SUMMARY OF ARCHITECTURE GUIDE

to the UN 17 Sustainable Development Goals
January 2019

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The Danish Association of Architects and
The UIA Commission on the UN SDGs

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PREFACE

The Sustainable Development Goals are a call for action
by all countries – poor, rich and middle-income –
to promote prosperity while protecting the planet.

Architects can provide basic ideas and proposals for regulations that make it possible for us to have sustainable cities and communities in the future. Architects can facilitate the open dialogue and work in partnerships to give us good solutions and can encourage authorities to make the regulations necessary to move forward.

Mogens Lykketoft

Former Danish Minister of Finance and of Foreign Affairs,
President of the United Nation's General Assembly
from September 2015 to September 2016.

November, 2018

INTRO

The 17 UN Sustainable Development Goals represent the aspiration of the people of the United Nations for a more sustainable future.

The Goals define the challenges we need to address to achieve a better and more sustainable future for all. They address the global problems we face together, including those related to poverty, inequality, climate, environmental degradation, prosperity, peace and justice. The Goals are deeply interconnected, and to leave no one behind, the world must move significantly towards achieving each Goal by 2030.

The built environment, planning, architecture and design, interact with every goal. And most crucially: not just on an aspirational level or as future potential, but through realized buildings, settlements and cities all over the world. Architectural solutions are already there, everywhere, contributing to sustainable communities and quality of life. However, the built environment is also a part of the current challenges a major consumer of energy and natural resources, and producer of waste. Furthermore, how we build can exacerbate inequalities and affect health.

That is why the Institute of Architecture and Technology at The Royal Danish Academy of Fine Arts Schools of Architecture, Design and Conservation, the Danish Association of Architects and the UIA Commission on the UN Sustainable Development Goals have created this architecture guide to the Goals. With this guide book we hope to make it tangible how the built environment interacts with the goals and to inspire architects and stakeholders involved in the built environment to engage with the challenges. It is for each and every one of us to contribute to the realization of the goals.

The intention of this book is to provide an architecture guide to the Goals. The 17 chapters present how each Goal is defined by the UN, outlines how it interacts with the built environment and gives examples of realized projects that illustrate architectural contributions.

Many of the cases address more than one goal, but the aim here is not to explore sustainable projects in their full complexity, but to understand the Goals as they relate to architecture. All cases are realized architectural projects, planning initiatives and structures. Our hope is that the cases will form a basis on which to start a conversation about how the built environment can contribute to each Goal.

In this first edition of the guide we have 2-3 cases to illustrate each goal, many from Denmark. In future editions we would like to expand the range of projects, and we welcome suggestions of cases to be included in the second edition, planned for 2020. Cases should be realized projects that illustrate how architects and architecture can contribute to the realization of the Goals.

Each case in this guide is inspiring and noteworthy, but they are not the final answer to how the built environment can contribute to the realization of the Goals. There is no one answer to that. To move towards the realization of the Goals, we need many new solutions, adapted to local climate, culture and challenges, and we need them not as ideas, but on the ground, implemented and in use. It is through realized buildings, settlements and planning the effect is achieved; environmentally and on our quality of life.

This publication is dedicated to the architecture students who will shape the future of architecture, planning and design; to the politicians who will aid them by understanding the intersections between architecture and the Goals; and to all citizens, professionals and institutions who join in the collective challenge ahead

- to address social needs while protecting the planet

On behalf of the Editorial Committee

Natalie Mossin
Chief Editor

A List of Architecture Guide to the UN 17 SDGs

Legend BM: Building Material, BE: Building Element, ED: Equipment Design, AD: Architectural Design, CD: Community Design, LD: Landscape Design, TP: Town Planning, PD: Politics Design

SDGs	General Goal		Architecture Guide		Case Practices					
No.	Logo	Basic Goal	Major Issue	Typical Solutions	No.	Name/Photo	Place	Type	Specific Solutions	Category
#01		NO POVERTY *End poverty in all its forms everywhere*	Architecture cannot lift people out of poverty, but the built environment can affect the impact of poverty on people's life through access to housing and institutions that are affordable.	1) Support to provide housing as a policy against poverty 2) Improve the living through social housing, co-op, and urban improvement 3) Affordable housing technology and supply system 4) Relationship with the local community during the building process 5) Secure available funds and resources as well as effective use of them	01-1	Volontariia Home for homeless children  Photo: Sonja Winkler	Pondicherry, India	Housing	①Homes for homeless children and their foster parents ②Experimental affordable house ③Mud-brick house burnt on-site ④Use of local natural materials & techniques ⑤Ceramic materials produced using the house as a kiln ⑥Upcycling waste materials	PD, AD AD BM, AD BM BE, AD BE ME
					01-2	Non-profit Affordable Housing  Photo::Rasmus Hjortshoj–COAST	Dortheavej, Denmark	Housing	①Social housing to low-incomes ②Pre-fab units stacked along a curve, creating a public space ③Healthy & comfortable buffer-zones of small terraces between housing units ④Simplified materials & colors characterizing in- and outdoor ⑤Public curved place opened to neighborhood	PD AD AD AD LD, CD
#02		ZERO HUNGER *End hunger, achieve food security and improved nutrition and promote sustainable agriculture*	The built environment contributes to the securing of food supplies through planning, landscape design and building complexes that protect existing ecosystems and prioritize the preservation and expansion of areas for food production.	1) Supportive development & land use for sustainable agriculture 2) Urban farming, co-operative production activities, and regenerative landscaping design 3) Secure the gravest reflecting the regional conditions 4) Design to cope with the climate change 5) Relationship between agriculture & building materials 6) End-users' participation into the process	02-1	Impact Farm  Photo: Abdellah Ihadian	Radonia, Denmark	Green house	①Economizing resources & time by using local agriculture ②New hydroponic system of high resource efficiency ③Significant freshwater saving ④Structure for lease & mobility ⑤Local and/or on-site production & consumption to be shared by the community ⑥Incorporated social facilities for events of mind-setting	PD, TP, LD AD, LD ,ED ED, AD, LD AD CD AD, CD
					02-2	The Michigan Urban Farming Initiative  Photo: Michigan Urban Farming Initiative	Michigan, USA	Urban farm	①Improvement of poor food metrics by using vacant areas ②Innovative forefront of sustainable urban agriculture ③Farmland: 1/3、Interactive agriculture: 1/3、Hardscape: 1/3 ④NPO of all volunteers ⑤Correction of social imbalance & strengthening urban community ⑥Sustainable urban agrihood by mixed-use development	PD, TP TP, LD LD, TP CD CD PD, TP

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#03		GOOD HEALTH AND WELL-BEING *Ensure healthy lives and promote well-being for all at all ages*	Most people spend the majority of their life indoors, making indoor climate an influential factor of health.	1) Healthy indoor environment is a fundamental issue of architectural design. 2) This should be primarily considered if the users are vulnerable in the hospital for instance. 3) Use of environmentally hazardous materials & substances should be avoided. 4) In addition to AD, CD & TP are also crucial to curb the spreading of diseases & exposure to bacteria. 5) Built-environment design must include the promotion of citizen's activities. 6) Also, the layout of districts & city itself should be elaborated to reduce risk of any accidents.	03-1	The Magoda Project 	Magoda, Tanzania Photo: Konstantin Ikonomidis	Housing	① House improvement to protect residents from epidemics ② Affordable building methods for health, hygiene & comfort, to be understood by the residents ③ Integration of traditional techniques of natural ventilation & building methods in Asia & Africa ④ Cooperation of the local technicians, handworkers, doctors & sociologists ⑤ Use of local woods & equipped with sanitary facilities ⑥ Experimental house to be investigated as a research tool ⑦ Involving the leaders of local communities, who promote to accept & understand the house	PD, AD AD, CD AD BM, AD PS BE BM, ED AD, PD CD, PS
					03-2	Konditaget Lüders -th e fitness roof 	Lüders, Denmark Photo: Rasmus Hjortshoj - COAST for Lokale og Anlagsfonden	Car Parking	① Secure exercise space in urban area for the citizens' health & well-being ② Space for recreation & exercise added to infrastructural facility (car parking) ③ Car parking+Green facade+Roof-top playground (2,400 ㎡) ="Park & Play", creating a new urban skyline	AD AD, LD AD,LD, CD
					03-3	Maggie's at the Robert Parfett Building 	Manchester, UK Photo: Nigel Young–Foster + Partners	Refuge	① Maggie's Centre socially supporting cancer patients & their families ② Architectural roles of contribution for healing by silence & clean air ② Curing effects promoted by space, color, sound, safety & comfort ④ "Home away from home" with daylighting, greenery & vista ⑤ Central kitchen & common table surrounded by a variety of spaces such as personal niche, library, exercise & meeting room ⑥ Devices in- and out-side of greenhouse to enjoy curing effects	PD, CD AD, LD AD AD, LD AD AD, LD

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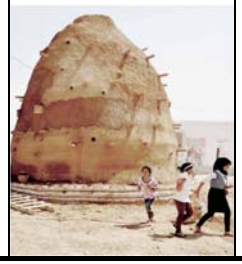
No.	Logo	Basic Goal	Major Issue	Typical Solutions	No.	Name/Photo	Place	Type	Specific Solutions	Category
#04		QUALITY EDUCATION *Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all*	Schools and educational spaces are a crucial part of our investment in the future.	1) In whatever situations, access to school for receiving education determines the future of children. 2) Affordable & productive learning environment, therefore, should be provided as an architectural design. 3) As examples, independent energy supply system and moveable classroom for seasonal immigrant workers are found. 4) These can be good opportunities to learn the significance for users & craftsmen of buildings, settlements & urban areas. 5) The collaboration with the community at design & usage stages can promote sustainable local culture. 6) Especially, at the primary education level, the key is to focus on developing the knowledge of sustainable design.	04-1	Avasara Academy  Photo: Case Design	Avasara, India	School	① Half of all girls in India never make it secondary education, and get married before the age of 18. ② This academy provides such girls with education, as well as the community mind-set change ③ As a boarding school, it creates safe and familial atmosphere in- and outside. ④ Supporting girls' characters, special structure is elaborated for individuality, concentration and social life. ⑤ Using traditional & local materials, soft & characteristic spaces have been realized.	PD AD, CD AD AD, CD BE, AD
					04-2	Frederiksbjerg School  Photo: Hufton+Crow	Aarhus, Denmark	School	① Physical exercise just after classes is beneficial for keeping memories of knowledge. ② Buffer zones for this purpose should be therefore activated. ③ This public school has been designed to promote indoor & outdoor physical activities based on the national relevant policy. ④ A variety of roots between 2 points are provided to multiply the exercise possibilities. ⑤ Diverse in- & outdoor spaces including class theaters with stairs instead of tables & chairs	AD AD, LD PD, AD AD, LD AD, LD
					04-3	The Community Dome  Photo: Martina Bo Rubino	Za´atari Village、Jordan	School	① No access to educational facility for most of refugee children from Syria. ② The purpose of "100 classrooms for refugee children" is to provide affordable & easy-to-build schools, as well as to promote this technique through participatory workshop ③ In cooperation with NGO Acting for Change Jordan, spaces for children were built by means of Super adobe method. ④ Transfer of the method to the region strengthens its economy.	PD PD, PS AD,CD, PS AD, CD

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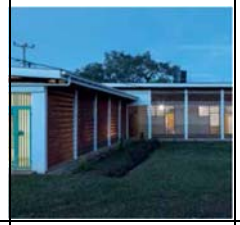
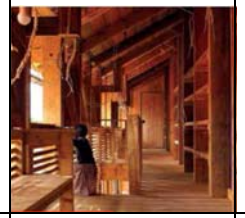
#05		GENDER EQUALITY *Achieve gender equality and empower all women and girls*	To support a movement towards gender equality, the design of buildings, settlements and urban areas must be inclusive to all citizens regardless of gender.	1) Public spaces, facilities & services must secure safety for girls, women, LGBT+ and citizens, as well as minimize risks of abuse. 2) These are the keys for social self-supporting of women & girls. 3) Affordable and safe facilities with health & sanitary services and meeting places should be provided. 4) Examples can be maternity clinics, safe houses or secure bathrooms. 5) Design of playgrounds, public parks & sports facilities should offer the similar services. 6) The building industry must work towards equal pay, promote diversity and oppose sexual harassment. 7) The industry, from design through construction, must avoid a narrowly gendered work culture, so that more women can join the industry.	05-1	Kachumbala Maternity Unit  Photos: HKS Architects	Kachumbala, Uganda	Maternity unit	① Eastern Uganda is extremely poor and suffers high maternal & infant mortality rate. ② New maternity clinics are needed in such areas with limited access to basic services. ③ This is maternity facility provides possibility of staying for post-observation and the family, due to poor access to transportation. ⑤ More than 90% of BM is locally produced and no electricity is needed for building. ⑥ With the assistance of UK-based professionals, it provides training & local health care.	PD AD, PD AD AD PD, CD
					05-2	Nakuru Children's home  Photo: Orkidstudio	Nakuru, Kenia	House	① In Kenia, over half the female lives under the poverty line, and less than 50% of girls are educated beyond primary school level. ② The building sector has been growing very fast, and a huge potential for education & employment of women. ③ Women who took part in building this Children's Home have proved their skill & value. ④ It brought them economic independence & transformation of life and changed the mind-set of their male counterpart.	PD AD, PD AD, CD CD
					05-3	Wonder Wood – a loop of movement  Photo: Leif Tuxen for the Danish Foundation for Culture and Sports Facilities	Skørping, Denmark	Play-ground	① Men and women have different preferences for exercise facilities and space. ② This project's aim was to promote physical exercise of girls at the school. ② The cluster-wise dispersed play zones for girls are integrated with trees and a variety of wooden elements. ④ These Edge Zones are open to all children and successfully proved to be much more used for exercises by girls than before.	PD PD, AD AD, LD AD, LD

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#06		CLEAN WATER AND SANITATION *Ensure availability and sustainable management of water and sanitation for all*	To take advantage of rainfall where clean water is scarce, buildings and urban areas must be designed so that rainwater can be collected, purified and used as drinking water.	1) Rainwater should not be mixed with wastewater in order to let enter the groundwater. 2) Building & sewage systems should be designed to keep bacteria & contaminated water separate from clean water and out-of-contact with citizens. 3) The key point is to ensure access to toilet facilities handling the waste produced. 4) Also BM should be chosen from those which do not contaminate the groundwater, whether during extraction, construction or in use. 5) Built-environment must be designed to withstand the climate change related to water, including extreme precipitation, drought and floods. 6) And the water resource conservation can be promoted by integrating with recreational function. 7) Examples are found in water handling features at building & urban levels, and communal toilets for slum areas.	06-1	Warka Tower  Photo: Warka Water Inc.	Dorse, Ethiopia	Water collection tower	① Major health problems in Ethiopia are caused by the lack of clean water & sanitation systems. ② Warka Tower makes it possible to harvest portable water from the atmosphere by collecting rain, fog and dew through the use of gravity, condensation & evaporation, without electrical power. ③ It is designed to be operated by the villagers, who can also use the associated shaded spaces as communal meeting facility. ④ BMs are locally produced and 100% recyclable & biodegradable. ⑤ It can be therefore easily built with simple tools and maintained by local villagers.	PD AD, MD AD, LD BM AD, CD
					06-2	Frederiksbjerg School  Photo: Carsten Ingemann	Aarhus, Denmark	Park	① Climate change causes heavier rainfall putting a growing pressure on wastewater treatment & sewer systems, in Denmark too. ② It results in overflow & outlet to lakes and harbors with the risk of water contamination to vital natural habitats. ③ The municipality expanded its treatment facilities into a multi-purpose recreational park with the water surface of 2.6ha. ⑤ It provides play-areas related to sports on water, as well as an educational center about water resources and treatment systems.	PD PD, LD PD, LD PD, AD, LD
					06-3	Living Machine  Photo: Carmen Magana	San Francisco, USA	Office building	① Sustainable water treatment system & recycling are the central issues of built-environment design. ② This building is the 1st example in US of treating greywater and waste water on-site by means of Living Machine System. ② This was executed for the wide spread of its system, and obtained LEED Platinum, producing 3 million liters of recycled water a year.	PD AD, MD AD, PD, MD

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#07	7 AFFORDABLE AND CLEAN ENERGY	AFFORDABLE AND CLEAN ENERGY *Ensure access to affordable, reliable, sustainable and modern energy for all*	The built environment is a major source of energy consumption and a potentially crucial energy producer.	1) Reduction of energy consumption through optimal building layout and BE selection to minimize the excessive heating. 2) Energy recycling system by storing excessive heat during the day and employing it at night. 3) The key of the above is to analyze the given geographical, climatic and cultural conditions, and to design the built-environment accordingly. 4) Examples include the use of day-lighting & natural ventilation, as well as BMs that support heating & cooling the building. 5) Building industry should contribute to the reduction of total energy consumption from the BM extraction, through the construction phase, to the use and disassembly.	07-1	Powerhouse Kjørbo  Photo: Ketil Jacobsen	Oslo, Norway	Retrofit of existing building ＋ Power Station	① Energy consumption can be largely reduced by effective retrofitting the existing building. ② This project in Norway has succeeded to produce more renewable energy than it uses by refurbishing an office building of 80s'. ③ Renewable energy system has been employed by means of collaboration with the experts of related areas. ④ Energy load is reduced by the effective use of well water, solar panels and simple zoning. ⑤ Consequently, the lifecycle embedded energy is considerably reduced.	PD, AD AD, MD AD, MD AD, MD, LD AD
					07-2	Øvre Forsland Hydropower Plant  Photo: Helgeland Kraft	Forsland, Norway	Hydro-power Station	① Alternative energy resources, in the place of fossil fuels, can improve the air potation and reduce greenhouse gas emission. ② This project in northern Norway attained high efficiency by retrofitting the existing hydraulic power station, which became a tourist destinations. ③ By visualizing the power plant process, corresponding to the surrounding environment, it gives the visitors specific & effective experiences of power production for 1,600 households.	PD PD, LD PD, AD, LD
					07-3	Paramit – factory in the forest  Photo: Lin Ho	Penang, Malaysia	Factory	① Architectural design can affect the energy performance and ecological footprint. ② This example, constituted of factory, warehouse and offices, is designed for engineering, manufacturing and post-manufacturing services. ② Its high energy efficiency gives 45% reduction of energy consumption, compared to the former factory. ④ A variety of passive solutions are employed for environment.	AD AD, MD AD, LD AD, LD

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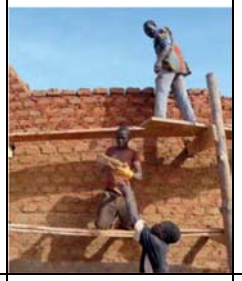
#08		DECENT WORK AND ECONOMIC GROWTH *Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all*	The built environment interacts with decent work and economic growth on both a planning level and on a building level.	1) Safe public spaces & affordable transit routes are crucial for finding employment. 2) Transit system is above all key factor for the access to a work-place from home. 3) The work-place should be designed as a healthy & productive space for employees. 4) Investing in good working environments back to a company's economic growth through higher productivity & fewer sick days. 5) In the building industry, focus is needed on decent working conditions and safety for workers. 6) Consequently, by emphasizing investment in human resources, the industry can develop towards more sustainable economic growth by using raised skills and knowledge to reduce the amount of raw materials and energy needed while raising productivity.	08-1	Atelier Gando  Photo: Kere Architecture	Burkina Faso	Atelier	① The population's literacy in Burkina Faso is only 20%, which calls for increased educational support to create local at grows & employment. ② Atelier Gando is a center for sustainable building technology, aiming to exchange between local craftsmen, architects, students, visitors to study and innovate building methods. ③ The building process itself was an opportunity for the creative exchange of tradition and contemporary building techniques. ④ The students visiting the atelier will be able to work with site specific challenges & the dynamic collaboration across nationality and culture.	PD AD, PS AD AD, PS
					08 -2	SiteCover  Photo: Dragor Luftfoto ApS	Denmark	Site house	① Construction sites are exposed to the vagaries of weather, which calls for provision of simple solutions for the safety of building workers as well as keeping the building quality and period. ② SiteCover is a combined cover and crane for construction that allows an indoor building activity. ③ It provides safe & comfortable working environment, and can minimize the construction period.	PD AD, ED AD
					08-3	Moving Schools  Photo: Mette Lange	Goa, India	Class-room	① The seasonal migrant labor population of India is estimated as high as 100 million, and their children face a crucial lack of education. ② Moving School is a series of mobile classrooms that are designed to float, roll and unfold. ③ The 4th school in Goa opened in 2005 on a floating platform in the river for the children of labor groups moving on the river to extract the sand. ④ Semi-permanent structures & a hostel also opened in 2012.	PD AD AD AD

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#09		INDUSTRY, INNOVATION AND INFRASTRUCTURE *Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation*	The building industry is producing massive amounts of waste and is consuming large amounts of natural resources and energy.	1) To advance the building environment sustainability, it is needed to develop innovative process of production and assembly as well as the related industrial infrastructure. 2) It includes also trans-portation and services related to the production. 3) The building industry is by nature site-specific, and we must aim at utilizing local industries and developing sustainable products locally in all countries. 4) This requires the development of both physical and digital infrastructure to promote more sustainable trade. 5) For example, the focus must be shifted from no waste in production to a lifecycle perspective. 6) And a prototype should be needed to be able to promote training & developing the new capacity at all levels as well as test the possibility.	09-1	Soft Cells by Kvadrat  Photo: Ed Reev	Denmark	Wall & Ceiling Panel	① A comfortable environment is influenced by architecture and its materiality, and how it affects all our senses. ② In order to produce sustainable BEs on an industrial scale, the whole chain of production, disassembly and biodegradability must be taken into consideration. ③ Soft Cells is an acoustic wall and ceiling panel system that delivers sound absorption and creates a comfortable environment. ④ The panels can be customized in shape and color and can be integrated in various design schemes, being resistant to humidity and temperature. ⑤ Consisted of two layers of tensioned textile and acoustic padding, the panels absorb sound on the low & md-range frequencies. ⑥ The modular design makes it easy to disassemble and reuse. ⑦ Most components and materials can easily go into recycling streams.	AD AD, BM, BE AD, BM, BE BM, BE BE BE, BM BM, BE
					09-2	Plastic: recycled and hand-crafted  Photo: Smile Plastics		Building Material	① Since 1950 around 9 billion tons of plastic has been produced, and closed to 7 billion tons have become waste. Less than 10% of the discarded plastic has been recycled and it is estimated more than 450 years to biograde. ② Simple Plastic integrated technology and art to disseminate the unexpected beauty of scraps. ③ All the BM is handmade and composed of 100% harmless plastics that can be recycled and up-cycled. ④ Those BM can be applied to from interior to exterior finishing, and a variety of recycle resources are used to produce them,	PD BM BM BM, AD

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#10	10 REDUCED INEQUALITIES	REDUCED INEQUALITIES *Reduce inequality within and among countries*	The built environment can act as an amplifier and enforcer of inequalities.	1) Disabled citizen risk being confined in their homes or unable to hold a job due to limited access to the transportation systems and facilities. 2) Building design may segregate the users due to religion, race, gender and/or LGBT+. 3) To improve such inequalities, social responsibility of architecture should be fulfilled through focusing on the inclusive design. 4) Building, settlements and towns should be all elaborated on the central theme of accessibility and usability. 5) Inclusive design should aim at being used by all as well as elaborating the program based on the regional culture and needs. 6) Examples include office buildings, public places of spirits, parks and public facilities of universal design.	10-1	Kamppi Chapel of Silence  Photo: Marko Huttunen	Helsinki, Sweden	Place of spirit	① Regardless of political or religious belief, we require sometimes a moment of reflection in silence. ② Traditionally, spaces o refuge and spirituality have been linked to specific beliefs with a different set of rituals and special concepts, which rarely facilitated inclusion and interaction of audiences. ③ This chapel has a space for cure & peace irrespective of religion, faith and origin. ④ It is located in the lively commercial center of Helsinki, and provides citizens with warm and comfortable atmosphere by using thick Finnish woods.	PD AD, PD AD, PD BM, AD, CD
					10-2	Small-scale neighbourhoods in Chon gqing  Photo: Gehl Architects	Chongqing, China	District	① Over the next 30 years, 300 million people will move to the cities in China, and the human streets are replaced with high-ways. The result is megacities full of large-scale mono-functional zones devoid of human life. ② In this example, local municipality and architects have improved the urban public spaces through re-vitalizing the streets. ③ Consequently, much more people spend their time in the old and small streets, and public spaces are now being permanently implemented by local planning and design teams.	PD, CD, TP CD, TP, PS PD
					10-3	The House of the Disabled People's Organization  Photos: Martin Schubert	Taastrup, Denmark	Center for disables	① UN Rights of Persons with Disabilities states that "all parties shall tale appropriate measures to ensure that people with disabilities are treated equally to others." ② The Disables People's Organization in Denmark has built its headquarters as a model. ③ The design team elaborated more integral and low-tech methods from the beginning.	PD, AD AD AD, BM

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#11		SUSTAINABLE CITIES AND COMMUNITIES *Make cities and human settlements inclusive, safe, resilient and sustainable*	The built environment is crucial to the development of sustainable cities and communities.	1) Architecture, design & planning contribute in multiple ways to make cities and settlements inclusive, safe, robust, resilient and environmentally sustainable. 2) Among them, most important challenge is to provide affordable and healthy living environment as well as urban traffic systems enabling walking, biking and commuting by public transport. 3) Participation of all the stakeholders into the design process makes it possible to create inclusive and less risky urban design. 4) This should also help reduce and counteract the environmental impacts of overuse, traffic, waste, noise and light pollution in urban areas. 5) Also it includes vegetation and green areas to help counteract the loss of biodiversity. 6) Examples can be found in housing renewal, climate change adaptation, collective reuse station etc.	11-1	Low Impact Living Affordable Community (LILAC)  Photo: White Design	Leeds, UK	Resi-dential district	① Design can make our cities more inclusive , safe and resilient, sharing the common resources, reducing the use of space & energy. ② LILAC is a co-housing project mixing private areas and common facilities. ③ A common house with household facilities surrounded by green areas promotes social activities of the residents. ④ By employing prefabricated building methods, using locally produced woods, straw bale and high efficient BE, an extremely low energy consuming and comfortable living environment has been created. ⑤ In addition, car-sharing, training of how to use equipment and tools, sharing of meals and growing food on allotment are managed and operated.	PD, AD, TP AD, CD CD BM, ED, AD CD, AD
					11-2	Taasinge Square in the Climate Resilient Neighbourhood  Photo: Steven Achiam, GHBLandskabsarkitekter	Copen-hagen, Denmark	Square	① Even in Copenhagen, new natural disasters like serious flooding due to heavy rain by climate change requires more tremendous costs to maintain the old existing infrastructure. ② This example is an early urban square that aiming at relaxing those problems, playing the roles of treating and storing rainwater as well as being a meeting place for citizens. ③ It reduces the sewage impact and strengthens the biodiversity by the greenery that is visualized. ④ In addition, through the participation of local residents, it succeeded to share the significance of the project and to help in strengthening familiarity, community and sense of ownership among the local residents.	PD, TP LD, TP, CD MD, LD LD, PS

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#12	12 RESPONSIBLE CONSUMPTION AND PRODUCTION	RESPONSIBLE CONSUMPTION AND PRODUCTION *Ensure sustainable consumption and production patterns*	The building industry is a major contributor to waste.	1) When buildings are renovated or demolished most of the value of existing materials and components are lost, and huge amount of diverse wastes are produced including from cut-off bits, over discarded formwork and the wrapping. 2) Therefore, long-life design, continuous maintenance and careful renovation are the keys of sustainable consumption of the built-environment. 3) Although the initial use changes and become obsolete, building design allows them to transform into different uses over time, so that the BMs retain their value. 4) And respective BM can be recycled or up-cycled through the design and the application. 5) New construction as well as renovation should put the priority on reducing the amount of BM used and wastes produced.	12-1	DESI Training Center  Photo: Kurt Hoerbst _ Alexandra Grill	Rudrapur, Bangladesh	School	① In developing countries, living conditions depend traditionally on household production and self-sufficiency. But with increasing living standards come a change of life-style towards higher level of consumption and dependency on imported materials, which result in a large carbon footprint. ② This example is a vocational school built in a rural area of Bangladesh, mixing traditional and modern building methods. ③ An affordable & beautiful learning space has been created by using passive natural energy, rationalizing the space constitution, respecting the local aesthetics & lifestyle and applying self-build process, which the residents highly proud of.	PD, BM, AD AD, MD BM, AD, CD
					12-2	Upcycle Studios  Photo: Arkitekt Gruppen	Chongqing, China	Studio	① Urbanization increases the demand for housing, which rapidly produces a huge amount of wastes. Up-cycling of them is a crucial challenge for making their potential value much higher. ② In this example, by using the up-cycled local wastes, it became highly compatible with market conditions. ③ Consequently, it succeeded in commercial implementation and being changing the perception of stakeholders.	PD, BM, AD BM, AD BM, CD
					12-3	Mjøstårnet  Photo: Moelven webcam 16.11.2018	Brumunddal, Norway,	Office building	① It is expected that huge amount of floors will be built with BMs of large CO_2 emission, which calls for employment of as much sustainable BMs as possible. ② This example in Norway is the highest wooden building, built by timbers from the sustainably managed forest in the region, based on the 12th century's wooden churches.	BM, AD AD, BM

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#13		CLIMATE ACTION *Take urgent action to combat climate change and its impacts*	The CO_2 footprint of the built environment must be reduced, and buildings and settlements must be adapted to the changing climate.	1) The CO_2 impact of built environment must be reduced through energy renovation by integrating renewable energy production, expanding sustainable transportation systems, reducing transport of BMs and emphasizing the use if local & renewable BMs. 2) By applying region specific building design, energy consumption for air-conditioning & lighting can be minimized, while maximizing the comfort of indoor environment. 3) And existing built environment must be adapted to the climatic changing conditions, including extreme rainfall, floods, hurricanes, drought and heat waves. 4) Those solutions should be based on the minute considerations about the local culture, geo- and topography and climate. 5) An example is a park for recreation as well as for storing heavy rainwater, which is co-benefit.	13-1	Qunli Stormwater Park  Photo: Kongjian Yu, Turenscape	Harbin, China	Park	① Chinese president Xi said "A city should be like a sponge," supporting a new movement Chinese urban planning against floods called "Sponge City," which reintroduced traditional methods into the rapid urbanization in China. ② This example in Harbin is a landscape design, following the policy to renew the former wetland to a huge park. ③ This park stores and purifies the storm water coming from developed areas and provides wonderful green landscape.	PD, LD, TP LD LD
					13-2	Lindevangs Park  Photo: Carsten Ingeman	Frederiksberg, Denmark	Park	① Global warming will result in more extreme weather phenomena such as heavy rains during summer & autumn, which requires sustainable urban sewage solutions. ② This example is a green urban space in Denmark integrating meeting space for citizens and a solution for climate change. ③ Water and its flow are the key aspects of the integral land-scape with a variety of plants.	PD, LD LD, CD LD
					13-3	Portland Green Streets Programme  Photo: Bureau of Environmental Services	Portland, USA	Green walkway	① Extreme precipitation events have produced more rain in the world, which became a crucial risk for the sewage system in urban area. ② City of Portland is a leader of vitalizing the neighborhood and strengthening its local economy by controlling the storm rain. ③ This Green Street that is designed to reduce the above-mentioned risk using natural systems has been built in more than 2,000 places within the city to date.	PD PD, CD LD, PS

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#14	14 LIFE BELOW WATER	LIFE BELOW WATER *Conserve and use the oceans, seas and marine resources for sustainable development*	Most of the built environment is situated on land, but its activities affect the oceans	1) Building industry affects the oceans through transport of BMs at sea, while existing settlements and cities discharge waste-water and other wastes to the oceans as huge impacts. 2) To help preserve life under water, we must reduce transport of BMs over long distances by sea through the development of local industries, and abolish plastic wrapping of BMs to reduce the source of non-degradable waste that ends up in the ocean. 3) By means of LD & TP, pollutants must be handled on-site so that they do not reach the groundwater or the ocean. 4) AD and TP may able to reduce the cost and also build the water treatment infrastructure with co-benefits, while LD can regenerate the polluted land facing the ocean. 5) In addition, through such built environment for coastal eco-system, new knowledges can be created, which help increase public awareness.	14-1	The Wadden Sea Centre  Photo: White Design	Waden Sea, Denmark	Museum	① The largest natural park of Denmark, Wadden Sea, is appointed World Heritage by its unique landscape, rich bio-diversity and many migratory birds and the others. ② This center was built in order to disseminate and strengthen the knowledge & understanding about the mudflats and the sea banks as well as to preserve them. ③ AD was focused on making harmony with the horizontal landscape of the vast area between sea and land, associated with various facilities for visitors provided with the information about the wild life. ④ Students, pupils and kinder-gardens can effectively learn about the flora & fauna and the geography through the experience.	PD PD, AD AD PD, AD, LD
					14-2	Fischer Family 'August'   Photos: Adam KR Fischer Lighting	Copenhagen Denmark	Lighting system	① To create sustainable architecture, we must pay attention to use as many BMs that can be recycled or up-cycled as possible. ② As ca. 20% of all the plastics is used in the building industry, there is a tremendous possibility of recycling them. ③ This example represents an energy efficient lighting system with LED that can be applied to existing system, while all the materials and components are recycled and can be further recycled later. ④ Taking the serious problem of "Ghost fishing" by "Ghost nets" into account, this lighting has been developed using the ghost nets to be up-cycled, and installed in the National Aquarium Denmark.	PD, BM BM BM, ED, AD BM, AD

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#15		LIFE ON LAND *Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation and halt biodiversity loss*	The amount of buildings, settlements and cities taking up land is rapidly growing.	1) To protect, restore, and support ecosystems & bio-diversity, buildings and settlements must include habitats for plants, insects and animals. 2) This means that green-field developments should be kept to a minimum and that planning and development of all new settlements must ensure sustainable conditions for local eco-system, and the natural networks that allow plant life to attain the symbiotic relations with the built environment. 3) Building industry can avoid excessive harvest of forests through the use of BMs from the sustainable and renewable resources. 4) AD & LD must consider the local flora & fauna as its basic elements to help support and chain with the local ecosystems. 5) By minutely laying out the buildings in vulnerable and ecosystems or wildlife parks, it can add to their preservation through sustainable tourism and raised public awareness.	15-1	Red Rib bon Park  Photo: Kongjian Yu, Turenscape	Qinhuangdao, China	Park	① Supporting natural wild life while creating access to green and lush areas in densely populated regions is a balance between intervention and preservation. ② This example is a landscape architecture for recreation, which responds to the above purpose. ③ The impressive ribbon-like red object curves along the river bank, and invites the users to the open space associated with a variety of elements. ④ The boardwalks are the access for the citizens toward the river and wetlands.	AD, LD, TP LD LD LD, TP
					15-2	Novo Nordisk Nature Park  Photos: Torben Petersen & SLA Architects	Frederiksberg, Denmark,	Office building land-scaping	① Wide-spread modernist urban-planning made vast surfaces asphalted, which deprived habitat from wild life due to this mono-functionality. ② This example is a landscape of a headquarters building, which strengthens the sustainable biodiversity according to the local forest and the characteristic geography. ③ A variety of biotope methods are applied to provide the employees, visitors and citizens with a recreational destination.	TP, LD LD LD, CD
					15-3	The Norwegian Wild Reindeer Centre Pavilion  Photo: Diephoto designer. de	Hjerkinn, Norway	Pavilion	① Urbanization to date made stresses on the natural environment rapidly growing, and consequently our future generations will lose the possibilities to enjoy the realm of benefits from the basic ecosystem. ② This example is an observation & research center of wild reindeer, and both researchers and visitors can access by a hiking trail through the surrounding areas with rich indigenous plants. ③ The design team gave efforts to focus on BM quality and their durability with a unique beauty.	PD, TP, LD AD, LD AD, LD

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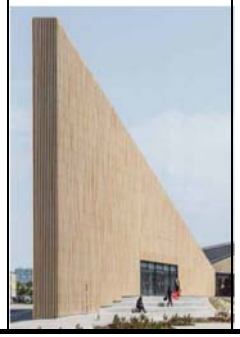
#16		PEACE, JUSTICE AND STRONG INSTITUTIONS *Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels*	Parliaments, courthouses and public libraries are cornerstones in a just and peaceful society, while local community centers, places of worship and safe houses can represent citizens' commitment to an inclusive and compassionate society.	1) Architecture does not make an institution just, but the effort and values put into a building can represent society's commitment to justice, democracy and inclusiveness. 3) Examples of this span from prestigious building for ministries or town halls to the establishment of UN emergency architecture in disaster zones. 4) To support society's expression of its values through buildings and public space, architecture and planning must ensure that public spaces and institutions are inclusive, welcoming, secure, and non-discriminatory. 5) The building industry itself must pay close attention to procurement and construction processes in order to discourage all forms of organized crime, as well as ensure not to rely on abuse, exploitation, human trafficking or child labor.	16-1	The International Criminal Court (ICC) in Hague  Photo: SLA Architects	Hague, Nether-lands	Court-house	① Such institutions as ICC have a dilemma to keep them as public domains with the transparency & inclusion, while safety. ② This case has been designed not only to deal with risk issues but also to undermine inclusion & equal access to public space. ③ The design team has coped with a variety of themes including terror-prevention, identity making, climate adaption, storm-water management and safety for stakeholders. ④ The international significance is symbolically expressed in the biodiverse courtyard.	PD, AD, LD AD, LD AD, LD LD
					16- 2	Bogotá – policies of change  Photo: Vladimix	Bogotá, Colombia	Town develop-ment	① In the mid-90s Bogota reached a critical point of the least livable city in Latin America due to the mass immigration, poverty and soared criminal rates. ② Therefore, The city's leader-ship level has committed to sustainable urban development. ③ Massive developments of public infrastructure as well as a series of unconventional campaigns have developed citizenship and participation, which made Bogota as forerunner of sustainable urban development.	PD, TP PD TP, CD
					16 -3	Tingbjerg Library and Culture House  Photo: Rasmus Hjortshøj - COAST	Copenhagen, Denmark	Public culture center	① This region in Copenhagen suffered from social problems of its high criminal rate. ② The municipality has decided to extend the school with a new library and culture house, respecting the existing framework. ③ Its unique tower-like form and the transparent façade towards the road side warmly welcome the citizens and make the indoor activities visible ④ And also it supports community-based activities under the same roof.	PD, TP PD, AD AD, CD CD

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#17	17 PARTNERSHIPS FOR THE GOALS	PARTNERSHIPS FOR THE GOALS *Strengthen the means of implementation and revitalize the global partnership for sustainable development*	Every city is built by many hands, and similarly we need to work together to reach the 17 sustainable development goals, as no single stakeholder can reach them alone.	1) The challenge of achieving the goals requires the involvement of all; from governments and institutional actors to researchers, businesses and citizens. 2) Architects, planners and designers can contribute by sharing knowledge, promoting sustainable solutions and engage in collaboration with research and institutional partners for the implementation. 3) Examples span from non-profit partnerships to provide homes for homeless to commercial partnerships to develop new sustainable products and services to the building industry. 4) Key to the partnership is a willingness to include new knowledge, test new practices, engage with local climate, culture & resources and work with end-users in a life-cycle perspective. 5) The global issues of SDGs require us to work together across professional fields and national borders.	17-1	TECHO – a youth led non-profit organization  Photo: TECHO	Latin America	Organ-ization	① 104 million people live in slums in Latin America, lacking a proper home and access to basic services. ② To cope with those problems, a NPO TECHO was established, led by youth. ③ The strategic objectives：I Ⅰ：Promotion of community development in slums Ⅱ：Fostering social awareness and action Ⅲ：Political advocacy ④ TECHO is engaged in corporate partnerships with major international businesses who bring funding, knowledge and manpower.	PD PD PD PD, PS
					17- 2	Climate Tile  Photo: Torben Petersen & SLA Architects	Frederiksberg, Denmark,	Product	① Climate adaptation is a big challenge to overcome today, but also an opportunity to innovate and collaborate across fields and interests. ② This is a new scalable tile system with water treatment capabilities, developed by a cross disciplinary partnership and collaboration. ③ It can catch and redirect 30% of the projected extra rainwater falling due to climate change.	PD BM, LD, PS LD
					17- 3	Architecture without borders, Magburaka Education and Computer Center  Photo: Carina Refsing Nissen	Magburaka, Sierra Leone	Activity	① Many of the world's problems relating to inequality are embedded in the built environment, and to be able to combat this inequality we have to collaborate across borders, while preserving the historical heritage o people. ② SF-Int. is one of the most representative NPOs, promoting such capacity building activities in the five continents as those in Sierra. Leone	PD, AD, PS PS, AD

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REFERENCES

1. The Royal Danish Academy of Fine Arts Schools of Architecture, Design and Conservation (KADK), is an architecture school in Copenhagen dating back to 1754. In 2015 KADK committed to working with the UNs 17 Sustainable Development Goals, making it mandatory for all graduates to engage with the goals in their thesis.

For more information visit www.kadk.dk

2. The UIA Commission on the 17 UN Sustainable Development Goals was established in 2017 by the International Union of Architects. The commission brings together architects from all over the world with the purpose of collecting, analyzing and disseminating knowledge of how architecture and architects can and will contribute to the fulfilment of the Goals.

For more information:
www.uia-architectes.org/webApi/en/working-bodies/sdg

3. The Danish Association of Architects was founded in 1879 in order to support and promote the conditions of architects whilst ensuring architectural quality in our cities, buildings, landscape and environment. The associations of architects in the Nordic countries which form theNordic Section in the UIA will host the UIA World Congress in Copenhagen in 2023 with the theme "Sustainable Futures". The Congress will focus on the 17 UN Sustainable Development Goals.

For more information: www.arkitektforeningen.dk
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