7851.27	56717
Czech Republic	10.51	7.87	8.21	19529.84	205270
Hungary	9.86	7.06	7.33	14028.72	138347
Poland	38.00	23.14	23.44	14342.91	544967
Republic of Moldova	3.56	1.55	1.50	2238.90	7962
Romania	19.91	11.77	11.87	9996.67	199044
Russian Federation	143.82	105.16	101.94	12735.92	1831674
Slovakia	5.42	2.93	2.95	18501.15	100249
Ukraine	45.36	31.12	29.28	3082.46	139829
Channel Islands	0.16	0.05	0.06		0
Denmark	5.64	4.96	5.40	60707.25	342362
Estonia	1.31	0.87	0.83	20161.58	26485
Faroe Islands	0.05	0.02	0.02		0
Finland	5.46	4.60	4.88	49823.70	272217
Iceland	0.33	0.32	0.37	52004.49	17036
Ireland	4.61	2.99	3.64	54374.35	250814
Isle of Man	0.09	0.05	0.05		0
Latvia	1.99	1.37	1.28	15719.24	31287
Lithuania	2.93	2.00	1.93	16506.86	48354
Norway	5.14	4.14	4.90	97307.42	499817
Sweden	9.69	8.32	9.40	58938.77	571090
United Kingdom	64.51	52.73	58.84	46331.98	2988893
Albania	2.89	1.84	2.28	4564.39	13212
Andorra	0.07	0.07	0.07	42806.50	2013 3116

Bosnia and Herzegovina	3.82	1.52
Croatia	4.24	2.51
Greece	10.96	8.68
Italy	61.34	42.17
Malta	0.43	0.41
Montenegro	0.62	0.40
Portugal	10.40	6.73
Serbia	7.13	5.24
Slovenia	2.06	1.03
Spain	46.40	37.56
TFYR Macedonia	2.08	1.20
Austria	8.53	5.65
Belgium	11.23	10.94
France	66.21	51.67
Germany	80.89	62.17
Liechtenstein	0.04	0.01
Luxembourg	0.56	0.49
Monaco	0.04	0.04
Netherlands	16.85	15.24
Switzerland	1.27	6.09
TOTALS (billion)	0.733	0.547

1.65	4790.05		18286
2.60	13475.26		57113
9.02	21498.42		235574
44.12	34908.50		2141161
0.42	22776.20		9735
0.41	7378.46		4588
7.36	22132.17		230117
5.06	6152.87		43866
1.08	23999.13		49491
39.91	29767.35		1381342
1.27	5455.59		11324
6.16	51190.81		436888
11.47	47352.94		531547
57.33	42732.57		2829192
62.54	47821.92		3868291
0.01	149160.80	2012	5562
0.59	116664.26		64874
0.04	163351.60	2011	6146
16.43	52172.17		879319
7.21	3477.15		4413
0.567	28882.913	av	2,117

Oceania

Country	Total Population 2014 (million)	Urban Population 2015 (million)	Projected Urban Population 2030 (million)	GDP per capita 2014 (\$ USD)	Total GDP 2014 (USD \$ millions)
Australia	23.49	21.39	25.84	61925.50	1454675
New Zealand	4.51	3.97	4.55	44342.16	199970
Fiji	0.89	0.48	0.55	5112.32	4532
New Caledonia	0.27	0.19	0.24		0
Papua New Guinea	7.46	0.99	1.50	2268.16	16929
Solomon Islands	0.57	0.13	0.22	2024.19	1158
Vanuatu	0.26	0.07	0.11	3147.96	815
Guam	0.17	0.16	0.19		0
Kiribati	0.11	0.05	0.06	1509.52	167
Marshall Islands	0.05	0.04	0.04	3529.75	187
Micronesia (Fed. States of)	0.10	0.02	0.03	3057.09	318
Northern Mariana Islands	0.05	0.05	0.05		0
Palau	0.02	0.02	0.02	11879.68	251
American Samoa	0.06	0.05	0.05		0
Samoa	0.19	0.04	0.04	4172.22	800
Tonga	0.11	0.03	0.03	4113.99	434
Tuvalu	0.01	0.01	0.01	3826.90	38
TOTALS (billion)	0.038	0.028	0.034	43847.485	av 1,680

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Latin America and the Carribean

Country	Total Population 2014 (million)	Urban Population 2015 (million)	Projected Urban Population 2030 (million)	GDP per capita 2014 (\$ USD)		Total GDP 2014 (USD \$ millions)
Antigua and Barbuda	0.09	0.02	0.02	13432.08		1221
Bahamas	0.38	0.32	0.38	22217.49		8511
Barbados	0.28	0.09	0.10	15366.29		4355
Cayman Islands	0.06	0.06	0.07			0
Cuba	11.38	8.67	8.60	6789.80	2013	77262
Dominica	0.07	0.05	0.06	7244.50		524
Dominican Republic	10.41	8.41	10.65	6163.58		64138
Grenada	0.11	0.04	0.04	8573.69		912
Haiti	10.57	6.22	8.74	824.16		8713
Jamaica	2.72	1.54	1.76	5104.77		13891
Puerto Rico	3.55	3.45	3.47	28681.70	2013	101774
Saint Lucia	0.18	0.03	0.04	7647.53		1404
Saint Vincent and the Grenadines	0.11	0.06	0.06	6668.89		729
Trinidad and Tobago	1.35	0.11	0.11	21323.75		28883
United States Virgin Islands	0.10	0.10	0.10			0
Belize	0.35	0.15	0.21	4831.18		1699
Costa Rica	4.76	3.84	4.91	10415.44		49553
El Salvador	6.11	4.29	5.00	4119.99		25164
Guatemala	16.02	8.38	13.21	3673.14		58827
Honduras	7.96	4.61	6.76	2434.83		19385
Mexico	125.39	99.25	119.02	10325.65		1294690
Nicaragua	6.01	3.68	4.75	1963.05		11806
Panama	3.87	2.66	3.48	11948.85		46213
Argentina	42.98	38.68	43.78	12509.53		537660
Bolivia	10.56	7.55	10.08	3124.08		32996
Brazil	206.08	174.51	197.46	11384.42		2346076
Chile	17.76	16.05	18.11	14528.33		258062

TOTALS (billion)	0.626	0.501	0.594	9849.546	av	6,164
Venezuela	30.69	27.85	33.48	12771.60	2011	392009
Uruguay	3.42	3.27	3.47	16806.77		57471
Suriname	0.54	0.36	0.41	9680.12		5210
Peru	30.97	24.50	30.16	6541.03		202596
Paraguay	6.55	4.20	5.59	4712.82		30881
Guyana	0.76	0.23	0.27	4053.90		3097
Ecuador	15.90	10.34	13.35	6345.84		100917
Colombia	47.79	37.86	45.90	7903.93		377740

North America

Country	Total Population 2014 (million)	Urban Population 2015 (million)	Projected Urban Population 2030 (million)	GDP per capita 2014 (\$ USD)		Total GDP 2014 (USD \$ millions)
Canada	35.54	29.35	34.30	50235.39		1785387
United States of America	318.86	265.36	305.36	54629.50		17419000
Bermuda	0.07	0.07	0.07	85748.10	2013	5589
TOTALS (billion)	0.354	0.295	0.340	54194.639 a	av	19,210

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	Country	Total Population 2014 (billions)	Urban Population 2015 (billions)	Projected Urban Population 2030 (billions)	GDP per capita 2014 (USD \$)	a Total GDP 2014 (USD \$ billions)	
т	OTALS (billion)	7.171	3.897	4.991	10664.588	av 76,472	

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7. Meeting Participants



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