Lighting in the Urban Age
Meaningful design for cities, people & places.

ARUP

Contents

Urban lighting platform - Blurring the boundaries

# Executive summary
Lighting in the Urban Age

More than half the world's population currently lives in cities and it is estimated that this figure will be 75% in the year 2050 (*The Endless City*, 2007). Those involved in the design, governance and implementation of cities are increasingly required to develop innovative solutions to respond to today's exponential urbanism. The life of our cities after dark is only one element of this challenge, but one that needs to be addressed in a wider social, economic and environmental context. In simple terms, we light our cities so that its inhabitants can perform a variety of functions both by day and night. How we do this and in particular, how successfully we do this, requires an equally innovative and informed design approach.

This paper presents the result of internal research funding, awarded by Arup's Design & Technical Executive, to further investigate and propose an integrated approach for sustainable urban lighting masterplanning.

This research is in response to a perceived gap in the current knowledge of the link between urban design and lighting engineering.

The majority of urban lighting approaches either lean towards urban strategies or towards engineering solutions. Urban strategies are able to transform a space into a place unlocking the potential of the urban environment, but lack the technical knowledge of how to do so. Engineering solutions are technically sound, comply with codes and regulations; however, they often lack the design sensitivity and understanding of the urban context.

As a firm of multidisciplinary designers and engineers, we propose that the integration of these two very different design methodologies is possible by first understanding the following four key 'drivers of change' that are currently shaping the built environment:
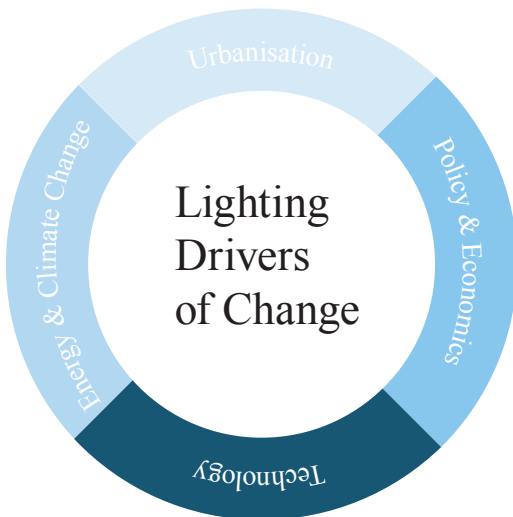
Urbanisation more and more of the world's population are moving to urban areas. 50% of the world's population living in cities 2007; this will be 75% in 2050

Policy & Economics current inter-national and national policies are calling for the reduction of carbon emissions and local municipalities in the current economic climate are facing reduced expenditure budgets.

Energy & Climate Change as a result of finite resources, the economic crisis, and planning policies, cities must minimise both installation and maintenance costs as well as overall energy use.

Technology advancements occur rapidly which drives innovation, the nature of infrastructure and lifestyle changes.

Through the examination of these broad headings, a unique design framework for urban lighting is proposed.

Finally, this paper tests the proposed methodology by exploring three lighting masterplan case studies.

The firstdevelopment, Mshereib in Doha (Qatar), is integrated into the existing city fabric.

The second development, New Songdo City in S ongdo (South Korea), is part of a new "satellite" city detached from the existing urban fabric.

The third project is ity City Park in Bradford (UK) which creates a high quality public realm.

All three projects pose very different urban conditions contexts, local policies and attitudes towards energy optimisation and technology.

Introduction
Why Arup?

Total Architecture

Arup's lighting design practice incorporates the overall philosophy of the firm and the belief in 'Total Architecture' as defined by Sir Ove Arup in every project. This approach lies at the heart of what we do, in that great things can result when "all relevant design decisions have been considered together and have been integrated into a whole by a well organised team". For the lighting practice, this means combining creativity with technical expertise and viewing our input as one part of a whole.

The unique philosophy that underpins the way Arup works, together with the team's unparalleled expertise in museum daylighting design, retail branding, and media facade architecture leads to a natural evolution of the definition of public space and a move into strategic urban lighting design work.

Museums & Galleries

Arup's lighting practice was formed on the basis of innovative and design-led collaboration with architects such as Renzo Piano, David Chipperfield and Herzog & de Meuron. Bespoke daylighting systems that not only deliver the right quality of light but also form a key element of the building's architecture, led to projects that created spaces for people using natural light. The evolution of galleries as both public, retail and educational spaces also began to pave the way for the lighting practice to move into other areas of design.
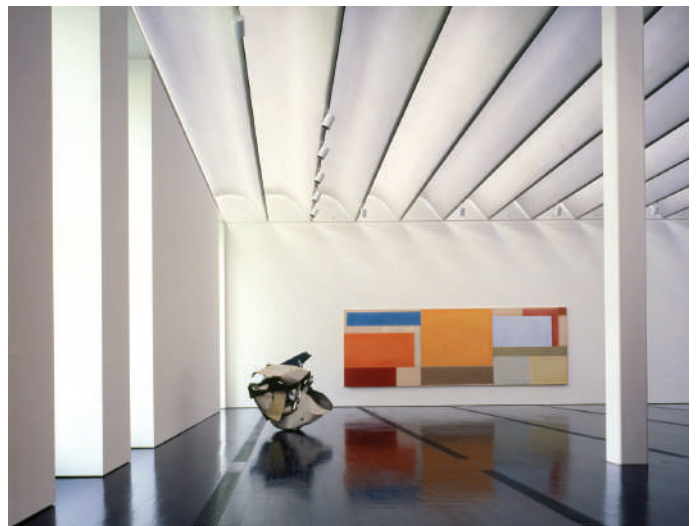
top Ove Arup & team © Max Dupain
bottom Menil Collection Museum © Richard Bryant

Retail Branding

Recruited as designers through our museum and gallery
experience, later work in the retail sector with PRADA,
Paul Smith, Selfridges, Chloe, and Louis Vuitton led to
defining retail brands and spaces through architectural
lighting concepts. The design architects for Chloe sought
a concept that treated the shops as galleries where the
items become works of art within the space. Likewise,
Louis Vuitton were searching for a lighting concept that
improved both the appearance of the global branches,
but also the quality of the internal environment.

Media Facades

The team's close working relationships with
architects such as UN Studio and Asymptote also led
to the introduction of media architecture on the external
building facade. First of its kind, the Galleria fashion
store in Seoul, Korea, was the largest and most complex
low resolution media facade changed the nature of the
store's image, also became a visual icon and tourist
attraction for the city.
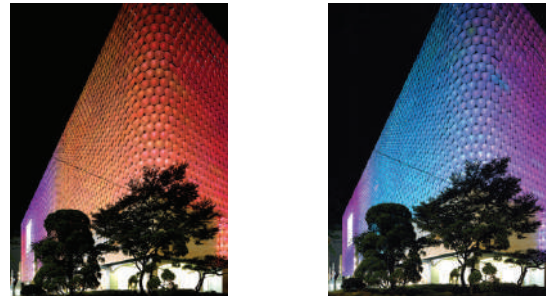
Lighting in the Urban Age

It is no surprise that the next step from gallery spaces
to media facades is to outdoor public spaces and cities
as a whole. What lighting can do for a gallery, that is
in some way 'a city within a city', it can also do for our
urban environment.

This paper examines the key drivers of change that
cities are facing and ways that strategic lighting design
can have an impact on the 'Total Architecture' of the
city, for today and in the years to come. By creating an
interface between design and engineering, together with
the driving forces of change, we propose an integrated
approach to urban lighting design.

top Louis Vuitton shop © Michael van Oosten
middle Galleria, Seoul © Christian Richters
bottom City Park, Bradford © Giles Rocholl Photography

Drivers of Change

What are the most pressing issues facing urban lighting design?

What will our world be like in 2050? A set of cards, produced by the Arup Foresight & Innovation team identifies some of the leading drivers of change that affect our future.

Each card depicts a single driver. A brief fact and rhetorical question are on one face, backed up by a brief indication of the breadth and depth of the content on the other face. The card set was devised by the Foresight & Innovation team at Arup, a group tasked with exploring emerging trends and how they impact upon business of Arup and its clients. The publication serves not only as a vibrant visual record of research, but also as a tool for discussion groups, personal prompts, for workshop events or as a "thought for the week".

As a tool to structure the backbone of the Urban lighting research project, four key Drivers of Change, or larger research topics were selected as a base to further study and examine the implications for lighting design masterplanning.

Urbanisation

Policy & Economics

Lighting Drivers of Change

Energy & Climate Change

Technology
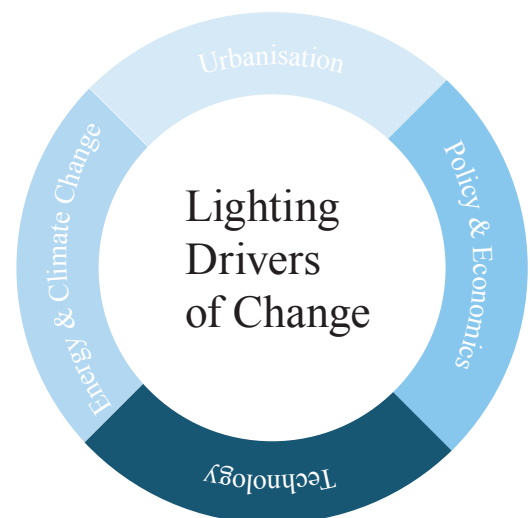
Urban Lighting Drivers of Change

We have identified the following four key Drivers of Change, based on our current work and project experience, that affect Urban Lighting:

Urbanisation More and more of the world's population are moving to urban areas and face varied urban challenges in terms of social cohesion, employment, and population expansion or contraction.

Policy & Economics Current international and national policies are calling for the reduction of carbon emissions and local municipalities in the current economic climate are facing reduced expenditure budgets.

Energy & Climate Change As a result of finite resources, the economic crisis, and planning policies, cities must minimise both installation and maintenance costs as well as overall energy use.

Technology advancements occur rapidly which drives innovation, the nature of infrastructure, and lifestyle changes.

Through the examination of these broad headings, a unique multi-dimensional design framework for urban lighting is proposed.

images Drivers of Change cards © Arup

Urbanisation
What are the key issues cities are facing today?

At present, 50% of the world's population resides in urban areas. This number is only likely to increase, although the distribution of population and nature of the increase is not everywhere the same.

All cities, regardless of their pace of growth or development, are facing similar issues of economic stability, social cohesion and climate change. All three factors need to be considered when working at an urban scale, whether it is a public space or an all-encompassing masterplan.

In China, India, Africa and Latin America, urban populations are exploding and cities are growing exponentially. At the same time, many developed cities are shrinking and being dramatically restructured as a result of shifting economic bases and new patterns of migration. With investment in urban real estate, infrastructure and renovation becoming the driving force behind economic growth, the physical and social landscapes of the city are changing at an astonishing rate. (Urban Age 17.11.10 http://www.urban-age.net/introduction/idea/)

What this means for lighting design, and in particular urban lighting, is that all cities are not alike, nor should they be. In addition to respecting and enhancing the local culture and local identities, it is fundamental to acknowledge that the governmental structures are different, levels of crime vary, investment in 'green strategies' are unique, and the demands on the population, whether increasing or decreasing, is also very different.

Different design responses are required for different cities. We will explore this notion, later in the case studies section at the end, as a city in England that is fighting to bring people into the town centre has different needs than a city in China simply struggling to cope with urban sprawl or a series of 'urban centres'.

top Shanghai City Skyline © Martin Saunders Photography

Policy & Economics
Relevant policies for cities & lighting design

Current international and national policies are calling for the reduction of carbon emissions and local municipalities in the current economic climate are facing reduced expenditure budgets. Lighting plays only a small part, but more and more regional planning documents and initiatives are focused on energy, the environment, and climate change.

As lighting designers, we need to be aware of local policies, understand the current debates and discussions, and also be in a position to influence policies that directly influence lighting.

The diagrams from the Urban Age research project in 2009 indicate the varying degree to which countries are funding 'green initiatives', which has a profound impact on the work that we do. Not surprisingly, South Korea, the EU, and China are leading the way in terms of the percentage of financial support. This indicates where green stimulus is in place, but it also highlights opportunities for other countries to bolster their stimulus packages.

Other key relevant policy initiatives are as follows:

Kyoto protocol & Copenhagen 15
The most well-known initiative to globally reduce carbon emissions is the Kyoto Agreement, which was later followed by the Copenhagen 15, and is addressed each year, in the hope of a global, binding agreement.

The C40 initiative
The C40 , the Cities Climate Leadership Group, is an international initiative which helps cities committed to tackling climate change mitigation and adaptation.

Arup is playing a key strategic role advising on ways to tackle climate change. The C40 is a forum of 40 major carbon-emitting cities, and it is jointly founded by the GLA and the Clinton Foundation. It promotes city level initiatives and providing a network for sharing information and knowledge on best practices and solutions adopted that reduce the carbon footprint of the cities.

Home to half of the world's population and growing rapidly, cities consume over two thirds of the world's energy and account for more than 70 percent of global CO_2 emissions [VQ1]. The energy used for illuminating cities at night in both private and public domain is not the major contributor to energy consumption but its a key parameter we can easily tackle.

Ban of the incandescent light bulb
One of the most shocking and powerful movements in the European Union is the banning of high-wattage incandescent light sources. This forces change and has a powerful impact on the residential lighting market in particular.

LUCI & the charter on urban lighting
The Lighting and Urban Community International has recently published a Charter on Urban Lighting where more than 30 worldwide cities have signed up to principles for both 'Sustainable Cities' and 'Sustainable Light'. More information can be found on www.luci.org.

top California Academy of Sciences, Golden Gate Park © Tim Griffith

Energy & the Environment
What are the impacts, & more importantly, where?

Lighting is a visible element of expending energy and as such, is often a key target of energy reduction schemes. An interesting comparison lies between the amount of light pollution as compared to the amount of overall carbon emissions. As can be expected, the correlation is very close.

What is very remarkable, though, is the comparisons arising by the Urban Age conference series on the correlation between flood risks and carbon emissions.

According to the conference data, the cities emitting the most CO_2 do not necessarily bear the same level of risk when it comes to flooding, with those emitting less CO_2 annually. This fact reveals that the greatest "offenders" in CO_2 emissions affect the flooding of areas that have less of an energy impact. Shanghai and Mexico City are the only heavily polluting cities that are also largely prone to flooding.

Interestingly, lighting has often been seen as a source of progress for developing nations but we should see this in terms of lighting quality rather than quantity. However, as important it might be reducing the level of carbon emissions and amount of light pollution in developed countries, it is even more important to create new patterns of development and consider city lighting holistically.

Urban lighting planning or site wide strategies should include references and ideas to the following:

– minimise light pollution
– set out environmental zoning standards
– address the recycling of hazardous materials found in light sources
– minimise energy consumption
– consider life cycle costing analyses
– consider the responsivity to light of local ecology

right The Earth at night, Image credit: Marc Imhoff of Nasa Gsfc and Christopher Elvidge of Noaa Ngdc. Image by Craig Mayhew and Robert Simmon, Nasa Gsfc www.visibleearth.nasa.gov
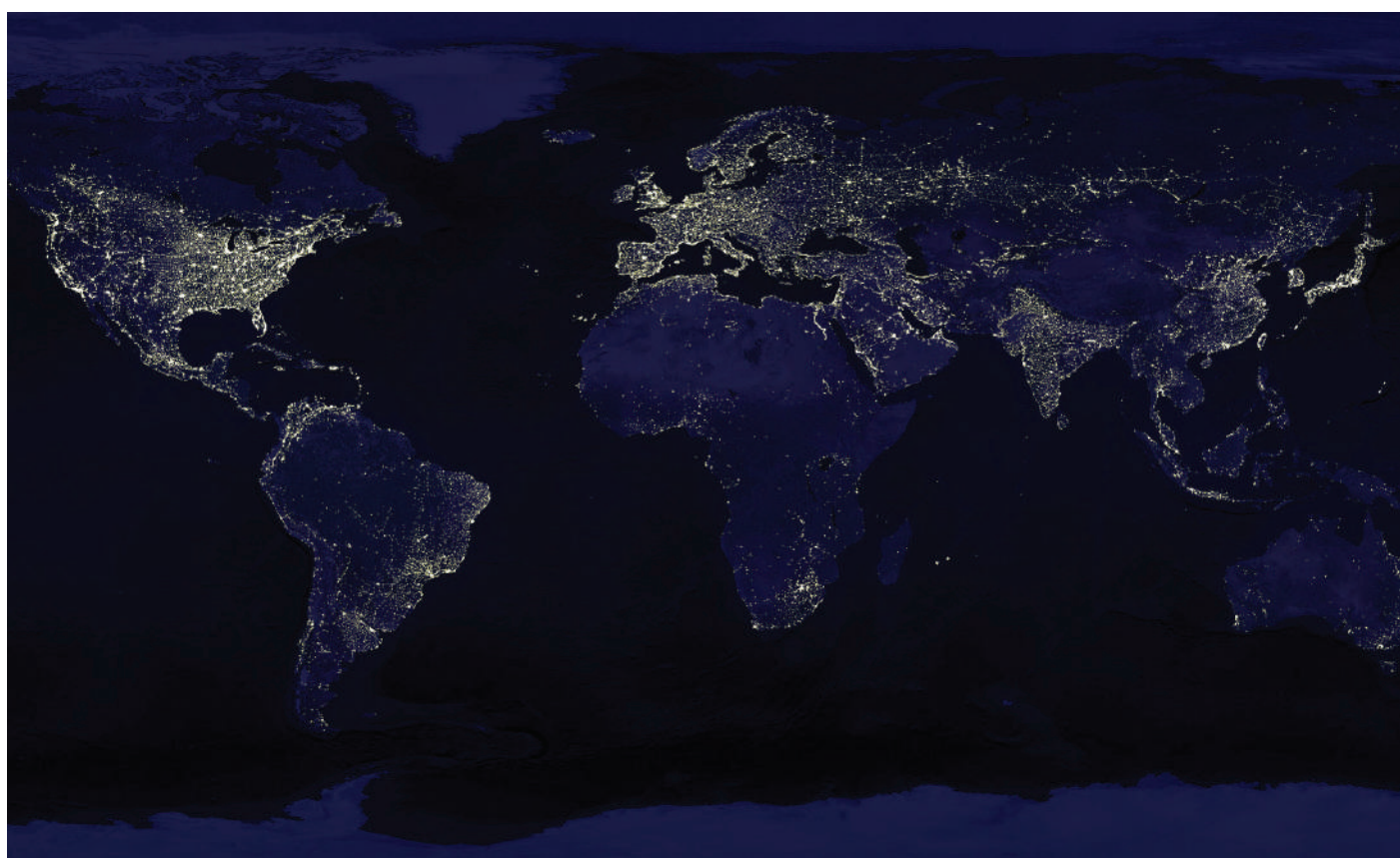
Technology
Modern technological advancements with sustainable solutions

Lighting equipment, lighting control, and renewable technology advances at a rapid pace. This knowledge is critical when providing strategic advice to cities, planners and architects. In addition, the current model for cities is simply not working as resources are not being used efficiently. Technology has the power to drive the changes towards designing cities and systems of power in a remarkably efficient way.

While the developed countries are struggling to find ways to reduce energy expenditure and its dependence on fossil fuels, the developing countries, without such an extensive services network, are making sustainable leaps and bounds through the use of innovative technology.

The New York Times recently published an article on solar lighting in Kenya that is transforming the lives of those with access to lighting and power through the use of small scale, affordable solar panel units that can also power cell phone chargers. It was also discovered that artificial lighting allowed people at the community to interact after dark, children were able to study and do their homework at night, thereby improving their future educational potential.

Sometimes a different but simple approach is required to really make a difference and create sustainable cities and sustainable lighting with a positive social impact. Shouldn't it be our aim that all lighting installations are to be powered solely by renewable sources?

Technology can be utilised in creative ways to bring people together. In Kenya perhaps this means illuminating a village shop, while in Europe an interactive media facade which allows social interaction and enlivens a deprived urban zone at night.

right Green Pix, Beijing © Simone Giostra, Arup, Ruogu

Urban Design Frameworks
Four inspirational urban design methodologies for lighting

Design frameworks help to organise the ways in which users experience cities, and the research and background is vast. Four urban design methodologies have therefore been selected that are applicable and inspirational for lighting design within an urban context. These general approaches can be used as both tools to understand the city and ways in which to communicate with urban designers. This of course is not an exhaustive list, but rather as a start in approaching strategic designs.

Kevin Lynch, The Image of the City (1960)
The first, and most widely used urban methodology is that of Kevin Lynch. This valuable publication allows a number of organising principles for the city, including landmarks, edges, nodes, districts, and paths. Lynch's methodology can easily be used in urban lighting design to begin to think of the various elements of the city, although it is limited with regard to the inherent character or nature of the city. It also does not include people and their use of the city, but rather views the city as a collection of built elements.

Jane Jacobs "The Uses of Sidewalks: Safety". from the Death and Life of Great American Cities
(1961). Jane Jacobs started writing about cities as a neighbourhood activist and not a design or trained professional. Therefore her writings are very practical and based on observation, rather than educational theories.

One element of her work that is applicable for cities after dark is the concept of 'eyes on the street' and natural surveillance. A street is not safe, regardless of the lighting level, if there is no element of natural surveillance or movement from point A to B. This is something that we, as lighting designers face a great deal in the urban realm, that increased lighting levels do not necessarily translate to a increased perception of safety.

Rob Krier, Urban Form (1975), pp. 20-22
Rob Krier is a Luxembourgian sculptor, architect, urban designer and theorist, based in Berlin. In his widely influential publication, "Urban Form", he seeks to examine and define the nature of urban form, in both structural and morphological terms. For lighting, one aspect of this methodology is the three different levels on which we experience urban spaces in terms of near, distant, and far views. This is not easily shown on a plan, but rather through the use of perspectives at varying scales.

William H. Whyte (1988)
from City: Rediscovering the City
Sociologist William Whyte began his studies of New York's public places at the request of the City's Planning Commission to help understand why some of the city's open spaces were heavily used and populated, while others were virtually empty. He used a mix of creating hypotheses and then testing these ideas by making films and analysing the results. What is powerful is that he had very simple conclusions that later seem very obvious, but that are often forgotten.

One simple conclusion was that the amount of sittable space was more influential than the amount of overall space. And similarly, he studied gender and found that the greater the proportion of women in a space, the better managed the space tended to be and as a result, more successful (The City Reader, pp. 483-490).
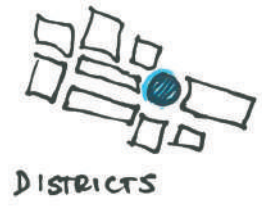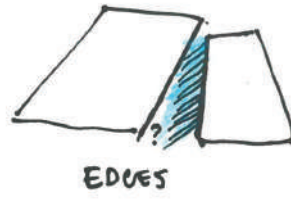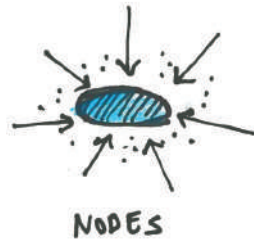
top Sketches of Kevin Lynch's key urban principles © Arup
bottom Art institute of Chicago © RPBW-Nick Lehoux

The Evolution of Urban Media
From billboards to bridges

One of the most pressing issues facing cities today is the widespread overuse of media. The overwhelming amount of information and visual disruption often causes city dwellers to simply shut out the exterior environment, as a result, the intended impact is much weaker if at all perceptible.

We strive for 'beauty and elegance' as compared to 'information overload 'and this is something to take into seriously into account in the design of lighting media solutions for our projects. In this brief essay, we look at how the design and use of media has evolved together with the opportunities and risks for designers, as well as city dwellers.

Media for a building
Our lighting team having an extended experience in the design and installation of media facades, often refers to a media facade as a 'luminous layer' of light. Historically, luminous layers have been first installed on billboards, media and on entire building facades as for advertising purposes.

This luminous layer can act simply as a piece of art, but ideally is a solution that becomes an inherent part of the building facade design. Rather than an afterthought or simply advertising space, an integrated luminous layer can give the building another face, as was the inspiration for the Galleria in Seoul, Korea, as well as Star Place in Taiwan. This outer, dynamic 'dress' for the building that contains a high-end department store was a key aspect of the design and wish for a media exterior.

Media for a street
Lighting media can also enliven the streets of our towns and cities. Two examples, Neville Street in Leeds, England, and the 'World's Largest Timepiece' festive lighting for Zürich, Switzerland, serve different purposes, but both create an interactive and dynamic layer of light. The installation in Zürich, in 2003, was the result of a winning competition entry to modernise the existing Christmas Lighting of the popular Bahnhofstraße. The temporary installation ran for two years, from 2003 to 2005, and is an example of both media as well as functional lighting. Additionally, the lighting also highlighted the surrounding building facades as well.

Neville Street in Leeds was the response of a need to enliven and better illuminate an otherwise dark passageway in the city for both safety and amenity reasons. This art installation changes its display every day of the year and has greatly improved the look and feel of Neville Street.

Media for infrastructure
Urban infrastructure elements such as the Sheikh Zayed Bridge in Abu Dhabi, UAE, are examples of dynamic lighting installations for otherwise functional elements. The design of the bridge highlights different colours and patterns for various times of the year that correspond with surrounding landmarks and local festivals.

The future
The design of media is now encroaching upon every element of the urban realm, and is no longer limited to billboards or even building facades.

Our approach is to create relevant, sensitive, and beautiful installations that use media and light as a design medium. This luminous layer of light should be an integral part of the design, not just an afterthought. It is essential that design proposals respond to and respect the local character of places to enhance the vibrancy, vitality and aesthetic quality of our cities.

right Sheikh Zayed bridge, Abu Dhabi © by Christian Richters

Our Philosophy
Meaningful design for cities, people & places

Who are we lighting for?
Lighting is for people and cities are for people.
What is unique about both the people and the place?
Has social equity been considered in terms of addressing
both the city centre as well as the urban periphery?

Understand the context
Is crime an issue? Do you need to reinforce a great
design/architectural concept/urban area? Do this
easily and simply. Do you need to transform a space
and create something entirely different?

Talk to people
Have you met with the local police, the local ecologist,
the town planner, the urban designer, and the local
residents? Get to know the place and the people,
local customs, culture, and character.

Think about cities, people and places, not luminaires
We can all impress and equally confuse others with our
knowledge of lighting standards, lamps, luminaires and
lighting controls. However, successful urban projects
focus on the city, people, and places, rather than the
equipment that will be used to achieve a design goal.

The Kinetic City
Design flexible systems for flexible infrastructure,
ever changing technology, work-forces, family structures,
and the changing nature of urban space.

Brush up on urban theory
Do you know what a 'landmark' is? Are there 'eyes on the
street'? Where are the 'pedestrian desire lines'? Learn to
speak the same language as the urban designers/architects.
In principle, lighting should reinforce the urban design so
that the city functions as well after dark as by day.

Simplify things
Create a clear hierarchy of what to light and what not to
light, and make room for great ideas rather than trying to
make everything a 'big idea'. Make it simple and allow for
creative intervention at the local project scale. Each street
does not need to be a different 'colour' to be unique.

A sense of scale
The scale and intensity of lighting should respond
to the scale and intensity of the built environment.
Draw everything in section when selecting a hierarchy
of luminaires and street furniture.

What are the local planning and policy constraints?
Where is the country located, what are the attitudes
towards both lighting and energy consumption,
how green are they, and how forward does the city
or client want to push the envelope?

Which technology is appropriate?
To LED or not to LED...?

Think big
Can a site wide lighting control strategy be implemented
at the start? This is likely to save more energy than
individual project reductions. Is there a wider ICT/
maintenance strategy? Ask the questions at the start
of a project and don't focus solely on lighting issues.

Imagine
What would really help the individual city/place/project?
What is unique about the site and how could this be even
better after dark? What does this particular city need to
make it function better?
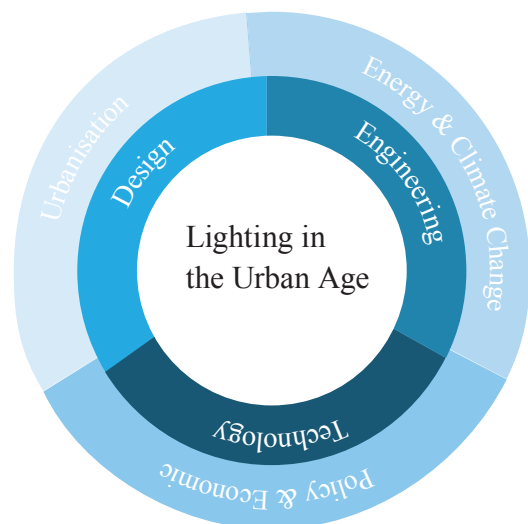
Case Study 01
Msheireb, Doha, Qatar
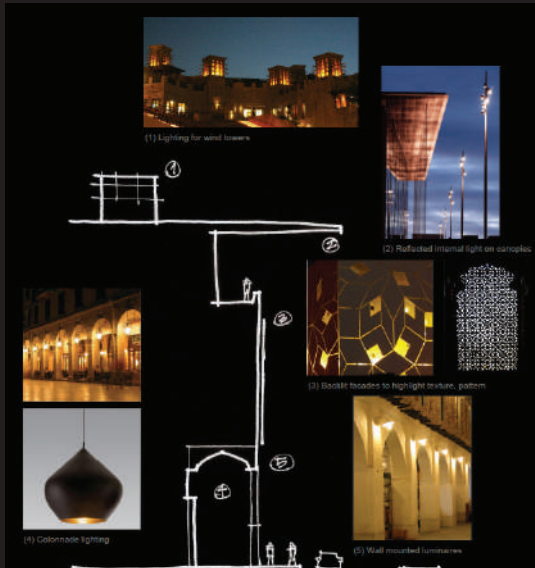

Msheireb Lighting Masterplan

The Msheireb is a 35 hectare mixed use development for the regeneration of the heart of Doha. Arup is leading and managing the project from Doha as well as delivering a number of design and engineering roles. The lighting masterplan development standards (MDS) included guidance for the nature of the development after dark, which includes various layers or elements from street lighting to wayfinding and signage, and from general comments to detailed compliance conditions. As the site is located within the centre of Doha, the strategy focused on integrating the proposed development within the existing context. In particular, a number of key themes were developed with regard to lighting and were carried out throughout all stages of the masterplan.

Contemporary Heritage

The overall masterplanning concept of 'Contemporary Heritage' applies to the architectural building form and open spaces, as well as down to the detail of the proposed street furniture. The design aims not to create a standard approach to a modern city, rather a contemporary solution for the city of Doha. With its roots as a an active fishing port, the strong presence of the Corniche, and the local architectural language and context, maintaining links to both past, present and future were fundamental. In lighting terms, this translates into the use of modern technology but in subtle ways that reveal texture and pattern, highlighting the varying roofscape of the development, and minimising both unnecessary light as well as light pollution.

above © Msheireb Properties, Allies & Morrison Architects

Illuminated building 'crowns' to emphasise the diverse roofscape
Landmark buildings to be prominent features at night
Key building facades that mark public spaces and visual corridors

Light – Dark – Light

Together with Allies & Morrison Architects, the concept of 'Light-Dark-Light' was developed for the building facade lighting. This means that all decorative lighting for the majority of buildings within the development should focus on highlighting the unique and varying roofscape and the building entrances or ground floor level. The facades should largely be left dark and where lit, this will be done very subtly to reveal unique patterns or materials. Landmark buildings were designated as being the exception to the rule as they also form a key entrance to the site or hold a special civic function, such as the mosque.

Sustainability: A sitewide approach

An innovative, site-wide lighting control system was designed that was based on the systems used for large projects such as airports. Based on the proposed Ethernet network, an intelligent and integrated site wide system allows the lighting to adjust to certain times of the day and therefore reduced intensity, or also for special events and uses. In addition, after a

pre-set time, all decorative lighting is to be switched off to minimise energy consumption. Such a system allows the development to fine tune and adjust the lighting levels of streets and spaces as needed and preferred, based on real experience.

Urban Form: A hierarchy of the layers of lighting

Finally, and as is provided for every masterplan, the scale, form, and nature of the proposed lighting solution responds to the scale, form, and nature of the urban form. A hierarchy of luminaires, lighting levels, lighting colours, and suggested lighting solutions was included in the final development standards document.

top images Urban strategy sketches & diagrams © Arup

Case Study 02
New Songdo City, Songdo, South Korea
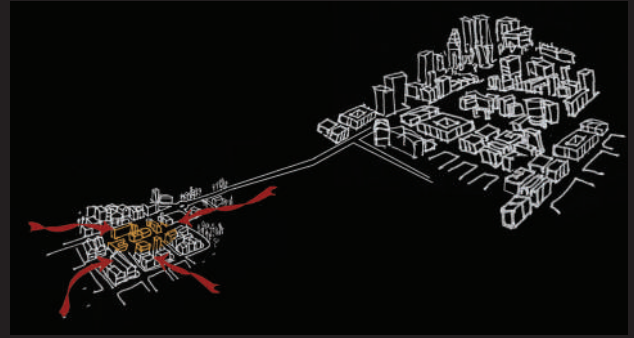
A "Satellite" City

New Songdo City is a $35 Billion, 1500-acre international business district being developed along Korea's Incheon waterfront scheduled for final completion in 2020. The aim is to create a distinctive and attractive "satellite" city for Incheon that can serve as a hub for international firms operating in the Yellow Sea economic basin.

In addition, one of the project's key design principles was to create a new model for a truly sustainable Korean urban development. An astonishing fact is that in Korea in 1960, 80% of the population was rural, and by 2000, 80% of the population was living in urban areas. As a contrast, in the US, Britain, and Germany, 60-80% of the population were living in urban areas in 1960. This speed of development presents very unique challenges for the sustainable use of resources.

Ambitious Sustainable Design

The sustainable design ambitions for this project served as a strong backbone for the nature and design criteria of the development . It was the first LEED certified development in Korea (for both buildings and neighborhood guidelines) and a delicate balance was defined utilising lower lighting levels as compared to the current Korean standards. Low level lighting meets both energy and environmental concerns also helping in the preservation of dark sky.

The sustainable aspect of the urban lighting design is further strengthened with the introduction of local manufacturers and low energy luminaires which provide a good level of amenity lighting throughout the scheme and provide accent lighting only where necessary. In addition, daylighting analysis was provided for all buildings, and a lighting control strategy for the main pathways was implemented to reduce the public realm lighting to after dark use and only where required.

top Songdo City © Kohn Pedersen Fox Associates

A variety of experiences

The design of the public realm creates a rich hierarchy of public spaces, a sequential journey of both private and prominent indoor and outdoor spaces that follow one another, interlink, and are sometimes even visually connected.

The lighting scheme in New Songdo City reinforces this experience through the use of light. Smaller spaces are more intimate using more discreet lighting and larger public spaces include more decorative and stronger lighting techniques. A true investment was made by the developer in the quality of the public realm at night, something that is often neglected in new developments whilst trying to keep a pace of rapid growth.

New Songdo City is being developed as a joint venture by Gale International and POSCO E&C working with Kohn Pedersen Fox Architects together with the support of Korean government and it's Free Economic Trade Commission. The park opened to the public in August 2009. It was well received and it now serves as the centrepiece of the New Songdo City development.

Creating a skyline

The image of New Songdo City as a desirable location included the creation of a 'skyline' by day and night. The towers were highlighted and building outlines illuminated to give the look and feel of a modern, contemporary city after dark. As an inherent challenge for satellite city developments, the design acknowledged the need to attract investors, visitors and residents.

top Park bridge & residential area © Arup

top Conference Centre © Arup

Case Study 03
City Park, Bradford, UK

Clear Ambition

From the onset of the project, Bradford Council had a clear ambition for City Park; a high-quality public realm space, that is entertaining and engaging for residents and visitors alike, delivering flexibility of use and extending the use of the space after dark. Furthermore, during times of rapidly increasing energy costs and greater public awareness of sustainability issues, energy consumption and efficiency was a key consideration allowing for a sustainable lighting scheme.

Balance

The lighting has been carefully balanced to deliver a flexible, playful night-time setting while maintaining the functional requirements for a city centre. Lighting levels have been selected to best balance the differing pedestrian experiences, aiding navigation around the park through emphasis of primary routes and decision points, and challenging the traditional 'blanket' lighting approach to large scale landscaped spaces.

top images © Giles Rochel

Multi-functional Space

At the heart of City Park is a large 'mirror pool' water feature measuring 74m in diameter and comprising over 100 illuminated fountains, including the UK's tallest urban fountain which reaches a spectacular 100ft. The mirror pool basin has been developed to provide a flexible multi-functional space. The body of water can be partially drained to reveal a causeway, allowing pedestrians to walk through the centre of the pool between the fountains, or drained fully to provide a large-scale events venue.

The Challenge

The technical challenge facing the design team was how to light a large open space with sufficient flexibility to match the different water level configurations and uses of the site, whilst avoiding the creation of a flat, featureless and over-lit environment.
Lighting is delivered from ten 17m tall feature columns which were developed in collaboration with artist Wolfgang Buttress, incorporating functional lighting equipment, lasers and interactivity sensors.

Colour

The fountains and integrated colour changing LED uplights add a dramatic and dynamic feel to the space and present stunning sequences. When combined with Haque Design and Research's interactive "Another Life" art installation, the light show is extended into the evening through the use of low intensity laser projections onto the plaza surface.

Control System

City Park's lighting installation is managed via a central control system. The system is programmed to automatically respond to the operating mode of the pool, optimising lighting provision to both the rising and falling water levels and artistic laser show requirements. Functional lighting is controlled to complement the fountain feature and artistic layer, avoiding unnecessary lighting of areas. The integrated architectural, artist and feature lighting concept for the mirror pool basin achieves a peak consumption of less than 1kw of energy.

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Reference documents
& further reading

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Whyte, William H. City: *Rediscovering the Center*. New York. Anchor Books. 1990. Print

Online Resources

Urban Age Conference Series
www.urban-age.net

Urban Age Lecture Series
www.lse.ac.uk

Case Studies

New Songdo City
http://www.songdo.com

Msheireb
http://www.msheireb.com

Bradford City Park
http://www.bradford.gov.uk/bmdc/regeneration/city_park

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