



Framework document on a Transformational Plan for the Built Environment

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Abstract

The UN Sustainable Development Goals (SDGs), the Paris agreement on Climate change and actions on Biodiversity, Resource-efficiency and Circular economy call for deep transformations in each nation and globally which in turn requires complementary transformations and actions by governments (central, regional and local), businesses of all kinds, the professions, civil society and academia. The main problem is that stakeholders lack a shared understanding of how the 17 SDGs can be operationalized and localised as well as conflicting interests make this a Herculean task. Drawing on earlier work by others and our own work over the last 25 years we have considered what is needed in terms of a Transformational Plan for the global built environment if it is to deliver and progress the UN SDGs, the Paris agreement and actions on resource-management and biodiversity by 2030 under and beyond pandemic health requirements. This document proposes a framework for transformation operations and actions for the built environment based upon an analysis of the context, the principles and key concepts behind and underpinning the plan, the journey from 2020 to 2030. To illustrate the necessary level of operational transformations, we advance an action agenda for all stakeholders, key messages for government, cities, businesses, professionals, civil society, research and science. We propose a global approach based on regional nodes - of the knowledge owners on the ground – and an action timetable for regular monitoring of SDG Transformations and their implementation in the period 2020-2030.

The “hands-on application” of the developed framework for a Transformational Plan to one region, the region of North-West Europe, identified concrete measures to achieve many of the UNSDGs by 2030. The top 12 of the selected examples are:

1. Organize citizen assemblies to develop ideas, build a ‘social mandate’, monitor progress by 2025.
2. Go ‘beyond the fragments’ and create a virtuous movement of the willing involving professions, research communities, building industries, supply chain partners, government, finance sector, clients and the development sector.
3. Reorganisation of responsibilities on the political and governmental levels.
4. Gradually change of the tax system (reduced taxes on labour and increased taxes on land use and primary material usage).
5. Extended and new provision designed and implemented to expand high-quality public green and blue space by 20% in all towns and cities by 2030, where at least 50% of new measures are in vulnerable neighbourhoods.
6. Ban sales of petrol and diesel cars latest by 2030.
7. Cycling infrastructure to be expanded (50%) in all towns and cities and between cities by 2030.
8. Major programmes of renovation and energy efficiency in all existing housing stock across the region by 2021.
9. Energy targets to be introduced on the building stock level.
10. Large scale expansion of sustainable and affordable housing across the region throughout the 10 year period.
11. State run innovative financing schemes for affordable building renovations.
12. Accelerate the shift to low embodied carbon materials and circular economy in all work by 2025.

The Transformational Plan for the Global Built Environment Sector¹

Introduction

2015 was a landmark year for multi-lateral cooperation and agreement on international issues pertaining to sustainability and climate change. Both, the Paris Agreement on Climate Change, and, the 2030 Agenda for Sustainable Development (along with its seventeen Sustainable Development Goals – SDGs at its core), were adopted in 2015 by all the UN member states. The 17 SDGs aim at eradication of depravities that concern the development of humanity. Hence, they span all the material dimensions of life – society, economy and the environment - and represent a shared consensus among nations to prosper sustainably. The proposal to develop SDGs, which could build upon the previously launched Millennium Development Goals for reducing extreme poverty, was first taken up in the 2012 United Nations

Conference on Sustainable Development held in Rio de Janeiro, Brazil. The SDGs were eventually adopted in 2015, at the UN Sustainable Development Summit, as a culmination of negotiations pertaining to the post-2015 development agenda (United Nations, 2020).

The 17 UN SDGs present a coherent set of 17 key objectives and should not be regarded as separate goals, rather they must be advanced together. Each goal allows different entry points into this integrated sustainability agenda for the built environment and is planned to be implemented by 2030. In our discussions with a range of actors involved across the built environment industries and policy making we suggest focussing on 10 key SDGs that surround SDG 11 the SDG for cities (see Fig. 1).



Figure 1: A suggestion for prioritising the UNSDGs for the built environment (www.beyond2020.se).

¹ The term “sector” is used for the built environment in the broadest sense in this paper., although this is not totally correct. In our understanding, it embraces the overall industry devoted to manufacturing building construction materials such as steel, cement, bricks, timber and glass, the construction and the real estate industry, architecture offices, planning offices, engineers, consultantices, the public authorities and the energy utilities responsible for power generation for electricity and commercial heat.

Thus to ensure focus and realistic actions we are concentrating on the following SDGs: SDG 1: No poverty, SDG 3: Good health and well-being, SDG 4: Quality education, SDG 6: Clean water and sanitation, SDG 7: Affordable and clean energy, SDG 8: Decent work and economic growth, SDG 9: Industry, innovation and infrastructure, SDG 12: Responsible consumption and production, SDG 13: Climate action, SDG 15: Life on land. Of course, not all SDGs carry the same importance or urgency on a global scale and a regional differentiation and priority setting are necessary.

Why a transformational plan?

The scale, significance, complexity and urgency of the problems facing the world in terms of urbanisation, demography, uneven development, climate change and biodiversity require clarity and guidance. This guidance must help all actors involved in the global built environment sector, navigate the complexity of the issues so that they can partner in delivering transformational plans and actions, forming a coherent, co-ordinated and cohesive programme of change over time commencing in 2020 to achieve the UNSDGs by 2030.

The UNSDGs have seriously entered the political and societal arena serve as a discussion platform and guiding framework. While tools have been developed to benchmark projects against the UNSDGs and roadmaps have been developed to provide a pathway forward by a few sectors, these are often limited to one SDG without describing concrete actions needed to reach the associated targets.

Given the scale, significance, and complexity of the problem the world faces in terms of urbanisation, demography, uneven development, climate change and biodiversity, clarity and guidance is urgently required to assist all actors involved in the global built environment. This transformational plan will guide those in the built environment professions to navigate the complexity of the issues to partner in delivering transformational plans and actions, forming a coherent, co-ordinated, and cohesive programme of change over time commencing in 2020 to achieve the UNSDGs by 2030.

Why a transformational plan for the built environment?

The built environment represents up to 70% of global wealth, generating 10% of the total GDP and providing 7% of global employment (Royal Institution of Chartered Surveyors, u.d.). The sector causes substantial environmental and social impact through land development and management of built infrastructure. Building construction and operations accounted for the largest share of both global final energy use (36%) and energy-related CO₂ emissions (39%) in 2018 (IEA 2019a, b). It is expected, that with the current trends, cities will host approx. 70% of the world's population and produce 85% of the economic output by 2050. This growth will come at a cost, manifest in the form of poor air quality, water scarcity, emissions, raw material consumption of up to 90 billion tons per year, and natural habitat destruction (Secretary-General, 2019). The social and economic impacts of this environmental damage are often not fully appreciated in the context of liveability and health and the role of the built environment professions.

The construction industry can have a high impact on working towards achieving a few specific goals such as goal 11 (sustainable cities & communities), 9 (Infrastructure & Innovation) and 7 (affordable & clean energy) but can also influence other goals (World Green Building Council, 2020). Research found that 74 of the 169 targets of the agenda (44%) were found to be dependent on construction and real estate activities - of which 29 targets (17%) are directly dependent and 45 targets (27%) are indirectly dependent (Goubran, 2019). And the urban form of the built environment affects lifestyle, social cohesion, resilience, etc., which also plays a huge role on the overall environmental footprint. There is a growing body of research that illustrates opportunities to build the UNSDGs into the building design process. Goubran, (2019), Goubran & Cucuzzella, (2019) and Mossin, et al. (2018) have been able to illustrate how the SDGs interact with the built environment in their guide entitled “An architecture guide to the UN 17 SDGs”.

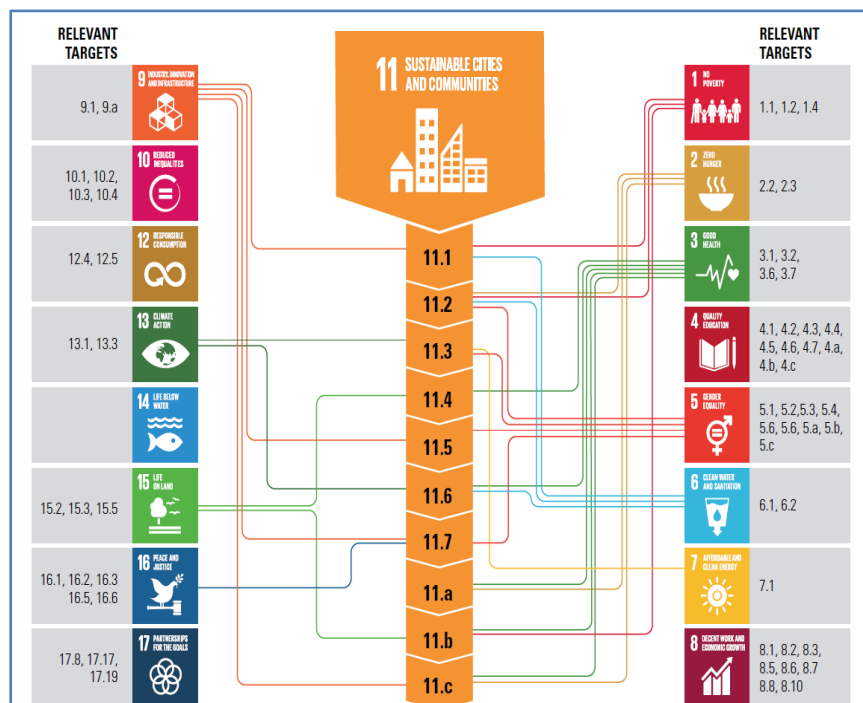


Figure 2: Interlinkages between SDG 11 and other SDGs (UN-Habitat 2018).

Purpose of the transformational plan?

The main purpose of the Transformational Plan is to provide clear guidance to the global built environment and interconnected sectors such as urban planning, urban design, urban landscape and green infrastructure to achieve the UNSDGs by 2030. All these sectors are critical in capturing life cycle assessment at the neighbourhood, city and regional scales.

To do this the draft Transformational Plan will be published and available to all participants at the conference as a focus for conversations on the implementation of the UNSDGs by the global built environment sector. From here it can be enhanced to form the agreed way forward generally for the sector for individual themes, components, actors, stakeholders and regions. It also will contain key messages for all stakeholders.

The Built Environment in the year 2030

This section aims to provide a future picture of the built environment in the year 2030 and with this in mind, we establish through backcasting the journey required to achieve this positive outcome and through it the wider delivery of the UNSDGs.

In doing this we have rejected the notion that business, as usual, will deliver the necessary goals. What is clearly needed if the UNSDGs are to be delivered is a more urgent and radical change and transformational approach.

This position is also supported by the experience globally in 2020 due to the coronavirus epidemic. The previous and idealized notions of places inhabited by coherent, homogeneous communities have been challenged and fragmented by the disruption. Assumptions of space, movement and place and indeed functionality of space have been challenged and are being reassessed. This experience provides an opportunity to rethink what a progressive built environment, town and city might be and what the key parameters might be in realizing new futures.

A journey of 15 years

We are writing in the year 2030. In the last ten years, the world has undergone an incredible change that could not be expected when the UN launched the 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015. Europe has reduced its carbon emissions by 55% compared to 1990, the share of renewable energies is close to 40% and energy efficiency improvements are reaching close to 35%. Physical and mental health and well-being have increased significantly and noise levels have reached tolerable levels. Most European countries are today under the “national emission ceilings for the five key pollutants – sulphur dioxide, nitrogen oxides, non-methane volatile organic compounds, ammonia and fine particulate matter – in order to reduce their harmful effects on the environment and halve their impacts on health compared with 2005”.² Humankind has demonstrated that a sustainable pathway is possible. Despite being only at the beginning of the journey it is apparent that regional differences need to be taken into consideration to achieve “peace and prosperity for people and the planet, now and into the future”³.

What did not seem to be very likely in a couple of decades, started when the Pandemic COVID-19 hit the world. First attempts by single governments revealed quickly that individual governments are powerless against a global pandemic and a long-lost will materialised slowly and gaining more supporters over time. Besides the pandemic, the world faced many more global threats in the year 2020 (see the following chapter for more insights), e.g. climate change and all the associated phenomena such as longer droughts and higher temperatures in some regions and more intense deluges in others with severe economic and social consequences.

² Directive (EU) 2016/2284 of the European Parliament and of the Council of 14 December 2016 on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC (Text with EEA relevance). OJ L 344, 17.12.2016, p. 1–31

³ <https://sdgs.un.org/goals>

Finally, the awareness grew - first among a few stakeholders and states before it achieved stronger backing from a growing number of supporters - that a change for the better can no longer be achieved with only conventional approaches. A stable group gathered around the slogan “build back better” that proposed radical changes on all societal levels including the legal framework, economic principles, etc. After an initial phase of scepticism, more and more people were convinced that change was necessary, even if painful adjustments were made again and again because this change process was wisely politically directed. This broadly based change was built and strengthened by the ‘voice’ of school children and young people and wider community engagement towards a ‘social mandate’ that has underpinned the change process to one of hope and action.

The built environment was one of the sectors that have been affected by the most fundamental changes besides agriculture. Compared to other sectors, e.g. the automotive industry and the energy sector that have already introduced – at least in several countries/regions – a principle change towards e-mobility and increased share of renewable energies, the construction and real estate industry was very fragmented, spoiled by a very high market demand accelerated by a growing population development especially in urbanised areas. At the end of the day, other sectors have not ushered in the new directions voluntarily, rather a change has been forced by political directives accompanied by a changing market, e.g. higher consumer awareness and responsibility, superior competitor offer etc. The same mechanism has governed the change for the better in the built environment as well and the progress achieved within 10 years is substantial. The world has changed drastically in the last decade and as one example, we have developed a more detailed look at the built environment in North West Europe by the year 2030⁴.

A snapshot of the built environment in North West Europe in 2030

The increased population migration towards Europe continued even in the last ten years from 2020 to 2030. People migrate for many different reasons e.g. to find work, follow a particular career path, moving somewhere for a better quality of life or to be closer to family or friends, to escape political persecution, war or environmental causes such as flooding. Europe addressed the pressure on affordable houses by building a hundred thousand units. The pressure on the housing market, especially in highly densified and expensive cities, has been very high for many years and even relatively well off families could not afford to live in these places. This resulted in so-called commuter societies where anonymous new districts have been raised and the inhabitants needed to commute to their workplaces, often individually by car. Today, this has been solved by providing low carbon and affordable buildings that are widespread over the city including their suburbs. The new generation of buildings is following the principle of design for disassembly without compromising the basic principles of a construction product, such as mechanical resistance and stability, safety in case of fire, hygiene, health and the

⁴ In a later stage of the Transformational Plan, the intention is that the different regional nodes provide their visions of the world in their specific region by 2030. At this stage, we wanted to illustrate a possible future for a “spatial envelope” (Germany, Sweden, Denmark, Finland, Netherlands, UK, Ireland, Norway, Belgium, Switzerland) that we feel very much at home in.

environment etc.⁵ A significant proportion of the existing building stock has been renovated and made more energy efficient while social-economic factors have been taken into consideration so that more people can afford to stay and live within urbanised areas. New conceptualisations of ‘functionality’ and ‘people centred’ buildings have responded to new ideas of place, space and community engagement.

New mobility solutions have been developed that do not require owning cars individually. Instead, a low-carbon mode of transportation is offered to all citizens and adapted to the specific purpose of the travel/journey. The system takes economic possibilities, time restrictions and preferences into consideration. These new mobility solutions helped to free valuable space within cities and especially city centres that have been partly renatured to adapt to the consequences of climate change and partly used to form a new mix of renovated and new buildings with mixed uses serviced by new forms of mobility and accessibility. In addition, these opened up spaces can also be used for urban micro forests, allotments and broader green spaces for relaxation and wellbeing.

⁵ REGULATION (EU) No 305/2011 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC.

Where are we now in 2020?

Urbanisation and demography

To be able to understand the scale and speed of urbanization, it is essential to draw on the work of the UN Department of Economic and Social Affairs, available in its 'World Urbanisation Prospects' report, published every 4 years, the most recent being 2018, which we have summarised in the following commentary (UN 2018).

Globally, more people live in urban than rural areas, with 55% of the world's population residing in urban areas in 2018. In 1950, 30% of the world's population was urban, and by 2050, around 70% is projected to be so. There is wide regional variation in urbanisation with Northern America having 82%, Asia approximately 50% and Africa with 43%. Growth in the urban population is driven by an overall population increase and the shift of the population from rural to urban living. Together, these two factors are projected to add 2.5 billion to the world's urban population by 2050, with almost 90% happening in Asia and Africa. Just three countries – India, China and Nigeria – are expected to account for 35% of the growth in the urban population between 2018 and 2050. India is projected to add 416 million urban dwellers, China 255 million and Nigeria 189 million.

Urban areas produce around 85% of the world's GDP but also produce more than 70% of the global greenhouse gas emissions (UN Habitat 2018, C40 cities 2019). Close to half of the world's urban dwellers reside in settlements with fewer than 500,000 inhabitants, while around one in eight live in 33 megacities with more than 10 million inhabitants. By 2030, the world is projected to have 43 megacities, most of them in developing regions.

In addition to the global urbanization processes, results from recent 'Population Revisions' (UN 2017) shed new light on the global population ageing process. Here we provide a brief summary of this phenomenon, its regional variation and its implications for transformational planning for sustainable futures. The number of older people (over 65 years) is expected to more than double from 841 million in 2013 to over 2 billion by 2050. Older people are projected to exceed the number of children (0–14 years) for the first time in the 2040s. There are clear social consequences from these changes including the smaller sizes of families, the reduction of the extended family, and, the dilution of the 'economy' of the extended family. Also, we reflect on the potential tensions from a growing young voice and the expanding voice of the elderly.

Fewer working-age adults are supporting this increasing number of older persons. The 'old-age support ratio', the number of persons aged 15–64 years per person aged 65 years or over, has been falling in tandem with population ageing. In the global north, this gives rise to worries about the tax base for pensions and social care and support. It also raises questions around the size and competence of the workforce in many different sectors, including the servicing of urban areas, the role of migration, intergenerational equity and the significance following the pandemic of rethinking aged care. During this year (2020) there will be more people over 65 than children under 5 for the first time in history (UN 2020).

As the world continues to urbanize, sustainable development depends increasingly on the successful management of urban growth, especially in low and lower-middle-income countries, where the most rapid urbanization is expected between now and 2050. Integrated policies to improve the lives of both urban and rural dwellers are needed, strengthening the linkages between urban and rural areas and building on their existing economic, social and environmental connectivity.

Urban growth is closely related to the three interrelated dimensions of sustainable development: social, economic, and environmental. Well-managed urbanization and sustainable urban development, informed by an understanding of population trends over the long run, can help to maximize the benefits of high levels of density while minimizing environmental degradation and other potential adverse impacts of a growing number of city dwellers. To ensure that the benefits of urbanization are shared fairly, policies need to ensure access to infrastructure and social services for all, focusing on the needs of the urban poor and other vulnerable groups for housing, education, health care, decent work and a safe environment (UN World Urbanization Prospects 2018). Social cohesion as defined in Rueda et al. 2019 speak to the urgency of sufficient diversity and mixity (also known as “urban complexity”).

Even though there has been a reevaluation of living in smaller towns and villages away from urban areas following the impact of the coronavirus epidemic growing urban agglomerations remain the focus for national economic performance and local and global environmental performance. Both national ‘urban’ policies and the planning, management and governance at the city level become critical in the realization of sustainable urban futures and increasing national competitiveness in global markets. How policy-making and government can bring these two objectives together and create action on the ground that meets the demands of climate change, implementation of UN SDGs and counter the loss of biodiversity, is one of the key questions for the immediate future (UN 2015, 2018, SDSN-Bertelsmann Stiftung 2017, UN Habitat, 2018, Kurz 2020).

Trends that will influence the period 2020-2030

In this section, we combine changes and innovations that are likely to be evident in the next 10 years that can profoundly influence the context and processes of home and work life, key urban processes and their management and governance and the transformative potential for industry, cities, health, climate change and the built environment. We humbly recognize that predictions like these are often overtaken by other events or innovations difficult to even consider and understand at this starting moment.

We have identified the changes and innovations in the form of two tables (Tables 1 and 2). The first is on digital, technological and energy innovations that may become common place and will have a major influence on the future of cities, health and well-being. The second is on the wider processes of urban futures. These two sets of innovations, in reality, will interact and become more integrated issues influencing urban and health futures (see Fudge, Grant and Wallbaum 2020).

Table 1. Digital, technological and energy innovations⁶

Informational technology, communications and intelligence	<ul style="list-style-type: none"> • Artificial Intelligence as fundamental advanced support within all products, services and government. • Drones (on ground, under water and in the air) are brought into wide usage for moving appropriate goods, as sensors and as health and safety monitors and actors. Policies for drone ‘operational space’ are in place as part of mobility strategies. • Virtual reality becomes extended reality and influences healthcare to real estate and environment to navigation systems. • 5 G data networks become the fundamental underpinning of all communication processes and the basis of Industry 4.0 smart manufacturing. • Computer vision returns and advances beyond Google glass and is associated with wearable computing and embedded chips.
Public health and health care^[SEP]	<ul style="list-style-type: none"> • Digital health comes of age with home-based and body worn technologies going well beyond fitness and allowing remote health monitoring and supervision for vulnerable populations and people with chronic conditions. • Personalised and predictive medicine and treatment plans become mainstream. • Anticipation and preparedness for new forms of disease and pandemics (including risk of multi-resistant germs) are normalised across the globe.
Transport energy and construction	<ul style="list-style-type: none"> • Autonomous driving systems influence all mobility, including public and private mobility, agricultural vehicles, construction, large scale manufacturing. Innovations in integrated and free public transport, alongside other modes including cycling and walking plus the expansion of electric vehicles becomes the norm. • All vehicles become electric with different sources – batteries and hydrogen fuel cells. Other mobility innovations continue including bio fuels. • By 2023 VTOL air vehicles including taxis, ambulances etc in operation in US, Australia, Singapore, Dubai and UK. • Smart building, off site fabrication and manufacture, robotic building operations become mainstream and expand to scale. • Energy storage systems supporting decentralised production of renewable energy become more mainstream.
Nature and food	<ul style="list-style-type: none"> • Food demands, supply and distribution and changing diets place new demands on agriculture, fishing and the associated retail and delivery systems. • Tree planting, mini-forests (see Akira Miyawaki Guardian 2020), sea grasses and rewilding at scale become more common place and absorb carbon to counter other processes affecting climate change.

⁶ World Economic Forum 2018, ESPAS Europa.eu, TfL 2018 private communication, McKinsey pers. Communication and Fudge, Grant and Wallbaum (2020).

Table 2. Innovations in urban and health futures⁷

Urban planning and design	<ul style="list-style-type: none"> • Urbanisation continues to be dominant location for global population. • Cities while increasing in size are also stratified. • Urban planning and design becomes a crucial task for liveability and urban health. • Rethinking of land use categories with particular emphasis on retail, offices and mixed development. • Densification is balanced with liveability both inside and outside residential and work places. • Circular thinking becomes the basis of the future economy of the city. • Increase in engagement of citizens in city futures and decision-making.
Architecture and built environment	<ul style="list-style-type: none"> • All architecture, built environment, and urbanism design work will aim to go beyond the standard of net zero carbon in use. • Retrofit existing buildings as a more carbon efficient alternative to demolition and new build whenever this is a viable option. • Major programmes of renovation and energy efficiency in all existing stock introduced across the globe. • Include life cycle costing, whole life carbon modelling and post occupancy evaluation, as part of fundamental scope of work. • Housing developers incorporate neighbourhood well-being outcomes into their products. • Accelerate the shift to low embodied carbon materials in all work. • Large scale expansion of sustainable and affordable housing. • Adopt the values developed by CABI in the UK in all design work with particular attention to lifting the design quality, sustainability, sense of place and aesthetics of buildings, the public realm and infrastructure.
Mobility	<ul style="list-style-type: none"> • Transport strategies to deliver on mobility and health. • Expansion of public transport with low carbon propulsion. • Mainstreaming and prioritizing of cycling and walking. • Car free cities and parts of cities. • Transport all goes electric. • New forms of goods delivery including zero carbon trucks, vans and drones. • Redesigning all public realm including road space.
Environment	<ul style="list-style-type: none"> • Cities to become carbon neutral. • Air and water pollution solved with air and water quality on continuous improvement trajectory. • Systemic, circular thinking and integration adopted as the mainstream approach for creating sustainable cities and places. • Cities becoming smarter through the clever use of sensors, adaptability and responsive behavior.
Health and social aspects	<ul style="list-style-type: none"> • Reductions in inequality and health inequity. • Health and well-being goals spreading in non-medical policy areas. • Public space needs to be expanded as crucial to liveability. • Nature, water, trees and sense of seasons becomes part of urban life. • Expansion of social care and greater degree of connectivity with health care.

⁷ Nieuwhausen et al. 2019; own practice and research experience in London, Melbourne, Bath, Stockholm, Gothenburg, Barcelona and Bristol; and Fudge, Grant and Wallbaum (2020).

	<ul style="list-style-type: none"> • Increasing pressure on delivering equitable access to health-related services. • Use of 'social' and non-medical prescriptions for non-communicable disease. • Increasing attention on supporting population health in informal settlements.
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From these two tables, we can get a sense of what could be possible in the next 10 years in relation to urban and health futures and meeting the various UN SDGs, the Paris agreement on climate change and actions to combat the loss of biodiversity. As the UK Architects declaration on Climate and biodiversity emergency⁸ says:

'The twin crises of climate breakdown and biodiversity loss are the most serious issue of our time. Buildings and construction play a major part, accounting for nearly 40% of energy-related carbon dioxide emissions whilst also having a significant impact on our natural habitats.' (UK Architects 2019). They go on to declare that, 'meeting the needs of our society without breaching the earth's ecological boundaries will demand a paradigm shift in our behaviour. Together with our clients, we will need to commission and design buildings, cities and infrastructures as indivisible components of a larger, constantly regenerating and self-sustaining system.'

They also argue, as do we, that the research and the technology already exist for us to begin the transformation of city, built environment, urban planning and health futures.

Urbanisation, health and health equity

In the big picture, population health outcomes are worrying. The WHO asserts that the most important asset of any city is the health of its people, essential for fostering good livelihoods, building a productive workforce, creating resilient and vibrant communities, enabling mobility, promoting social interaction, and protecting vulnerable populations (WHO 2016). Here we examine the current state of the health of urban populations and highlight underlying trends. Even in our modern globalised world, the lack of adequate infrastructure for basic water and sanitation services, a provision intrinsic to urban planning, is linked to major infectious diseases and health inequalities in many cities. Today, some 3 in 10 people worldwide, or 2.1 billion, lack access to safe, readily available water at home, and 6 in 10, or 4.5 billion, lack safely managed sanitation (WHO & UNICEF 2017). In 2012, globally 12.6 million people died as a result of living or working in an unhealthy environment, nearly 1 in 4 of total global deaths.

Environmental risk factors, such as air, water and soil pollution, chemical exposures, climate breakdown, and ultraviolet radiation, contribute to more than 100 different diseases and injuries (Prüss-Ustün et al. 2016). Heading this list are stroke, coronary heart disease, diarrhoea and cancers. The environmentally mediated disease burden tends to be much higher in lower income countries except for certain non-

⁸ UK Architects Declare Climate and Biodiversity Emergency 2019.

communicable diseases, such as cardiovascular diseases and cancers, where the per capita disease burden is greater in the global north. In a rapidly urbanizing world, a large share of this health burden relates to urban environments that are poorly planned, managed and maintained. Globally, non-communicable diseases themselves account for nearly 70% of deaths each year (WHO & UNDP 2016) with rapid and unplanned urbanisation a major factor in an upward trend (key facts are illustrated in the box below, Table 3).

Table 3. Urban malaise⁹

Air pollution
In 2016, 7 million deaths were attributable to the joint effects of household and ambient air pollution (WHO 2018a), this includes deaths from cardiovascular diseases, chronic respiratory diseases and lung cancer. Around 91% of the world population was living in places where the WHO air quality guidelines levels were not met (WHO 2018b). People face disability and premature death from illnesses caused by air pollution, yet barely 1 in 10 cities worldwide reaches pollution control targets.
Physical inactivity
Worldwide, 1 in 4 adults, and 3 in 4 adolescents (aged 11–17 years), do not currently meet the global recommendations for physical activity set by WHO. As countries develop economically, levels of inactivity increase. In some countries, levels of inactivity can be as high as 70%, due to changing patterns of transportation, increased use of technology and urbanization (WHO 2018c). The global cost of physical inactivity is estimated to be INT\$ 54 billion per year in direct health care, in 2013, with an additional INT\$ 14 billion attributable to lost productivity – representing of 1–3% of national health care costs.
Poor nutrition
In 2014, more than 1.9 billion adults worldwide, 18 years and older, were deemed overweight while 462 million were underweight. More than 600 million were obese. 42 million children under the age of five were overweight or obese but 156 million were affected by stunting (low height-for-age). 50 million children were affected by wasting (low weight-for-height). Poor nutrition continues to cause nearly half of deaths in children under five, while low- and middle-income countries now witness a simultaneous rise in childhood overweight and obesity – increasing at a rate 30% faster than in richer nations (WHO 2019).
Housing conditions
Health conditions related to housing – such as poor access to water, poor indoor environmental quality and exposure to dangerous substances or hazards, or to infectious diseases – present an important health burden. For instance, poor or inadequate water, sanitation and hygiene (WASH) were responsible for 829 000 deaths from the diarrhoeal disease worldwide in 2016. Moreover, in Europe, about 15% of all new childhood asthma can be attributed to indoor dampness (WHO 2018d).

While evidence of the ‘urban advantage’ suggests that city populations often enjoy better health than their rural counterparts, there are substantial differences in health opportunities and outcomes in urban areas. To put that in perspective, urban data in 79 countries showed that children in the poorest one-fifth of urban

⁹ WHO/UN-Habitat (2020)

households are twice as likely to die before their fifth birthday compared to children in the richest one-fifth. In some places, this ratio is actually greater than five (WHO & UN- Habitat 2010).

And there is a knock-on and detrimental effect on the cost, and hence the availability of health-care services. With more people requiring treatment, for avoidable and preventable disease, healthcare costs are growing. Thus, the WHO stated, 'Achieving a healthy and sustainable environment is a key ingredient for preventing disease and enabling viable health care.' (WHO 2017a, p. 1)

One reaction to such statistics would be to focus on national and international health spending and health access in order to plan for a healthier future. Questions such as, 'How much is spent per head?', 'What percentage of GDP can we afford?', 'How is the money distributed?', 'Who has access to health care?', and 'How do the poorest and most vulnerable get more access to health care services?' However, influenced by a combination of language, lack of understanding, political expediency and sectorial barriers, the dominant focus has been to generate questions related to curing illness and supporting ill people when faced with these stark statistics.

Recent analysis suggests policymakers should pay more attention to broader social and education spending rather than simply health spending (CPP 2019). This echoes the WHO Ottawa Charter (WHO 1986) but some 30 years on. But we cannot find any national health policy that is based upon subsequent action on the Ottawa Charter's core principal that, 'health promotion is not just the responsibility of the health sector'? The questions needed to trigger transformative action in this sector need to begin by recognising the paradox of the importance of non-health spending for population health. It is essential to again re-think health policy, shifting away from a narrow definition and consider health in all policies and places (CPP 2019, Marmot 2020, Grant et al 2017, and Fudge, Grant and Wallbaum 2020)

Principles, key concepts and the need for change behind the Transformational Plan

Introduction and context

Before we expand on the principles, concepts and the need for change behind the Transformational Plan we present our understanding of the recent history and contemporary manifestation of the environmental and urban agenda.

Contemporary environmental thinking stems from a wide set of sources but the development of ideas began in the 1960s with Rachel Carson's study of the impacts of pesticides (DDT) as a major pollutant (1962). Paul Erlich popularised concerns over the 20 century population explosion (1968). In 1972 'The limits to growth' introduced the notion of boundaries and limits and the exhaustion of the resources of the planet. The oil crisis in the 1970s gave rise to a renewed interest in solar and eventually wind energy. By the 1980s there was a strong realisation that our lifestyles were affecting the whole atmosphere through not only resource depletion but also greenhouse gas release leading to rapid rises to global temperatures. The Bruntland Report of 1987 gave a definition of sustainable development that was always open to interpretation but led to the words coming into more everyday use and the concept variously interpreted used to define ways forward for the future. In the same year WHO developed their concept for healthy cities and by 1990 the EU had published the Green Book on the Urban Environment and the Council of Ministers had put in place the EU Urban Environment Expert Group that amongst other outputs over 15 years published the European Sustainable Cities Report in 1996. The Rio conference in 1992 introduced the concept of Local agenda 21, followed in 1996 by the ecological footprint (Wackernagel and Rees, 1996). By the 2000s the International Panel on Climate Change (IPCC) were producing their global reports and the understanding of environmental and global limits and more recently the concepts of 'safe operating space', planetary boundaries and unacceptable environmental change (Rockström et al 2009; Steffen, W., et al 2015). Throughout this period there have also been major reports from the UN and others on the accelerating growth of urbanisation and the role cities play increasingly in both the world economy but also the world's climate and environmental future. In 2015 UN Habitat prepared their UN SDGs as an approach to bring action globally by 2030 and this was coupled with the New Urban Agenda in 2016 to support governments in coping with climate change, poverty, urbanisation, and health (see also Whitmee, et al 2015, and Fudge, Grant and Wallbaum, 2020).

Principles and concepts

In this journey from the 1960s to the present day and the implementation of the Paris Agreement on Climate Change, the UNSDGs and actions on biodiversity, those of us involved have developed a whole series of principles and concepts to support our thinking, policy making, practice and actions. These include:

- the precautionary principle
- the integration principle
- the polluter pays principle

- the preventative principle
- the participative principle

Over time these fundamental principles have been added to through the following ideas and concepts:

- demand management
- environmental efficiency
- welfare efficiency
- equity and the more recent 'leaving no-one behind'

What has characterised this period is the focus on 'systems thinking' and a 'systems approach'; holistic and integrated thinking rather than siloes; in policy making the need to encourage joined up thinking and joined up actions, and, throughout the need to adopt circular thinking and to be able to carry out environmental analyses and evaluations as an integral part of all processes.

These approaches have recognised the need to identify the trade-offs and unintended consequences associated with the often ambiguous nature of sustainable development and its multiple stakeholders across dynamic and multiple time scales.

Transformational change and action

At one level of analysis considerable sophistication has been incorporated into how we plan for the future. However, at another level there is a growing concern that whilst we may have the intentions in policy and business strategy in place we are running out of time and we are 'thin' on actions and implementation. The problems that need to be addressed are not linear but rather layered, inter-connected and complex. With a renewed sense of urgency, borne out of the ecological crisis, climate breakdown, unacceptable levels of inequity and now accelerated by COVID-19 we need to restate the problem. What kinds of action for the built environment sector support responsive and rapid transformative whole system learning, action and change.

What then is transformational change and the need for transformational guidance and support? There is a broad literature on change and managing change that draws on a wide set of disciplines. We do not intend to rehearse these here but we are interested in focusing on the concept of transformation.

We are particularly focusing on a framework or plan that could be used to guide actors in the built environment sector globally and locally in transforming their practices to be in a position to meet the UNSDGs by 2030.

These processes and bodies of research, based on practice change in the real world, provide insights into methodologies, approaches and conceptual frameworks. Given our focus on the transformation of cities and the built environment, what then should we be thinking about in relation to a research, policy and practice agenda that would guide us in this endeavour?

- How transitions can be accelerated and which policy mix and tools might influence the process positively.
- How to encourage the decline of existing non-sustainable systems.
- Engaging with the politics of transitions and the development of a 'social mandate' for change
- How to use the agency of actors involved in transition processes
- How to diffuse 'green innovations' and achieve 'take up' more widely
- How to move beyond 'islands of innovation' and achieve scale.
- How to manage uneven dimensions of transition as a result of geography, cultural contexts and stages of development.

As we move on to expand on the work on the transformational plan, what seem to be the key questions we need to take with us on this journey so that we may be able to take the next steps actively? For us they include:

- How do you operationalize transformation?
- What methodologies and tools can be employed to achieve transformations?
- How can one operate at speed and scale to actively make a difference?
- Who are the key actors that need to be involved in transformational partnerships?
- What are the implications for policy, action and governance processes?
- What are the implications for existing and future business models, economic models and markets and how do you support these changes?
- What are the key changes we need to make personally, professionally, organizationally and politically?
- How is the transformational project best communicated, such that it can gain legitimacy and support to become a movement for change?

We have examined the key principles and concepts behind the preparation of the Transformational Plan that have developed over the period where the environmental and urban agendas have come strongly to the fore in our global future thinking. We have also looked at the need for urgent change and have raised questions that we think will need to be answered in formulating the Transformational Plan for a sustainable built environment to meet the demands of the UN SDGs, the implementation of the Paris Agreement on climate change and actions concerning biodiversity.

In the next section, we remind the reader of the earlier section on the speculative account for 2030 as the broad parameter for a global Transformational Plan. Then as an example of a more detailed regional plan, the Transformational Plan for North West Europe is outlined.

The "transformational plan"

Transformational Plan for North West Europe

As we have introduced earlier, the continuation of the current practice and minor changes will not allow us to even get close to achieve the UNSDGs by 2030. Hence, a larger, more fundamental and rapid transformation needs to happen.

Transformative change requires a critical exploration of the assumptions upon which society is built and the viable alternative practice that allows the evolution that will lead us towards rather than away from the SDGs. This chapter will exemplify concrete goals and measures that we consider are necessary to move forward as demanded by a more sustainable built environment.

Again, our list of measures is simply driven by the goals to be achieved, supported by the encouraging signals from the European Commission to even become more ambitious as part of the European Green Deal and to raise the 2030 greenhouse gas emission reduction target, including emissions and removals, to at least 55% compared to 1990¹⁰. Furthermore, the current Pandemic has shown that tremendous investments can be activated and re-directed to reduce the economic consequences of the Pandemic. In comparison to these enormous investments, it would cost 1% of global GDP per year to implement the 2015 Paris climate agreement¹¹, and 5% of global GDP each year across many sectors to implement the SDGs by 2030¹². These major strategic transitions involve a significant cultural, social and political change, new areas of employment, the role of women in the built environment, major shifts in education and retraining, growth in company transitions, and the rise of new start ups.

The following list provides examples of concrete measures for the built environment in North West Europe. Besides the fact that all measures need to be assessed appropriately regarding their consequences, priorities need to be identified and possible steps for phased implementation decided. Obviously, this includes the identification of further "areas" for intervention.

Table 4. Examples of concrete measures for the built environment in North West Europe

Transformational and change processes	<ul style="list-style-type: none"> • Encourage and support a movement and campaign for 'building back better' to take up the new 'Agenda 30' by 2025. Organise with regional nodes. • Organize citizen assemblies, women organisations and young peoples organisations independently but linked to more formal governance models to develop ideas, build a 'social mandate', monitor progress by 2025 • Create a coalition of all built environment professionals to collectively 'Declare' the new direction and responsibilities and link this to building and construction companies and material supply chains by 2025 including some form of auditing and monitoring
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¹⁰ https://ec.europa.eu/clima/policies/strategies/2030_en (accessed October 21, 2020).

¹¹ Markandya, A. et al. (2018) Lancet Planet. Health 2, e126–e133.

¹² see go.nature.com/2yjp1wn and 'Wrong priorities'

	<p>process.</p> <ul style="list-style-type: none"> Utilise WSBE Conference series 2023, 2026 and 2029 to monitor progress in relation to the Transformational Plans for the built environment sector for different regions of the world.
Architecture and built environment	<ul style="list-style-type: none"> All architecture, built environment and urban design work will aim to go beyond the standard of net zero carbon in use and could potentially be built into the professional code of ethics Retrofit existing buildings as a more carbon efficient alternative to demolition and new build whenever this is a viable option. Include life cycle costing, whole life carbon modelling and post occupancy evaluation as part of fundamental scope of work. Major programmes of renovation and energy efficiency in all existing housing stock introduced across the region by 2023, like the renovation wave in Europe. All housing developments incorporate internal liveability and neighbourhood well being outcomes into their housing schemes and products Accelerate the shift to low embodied carbon materials, e.g. half of the emissions they have today, in all work by 2025. Large scale expansion of sustainable and affordable housing of a range of typologies across the region throughout the 10 year period. Smart building, off site fabrication and manufacture, robotic building operations become mainstream and expand to scale by 2030. Set up national design review systems for all major projects to ensure quality, sustainability, sense of place, and conformity to climate and biodiversity goals. Set up exhibition sites for 'build back better' practice examples of neighbourhood renewal, new build, major renovation, central city rethinking, transport infrastructure, new forms of movement, electrification of the city etc Set up competitions for 'build back better' sites including mixes of renewal, renovation as well as new build. Set up 'materials libraries' for building back better (similar to the one in Barcelona). Set up specific built environment innovation centres/'catapults' to encourage innovations and transformational approaches (see UK examples and EU KICS) Research agenda priorities on low emission building materials, digitalization of the built environment, housing renovation solutions.
Sustainable Mobility	<ul style="list-style-type: none"> Ban sales of petrol and diesel cars by 2030 (Norway 2025, UK, Netherlands, France, others already agreed for 2030). Ban sales of petrol and diesel vehicles (trucks, vans, construction and farm vehicles)by 2035. Public transport vehicles to be powered from renewable energy by 2035. Ban sales of petrol and diesel construction, agriculture and forestry equipment by 2035. All petrol filling stations to have electric refilling by 2025. Electric refilling infrastructure nationally to be in place and operational by 2030 (public and private). Electric supply to be 100% from renewables and nuclear by 2030.

	<ul style="list-style-type: none"> • Expansion of electric bicycles and scooters between 2019 and 2030. • Delivery drones in key sectors to be operational by 2030. • All children at school to have free public transport. • All people over the age of 70 to have free public transport within city regions and reduced fares for inter city travel. • Cycling infrastructure to be doubled in all towns and cities and between cities by 2030. • Walking infrastructure in towns and cities to be doubled in all towns and cities and between cities by 2030. • Electric water transport infrastructure to be available in all cities at sea and/or river locations. • Allocate congestion charge zone with ultra low emission zone in all city locations. • All 'dirty' vehicles banned for ultra low emission zones. • Very low emission buses, trams on all major city routes. • End licensing of petrol and diesel taxis and encourage switch to electric taxis through grants etc. • Expand car pooling using electric vehicles by 2035 and self driving vehicles after 2035. (car ownership may be questioned after 2035?)
Environment	<ul style="list-style-type: none"> • Air pollution reduced dramatically through a range of methods and practice changes (see sustainable mobility) • Water pollution reduced dramatically through a range of methods and practice changes. • Green spaces and water courses maintained and enhanced including major new tree planting and replacement programme for urban street trees by 2030. • Extended and new provision designed and implemented to expand green and blue space by 20% in all towns and cities by 2030. • Develop innovative urban landscaping including vertical greening, roof greening and pocket parks • Enhancement of nature and green belts around all cities by 2030. • Plant new urban forests (including mini forests see Japan) around towns and cities by 2030. • Rethink agriculture and food production with an emphasis on plant based diets and the strengthening of hedgerows, recreation and creation of meadows and the rewilding of poorer agricultural land by 2030.
Air pollution reduction	<ul style="list-style-type: none"> • Note through a range of changes in London air pollution has been reduced dramatically in 3 years 2016-2019 ie before covid 19, with 94% reduction for all residential population and 97% reduction for all schools (455 schools affected in 2016 to 14 affected in 2019.) • Mechanisms for change include: • Allocate congestion charge zone with ultra low emission zone in all city locations. • All 'dirty' vehicles banned from ultra low emission zones • Very low emission buses, trams on all major city routes • End licensing of petrol and diesel taxis and encourage switch to electric taxis through grants etc • Double cycling and pedestrian space in all town and city areas between 2020 and 2030.

Health and social aspects	<ul style="list-style-type: none"> • Nature, water trees and sense of seasons becomes crucial part of urban life and wellbeing and urban planning priority policy by 2025 • Health and well being objectives met in non medical policy areas as part of 'liveability' ethos by 2025. • Public green and blue space to be expanded by 20% as part of positive health and liveability objectives by 2030 • Rethinking of intergenerational meeting spaces for young and elderly populations (see Japanese and Netherlands examples) by 2025. • Rethinking of Aged Care following the problematic experience during the pandemic. Implement new strategy for Aged Care by 2025. • Walking and cycling provision expanded to encourage active lifestyle by 20% by 2025.
Public health and health care	<ul style="list-style-type: none"> • Digital health comes of age with home based and body worn technologies going well beyond fitness and allowing remote health monitoring and supervision for vulnerable populations, people with chronic conditions and for the public in general. • Personalised and predictive medicine and treatment plans become mainstream. • Anticipation and preparedness for new forms of disease and pandemics are normalized across the region.
Legal frameworks	<ul style="list-style-type: none"> • Introduction of areas with reduced legal requirements and standards (experimental neighbourhoods). • Energy targets will be introduced on the building stock level not only the individual level. • Regulation/Allowance of roof extensions. • Cost recovery regulations for renovation works. • Public Procurement of Innovative (PPI) solutions. • Reorganisation of responsibilities on the different political and governmental levels.
Economic framework	<ul style="list-style-type: none"> • Gradually change the tax system (reduced taxes on labour and increased taxes on land use and primary material usage). • Increasing taxes on CO₂-emissions. • State run innovative financing schemes for affordable building renovations. • State incentive system for rethinking professional education, building trades training, retraining and movement to new areas of employment. • Making responsible investments and green finance mandatory, at least for all public investments by 2030.

Next steps

This document provides a framework for the development of a Transformational Plan – or more precisely several regional Transformational Plans for the Built Environment. As stated earlier, this document is seen as an invitation for discussion, both in terms of the content and interpretation of the areas of importance as well as the global and regional implementation process.

The development of the regional plans needs to be owned and carried out by the stakeholders in the different regions. We do see it as a kind of revival of the *Local agenda 21* phenomenon in the 1990s that was able to activate a wide range of stakeholders across the globe even though the level of awareness of the global vulnerability and urgency was not as critical then as it is today.

Over the last few months, we have talked to several people and institutions all around the world and some of them have expressed their interest to host a “regional node” and to facilitate the development of a regional transformational plan. Chalmers has offered to support the regional nodes with global coordination that will assure a high degree of consistency among the different regional Transformational Plans whilst being sensitive and flexible in terms of regionally specific capabilities, challenges and priorities. Currently, we have identified up to five regional node facilitators in Asia, Australia/New Zealand, North America, Africa and Europe with the ambition to grow even further, e.g. up to 12-15 regions globally. This number would still allow global coordination without jeopardizing regional differences. We could imagine that the regional nodes are willing to coordinate and support regional sub-nodes if this is considered meaningful.

The Transformational Plan will be available and discussed at the conference on the 4 November 2020. To enable an open discussion, we would suggest hosting a cloud-based platform on the internet with e.g. a WIKI-like functionality to allow online commenting and discussions. The authors will take comments from participants, speakers and others up to the close of business on Monday 9 November 2020. The authors will then revise the Transformational Plan and publish it with a one page Executive summary, a 3-5 page policy and practice guidance summary and place these on the post conference website for wider dissemination.

We suggest that the progress achieved will be presented at least every three years at the World Sustainable Built Environment (WSBE) conferences, e.g. at the next WSBE 2023 in Montreal, then in the year 2026 and 2029. The regional Sustainable Built Environment (SBE) conferences, taking place in-between the WSBE-conferences, could be seen as supporting events to gather opinions, enable discussions and report on the regional progress achieved. The WSBE conference in 2029 is seen as a major event, one year before the UNSDGs should have been achieved, where we will report about the achievements as well as the remaining gaps to achieve the 2030 goals.

Besides the organizational set up, we have commenced our search for the financial resources and key partners on the regional as well as the global level to allow for the realization of this ambitious but essential 10 year plan.

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