

# Nordic urban strengths and challenges

- How do we perceive ourselves when it comes to developing sustainable, smart and liveable cities?

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Nordic Built Cities



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Nordic Innovation



# Nordic Built Cities

## Nordic urban strengths and challenges - How do we perceive ourselves when it comes to developing sustainable, smart and liveable cities?

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This report was produced by Finnsson & Co for Nordic Innovation and Nordic Built Cities. The report is based on the findings from a study conducted by Rambøll Management Consulting.

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Nordic Innovation is an institution that stimulates innovation and trade between the Nordic countries. The organisation reports to the Nordic Council of Ministers and is a central actor for the implementation of the Nordic Co-operation Programme for Innovation and Business Policy.

Nordic Innovation's overall aim is to create added value through Nordic co-operation with the vision that Nordic countries should be a world-leading region in the area of innovation and sustainable growth.

Nordic Innovation is responsible for the design and management of the Nordic Built Cities programme, running from 2015-2017. The aim of the programme is to develop, visualise and export Nordic innovative solutions for sustainable, smart and liveable cities.

[www.nordicinnovation.org](http://www.nordicinnovation.org)  
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# Nordic Built Cities

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# Nordic Built Cities

## Foreword

An increasing population and historically unprecedented urbanisation characterise the 21st century. When resource-scarcity, climate change and growing demands for liveability are added into this mix, thinking of innovation and sustainability in the built environment becomes critical. The Nordic countries are in a strong position to address many of these challenges.

The Nordic Built Cities programme is based on the conviction that the Nordic countries have a political and commercial interest in further developing this position of strength. The programme's overall vision is to develop, visualise and export Nordic innovative solutions for liveable, smart and sustainable cities.

The ten principles of the Charter represent the strengths and aspirations of the Nordic approach to making liveable, smart and sustainable cities and buildings. The Charter is the platform for the programme and a key element in its Nordic branding.

During 2015, Nordic Innovation will, in collaboration with the lead country, Denmark, launch the Nordic Built Cities Challenge and invite stakeholders to share their views on how to boost exports of Nordic solutions for liveable, smart and sustainable cities.

We start this bottom-up dialogue at the Nordic Built Cities Arena in Copenhagen on April 27, with the ambition to begin concrete export promotion activities in 2016 when Finland is the lead country for the Nordic Built Cities programme.

This qualitative study aims to serve as a starting point for the dialogue. It was commissioned by Nordic Innovation in 2014 in order to obtain an overview of how we in the Nordic region perceive ourselves – our challenges and strengths when it comes to sustainable, smart and liveable urban solutions. The study consisted of interviews with stakeholders from all around the Nordic region.

The questions asked were:

- What are perceived to be the main urban challenges in the Nordics?
- What are perceived to be the key Nordic strengths when it comes to developing and offering innovative solutions for export?

This report is based on the findings from interviews and a desktop study that were carried out by Rambøll Management Consulting during the autumn of 2014. The appendices of the report, including e.g. methodology and a list of contacts, can be downloaded from [www.nordicbuiltcities.org](http://www.nordicbuiltcities.org).

From Nordic Innovation's perspective, the results indicate great potential for Nordic businesses to join forces in order to offer holistic urban solutions for the international market. We therefore look forward to your input and your contribution to making the Nordic Built Cities vision a reality!

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Nordic Innovation





# Nordic Built Cities

## The Charter

### OUR NORDIC BUILT PRINCIPLES

WE WILL CREATE A BUILT ENVIRONMENT THAT:

- |  |           |  |
|--|-----------|--|
| Is made for people and promotes quality of life  | <b>01</b> | <b>06</b> Is robust, durable, flexible and timeless - built to last  |
| Pushes the limits of sustainable performance, as a result of our innovative mind-set and high level of knowledge | <b>02</b> | <b>07</b> Utilises local resources and is adapted to local conditions  |
| Merges urban living with the qualities of nature   | <b>03</b> | <b>08</b> Is produced and maintained through partnerships founded on transparent collaboration across borders and disciplines. |
| Achieves zero emissions over its lifecycle   | <b>04</b> | <b>09</b> Employs concepts that are scalable and used globally   |
| Is functional, smart and aesthetically appealing, building on the best of the Nordic design tradition            | <b>05</b> | <b>10</b> Profits people, business and the environment   |



## Country profile

# Denmark and the Faroe Islands

### Sustainable urban development is founded in the proud tradition of Danish architecture

The Danish Government introduced a new innovation strategy, Denmark – A Nation of Solutions, in 2012. A key objective is to develop policy initiatives and reinforce partnerships on climate adaptation in urban areas. The Danish Government and the local Governments agreed to increase investments in climate adaptation by DKK 2.5 billion, which provided the municipalities with further opportunities to invest in more liveable, sustainable and smarter cities.

One of the key focus areas is the concept of smart cities, which combines the physical and social aspects of urban areas by means of digitalisation, and also by engaging a wide range of stakeholders in the development of new solutions. Most Danish municipalities use this methodology to create innovative solutions for sustainable urban development.

The Ministry of Housing, Urban and Rural Affairs is also focusing its attention on improving the environment for smart city partnerships. Furthermore, several Danish think tanks work on the topics of urban policy and smart cities, e.g. 2025 BYEN and the Smart City Network.

Urban development is based on the Danish Act on Urban Renewal and Urban Development from 2004. MDKK 285,5 were allocated to urban renewal in 2014. Approximately 80 per cent of the funding was allocated to improvement of recreational areas, building renewal and condemnation, while the remaining 20 per cent was intended for area renewal. Every year,

pilot and development projects are documented and analysed in a national urban renewal database. This provides the foundation for future progress and optimisation.

Sustainability and liveability have been high on the agenda in Denmark since the 1960's. One of the frontrunners is Jan Gehl, the Danish architect who revolutionised urban development by focusing on the space in between buildings and by prioritising pedestrians and cyclists in the city design. Today, his thoughts are embedded in urban planning in Denmark and abroad.

Innovative solutions for sustainable urban development in Denmark are often created based on end-user demand. In many cases, the development of liveable and sustainable solutions are driven by co-operation between municipalities, philanthropic funds and dedicated professionals. One of the iconic examples of such collaboration is the harbour bath in Copenhagen that symbolises the transformation from a polluted harbour into a world-renowned and clean recreational area.

### Challenges and themes

Population growth and urbanisation pose a challenge for urban development in Denmark, and in particular in Copenhagen. At present, there is an undersupply of housing in the city, which is expected to grow at a pace of 1,000 new inhabitants per month until 2025. To accommodate the population growth, new neighbourhoods are being created across the city.



Copenhagen's flagship project, Nordhavn, is acclaimed for its emphasis on smart city techniques and liveability. The area will accommodate 40,000 people by 2050. Other major building projects include developments in Valby and in the new Carlsberg City, where the old brewery site will be turned into a vibrant and sustainable city district. The development is continuously aligned with Copenhagen's ambition of being a city for everyone:

"If we don't introduce measures that ensure that everyone can be a part of Copenhagen, the city may suffer the same fate as cities like Paris and London, in which the city centre is only for rich people," says Frank Jensen, Lord Mayor of Copenhagen. "We do not want a fragmentation that prevents ordinary wage-earners from living in Copenhagen."<sup>1</sup>

Social sustainability is an emerging field in the planning of sustainable urban environments and needs to be further addressed. The concept encompasses notions of social cohesion, equity, sense of community and quality of life. This social perspective is included in the planning of Nordhavn, where public housing is integrated to ensure diversity and equity across neighbourhoods.

Financing of sustainable solutions is also a much-debated issue. Companies involved in the development of smart city solutions are said to struggle, as most projects focus on climate adaptation. Developing sustainable solutions for the residential market calls for involvement from a broader range of investing actors.

Even though many SMEs are capable of providing innovative solutions to problems related to efficiency and big data systems, no standards are available for such applications. Experts indicate that central authorities should place further emphasis on this issue in order to make way for more standardised solutions to be implemented on a bigger scale. Innovation platforms, Public Private Partnerships and public procurement were also identified as means to increase focus on smart, sustainable and liveable city technologies.

## Strengths in Denmark

### - sustainable solutions for urban spaces

Denmark has strict regulation on the sustainability of new buildings. Building standards and certifications are coordinated by Green Building Council Denmark, an organisation that promotes sustainability in construction. Larger municipalities are ambitious with regards to urban development and try to involve citizens in decision-making processes. Furthermore, the Danes are early adopters of new innovations.

Sustainable urban development is founded in the proud tradition of Danish architecture. Most architects come from The Royal Danish Academy of Fine Arts, which is more oriented towards creativity and design than most technical universities. Denmark has a large number of successful consultancies, many of which are represented internationally.

<sup>1</sup> [www.politiken.dk/kultur/ECE1877411/her-er-planen-der-skal-loese-koebenhavns-befolkningsboom/](http://www.politiken.dk/kultur/ECE1877411/her-er-planen-der-skal-loese-koebenhavns-befolkningsboom/)



## The Faroe Islands

In the Faroe Islands, focus has been more on preserving nature and less on urban planning. The Ministry of Fisheries is responsible for urban planning and building regulation. It recently issued a new building regulation that incorporates demands for energy efficiency in commercial and residential buildings.

As of today, there is no national strategy for the development of urban spaces. Urban development is described as ad hoc, and development projects are only initiated if funding is available. A competition like that of Nordic Built Cities could therefore play an important role in creating a platform for future development of urban spaces.

One challenge is to balance conflicting interests regarding the area surrounding the Port of Torshavn, the main hub for all foreign trade in the Faroe Islands. The business sector has expressed interest in expanding the port and exploiting more of the coastal area. The local community, on the other hand, expresses great interest in preserving the historic sites surrounding the port.



Cykelslangen in Copenhagen  
Dissing+ Weitling Architecture  
In cooperation with Rambøll and MT Højgaard  
Photo: Rasmus Hjørtshøj - COAST Studios





## Case Study Denmark

### Cykelslangen

In the area surrounding the Fisketorvet shopping centre in Copenhagen, the infrastructure had been a source of conflict between pedestrians and cyclists.

There was no separation between pavements and bikelanes, which meant that pedestrians and cyclists had to share the narrow space between the harbour and the shopping centre. Cyclists crossing the area had to make sharp turns around corners with limited visibility, often putting pedestrians at risk.

The municipality of Copenhagen assigned Dissing+Weitling architecture to come up with a solution. It was developed in cooperation with Rambøll and MT Højgaard.

The solution was a 230-meter long cycle bridge across the harbour, which was opened in 2014. More than 12,500 cyclists cross the bridge per day. The solution has made the area more liveable and increased safety, all while promoting cycling as the preferred means of transport in the city.

## Table Denmark

### Identified projects in Denmark

Thematic areas	Description of challenges
Green solutions 6 projects	Parks, recreational areas and architecture in areas with high population density
Climate adaptation 6 projects	Renovation of parks to capture excess water from cloudbursts, or use of innovative material to absorb or lead the water
Re-development 4 projects	Re-development of urban areas, making them more liveable and sustainable
Sustainable transport 4 projects	Building infrastructure for alternative transportation, such as bicycling
IT and Technology 4 projects	Data visualising and utility thereof
Liveable buildings 1 project	Multipurpose structures, e.g. waste treatment plant & ski slope
Waste Treatment 1 project	Efficient waste treatment plant – combined with a ski slope



## Country profile

# Finland and the Åland Islands

Smart city development in Finland is particularly strong in ICT solutions and services

The planning of urban spaces and smart cities has received considerable attention in Finland in recent years, and several governmental initiatives and programmes have been designed to assist the development of urban spaces. The underlying objective behind many of these initiatives is to encourage Finnish companies to develop new solutions for smart city spaces. A key method has been to encourage the construction and development of flagship city areas.

The Finnish Government has set up two major national programmes focusing on sustainable urban development. The Witty City Programme is managed by Tekes, the Finnish Funding Agency for Innovation, and facilitates the construction of better living and working environments. Six smart city pilot projects have been selected for the programme, addressing everything from the use of local energy to solutions based on open data.<sup>1</sup> Secondly, the Innovative Cities Programme, INKA, aims to create innovation clusters for liveable cities, consisting of growth-oriented companies that are capable of creating products and services for the international market.<sup>2</sup>

Finnish municipalities are responsible for city planning, public procurement and energy investments. A noteworthy development is the construction of several smart city areas around Finland, acting as test beds and living labs for innovative products and services related to urban challenges. The construction of these smart city areas enables Finnish companies to acquire vital references that help them sell

their products to international markets. This work is supported by RYM, the Strategic Centre for Science, Technology and Innovation of built environment in Finland.

The Finnish public sector invests considerable resources in the development of urban spaces. The budget of the Witty City Programme totals €100 million<sup>3</sup>, of which €40 million is funded by Tekes. The INKA programme has an annual budget of approximately €20 million<sup>4</sup>.

### Challenges and themes

A key challenge in the development of urban spaces is to find demand-driven, solution-centred and multi-sector solutions to the challenges that face the municipalities. This applies to large-scale renovation of old city areas and the integration of combined physical and digital solutions for urban development. Tekes has played an active role as the facilitator of these innovations.

The cities' role as drivers of green solutions and key actors in the transformation towards a low-carbon society is widely acknowledged. Some critics have argued that Finnish cities and municipalities should set more ambitious goals for energy-saving and energy-efficiency in order to promote bottom-up procurement of low carbon urban solutions. Nevertheless, the government-level initiatives discussed in this section are seen as important improvements.<sup>5</sup>



Rapid industrialisation and urbanisation in the 1960s and 1970s led to the construction of many high-rise suburbs around Finnish cities. Around a fifth of the population lives in these areas today. Many of them are approaching the end of their lifecycle and Finnish cities are thus facing a renovation project of an immense scale. Moreover, socioeconomic decline and poverty in these areas must be addressed.<sup>6</sup>

Another change affecting the city space is the rapid digitalisation of services. The challenge is how to utilise modern technology to transform and improve public services, i.e. by using open data. Helsinki has successfully opened up publically available data to developers through the Helsinki Region Info share service.<sup>7</sup> This has enabled the creation of several new public transport services.

A key challenge in city planning is to ensure that the city structure is dense enough to avoid large distances between different parts of the cities. Most large Finnish municipalities have an active, growing and vibrant city centre. They acknowledge the need to 'expand inwards' by having policy measures in place that support the construction of new buildings in the vicinity of the urban centres.

In Helsinki and other major Finnish cities, young adults are moving into the city centre at a growing rate. Together with the larger number of retirees in the urban districts, these groups create a large demand for public transport.

Another challenge is to identify new zones that can accommodate housing in the future. To reach this objective, several projects aiming to clean and safely redevelop contaminated sites have been launched.

### Strengths in Finland - sustainable solutions for urban spaces

The importance of smart and sustainable city development has been recognised at the national level in Finland. Through Tekes and other funding agencies, significant funds are made available to support the development of innovative products, services and solutions in the city space. Particular emphasis is placed on smart solutions in planning and design, energy, waste management, recycling and mobility.

Strong Government support for innovative urban space development is a key asset. The INKA programme is a case in point. It seeks to approach urban development and innovations from a new perspective, using the city space as a testbed for new solutions. Smart city development in Finland has been particularly strong in ICT solutions and services. The Kutsuplus Smart Ride service is one example where the Finnish ICT sector has entered the urban development market.<sup>8</sup>

Large demand for new construction zones in central areas in the larger cities has instigated Finnish municipalities to work on infill development in contaminated areas. Old industrial sites and docks

<sup>1</sup> [www.tekes.fi/en/programmes-and-services/tekes-programmes/witty-city/](http://www.tekes.fi/en/programmes-and-services/tekes-programmes/witty-city/)

<sup>2</sup> [www.tem.fi/inka](http://www.tem.fi/inka)

<sup>3</sup> [www.tekes.fi/ohjelmat-ja-palvelut/ohjelmat-ja-verkostot/fiksu-kaupunki/](http://www.tekes.fi/ohjelmat-ja-palvelut/ohjelmat-ja-verkostot/fiksu-kaupunki/)

<sup>4</sup> 50 % of the programme is funded by the Government and 50 % by the regions.

On top of this, the programme utilises funds made available through the European Union structural funds.

[www.tem.fi/inka](http://www.tem.fi/inka)

<sup>5</sup> [www.sitra.fi/julkaisut/Selvityksi%C3%A4-sarja/Selvityksia81.pdf](http://www.sitra.fi/julkaisut/Selvityksi%C3%A4-sarja/Selvityksia81.pdf)

<sup>6</sup> [www.aka.fi/tiedostot/tiedostot/asumi/avajaisseminaari%202011/esitykset/matti%20kortteinen.pdf](http://www.aka.fi/tiedostot/tiedostot/asumi/avajaisseminaari%202011/esitykset/matti%20kortteinen.pdf)

<sup>7</sup> [www.hri.fi/fi/](http://www.hri.fi/fi/)

<sup>8</sup> [www.ajelo.com/](http://www.ajelo.com/) and <https://kutsuplus.fi/tour>



are typically centrally located and constitute liveable locations for new dwellings. A number of these sites are now being rededicated to construction and sustainable urban development.

The openness and transparency of the city planning process is regarded as a key strength. Today, Finnish cities value the opportunity to involve citizens and private companies in urban planning and development. Transparency in decision-making processes ensures that the cities are more responsive towards demands regarding environmentally-friendly planning. This is further supported by Finnish innovation intermediaries that have taken an active role in smart city development.

### The Åland Islands

In the Åland Islands, the national agency for innovation and growth, Åland Technology Centre (ÅTC), does not specifically address urban development. Stakeholders in the islands are mainly concerned with the environmental aspects of sustainable development. The regional Government recently issued a strategy for sustainable development that will guide the future work in the Åland Islands.

As a part of the implementation of the strategy, ÅTC has initiated a collaboration project with the Finnish cleantech cluster CLEEN, with the aim to develop a smart grid network in the islands. The project is investigating the possibilities to use Åland as a test area for smart grids.



The Kalasatama area in Helsinki  
Photo: Helsinki City Media Bank



## Case Study Finland

### The Kalasatama area in Helsinki

Construction of the Kalasatama, an old harbour area in central Helsinki is an example of the latest smart city projects in Finland. The area will host a total of 20,000 people once construction is complete.

The physical construction runs in parallel with the development of Fiksu Kalasatama, or Smart Kalasatama, which seeks to provide the area with digital services based on open data, smart traffic solutions, waste solutions, energy grid solutions and living lab working environments through the use of common use spaces. The innovation intermediary Forum Virium has been a key driving force in the process.

#### Digital public transportation service

Near field communication tags at bus stops enable passengers to receive information about the arrival times of the next bus, tram or train and information about the weather. Passengers can purchase a travel ticket on their mobile device.

#### Clever parking integrated with public transport

As a person drives into a car park in Kalasatama, a travel service automatically sends information on the connecting public transport options to the person's mobile phone, including information on the next connecting bus, metro and tram, as well as information on possible disturbances in public transportation.

## Table Finland

### Identified projects in Finland

Thematic areas	Description of challenges
Test arenas for urban development 20 projects	Re-development areas are used as a platform for new innovative ideas for urban development
Energy and resource efficiency 19 projects	Increased energy efficiency by using waste and wastewater for energy production
Digital services 13 projects	Digital services for the city space
Sustainable transport and mobility 9 projects	Products, services and concepts that promote sustainable transportation and mobility
Planning process 4 projects	New methods and solutions for urban planning, including citizen involvement and IT solutions (i.e. GIS)
Industrial renewal 4 projects	Projects that support industrial renewal in the city space
Research 4 projects	Research on smart cities
Digital services 3 projects	Digital services brought to the home
Sustainable construction 3 projects	Sustainable construction methods and concepts
Green solutions 2 projects	Parks and recreational areas in areas with high population density
Automation 2 projects	Solutions in automation
Urban space development for the elderly 2 projects	Services, products and concepts for the elderly
Air quality and pollution prevention 1 project	Measures aiming to reduce pollution and improve air quality
Lighting 1 project	New lighting solutions, products and concepts
Communication 1 project	Solutions in urban space communication



## Country profile

# Iceland

### Quality of life is an important parameter for urban development in Iceland

In Iceland, the overall focus is to promote a more environmentally sound and sustainable development, using less energy through more sustainable transports and more energy-efficient buildings.

Central actors in the innovation system include Innovation Center Iceland, which is part of the Ministry of Industries and Innovation<sup>1</sup>, and Rannis, the Icelandic Centre for Research, which reports to the Ministry of Education, Science and Culture.<sup>2</sup>

Rannis is responsible for the country's implementation of Horizon 2020. The Iceland 2020 strategy targets eco-innovation as the fastest-growing sector in the next decade, and aims to double growth in turnover between 2011 and 2015. Green public procurement enjoys high priority.<sup>3</sup>

#### Challenges and themes

Use of private cars is very high in Iceland, and demand for public transport is thus lower compared to other Nordic countries. Iceland's low population density is a challenge with regards to developing efficient public transport options. Due to these reasons, transport remains a fundamental issue with regards to more sustainable urban development in the country.

Particular attention is paid towards ways in which different neighbourhoods and urban areas can be connected. In the greater Reykjavik area, for instance, there are five municipalities, which are all working

together to improve transports between the different areas in the capital region. In order to minimise the use of cars, the construction of cycle paths is now prioritised. Other methods for reducing the dependence on cars include densification of urban districts.

Energy efficiency is another main focus in Iceland. Energy prices differ between different parts of the country, something which has increased attention on the need for more energy efficiency. Historically, geothermal and hydropower industries have attracted foreign investments from high-technology green firms. For buildings, sustainability certifications like BREEAM and LEED are used.

In 2012, a new planning and building regulation was passed. The new regulation stipulates requirements related to energy efficiency in new buildings and encourages more sustainable development. However, the lack of a clear definition for sustainability poses a challenge. Furthermore, the economic crisis in Iceland has had a big impact on the municipalities and their ability to finance the redevelopment of urban areas.

The Icelandic National Planning Agency is now drafting a national planning strategy based on the new regulation – the first of its kind in Iceland. One of four key themes is the quality of the urban environment, including aspects such as environmental sustainability, public health, links between transport modes,





sense of place, and historical roots. This broader perspective on sustainable urban development is the focus of more and more attention, especially in the Reykjavik Capital Area.

### Strengths in Iceland - sustainable development

The relation between the physical environment and liveability has been a key focus in Iceland. Stakeholders have previously not been concerned with the social aspects of sustainable development. Instead, the environmental and economic aspects have been prioritised.

Quality of life is an important parameter for urban development in Iceland. Innovation Center Iceland recently finished a research project in collaboration with a number of architect firms and municipalities in the Reykjavik area, focusing on Quality of life in the built environment.

Iceland is a relatively small country with a small population, which means that the number of actors involved in urban development is limited. With the location between Europe and North America, both continents have influenced planning in the country. Despite this, Iceland has managed to avoid the type of low-density neighbourhoods that often characterise North-American cities. Instead, Iceland has created a mix of different types of residential units, resulting in less segregation compared to other Nordic countries.

<sup>1</sup> [www.nmi.is/about-us/](http://www.nmi.is/about-us/)

<sup>2</sup> [www.en.rannis.is/](http://www.en.rannis.is/)

<sup>3</sup> [www.oecd.org/iceland/sti-outlook-2012-iceland.pdf](http://www.oecd.org/iceland/sti-outlook-2012-iceland.pdf)



Harpa Reykjavik Concert Hall  
Henning Larsen Architects and Batteriid Architects  
Photo: Vigfus Birgisson



## Country profile

# Norway

### Social sustainability is an important aspect of urban redevelopment

In Norway, working across sectors and disciplines is seen as key in achieving sustainable development. In the public and private sector alike, urban planning is regarded as an effective tool to build sustainable communities and meet the needs of an expanding population.

While the private sector has long been aware of the potential in sustainable buildings, the public sector's focus on sustainability has only recently resulted in specific actions and projects. The real potential of enhancing urban sustainability lies in combining public and private sector capacities.

An example of such collaboration is the Cities of the Future programme, which was initiated by the Government and the 13 largest municipalities in Norway. The programme provided an opportunity for the municipalities to develop their ideas on green urban development together with the business sector, the regions and the Government. The feedback has been largely positive, especially from the municipalities, which are increasing their focus on sustainability in urban development.

Several public development initiatives have been driven by social objectives. Examples of this include making city areas more attractive and liveable through green planning efforts, and thereby adding to social and cultural diversity.

### Challenges and themes

Population growth and urbanisation in Oslo and other larger municipalities has put pressure on the housing market. Demand for centrally located housing is growing and real estate prices are at an all time high. This makes it difficult for people with low income to buy or rent a house or a flat. Authorities thus need to find new solutions to increase housing supply and identify locations for new development projects. In Norway, larger municipalities and regions have initiated strategic city planning processes addressing population growth. For instance, Oslo and Akershus are working together on a regional master plan within land use and transports.<sup>1</sup>

Social sustainability is an important aspect of urban redevelopment and a focal point to national, regional and local authorities in Norway. As social sustainability is a diverse concept, citizens, authorities and policy makers may have different assumptions of what it entails. This places high demands on the authorities to come up with sustainable solutions that accommodate the many different needs, and also contribute to more liveable cities and urban spaces.

Increased attention has moreover been given to social sustainability as an aspect of area development. As an example, Trondheim has started an urban area development project in the Saupstad Kolstad area, in collaboration with citizens, businesses and other partners. A key objective is to involve citizens in de-





veloping green recreational areas and new meeting places. The project is part of a national urban development programme<sup>2</sup> and aims at making the area more liveable, diverse and sustainable.

Good living and improved social and cultural conditions often require other solutions than “just” buildings and other development projects. In response, a holistic national urban redevelopment programme has been developed,<sup>3</sup> aiming at creating more environmentally-friendly and inclusive urban environments through area rehabilitation. Local resident involvement is a key priority. An example of this is Mosaikk, a project launched by Skien municipality, which uses art projects, cultural events and rehabilitation of backyards to create new social and urban meeting places.<sup>4</sup>

Compared to Norwegian public actors, private actors have voiced a broader understanding of innovation and sustainability concerning urban spaces development. The general view is that there are more innovative methods, technical solutions and sustainable materials than what is being utilised today. A challenge is thus to ensure more cooperation between the public and the private sector.

Innovation in urban spaces needs planning and preparation, cooperation between public authorities and private sector, and, last but not least, new ways of matching technical solutions to meet the needs of a specific area. The ‘Cities of the Future’ pro-

gramme is a good example of how to ensure more cooperation between public and private actors. The programme’s focus has been to develop methods for creating new urban spaces and green solutions through public-private cooperation.

Funding of sustainable projects is widely regarded as a challenge for municipalities and private enterprises, i.e. property developers and construction companies. There is a need for state funding and grant schemes, but also more knowledge about potential investors and solutions on how to fund sustainable projects. One critical aspect is that municipalities, developers, investors and other stakeholders lack knowledge and incentives to invest in innovative and sustainable solutions.

In order to maintain momentum and further develop sustainable urban planning, a national focus from relevant authorities and stakeholders is required.

### Strengths in Norway - sustainable solutions for urban spaces

A key focus in Norway is to create more green spaces, for instance by encouraging use of green roof methods when developing new urban areas. Green roof is a method that uses vegetation on roofs to hold back water and thus curb the runoff after heavy rain. As densification of cities increases the proportion of impervious surfaces, this is an important means of climate adaptation in urban spaces.

<sup>1</sup> [www.plansamarbeidet.no/](http://www.plansamarbeidet.no/)

<sup>2</sup> [www.husbanken.no/omradeloft](http://www.husbanken.no/omradeloft)

<sup>3</sup> [www.husbanken.no/english/other-areas-of-responsibility/urban-redevelopment/](http://www.husbanken.no/english/other-areas-of-responsibility/urban-redevelopment/)

<sup>4</sup> [www.biblioteket.husbanken.no/arkiv/dok/Komp/Mosaikk%20erfaringer%20tips%20og%20gode%20rad%20fra%20Skien.pdf](http://www.biblioteket.husbanken.no/arkiv/dok/Komp/Mosaikk%20erfaringer%20tips%20og%20gode%20rad%20fra%20Skien.pdf)



The zoning plan for Bjørvika, a newly developed area in Oslo, requires that at least 50 per cent of the high rise buildings have green roofs. Using this method will isolate the buildings and reduce energy consumption and costs. Green roofs are effective tools in terms of handling excess water from heavy rainfall, and also constitute an appreciated supplement to cities' green infrastructure and recreational spaces.

Another focus in Norway is to develop passive houses and low-energy buildings. These building developments serve as ideal projects for possible stakeholders, investors, municipalities or others who aim to build environmentally friendly. In passive housing, the economic benefits are clear as the return on investment can be calculated and communicated.

FutureBuilt is a ten-year programme (2010-2020) with a vision of developing carbon neutral urban areas and high-quality architecture through pilot

projects, including individual buildings and city areas. The pilots are set to reduce greenhouse gas emissions from transport, energy and material consumption by at least 50 per cent. As of 2014, a total of 33 pilot projects are included in the programme, which is a partnership between four municipalities, six national authorities and the National Association of Norwegian Architects.

Furthermore, transportation, including public and alternative transportation, is a focal point in Norway. Oslo is currently working on a new strategy for bicycles, and infrastructure for cyclists is being improved throughout the country.

Norway's key strengths with regards to sustainable urban development include strong regulation and thorough legislation when building new buildings. The regulation defines a number of requirements regarding low energy use, energy efficiency etc.



The Opera House in Oslo  
Snøhetta Architects



## Case Study Norway

### Blue green factor - a tool to secure quality in urban spaces

The "Blue green factor" is a tool that ensures predictability for a developer with regards to requirements for outdoor spaces, i.e. regarding water management, vegetation and biodiversity in new building projects.

Using the blue green factor promotes an urban development that also includes aquamarine elements. An introduction of this factor will involve a boost in blue green city planning, making soil, water and air purer and the cities to be greener, fresher and more beautiful.

The blue green factor is a quantitative tool where the use of scoring of various green qualities gives incentives to choose green solutions in urban city development. Number of existing trees exceeding 10 meters, number of newly planted trees expected to exceed 10 meters, or different surfaces with vegetation are some examples of the qualities that are given a score.

The method has been developed in cooperation between Oslo and Bærum municipalities and Dronninga landskap, C.F. Møller og COWI. One aim has been to develop a tool that will ensure that blue-green factors are taken into account in new development projects. This is especially important for Oslo and Bærum, as these municipalities are expected to grow by more than 400,000 people by 2030, and thus need more urban green spaces and land to handle excess water.

## Table Norway<sup>1</sup>

### Identified projects in Norway

Thematic areas	Description of challenges
Re-development/ green solutions 7 projects	Re-development of urban areas, making them more liveable and sustainable. Parks, recreational areas and architecture in areas with high population density
Sustainable transports 4 projects	Building infrastructure for alternative transportation methods, such as bicycling
Zero- emission buildings 3 projects	Plus house, low energy buildings, passive house
Climate adaptation 5 projects	Renovation of parks to capture excess amounts of water from cloudbursts, or use of innovative material to absorb or lead the water
Urban spaces 1 project	Renovation of urban spaces using art, culture
Planning process 1 project	New methods and solutions for urban-planning

<sup>1</sup> [www.regjeringen.no/globalassets/upload/subnettsteder/framtidens\\_byer/klimatilpasning/2014/bgfvedlegg2bakgrunn2014.01.28.pdf](http://www.regjeringen.no/globalassets/upload/subnettsteder/framtidens_byer/klimatilpasning/2014/bgfvedlegg2bakgrunn2014.01.28.pdf)  
[www.regjeringen.no/globalassets/upload/subnettsteder/framtidens\\_byer/klimatilpasning/2014/bgf\\_veileder\\_byggesakhoveddelen2014.01.28.pdf](http://www.regjeringen.no/globalassets/upload/subnettsteder/framtidens_byer/klimatilpasning/2014/bgf_veileder_byggesakhoveddelen2014.01.28.pdf)



## Country profile

# Sweden

### Liveable surroundings are prioritised in national strategies for growth and innovation

Recently, the built environment in Sweden has received increased attention, as liveable surroundings are among the priority areas in the National Strategy for Local and Regional Growth and Attractiveness, launched in 2014.<sup>1</sup> In the Swedish Innovation Strategy, issued in 2012, liveable surroundings are mentioned as being essential in order to attract skilled people. It states that the public sector has a role in fostering innovation, i.e. by endorsing new solutions in urban planning.<sup>2</sup> Both strategies were however issued before a new Swedish Government was formed in autumn 2014, and may thus be subject to change.

Sustainable and liveable cities are identified as one of four major societal challenges for sustainable growth by Sweden's innovation agency, VINNOVA. Urbanisation leads to new opportunities as well as new challenges. For instance, cities are believed to be the major drivers for economic growth in the future, but high density in cities also means greater stress on the environment. In order to deal with future challenges, VINNOVA identifies a need for cities to be organised and planned in a way that they remain liveable and sustainable.<sup>3</sup> VINNOVA is part of the Joint Programming Initiative Urban Europe, focusing on research and developing solutions to urban challenges.<sup>4</sup>

Challenge driven innovation is a VINNOVA-funded programme that aims to identify innovative solutions in all four societal challenges identified by VINNOVA, one of them being sustainable and liveable cities.

In this programme, a number of projects have been funded gathering public and private actors, universities and research institutes. Since 2011, five open calls for proposals have been made, one of which addressed the creation of innovation platforms for sustainable and liveable cities.

On local level, the municipalities of Stockholm and Malmö stand out, as they have had several large projects in the field of sustainable cities. In recent years, urban spaces have become increasingly important for Swedish municipalities, especially with regards to social sustainability.

#### Challenges and themes

Larger cities mean higher density. One challenge that occurs with higher density is how to preserve and develop recreational areas in order to maintain sustainable and liveable cities. At the same time, high density is vital in creating cities that are not too dependent on transportation.

There is a need for renovation and refurbishment of the large housing stock built in the 1960's and 1970's, which does not meet current energy efficiency standards. Oftentimes there are also social problems in these areas. The areas have been used as test areas for finding innovative solutions that address social and environmental problems through redevelopment of urban space.



Municipalities in Sweden address the social aspect of sustainable urban development in a number of ways. One example is where municipalities stipulate certain requirements for contractors to use unemployed residents living in the area that is being redeveloped. By doing so, the municipalities are able to improve energy efficiency in the buildings and simultaneously address the issues of unemployment and social exclusion in that particular district.

Recent scientific reports indicate that the larger cities are becoming more gentrified, suggesting that the growing class distinction between households also has an impact on the structure of the cities.<sup>5</sup> Whereas municipalities historically have addressed the environmental aspects of urban development, focus has now moved towards the social aspects of the built environment, in conjunction with the sustainability aspects. Many growing cities have a problem with segregation, and municipalities are now focused on an urban development that is inclusive and fair.

Also, in their role as landowners, municipalities often demand that property owners provide differentiated rental rates in order to minimise segregation. There are also examples of property developers taking social responsibility, for instance by analysing the need and the behaviour of residents, as well as by building more rental properties rather than owned properties.

Another issue for the municipalities is to create urban environments that the residents themselves con-

sider to be liveable, which can be achieved through citizen involvement. An example of this is public workshops where residents are invited to partake in the planning process of urban areas. In many cases, municipalities require social impact assessments as a mandatory part of development plans for neighbourhoods.

Establishing collaboration between different actors is a reoccurring challenge in planning urban spaces. One way to address this is through the creation of innovation platforms that bring public sector, enterprise, science parks, universities and research institutes together to find innovative solutions to urban planning issues.

### Strengths in Sweden - sustainable solutions for urban spaces

Urban planning in Sweden is characterised by dialogue and cooperation between actors. Being consensus-driven, Swedish actors have a good ability to work unified towards a common goal and integrate different perspectives. The consensus is often stressed in innovation platform projects.

The Swedish ICT sector is strong. According to a recent study by Swedish agency Growth Analysis, the sector accounted for as much as 42 per cent of aggregated growth in Sweden in 2006-2013. Smart city projects include a common services platform for an ICT solution developed in Norra Djurgårdsstaden (Stockholm Royal Seaport).

<sup>1</sup> [www.regeringen.se/content/1/c6/24/16/63/e0e1d3b3.pdf](http://www.regeringen.se/content/1/c6/24/16/63/e0e1d3b3.pdf)

<sup>2</sup> [www.regeringen.se/content/1/c6/20/11/84/7991d65e.pdf](http://www.regeringen.se/content/1/c6/20/11/84/7991d65e.pdf), (page 19; 47-48)

<sup>3</sup> [www.vinnova.se/sv/Om-VINNOVA/VINNOVA-och-omvarlden/Samhallsutmaningar/](http://www.vinnova.se/sv/Om-VINNOVA/VINNOVA-och-omvarlden/Samhallsutmaningar/)

<sup>4</sup> [www.vinnova.se/sv/EU-internationell-samverkan/Europasamarbete/Joint-Programming1/JPI---Urban-Europe/](http://www.vinnova.se/sv/EU-internationell-samverkan/Europasamarbete/Joint-Programming1/JPI---Urban-Europe/)

<sup>5</sup> See for instance Loit, Jon, En stad i världsklass – hur och för vem?, 2014



Swedish actors are moreover at the forefront regarding ecosystem services, with emphasis on how to integrate this perspective into municipal urban planning and the development of urban spaces.

In redevelopment, emphasis is placed on strengthening the ecosystem in areas already used for housing. Focus is not only on how to preserve biodiversity in development areas, but also to look at how residents could benefit from green spaces. An example of this is a collaborative project between municipalities in the southern parts of Stockholm and a number of architects, universities and technical consultancy firms. Moreover, Malmoe is well renowned for its ecosystem services.

Traditionally, a key strength for Sweden is system solutions such as district heating. Other focus areas include energy efficiency, sustainability certification and the use of safe and sustainable materials in buildings. There is currently no Swedish certification for urban areas, but the organisation Sweden Green Building Council is in the process of developing this. One Swedish technical consultancy firm states:

"When we're developing solutions, we look at the urban space as a whole. Sweden has a rigid planning process that forces actors to collaborate. Also, Swedish actors are much concerned with the use of sustainable and non-hazardous materials. In general, we have a system perspective in district heating, water, wastewater management and waste management. The overall ambition is always to find a solution that suits everyone's needs."



Harbourfront, Stockholm





## Case Study Sweden

### The Innovation Platform Norrby

The Innovation Platform Norrby (2013-2015) is managed by the municipality of Borås and is an ongoing research project that is funded by VINNOVA. The main objective is to build a triple helix collaboration platform for the redevelopment of the area of Norrby.

The idea is for the city district of Norrby to act as a national and international reference case on how to work with sustainable development, addressing technical, economic, environmental, cultural and social challenges.

Innovation Platform Norrby is divided into six different work packages:

- Living Lab
- The bio-based city
- Value creation and the network of the city
- Energy efficient lifestyle
- Including citizenship
- Results and dissemination

## Table Sweden

### Identified projects in Sweden

Thematic areas	Description of challenges
Test arenas for urban development 8 projects	Re-development areas such as old industrial sites or impoverished districts are used as a platform for new innovative ideas for urban development
Green solutions 5 projects	Parks and recreational areas in areas with high population density
Planning process 5 projects	New methods and solutions for urban planning, including citizen involvement and IT solution (i.e. GIS)
Sustainable transports 4 projects	Projects that enhance living conditions in the urban area through sustainable transports
Energy efficiency 3 projects	Increased energy efficiency by using waste and wastewater for energy production
Sustainable construction 2 projects	New solutions for construction that are energy efficient and safe
Water and storm water management 2 projects	Solutions for storm water management to create resilience for climate change
Noise reduction 2 projects	New innovative solutions for how noise can be reduced in urban areas, for instance with vegetation



## Conclusions

A total of 74 interviews have been conducted in the Nordic countries, the Faeroe Islands and the Åland Islands, complemented with desk research. Interviewed actors include 34 municipalities, 19 companies, 8 national agencies and 5 NGOs. A complete list of the interviewed persons is included in the appendices of the study, which can be downloaded from [www.nordicbuiltcities.org](http://www.nordicbuiltcities.org).

Respondents were asked open questions about what they perceive to be the key strengths and challenges in relation to liveable, smart and sustainable urban spaces.

### Challenges – development of liveable, smart and sustainable solutions for urban spaces

The challenges that are perceived as important in the countries are divided into two groups: challenges perceived in processes and politics and thematic challenges. Two different types of challenges concerning urban spaces have been identified. One is related to changes in the structure of the population and the other concerns climate change and environmental changes.

Smaller rural municipalities struggle with depopulation, while larger municipalities are challenged by gentrification and high population density, i.e. crowding and a growing need for housing. Given that larger cities become increasingly important as growth centres, it is not surprising that urbanisation is viewed as a major challenge in the Nordic region.

As population density in the major Nordic cities increases, new solutions are necessary. In order to solve challenges associated with urbanisation and environmental changes, cities must develop solutions that address social, environmental, economic and cultural challenges.

### Challenges related to processes and politics

Collaboration between public and private and anchoring of new projects among the population are perceived as major challenges in four countries. In Denmark, the industry calls for more standardised solutions to ensure scalability, and in Norway, the industry expresses the view that the public sector is not implementing the innovative methods available when creating new urban areas.

Regarding anchoring and public accept of new developments, one example is in Sweden, where local companies are engaged in redevelopment projects. The projects thus not only raise the standard in the redeveloped areas, but also provide employment opportunities to the local population. Also in Sweden, urban spaces are used in order to develop new commercial possibilities. This is the case in Rosengård, where VINNOVA funds a project that promotes urban agriculture for private or commercial use.<sup>1</sup>

### Thematic challenges

Climate change and the changes in environmental conditions are of course a challenge for all Nordic countries. The urban space is seen as an asset in this





context, i.e. for handling storm water and offering other ecosystem services in the city.

Social sustainability is seen as a major challenge for all countries but Iceland. In Sweden and Denmark, one area of concern is the challenge of creating urban spaces that promote wellbeing, social inclusion and safety for citizens. Especially in Denmark, the creation of liveable urban areas and buildings is a focus area for several of the identified actors.

In Sweden, the social challenges in the cities of Malmö and Stockholm have proven to be immense in recent years. The development of new urban spaces is one method to make the socially challenged areas more inclusive. The holistic approach is that social, economic, cultural and environmental aspects must be considered simultaneously.

One element of this is to ensure that living costs remain affordable. The high-rise buildings that were built in the 1960-1970s are often refurbished in order to make the areas more liveable and reduce their carbon footprint. The challenge is to ensure that they remain affordable, despite the considerable refurbishment costs.

Rambøll has not been able to verify that urban space development is seen as a major challenge in Iceland. Given the relatively small population, this cannot be regarded as a surprise.

When developing smart, sustainable and liveable urban spaces, environmentally sustainable buildings remain an important focus area for many of the identified actors in the Nordic countries. Another focal point is transport and infrastructure. Actors face the challenge of creating urban spaces and denser cities with effective public transport systems, which helps reduce the dependence on cars.

According to the analysis, ICT solutions have made their way into urban space development. This can be seen especially in Finland and Sweden where the use of technical solutions is increasing in areas such as smart grids, monitoring of energy consumption and communications.

### Strengths related to sustainable solutions for urban spaces

Rambøll has also asked the actors what they perceive as national strengths with regards to supplying solutions for urban spaces. The study shows that the overall picture differs between the countries, indicating that each country has specialised in different areas. The identified strengths are divided into two groups: strengths related to process and politics and thematic strengths.

In the area of processes and politics, involving the population is a strong point in Denmark, Finland and Sweden, but all three of these countries also perceive this area as a challenge. One can thus

<sup>1</sup> [www.vinnova.se/sv/Resultat/Projekt/Effekta/2011-01544/Stadsbruk-Rosengard---odling-for-en-hallbar-stad/](http://www.vinnova.se/sv/Resultat/Projekt/Effekta/2011-01544/Stadsbruk-Rosengard---odling-for-en-hallbar-stad/)



assume that these actors believe that they are doing a comparatively good job but that there is room for improvement.

Awareness among public actors is regarded as an advantage in Denmark and in Finland. In Denmark, this can be explained by the tradition of sustainable and liveable cities. In Finland, the central strategy for new innovative solutions indicates a well-developed awareness in this field. Critics in Finland, however, claim that the country takes off from a low level.

Actors in Finland and Norway believe that they have comparatively rigorous policies on urban development. In Norway, this is related to legislation, while in Finland it is related to the holistic strategic approach undertaken by the Government.

Finnish actors view Finland as advanced in the area of smart cities and ICT solutions, which is not surprising considering Nokia's once dominating market position. The same is the case in Sweden, where LM Ericsson laid the foundation for a strong ICT-sector.

Another strength identified in Finland is infill development in contaminated areas. New methods for infill development are required as old industrial zones are redeveloped into housing areas.

In Denmark, competent technical consultants are seen as a comparative advantage. Given that Sweden, for instance, also has well-renowned technical consultants, one could argue that this is also a resilient area in Sweden. This was, however, not mentioned as one of the country's key strengths in the interviews. One explanation may be that this is not viewed as a comparative advantage on the international arena.

Ecosystem services are a strong asset in Sweden. Swedish actors are considered to be good at preserving biodiversity in development areas, solving challenges related to storm water and, at the same time, ensuring that residents can benefit from green spaces. Norway has moreover developed innovative tools for the use of ecosystem services, including green roof methods.

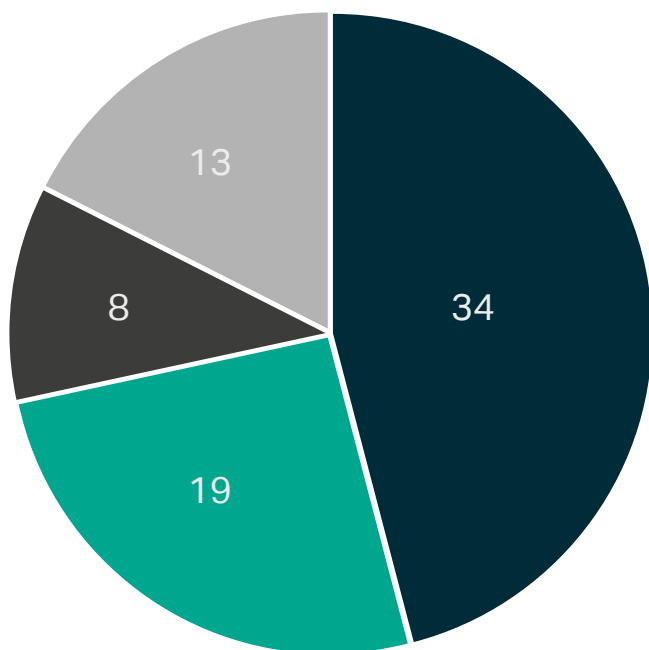
Solutions for waste disposal, energy and heating are emphasised as national strengths in Iceland, Norway and Sweden. These solutions are indirectly linked to urban spaces as they impact aspects of liveability, sustainability and how smart the urban spaces are designed. Iceland's key strength is geothermal heating and Norway is strong in energy efficiency, while Sweden has a well-developed district-heating infrastructure.



## Figure Distribution of interviews

### Challenges and strengths

In order to identify the challenges and strengths of each country, Rambøll has conducted 74 interviews with different actors involved in sustainable urban planning and city development in the Nordic region. The figure shows the distribution of the 74 interviews divided into municipalities, companies, national agencies and other, including NGOs.



- Municipalities
- Companies
- National agencies
- Other, including NGOs

## Table Identified challenges

This table shows a list of the key challenges addressed by the various actors in the Nordic countries. The list is ranked from top down by the number of identified actors that address each challenge.

### Challenges

- ▶ Development of urban areas
- ▶ Sustainable buildings
- ▶ Resource and energy efficiency
- ▶ Social inclusion and wellbeing
- ▶ Transport and infrastructure
- ▶ High density and green areas
- ▶ Collaboration between actors
- ▶ Aesthetically pleasing buildings and urban areas
- ▶ ICT
- ▶ CO<sub>2</sub> emissions
- ▶ Climate adaption
- ▶ Cleantech solutions
- ▶ Water, wastewater and waste management

Source: Rambøll Management Consulting





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Nordic Innovation

# Appendices

## Nordic urban strengths and challenges

- How do we perceive ourselves when it comes to developing sustainable, smart and liveable cities?

[nordicbuiltinities.org](http://nordicbuiltinities.org)



Nordic Built Cities



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**Nordic  
Built Cities**

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## Assignment and methodology

### Assignment

Nordic Innovation assigned Rambøll Management Consulting (Rambøll) to conduct a desktop-mapping study. One central task in the assignment is to register any Nordic actors that are relevant and may be interested in receiving support for the development and realisation of innovative solutions within smart, liveable and sustainable urban spaces in a Nordic context. These actors may be companies, municipalities, regions, property owners, property developers, funding bodies and projects as well as networks within sustainable urban spaces in the different Nordic countries.

One objective of the mapping is to facilitate the planning and implementation of national stakeholder interviews during the autumn of 2014 and the launch of the programme during Q1 2015. It will serve as an input into dialogue meetings in 2015 during the development of the export promotion module of the programme.

The other objective of the assignment is to identify different focus/thematic areas with which different actors work. The aim here is to assist matchmaking so that different actors can strengthen each other and jointly offer holistic solutions for liveable, smart and sustainable urban spaces. Another aim of the study is to create a larger understanding for different kinds of solutions that can be developed for urban spaces.

The mapping is based on the following questions (as expressed in the Invitation to Tender):

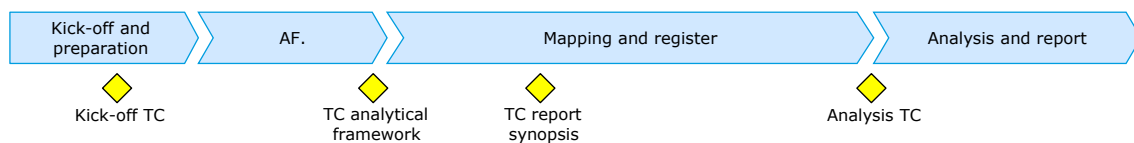
<b>1</b>	Identify groups of actors that are relevant for Nordic Built Cities (companies, networks, test beds, organisations, municipalities, regions etc.)  To define these groups and to describe why they are relevant for Nordic Built Cities
<b>2</b>	Establish a register with these actors with information regarding the following (50 – 100 contacts in each country). Actors should be grouped into type of actors  Name of organisation  Contact persons (and contact details) on the executive level
<b>3</b>	To shortly describe why the each actor is interesting for Nordic Built Cities and to describe focus area of each identified actor
<b>4</b>	To describe the defined focus areas and identified aggregated strengths of the actors in each country



## Methodology

The assignment has been conducted by Rambøll from late October 2014 to February 2015. The mapping has been conducted by the national Rambøll branches in Denmark, Finland, Norway and Sweden. The Swedish branch has had the overall responsibility to plan the activities of the assignment.

The assignment has been conducted in four steps as described in the figure and text below. The yellow boxes beneath the arrows indicate telephone conferences (total of four) that have been held with representatives from Nordic Innovation and Rambøll.



**Step 1: Preparations and kick-off:** In this initial phase, the Rambøll set up the assignment, i.e. informed the national branches within Rambøll and booked dates for internal meetings. In this phase all project participants read the background information of the study. The kick-off telephone conference (TC) was held on October 29, with representatives from both Nordic Innovation and Rambøll.

**Step 2: Analytical Framework (AF):** In this second phase of the assignment Rambøll established an analytical framework and the design of the database (the excel file). The questions included in the analytical framework were the same as those stated in the invitation to tender. The excel file contains parameters such as name of contact person, title, contact details and area of activities. The analytical framework was sent to Nordic Innovation and modified after the *TC analytical framework* (the second yellow square from the left in the figure above). The whole analytical framework can be found in the appendices of this report.

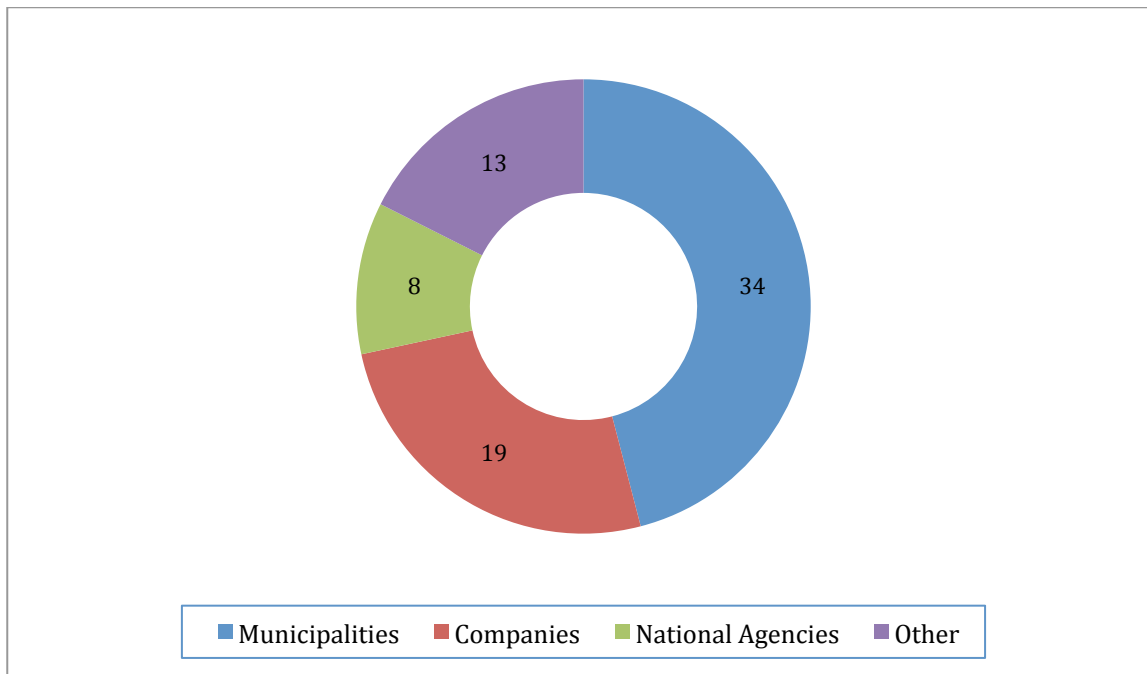
**Step 3: Mapping and register:** Rambøll used a "snowball technique" in order to identify different actors in Denmark (including the Faeroe Islands), Finland (including the Åland Islands), Iceland, Norway and Sweden. The main focus has been on the largest four Nordic countries. The snowball technique means that Rambøll has contacted key persons at e.g. the national innovation agencies and enquired them about other contacts. The snowball technique is thus a metaphor, suggesting that that the number of contacts grows for each contact.

In addition, Rambøll has used desktop research (i.e. websites and reports) to map the work areas of the identified contacts. In order to identify the challenges and strengths of each country, Rambøll has conducted 74 interviews with different experts within clean tech. Rambøll has used open questions when enquiring about challenges and strengths. The appendices of this report both entail a list of the questions asked in the interviews as well as a list of the organisations/companies that Rambøll has interviewed. The figure below shows the distribution of the 74 interviews divided on municipalities, companies and other. The group other includes five NGOs, one cluster organisation, one international network, one housing association and one ministry (Faeroe Islands).





Figure 1: Distribution of interviews



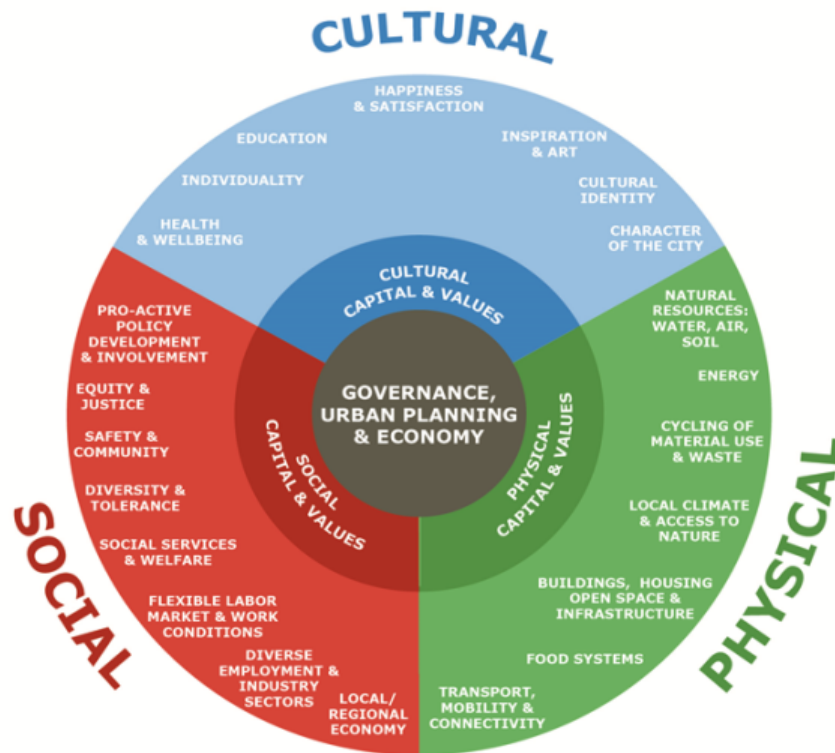
In the mapping study, a total of 476 contacts persons representing 394 actors have been identified. The contact persons represent actors from companies, municipalities, national agencies, industry cluster organisations, research institutes and universities. All contact persons are listed in the excel file (one of the deliverables of this assignment).

Step 4: Analysis and report: The final phase of the assignment was initiated with an "analytical TC" with representatives from Rambøll and Nordic Innovation. At the TC, Rambøll presented a PPT containing the overall results from the mapping for each country. The analysis was included in the report and a draft version of the report was sent to Nordic Innovation 28 November 2014 for revision. The report and the excel file were complemented a couple of times and the final version of both documents were sent to Nordic Innovation in the middle of February 2015.



## Model for assessing liveable cities

Figure 2: Rambøll's model for assessing liveable cities





Analytical framework

	Overall questions	Underlying questions
<b>MAPPING</b>	<p>Which actors can be identified in each country that can be an owner or a co-creator of innovative solutions within urban spaces?</p> <p>Aim is to identify groups of actors that are relevant for Nordic Built Cities. Furthermore, it is Rambøll 's task to explain why these groups are interesting.</p> <p>We have actors that own the challenges and actors can solve these challenges (products, services or innovative solutions)</p>	Which municipalities are owners of urban challenges and have the aim to develop urban spaces (can be large and middle sized municipalities)?
		Which companies are involved in creating innovative (new) solutions for urban spaces?
		Which industry research institutes and research organisations are involved in creating new solutions for urban spaces?
		Which intermediary organizations are involved in creating new solutions for urban spaces? (Cluster organisations, business networks, city development organisations, business incubators, business hubs, etc.)
		What other types of actors can be identified?
	In which thematic areas does the actor work with (concerning solutions for urban spaces)?	In which area does the actor work concerning solutions?
		What challenges does the actor address concerning urban spaces?
	What role does the actor take in solving urban challenges?	What role does the actor take in solving urban space challenges?
	Does the actor work with an international/national, regional, local perspective?	Does the actor work with an international/national, regional, local perspective
	In what way is the urban space development smart, liveable and sustainable?	In what way is the urban space development sustainable in terms of smart, liveable/ attractive and environment)?
I what way is the urban space liveable (cultural, social and physical/ health values)?		
Why the actors are interesting	Why are the above-mentioned actors interesting for Nordic Built Cities?	
<b>Summarising</b>	Areas and challenges and strengths	What are the primary challenges in each of the country?
		What are strengths in each country



## Challenges addressed by the identified actors

In this study, Rambøll has also conducted a quantitative analysis of the database of actors for each country. The analysis is focused on what challenges the identified actors are addressing with regards to urban spaces.

The table below shows aggregated data of which challenges the identified actors (n=350) address. Some actors address more than one of these challenges, and have therefore been assigned to more than one category (maximum 3 categories per actor).

The table includes all types of actors identified, ranging from companies, NGOs to public actors such as municipalities and national authorities. It is however important to note that since all actors have not been identified through contacts, data is missing for 65 actors in this table.

Table 1: Challenges relating to urban spaces addressed by the actors, divided by country

Challenges	Countries					SUM
	Denmark	Finland	Iceland	Norway	Sweden	
Development of urban areas	17	26	7	13	33	96
Sustainable buildings	15	32	7	7	30	91
Resource and energy efficiency	17	28	6	1	21	73
Social inclusion and wellbeing	25	2	7	7	23	64
Transport and infrastructure	6	17	7	11	16	57
High density and green areas	6	2	-	4	9	39
Collaboration between actors	6	5	1	9	16	37
Aesthetically pleasing buildings/urban areas	12	3	4	3	6	28
ICT	4	7	3	1	11	26
Co2 emissions	13	3	2	4	3	25
Climate adaption	6	-	1	5	3	15
Cleantech solutions	3	2	-	-	8	13
Water, wastewater and waste management	7	2	-	-	3	12
Other	-	4	3	-	3	10
<b>SUM</b>	<b>85</b>	<b>99</b>	<b>33</b>	<b>29</b>	<b>104</b>	<b>350</b>



## Summaries – Identified Nordic actors

### Identified actors in Denmark

The list of actors for Denmark consists of 81 contact persons, representing 77 different actors. The list of actors is a compilation of actors involved in innovative solutions that contribute to liveable, sustainable and smart cities.

Table 2: Summary of identified actors in Denmark

<b>Owners</b>	<b>No of actors</b>
Municipalities	15
Ministries/ Agencies	4
<b>Companies</b>	
Architects	12
Landscape architects	7
Cleantech companies	6
Construction	5
Consultancies	5
<b>Organisations</b>	
Networks for sustainable cities	4
Networks for companies that work with clean tech	3
Incubators	2
Universities and research institutes	6
Clusters	1
Enterprise	2
Interest organisations	2
Housing Association	1
Funds	2



### Identified actors in Finland

In this assignment, 104 actors and 136 contacts in Finland have been identified. These actors play an important role in the development of the urban city space.

Table 3: Summary of identified actors in Finland

<b>Owners</b>	
Municipalities and cities	25
Regions	1
<b>Companies</b>	
Architects	3
Property development/management	8
Construction company	24
Consultancies	9
Other	19
<b>Organisations</b>	
Networks for sustainable cities	1
Networks for companies that work with clean tech	4
Incubators	5
Universities and research institutes	3
Clusters	3



### Identified actors in Iceland

The list of actors in Iceland consists of 32 contact persons representing the same amount of actors.

Identified public actors operating on a national level include governmental authorities working with for instance innovation, planning and construction issues, and also different ministries, such as ministry of environment and national resources.

Private actors include architects, technical consultants and property management companies, as well as contacts in higher education and at the municipality of Reykjavik.

**Table 4: Summary of identified actors in Iceland**

<b>Owners</b>	
Municipalities	1
Public actors (national level)	7
<b>Companies</b>	
Architects and landscape architects	11
Consultancies	5
Property development/management	2
Construction	1
<b>Organisations</b>	
Networks for sustainable buildings/cities	2
Universities and research institutes	3



### Identified actors in Norway

The list of actors for Norway consists of 82 contact persons representing 79 different actors. These actors play an important role in the development of the urban city space.

Table 5: Summary of identified actors in Norway

<b>Public sector</b>	
Municipalities	18
National and regional public actors	15
<b>Companies</b>	
Property development/management	6
Architects and Landscape architects	5
Consultancies	7
<b>Other</b>	
Universities	5
Research institutes	11
Networks for sustainable cities	2
Foundations	2
Other	7





### Identified actors in Sweden

The list of actors for Sweden consists of 143 contact persons, representing 101 different actors. Swedish projects for innovative solutions in the area of urban planning issues often involve representatives from the public sector, research institutes and private enterprise, sharing experiences and ideas. The list is a compilation of actors involved in these kinds of projects.

Table 6: Summary of identified actors in Sweden

<b>Public sector</b>	
Municipalities	18
National and regional public actors	3
<b>Companies</b>	
Property development/management	11
Architects and Landscape architects	10
Consultancies	12
Construction companies	4
Power companies	2
<b>Organisations</b>	
Universities	11
Research institutes	10
Clusters and science parks	7
Networks for sustainable cities	6
Networks for companies that work with clean tech	4
Other	3



## Contacted organisations and companies

### Contacts in Denmark

Table 7: Contacts in Denmark

Name of organisation or company	Type
Aalborg	Municipality
Aalborg	Municipality
Atopia ApS	Architects
CLEAN	Cluster
Copenhagen (Centre of City development)	Municipality
CPH Containers	Construction
Henning Larsen Architects	Architects
Henning Larsen Architects	Architects
HIBE A/S	Construction
Himmerland Boligforening	Housing Association
Realdania By	Funding
The international Federation for Housing and Planning	NGO
Faroe Islands: Ministry of Fisheries	Ministry

### Contacts in Finland

Table 8: Contacts in Finland

Name of organisation or company	Type
City of Hamina	Municipality
City of Helsinki	Municipality
City of Jyväskylä	Municipality
City of Järvenpää	Municipality
City of Kotka	Municipality
City of Kuopio	Municipality
City of Lahti	Municipality
City of Oulu	Municipality
City of Pori	Municipality
City of Rovaniemi	Municipality
City of Salo	Municipality
Forum Virium	Test centre
Ramboll	Consultant
Ramboll Management Consulting	Consultant
Åland Islands: Ålands Teknologicentrum	Agency



## Contacts in Iceland

Table 9: Contacts in Iceland

<b>Name of organisation</b>	<b>Type</b>
Icelandic Green Building Council	NGO
Iceland Construction Authority	National agency
Innovation Center Iceland	National agency
Skipulagsstofnun (Iceland's National Planning Agency)	National agency

## Contacts in Norway

Table 10: Contacts in Norway

<b>Name of organisation or company</b>	<b>Type</b>
COWI	Consultant
Drammen kommune	Municipality
Finans Norge	NGO
Fredrikstad kommune	Municipality
Husbanken	Funding
Innovasjon Norge	National agency
Kommunal- og moderniseringsdepartementet, Planavdelingen, Byutviklingsseksjonen	National agency
NAL Framtidens bygg	Architect
NAL- Norske arkitekters landsforbundA	NGO
Oslo kommune	Municipality
Oslo kommune, Bymiljøetaten	Municipality
Rambøll Norge AS	Consultant
Skanska	Construction
Statsbygg	Construction
Trondheim Kommune	Municipality



## Contacts in Sweden

Table 11: Contacts in Sweden

Name of organisation or company	Type
Borås kommun	Municipality
Göteborgs Stad	Municipality
Helsingborgs stad	Municipality
HSB	Real estate
Huddinge kommun	Municipality
IQ Samhällsbyggnad	NGO
Johanneberg Science Park	Science Park
Jönköpings kommun	Municipality
Jönköpings kommun	Municipality
lab71	Architect
Lunds kommun	Municipality
Malmö stad	Municipality
Norrköpings kommun	Municipality
Ramböll Sverige AB	Consultant
Ramböll Sverige AB	Consultant
Reflex Arkitekter	Architect
Riksbyggen	Construction
Siemens Sverige	Multinational company
SP	Research Institute
Stockholms stad	Municipality
Sundbybergs stad	Municipality
Umeå kommun	Municipality
Uppsala kommun	Municipality
VINNOVA	National agency
Västerås kommun	Municipality
Växjö kommun	Municipality