

Factsheet

Ålesund, Norway

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Factsheet

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Foreword

This publication has been developed within the framework of the United for Smart Sustainable Cities (U4SSC) initiative. It provides an overview of the reporting and implementation of key performance indicators (KPIs) for smart sustainable cities (SSC) in the Region of Ålesund, Norway. This set of KPIs for SSC was developed to establish the criteria to evaluate ICTs' contributions in making cities smarter and more sustainable, and to provide cities with the means for self-assessments.

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This report was researched and written by Sahifa Imran, John Smiciklas and Cristina Bueti for the International Telecommunication Union (ITU).

Disclaimer

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This publication is intended for informational purposes only. The results and interim findings presented are a work in progress, as the KPIs (Recommendation ITU-T Y.4903/L.1603) implemented in Ålesund during the first phase of the project are being refined to improve the applicability of these KPIs to all cities. The revision of the KPIs may alter their scope and definition, as well as the required data-collection process.

This publication is based on the project conducted in Ålesund in 2018–2019.

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Abbreviations

CO ₂	Carbon Dioxide
DRR	Disaster Risk Reduction
EU	European Union
EV	Electric Vehicles
GDP	Gross Domestic Product
GHG(s)	Greenhouse Gas Emission(s)
GIS	Geographic Information System
ICT(s)	Information and Communications Technology/Technologies
IEA	International Energy Agency
ITU	International Telecommunication Union
KPI(s)	Key Performance Indicator(s)
NO ₂	Nitrogen Dioxide
NTNU	Norwegian University of Science and Technology
O ₃	Ozone
OiER	Organization for International Economic Relations
OECD	Organisation for Economic Co-operation and Development
PHEV	Plug-In Hybrid Electric Vehicle
PM	Particulate Matter (_{2.5} and ₁₀)
RD&D	Research, Development and Demonstration
SDG(s)	Sustainable Development Goal(s)
SIB	Sustainable and Intelligent Building
SME(s)	Small and Medium-Sized Enterprise(s)
SO ₂	Sulphur Dioxide
SSC	Smart Sustainable City/Cities
U4SSC	United for Smart Sustainable Cities
UN	United Nations
WHO	World Health Organization

Executive Summary

The United for Smart Sustainable Cities (U4SSC) has developed a set of international key performance indicators (KPIs) for Smart Sustainable Cities (SSC) to establish the criteria to evaluate information and communication technologies' contributions in making cities smarter and more sustainable, and to provide cities with the means for self-assessments in order to achieve the sustainable development goals (SDGs). In 2018, Ålesund, Norway agreed to pilot these U4SSC KPIs.¹ This Factsheet documents the key findings of the Ålesund's project:

- It starts by introducing the U4SSC initiative within the context of digitalization and the importance of the standardization of data in fostering smart sustainable city transitions.
- The subsequent sections describe the various smart sustainable city activities adopted by Ålesund, with notable KPIs from the three U4SSC dimensions (Economy, Environment, and Society and Culture) providing a clear picture of Ålesund's efforts in each of these areas.
- The Factsheet also outlines current projects underway, as well as planned future smart, sustainable development projects.
- Since one of the aims of the project was to improve the feasibility and applicability of the KPIs to all cities, Ålesund provided inputs on the existing KPI definitions, along with practical solutions to improve the data-collection process. The key findings from this will contribute to the development of the very first 'U4SSC Smart Sustainable Cities Index'.

The results from Ålesund's collection and reporting of data in accordance with the KPIs and the verification process undertaken are summarized in the following table. Key findings taken from across the different areas are highlighted underneath.

	Total	Reported	Verified	% KPIs Verified
Economy				
Core KPIs	23	23	23	100 %
Advanced KPIs	22	21	21	95 %
Environment				
Core KPIs	12	11	11	92 %
Advanced KPIs	5	5	5	100 %
Society & Culture				
Core KPIs	19	19	19	100 %
Advanced KPIs	10	9	9	90 %
Overall				
Core KPIs	54	53	53	98 %
Advanced KPIs	37	35	35	95 %
Total	91	88	88	97 %

Ålesund: Key Findings from across the KPIs

- To further optimize a *smart, sustainable ICT infrastructure*, Ålesund could utilize Recommendation ITU-T L.1601: ‘KPIs related to the use of ICT in smart sustainable cities’ and Recommendation ITU-T Y.4902/L.1602: ‘KPIs related to the sustainability impacts of ICT in smart sustainable cities’ or Recommendation ITU-T L.1400: ‘Overview and general principles of methodologies for assessing the environmental impact of ICTs’ and Recommendation ITU-T L.1440: ‘Methodology for environmental impact assessment of ICTs at city level’.
- *Public sector procurement* is on its way to achieving the benchmark, although the remaining procurement opportunities need to transition to e-procurement.

Why not help improve quality of life for your citizens or evaluate the urban functionality of your own city by piloting the U4SSC KPIs? Contact us at u4ssc@itu.int to find out more!

- To foster *innovation, utilize community resources and drive economic growth*, it is suggested that Ålesund considers the possibility of focusing on investing in higher education institute as engines of innovation and job creation and modernize basic infrastructure to ensure growth via year-round tourism.
- The region should look into causes behind its high rate of non-revenue water through the employment of best-practice water-loss accounting methods. Policies can be implemented to mandate conservation of the region’s *water resources*.
- An initiative is underway to install *smart water meters region-wide* and cooperation is planned with the National Food Safety Authority and the Norwegian Statistics agency to improve measurement and reporting mechanisms. Several ITU Recommendations and Supplements from Recommendation ITU-T Y.4000 to Y.4999: ‘Internet of things and smart cities and communities’ contain guidance on IoT applications and ubiquitous sensor networking (along with Supplement ITU-T Y Suppl. 36: ITU-T Y.4550-Y.4699: ‘Smart water management in cities’).
- Ålesund’s *electrical supply management* is effective, with little interruption and ongoing monitoring via widespread installation of household smart electricity meters and the prevalent use of ICTs to monitor the electrical supply systems.
- The region should investigate the use of *sustainability certification programmes* for ongoing building operations. Ålesund may consider implementing Recommendation ITU-T L.1370 ‘Sustainable and Intelligent Building Services’.
- Ålesund has recently approved a strategy for *public transport* that details specific strategies and measures to increase the use of public transport in an environmentally friendly fashion, but use could be increased through more frequent bus services and incentivizing vehicle sharing.
- In *urban planning* terms, Ålesund has reportedly implemented all five principles (compactness, connectivity, integration, social inclusiveness and resilience to climate change) which makes it a sustainably planned region, although there is still a high reliance on cars. Urban planning can be optimized by creating pedestrian zones and deploying measures to encourage foot traffic.

- To combat *climate change and air pollution*, Ålesund should continue to bring greenhouse gas emissions (GHGs) down as part of the Paris Agreement, under which Norway has committed to a target of at least 40 per cent reduction of GHGs by 2030 compared to 1990 levels².
- Ålesund performs very well across KPIs for *public space and nature, environmental quality*, although these can be optimized through additional green spaces. ITU recommendations in the K-series can provide further recommendations into limiting and managing the effects of EMFs.
- Ålesund should evaluate peak day and time *water consumption trends*, in addition to the overall demand and production trends – considering seasonal temperature and precipitation trends. It is recommended that the Region evaluates its wastewater treatment policies, measurement and reporting mechanisms. ITU Supplements such as ITU-T L Suppl. 14: ITU-T L.1500 ‘Standardization gap analysis for smart water management’ and ITU-T L Suppl. 15: ITU-T L.1500 series: ‘Requirements for water sensing and early warning systems’ should be utilized by cities when actualizing smart water management.
- Best practices such as enhancing, reinforcing public communication and outreach, evaluating contracts, recycling markets and pricing levels, modifying collection techniques, legislating/funding smart recycling and leveraging lessons learned regionally can help Ålesund to continue to develop its recycling capability and culture further, which should be a focus of its future sustainability strategy.
- It is recommended that the region encourages best practices in *energy management* through appropriate policies, incentives and procedures. ITU Recommendations that guide the modernization and optimization of various public energy use sources should be utilized, including, for example, Recommendation ITU-T Y.4458 ‘Requirements and functional architecture of a smart street light service’.
- Within the *Society and Culture dimension*, KPIs are widely reached thanks to a high adult literacy rate, positive health-related outcomes and a wide range of national government-funded cultural offerings.
- Ålesund considers the upcoming merger of five municipalities within the region into a single Municipality of Ålesund as of 2020 to be the perfect opportunity to utilize the U4SSC KPIs to better define the region’s collective goals and strategies (e.g. those related to its desired regional environment, land use and transport plans) within its new master plan.
- The development of the regional environment, land use and mode of transport plan is a top priority for Ålesund. This effort will be a platform for cooperation within the regional partnership, which will make sure that the current sustainability strategies will work well when the existing seven municipalities merge into three.
- It is recommended that Ålesund focuses its efforts on further developing certain key economic sectors, including its tourism, transport and technology sectors, as part of its SSC goals.
- It is recommended that Ålesund reviews the KPIs reported at the lowest levels of the benchmarks, in particular: water supply loss; private vehicles; shared transportation; public building sustainability; water and electricity consumption; and wastewater treatment.
- Ålesund should work closely with other cities on its SSC efforts in order to leverage any best practices and their shared experience with developing and instituting smart and sustainable policies and initiatives in the region.

- ITU would like to invite cities around the world to implement the U4SSC KPIs for SSC, enabling the cities to establish clear data-collection methodologies, collect data, and develop goals and targets.

Background: The United 4 Smart Sustainable Cities (U4SSC) Initiative

The United for Smart Sustainable Cities (U4SSC) is a UN initiative created to foster standardization, integration and interoperability of digital technologies within cities to make them smarter and more sustainable.

The initiative has developed a set of international **key performance indicators (KPIs) for Smart Sustainable Cities (SSC)**³ to establish criteria to evaluate ICTs' contributions to making cities smarter and more sustainable, and to provide cities with the means for self-assessment in the move towards smartness and sustainability.

The aim is to help cities worldwide use technology to serve the best interests of the people and the environment. For this reason environmental aspects as well as socio-economic factors also play a key role in the U4SSC framework.

Helping cities be smarter and more sustainable: The U4SSC KPIs

The U4SSC KPIs offer a common format to report the progress of smart sustainable city strategies. These indicators also enable cities to measure their progress relative to the United Nations Sustainable Development Goals (SDGs).

ITU's objectives for the U4SSC KPIs for SSC project in cities are as follows:

- **Assisting** cities with implementing the KPIs in order to measure and evaluate a city's progress in becoming smarter and more sustainable toward meeting the SDGs within the local context.
- **Learning** from cities' experiences and **sharing** this rich and varied knowledge, insights and feedback to other cities around the world, enabling them to refine their own smart sustainable city strategies.
- **Evaluating** the strengths of this system of KPIs and identifying any areas for improvement, and obtaining practical and actionable feedback toward supporting the international standardization work of ITU-T Study Group 20: Internet of Things and Smart Cities and Communities.
- **Providing** cities with a consistent and standardized method to collect data and measure performance and progress.

The KPIs are categorized into 3 dimensions:



ECONOMY










SOCIETY AND CULTURE



ENVIRONMENT

A further 7 sub-dimensions are:

-  ICTs
-  Productivity
-  Infrastructure
-  Environment
-  Energy
-  Education, Health and Culture
-  Safety, Housing and Social Inclusion

The KPIs are further subdivided into **core** and **advanced** indicators.

Core indicators are those that all cities should be able to report. They provide a basic outline of the city's smartness and sustainability – higher levels of performance are generally achievable within these KPIs.

Advanced indicators provide a more in-depth view of a city and measure progress on more advanced initiatives.

Details on each indicator are available online in the [Collection Methodology for Key Performance Indicators for Smart Sustainable Cities](#).

Each indicator has been chosen through a process of review and input by international experts and UN agencies, programmes and secretariats to ensure that the data collected support the SDGs in a local context. City leaders will benefit from these KPIs in terms of strategic planning and the measurement of their cities' progress towards their individual smart sustainable city (SSC) goals. The indicators will enable cities to measure their progress over time, compare their performance with those of other cities, use the data and insights gleaned as policy tools toward informed policy-setting and decision-making and – through analysis and sharing – allow for the dissemination of best practices and set the standards for progress in meeting the SDGs.



Benchmarks and Scoring Methodology

As part of the U4SSC KPI project, benchmarks were developed for most KPIs to develop a reporting framework to demonstrate to cities how their performance could be reported.

The benchmarks were set based on several factors

- Meeting the aligned SDG fully.
- Performance compared to other international and transnational targets (e.g. OECD, European Commission).
- Performance against UN agency goals (e.g., International Telecommunication Union).
- Evaluation of city performance using UN and other international statistical data.
- Performance measured versus leading city performance globally.

Performance to benchmarks were then scored in four ranges for every KPI and data point reported:

- 0 – 33 % of target – 1 pt
- 33 – 66 % of target – 2 pts
- 66 – 95 % of target – 3 pts; and
- 95 + % of target – 4 pts

The scores for each reported KPI and data point were added to give a percentage score for categories, sub-dimensions and dimensions and reported based on the above target scores. KPIs or data points that are not reported or have no benchmarks yet defined were excluded.

Example: Education 4 KPIs

- If all 4 are reported and the scores are 1 pt, 3 pts, 4 pts and 1 pt;
Total score 9 pts out of 16 = 56.25 % reported as 33 – 66 % of target.
- If only 3 are reported and the scores are 3 pts, 4 pts and 2 pts;
Total score 9 pts out of 12 = 75 % reported as 66 – 95 % of target.

U4SSC unique method

The originality of U4SSC's method lies in the fact that it regards ICTs and digital technologies not as an end in themselves, but rather as tools with which to make a meaningful contribution to achieving the SDGs in an increasingly digitalized landscape. Approximately one-third of the U4SSC KPIs concern digitalization

(for example, Student ICT Access) and two-thirds primarily concern sustainable development and environmental impact (for example, Noise Exposure). As such, U4SSC forms a necessary bridge between digitalization and sustainable development.

Ålesund and the U4SSC KPI Project

In response to questions on the level of its digital development and sustainability, the **Region of Ålesund decided to join this ITU-led project**, utilizing the needs, aims and solutions of the U4SSC. This ambitious project would help Ålesund **measure and compare** its degree of **digitalization and sustainability**.

Findings from this project are expected to form an SSC development trajectory to which administrators of other municipalities and regions similar in size and capacity to Ålesund will be able to adapt when developing their own smart sustainable strategies. The KPIs will also help demonstrate how Ålesund is progressing in its achievement of the SDGs. The continuation of the project could also assist Ålesund in conducting a periodic internal review of its current ICT-related efforts, thereby allowing the region to benchmark how its ICTs can best be used to monitor and improve its smart city processes and operations. This project can, therefore, play a key role in planning Ålesund’s SSC future.

Region Profile: Ålesund, Norway

City Profile			
Inhabitants	82 488	City GDP	USD 4 196 002 396
Area	3 606 km ²	Household Income	USD 80 296
Households	35 921	Inflation Rate	3.1 %

Originally established as a port town in 1848, Ålesund is part of a historic area in Norway recognized for its beautiful high mountains, blue fjords and distinctive Art Nouveau architecture. It is a member of ‘Réseau Art Nouveau Network’, a European network of Art Nouveau cities, including Glasgow, Barcelona and Vienna. The broader Region of Ålesund is an inter-municipal development partnership between the municipalities of Ålesund, Haram, Sandoey, Skodje, Oerskog, Sula and Giske. The focus of the regional partnership is cooperative economic development between municipalities, in order to market the region effectively as a competitive and attractive destination for businesses and people.

The region has a clearly defined urban city centre that is surrounded by smaller communities. The presence of Ålesund University College and the Norwegian University of Science and Technology (NTNU) has led to it becoming a university town with a total of 2 600 resident students. This university affiliation is important in strengthening Ålesund as the main regional centre between the cities of Trondheim and Bergen.⁴

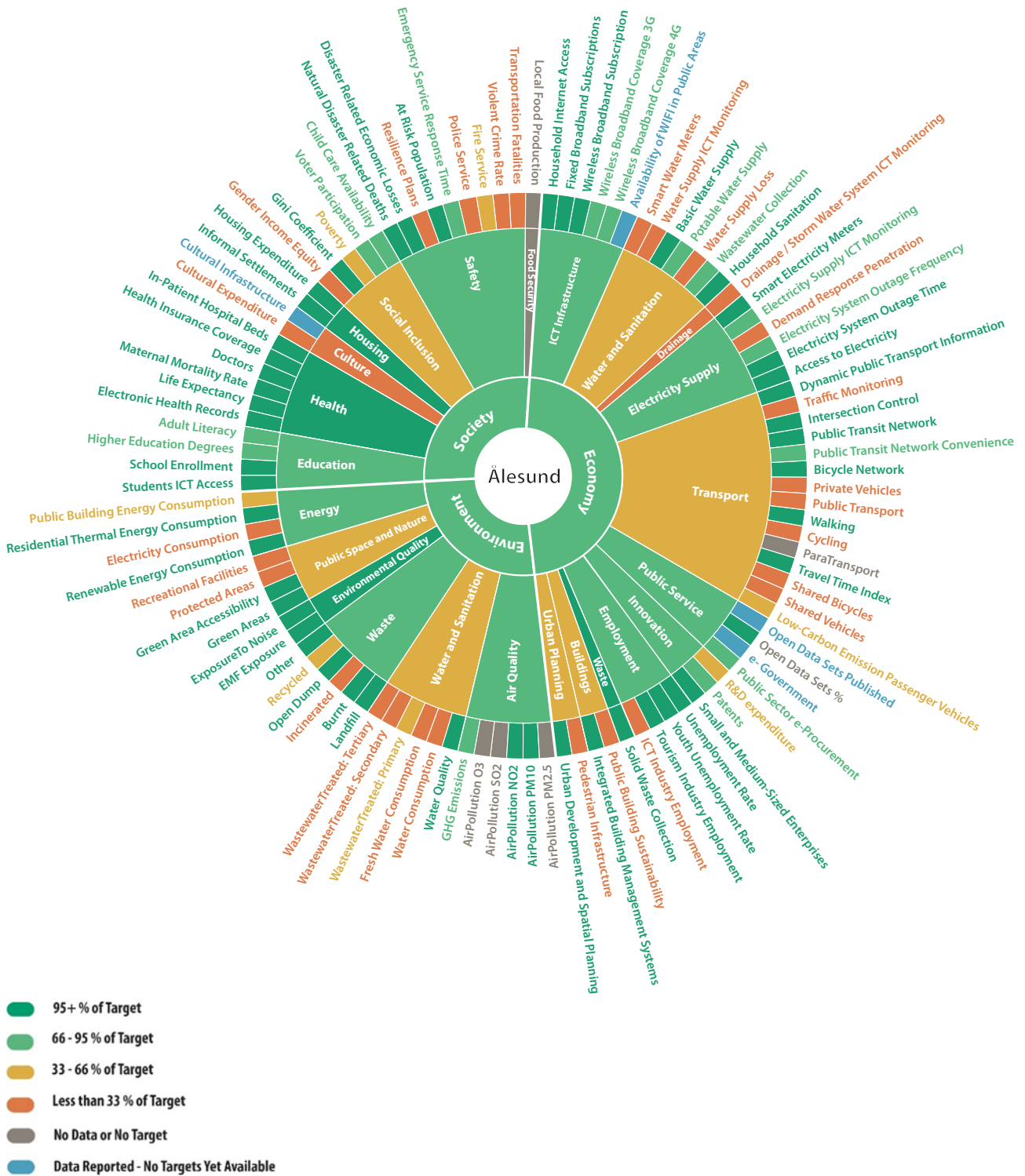
As a result, the region has developed many strong, global businesses that produce several goods and services and utilize a readily available, skilled workforce. This has resulted in Ålesund being one of the most productive and value-generating areas of Norway. It includes the most important fishing harbour in the country with a modern fishing fleet, in addition to a large furniture industry that manufactures well-known brands and household items. Previously home to the shipbuilding industry itself, the region still maintains close economic ties to its neighbouring shipyard communities. Furthermore, the region is easily accessible by air, sea or land, with good connections to centres such as Oslo, Bergen, Trondheim, Stavanger, Sogndal, Florø, Amsterdam, Copenhagen, Gdansk and Alicante.

Given these characteristics, and Ålesund's public commitment to its technological and smart sustainable city (SSC) initiatives, the region is ideal for the implementation of the U4SSC KPIs on Smart Sustainable Cities. The vital knowledge gained through Ålesund's experience will continue to be an important part of ongoing efforts to make not only the KPIs, but also U4SSC's upcoming Smart Sustainable Cities Index, the most effective methods to measure progress and provide guidance to cities on their journey towards becoming smarter and more sustainable.

The first year of Ålesund's participation in the KPIs project has concluded successfully as part of an ITU project and with the active support of Organization for International Economic Relations (OiER).

Ålesund and the KPIs: a Snapshot

The following chart provides an overview of how the KPIs are being met. Starting from the centre, the benchmark performance is indicated for: Dimensions, Categories and KPIs.



KPI Dimension 1: Economy

The first U4SSC KPIs dimension is Economy. This dimension covers the sub-dimensions of Information and Communication Technologies (ICTs), Productivity and Infrastructure.

In the ICTs sub-dimension, the KPIs include those related to a city's ICT infrastructure, water and sanitation, drainage, electricity supply, transport and public sector. These KPIs aim to assess the availability and use of the ICT infrastructure in cities that facilitate smart sustainable city services.

The Productivity sub-dimension includes KPIs related to innovation and employment. These KPIs aim to assess the use and impact of ICTs in the economic development of cities. They cover innovation, job creation, trade and productivity. These KPIs are also expected to play a pivotal role in assessing a city's adoption of the ICTs that support socio-economic growth.

The Infrastructure sub-dimension relates to water and sanitation, waste, electricity supply, transport, buildings and urban planning. These KPIs aim to assess the impact of ICTs on city infrastructure, development and sustainability.

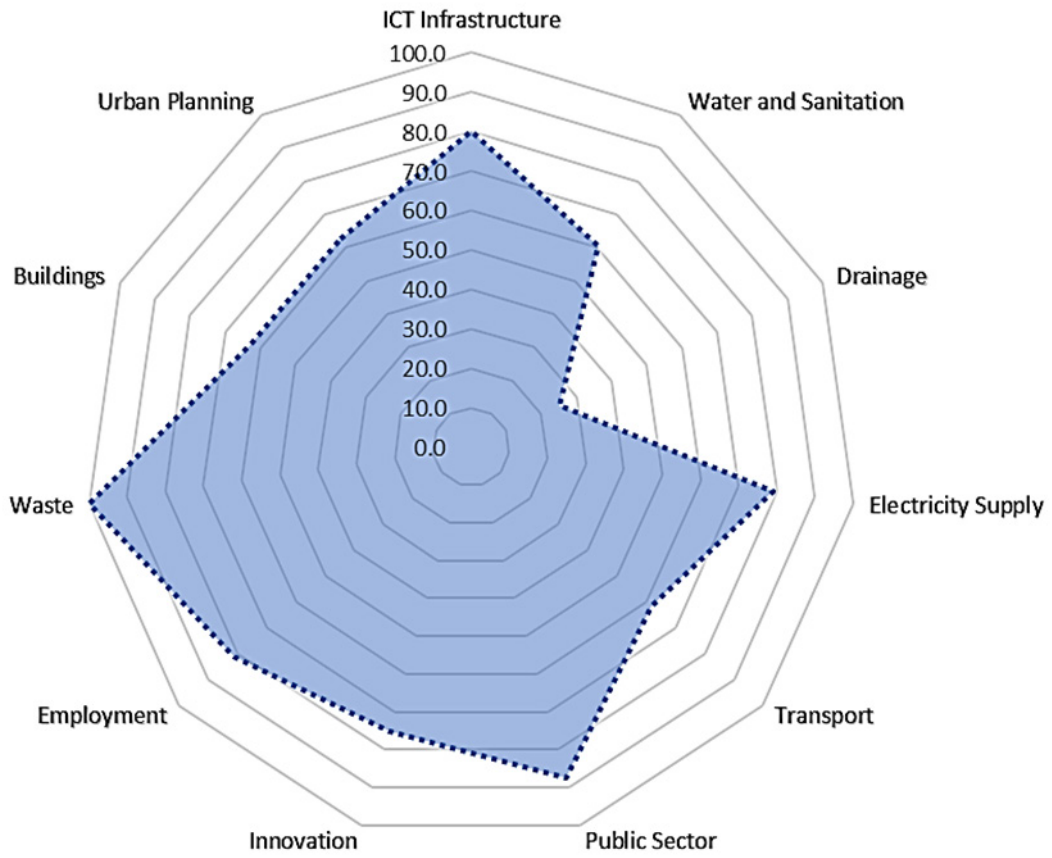
The key theme assessed by the Economy KPIs is the level of implementation of ICTs. A smart sustainable city (SSC) requires fixed and mobile ICT infrastructures to allow for the deployment of applications that will:

1. facilitate the development of smart and sustainable cities;
2. promote civic engagement; and
3. foster improvements in sustainability (gained through efficiencies in operations).








There are also KPIs within this dimension that are meant to help analyse the general economic well-being and innovation of a city and measure the support from ICTs in the process.

The following diagram summarizes Ålesund's KPI performance detailing the categories within the Economy dimension against the current U4SSC benchmarks.

ECONOMY



Information and Communication Technology (ICT) Infrastructure

Category	KPI	Result	Performance to Benchmark	SDG
	Fixed Broadband Subscriptions	82.85 %		
	Wireless Broadband Subscriptions (per 100 000 inhabitants)	116 674		
	Household Internet Access	96.00 %		
	Wireless Broadband Coverage – 4G	92.20 %		
	Availability of Wi-Fi in Public Areas	232 Spots	No benchmark available	

The reporting of Ålesund's economy starts with its connectivity and ICT infrastructure KPIs.





Mobile internet access and usage are prevalent. This is an important achievement for the region, as research shows that advanced wireless networks (and 4G penetration in particular) are necessary for technology leadership in any city. The benefits of such leadership are important for the economy of a city or region, and include local GDP growth, job increases, technological cost savings, and a broadly deployed network-driven innovation engine.⁶ For growing cities or regions such as Ålesund, achieving and sustaining such economic growth is all the more important when competing for resources and talent with larger commercial centres.

Moreover, Ålesund's overall household penetration rate is higher than the Norwegian average of approximately 90 per cent.⁷ It will be further bolstered when the region finishes providing high-speed, fibre-based broadband for households in rural areas over the next few years.

Optimizing smart, sustainable ICT infrastructure: To capture the ICT usage state at that time and to conduct even deeper analysis, Ålesund could utilize Recommendation ITU-T L.1601: 'KPIs related to the use of ICT in smart sustainable cities' and Recommendation ITU-T Y.4902/L.1602: 'KPIs related to the sustainability impacts of ICT in smart sustainable cities'. Also useful are Recommendation ITU-T L.1400: 'Overview and general principles of methodologies for assessing the environmental impact of ICTs' and Recommendation ITU-T L.1440: 'Methodology for environmental impact assessment of ICTs at city level'.

For the expansion of high-speed broadband in rural areas, in particular, Recommendations ITU-T Y.3000 to Y.3499: 'Future networks' can help guide forward-looking implementation.

Public Sector

Category	KPI	Result	Performance to Benchmark	SDG
	Open Data Sets Published	119	No Benchmark Available	
	Open Data Sets Availability	100.00 %		
	e-Government Services	80	No Benchmark Available	
	Public Sector e-Procurement	84.92 %		

While the role of e-governance as a building block to a true smart city has been emphasized by the UN, research shows that there still exists a significant gap between large and small cities in their ability to afford the digital infrastructure, platforms and software applications on which the public sector must rely to deliver e-services. The gap is widespread and is be found in areas where the urban-rural divide is acute.⁸








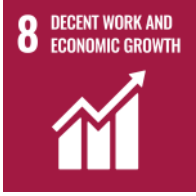



Research also shows that many cities around the world still indicate the need for a more equitable provision of services. E-governance and e-services are a natural solution to this need. The electronic services delivery model leads to city spending that is based on evidence and is oriented toward results, thereby ensuring that the city becomes broadly partnered, resident-involved, diversity-informed, smartly resourced, employee-engaged and more data-driven.⁹

All of Ålesund’s potential datasets are available publicly, which is considered very conducive to allowing stakeholders and private businesses to review and build applications based on the open data sets. The openness of a city’s data can be considered one of the key building blocks for the new digital economy. The actual publication is done nationally at geonorge.no using most of the data provided by the region. This is part of a private-public partnership between various entities called GeoVEKST that establishes and maintains map data in Norway. The region still prepares the data and funds the effort, after which the majority of the datasets are published by a national mapping authority or by other state actors. The same state actors also prepare datasets for their own use, which cover the region and are also publicly available.

Optimizing public sector procurement: While it is on its way to achieving the benchmark, there is still room for Ålesund to conduct 100 per cent of its public sector procurement activities electronically. For the remaining 15 per cent of procurement opportunities that need to transition from paper to e-procurement, it is recommended that the region also advertises them electronically through its e-procurement portal, in order to register any remaining or new vendors and start providing electronic notifications of addenda during the transition period. Procurement activities or opportunities should be counted as fully electronic only once they are available online, require an online response and if any information materials or applications/forms are not available for manual processing via municipal offices.

Ålesund may find ITU Recommendations such as Recommendation ITU-T Y.3600: ‘Big data standardization roadmap’ particularly helpful when scaling the backend of its e-services and e-processes, along with Recommendation ITU-T Y.4461: ‘Framework of open data in smart cities’ when expanding its open data offerings.

Innovation and Employment

Category	KPI	Result	Performance to Benchmark	SDG
	R&D expenditure (relative to GDP)	1.13 %		
	Patents (per 100 000 inhabitants)	35.16		
	Small and Medium-Sized Enterprises (SMEs)	99.71 %		
	Unemployment Rate	2.16 %		
	Youth Unemployment Rate	2.25 %		
	Tourism Sector Employment	3.90 %		
	ICT Sector Employment	1.25 %		

Ålesund’s overall unemployment rate is lower than the Norwegian rate of 4 per cent (Q1- 2019), while its rate of youth unemployment is significantly lower than the national level of 10.6 per cent (Q1- 2019).¹⁰ The region’s positive performance on youth unemployment relative to other European localities of similar size and population makeup is atypical, given the average youth unemployment rate among the European Union countries of at least 14 per cent.¹¹ This is a notable result, as youth unemployment is highly indicative of a region’s overall health, making it one of the most illustrative economic indicators.

ICT sector employment is reportedly low in Ålesund, although this may be an indication of the difficulty in categorizing this KPI, as many high-tech jobs exist in other sectors like shipbuilding and do not fall within the scope of the KPI. In order to improve performance, however, the region should look to hire locally for its own future technology needs. As the various municipalities in the region integrate digitally and work on smart alternatives to unify government services, there is an opportunity to generate a talent pipeline by supporting appropriate programmes at the local university and other institutions of higher knowledge. Creating and retaining a larger, smart workforce will be the key to unlocking Ålesund’s full potential as a ‘smart city’.

One way the region can do this is by leveraging international students and researchers at the local university and higher education institutions. By retaining these graduates, the region can benefit from their economic contributions that will ultimately increase new business formation, attract more capital to the region, and drive future job creation. While immigration policy is typically set at the national or federal level,

local initiatives are recommended to provide international students and researchers part-time and/or entrepreneurial opportunities that could apply toward their visa requirements.¹²

Tourism is a major economic force that is no longer exclusive to the traditional, large, urban hotspots. With its attractiveness as a naturally, historically, culturally and architecturally beautiful region, there is potential for Ålesund's tourism sector to grow further, which will create more jobs in the sector.

A rise in tourism could also lead to further SMEs that are already important for growing regions such as Ålesund. Research shows that the more flexible structure of SMEs corresponds well to the agility and innovativeness often possible in smaller and medium-sized cities or regions, compared to that of large firms that could find themselves constrained by their own structures and resistant or unable to change.















Given that most businesses in Ålesund identify as SMEs, continuing to identify and incorporate the needs of small and medium-sized businesses into regional policy will be vital for Ålesund's continued economic growth and success. Also vital will be addressing barriers to entrepreneurship through policy, namely obstacles in the regulatory environment, access to finance, exploitation of knowledge from research, skills for entrepreneurship, and ensuring that women, young people and people from all social groups have an opportunity to create successful businesses.¹³

Lastly, its innovation indicators show that Ålesund is positioned well in this regard, in large part due to its status as a university town. Incentivizing technological research – through policy and fiscal spending – that aligns with the needs of the area's economic sectors will be important for economic growth, given the high SME makeup of the region. Research shows that technologies that enhance productivity and connectivity offer vital opportunities for start-ups and established SMEs to participate in the global economy, access skills and talent, leverage diverse financing instruments, and innovate and grow. However, the uptake and utilization of digital technologies can be uneven, with many SMEs lagging in the adoption of productivity-enhancing digital tools and applications. R&D and innovation, access to technology and digitalization are key drivers of SME productivity at the firm level, which (in turn) is a key driver of long-term growth.¹⁴ It is recommended, therefore, that Ålesund facilitates and provides a platform for dialogue between its business community, academia and not-for-profit community as part of a strategic economic growth vision. Building a cohesive, integrated and collaborative economic eco-system will lead to more accelerated growth over a collection of insular individual businesses and organizations.

Optimizing innovation and driving growth: In conclusion, it is recommended that Ålesund focus on the following three areas¹⁵ to leverage underutilized community resources and drive economic growth:

1. Invest in its university and other institutions of higher education as engines of innovation and job creation, to leverage their ability to attract international talent. It is recommended that the region utilizes job market demand analytics to align labour supply with demand, develop better training programmes and work with institutions to fill education gaps, thereby creating a local talent pipeline.
2. Foster diverse communities and networks, utilizing untapped synergies to drive higher economic returns, as well as greater equity.
3. Build and modernize basic infrastructure to ensure future growth via year-round tourism and to retain a highly trained local workforce.

Water and Sanitation, Drainage and Waste

Category	KPI	Result	Performance to Benchmark	SDG
	Smart Water Meters	0.76 %		
	Water Supply ICT Monitoring	20.94 %		
	Basic Water Supply	100.00 %		
	Potable Water Supply	92.00 %		
	Water Supply Loss	32.12 %		
	Wastewater Collection	93.53 %		
	Household Sanitation	100.00 %		
	Drainage/Storm Water System ICT Monitoring	0.00 %		
	Solid Waste Collection	100.00 %		

Currently, less than a quarter of Ålesund's water distribution system is monitored using ICTs. There is also little monitoring at the source of consumption via smart water meters. Similarly, no part of the region's drainage/storm water system is monitored using ICTs. At the same time, the rate of water loss through the water distribution system is very high and should be an area of focus, Water lost in this manner is referred to as non-revenue water. Non-revenue water includes physical losses such as water used for firefighting, system leakage, un-metered municipal uses, and apparent losses resulting from billing inaccuracies.

Water conservation is becoming increasingly crucial given the greater water stress being experienced around the world, including that caused by its use (and waste) in agriculture. Freshwater accounts

for only 3 per cent of the world's water to begin with, and with two-thirds of it tucked away in frozen glaciers or otherwise unavailable for our use, freshwater use continues at unsustainable levels.¹⁶

Moreover, global climate change is already impacting patterns of weather and water. This is exacerbated by urban growth or amalgamation in growing areas such as Ålesund, placing increasing pressure on local water resources. No part of the world is truly safe from potential water distress. This was evidenced in 2018 when it took less than three weeks without rain amid unusually warm temperatures for the Norwegian capital, Oslo, to suddenly face a potential water shortage.¹⁷ Therefore, it is imperative that every city and urban region treats water as a scarce resource, and starts to place a far stronger focus on managing supply.









It is highly recommended that the region also looks into the causes behind its high rate of non-revenue water through the employment of best-practice water-loss accounting methods, such as the Wastewater Association Water Audit Method. An advantage of using such standardized audit methodology is that it helps measurably pinpoint the root cause behind water loss by calculating the system's Infrastructure Leakage Index – which is a ratio of the Current Annual Real Losses in the system to the Unavoidable Annual Real Losses. A system with an Infrastructure Leakage Index value of 1.0, for example, would have no unavoidable leakage; a system with an Infrastructure Leakage Index value of 2.0 may be able to reduce its leakage level by half.¹⁸

It is also important that Ålesund develops policies that mandate the conservation of the region's water resources. This would include developing progressive water-loss thresholds for the foreseeable future. It would also entail working with the national government to require public drinking water utilities to submit a water conservation plan for the region that includes overall best practices relevant to water-loss management. These practices could include the following: supply metering with an accuracy of ± 5 per cent; universal metering of public uses of water; meter testing and repair, and periodic meter replacement; periodic visual inspections along distribution lines; and audits of customer service lines. Additionally, public drinking water suppliers serving the region should be required to develop an ongoing programme of leak detection, repair, and water loss accounting for the transmission, delivery and distribution system, the documentation of water pumpage, delivery, sales and loss volumes. These plan requirements should also apply to the wholesale customers of these systems.

Optimizing water resources, smartly: Ålesund recognizes the need to mitigate this and has recently started an initiative to install smart water meters region-wide. It also plans to work with the National Food Safety Authority and the Norwegian Statistics agency to improve measurement and reporting mechanisms.

Several ITU Recommendations from Recommendations ITU-T Y.4000 to Y.4999: 'Internet of things and smart cities and communities' contain guidance on IoT applications and ubiquitous sensor networking (along with Supplement ITU-T Y Suppl. 36: ITU-T Y.4550-Y.4699: 'Smart water management in cities').

Electricity Supply

Category	KPI	Result	Performance to Benchmark	SDG
	Smart Electricity Meters	95.01 %		
	Electricity Supply ICT Monitoring	91.41 %		
	Demand Response Penetration	0.04 %		
	Electricity System Outage Frequency	1.05		
	Electricity System Outage Time	66.86 Minutes		
	Access to Electricity	97.39 %		

This monitoring is important, as it allows for a more direct and real-time measurement of the load on an electricity grid and the consumption habits of consumers. Real-time data can allow for more real-time pricing of electricity and the implementation of tools to manage energy usage and peak demand.

Also of help in this regard will be further development of the country’s demand response penetration or capability. Demand response would provide an opportunity for consumers to play a significant role in the operation of the electric grid by reducing or shifting their electricity usage during peak periods in response to time-based rates or other forms of financial incentives. Demand-response programmes could also be used by electric system planners and operators as resource options for balancing supply and demand.





Heating and cooling systems have been found to be one the most promising areas for instituting demand response. They offer explicit (i.e. real-time, short-notice) flexibility, as well as implicit flexibility (i.e. long-term expected changes in load demand). Both types of flexibility reduce the need for electric grid investments via capacity expansions and help lower network costs in other areas, in addition to several other tertiary benefits.¹⁹

In Norway, electricity is the main source of heating; consequently, the potential flexibility from space and water heating in Norway is substantial. Further development of demand response capability and awareness is recommended for all Norwegian cities and regions, including Ålesund – particularly in light of the news that Norway has recently adopted a regulation for consumers and producers of more than 1 megawatt per hour that will require them to pay more for grid upgrades and extensions.²⁰

Optimizing electrical supply: Several ITU Recommendations from Recommendation ITU-T Y.4000 to Y.4999: ‘Internet of things and smart cities and communities’ contain guidance on IoT applications and ubiquitous sensor networking, including, for example, standards such as Recommendation ITU-T Y.4409/Y.2070: ‘Requirements and architecture of the home energy management system and home network services’.

The rising popularity of electric (EV) and plug-in electric vehicles (PHEV) (see also the section on ‘Transport’), combined with increasing battery capacity and charging power, could mean that EV charging needs may become more significant in the distribution grid.²¹ This could encourage greater demand response penetration over the next decade.

Buildings

Category	KPI	Result	Performance to Benchmark	SDG
	Public Building Sustainability	13.70 %		
	Integrated Building Management Systems in Public Buildings	100.00 %		

While integrated building management systems are routinely utilized in Ålesund, not so many of the region’s public buildings are certified sustainable. The sustainability of human activities in urban areas cannot be addressed without taking into consideration the building, which is the most basic unit that makes up a city. It is recommended, therefore, that the region should investigate the use of sustainability certification programmes for ongoing building operations, as these programmes provide a standardized method for optimizing the environmental performance of existing and new building stock. It should also adopt energy and water efficiency standards for new buildings (particularly in commercial projects) to decrease their life cycle environmental impact.
















Optimizing building services: Ålesund should also consider implementing Recommendation ITU-T L.1370 (ex. L.SIB) ‘Sustainable and Intelligent Building Services’. This Recommendation sets the minimal requirements for the efficient and sustainable management of the building as a unit. It also defines the services enabled by the sustainable and intelligent building (SIB) concept, the way it contributes to the goals of sustainability, its features, its different possible functioning modes, or its internal architecture and requirements with the IoT node at its core.



Interoperability is mentioned among these requirements and specifications, as most of the added value that the SIB provides comes into action when it interacts with other parts of the building, other buildings, city elements, or with the city itself. Protocols, semantics and normalization are key as a part of this interaction, and the SIB with its IoT node is required to be compliant with all of them.

Extensibility is another key feature for the SIB and the IoT node. The technology behind smart and sustainable cities is currently evolving very quickly. This is why one of the most important architectural patterns to take into consideration is to design a SIB and an IoT node that supports not only upgrading, but also the capacity to accommodate new technologies, protocols, services and applications that may be relevant for the industry in the future.

Furthermore, ITU-T Study Group 5: ‘Environment, Climate Change and Circular Economy’ is working on a draft Recommendation ITU-T L.SP_OB: ‘A methodology for improving, assessing and scoring the sustainability performance of office buildings’ which will provide a framework critically assess ten key areas of environmental performance and management: Energy, Water, Air, Comfort, Health & Wellness, Purchasing, Custodial, Waste, Site, and Stakeholders.

Transport

Category	KPI	Result	Performance to Benchmark	SDG
	Dynamic Public Transport Information	100.00 %		
	Traffic Monitoring	10.20 %		
	Intersection Control	100.00 %		
	Public Transport Network (per 100 000 inhabitants)	755.26 km		
	Public Transport Network Convenience	93.53 %		
	Bicycle Network (per 100 000 inhabitants)	150.32 km		
	Transportation Mode Share: Private Vehicles	71.00 %		
	Transportation Mode Share: Public Transport	6.00 %		
	Transportation Mode Share: Walking	19.00 %		
	Transportation Mode Share: Cycling	3.00 %		
	Transportation Mode Share: Para Transport	Not Reported		
	Travel Time Index	1.18		
	Shared Bicycles (per 100 000 inhabitants)	0.00		

Category	KPI	Result	Performance to Benchmark	SDG
	Shared Vehicles (per 100 000 inhabitants)	0.00		
	Low-Carbon Emission Passenger Vehicles	3.91 %		

Ålesund has indicated that an important milestone of the region’s municipal cooperation is the development of a regional environment, land-use and mode of transport plan. This is necessary in a region where the vast majority of travelers regularly use their private vehicles, and where the use of public transport reported as the main mode of travel at a distant 6 per cent.

To this end, Ålesund has recently approved a strategy for public transport that details specific strategies and measures to increase the use of public transport in an environmentally friendly fashion. As an example, the counties of Møre and Romsdal have implemented procurement policies to push for more environmentally friendly buses. Ålesund is a key partner in the partnership for medium-sized cities in Norway that are working together to make the participating cities viable for urban environment deals with the Norwegian Government, in order to attract additional funding for environmentally friendly modes of transport and infrastructure.

Optimizing transport: The region would also benefit from more frequent, round-the-clock bus services later in the evenings every day after 5.00 pm on Saturdays and all day on Sundays. This would be important in easing and facilitating residents’ and visitors’ mobility, since the main alternative to buses, i.e. taxis, are very expensive in Norway.

Another recommendation is to allow for, and incentivize, vehicle-sharing services and carpool programmes as transit alternatives. Such services or programmes offer commuters competitive and transparent rates, along with the ease of ordering their rides through their mobile phones. This could have an impact on the way that people get around within and outside the region, leading to it becoming more connected. It would make it easier for travelers, especially tourists, to access areas that are more difficult to get to or are not usually serviced by the public transportation or taxicab options.





Finally, it is recommended that Ålesund incentivize the use of electric vehicles (EV). The region has reported that the 3.91 per cent figure only includes cars, and no other comparable electric vehicles such as vans.

Norway is already the world’s largest market for electric vehicles (EV) in comparison to the total number of vehicles sold. In 2018, EVs had a share of the new car market of approximately 30 per cent, with plug-in hybrids (PHEV) holding a 19 per cent market share. There is further movement to stop the sale of new conventional, i.e. gasoline- or diesel-powered cars in the country altogether by 2025. This means that by 2030, the country is projected to have 1.5 million private electric vehicles.²²

This is a step in a sustainable direction for the country, upon which Ålesund can capitalize by working to attract funding from the national government to incentivize the greater adoption of electric vehicles in the region.

There are many other ITU Recommendations that could help during formulation of the region's new transport plan, such as Recommendations ITU-T Y.1300 to Y.1399: 'Transport' and ITU-T Y.1700 to Y.1799: 'Operation, administration and maintenance'. In private vehicle heavy cities, Recommendation ITU-T Y.4456: 'Requirements and functional architecture for smart parking lots in smart cities' can also help guide measures to alleviate vehicle congestion or to optimize flow.

Urban Planning

Category	KPI	Result	Performance to Benchmark	SDG
	Pedestrian Infrastructure	0.01 %		
	Urban Development and Spatial Planning: Compact	YES		
	Urban Development and Spatial Planning: Connected	YES		
	Urban Development and Spatial Planning: Integrated	YES		
	Urban Development and Spatial Planning: Inclusive	YES		
	Urban Development and Spatial Planning: Resilient	YES		

Well-managed urbanization techniques generate economic prosperity, sociocultural progress and environmental sustainability. Poorly managed urbanization causes increased inequality, the growth of slums and negative climate change impacts. Successful urban development and planning requires evidence-based design, implementation and management.

To be considered ‘sustainable’, urban plans should have all of the following five principles/elements, as demonstrated through evidence-based and innovative methodology (including data innovations like spatial analytics, GIS and Big Data):

- 1) **compactness:** avoiding urban sprawl;
- 2) **connectivity:** places and locations to demonstrate high connectivity;
- 3) **integration:** mixed urban land use;
- 4) **social inclusiveness;** and
- 5) **resilience to climate change.**

Ålesund has reportedly implemented all five principles, which makes it a sustainably planned region.

However, Ålesund’s sustainability level is generally impacted by the high reliance on cars in the region, which also translates into a lack of pedestrian infrastructure. Pedestrian zones (also known as car-free zones) are areas of a city that are reserved for pedestrian use only. Most, or all, automobile or truck traffic is prohibited from such zones (except for emergency vehicles or occasional deliveries or taxis).

Pedestrian zones tend to improve the local areas in terms of pollution, noise, livability and safety for pedestrians.

Optimizing urban planning: Creating more pedestrian zones can help Ålesund encourage its citizens to walk and cycle more, as well as provide more places for people to engage in and create a sense of community.²³ It is recommended that Ålesund employs the following key guidelines²⁴ when planning and designing such zones:

1. **Design for the right speeds:** Foot traffic and pedestrian access should be prioritized over automobile traffic and access. Roadway widths, curvature and intersection design should be optimized for pedestrian use, not for automobile speed.
2. **Consider streets public spaces:** Roads, parking lots, pavements, and so on should be planned to serve more than one mode (cars) and more than one purpose (movement). Roads can be planned to share space with dedicated bus lanes, cycle lanes, and on-street parking. Parking lots can be planned and zoned to become public markets on weekends. Pavements can be improved by making them wide, well-lit, aesthetically pleasing and inviting, and by providing benches, outdoor cafes and public art.
3. **Envision community outcomes:** The region's transportation network should incorporate design that supports their role as public spaces. Transportation projects should be integrated with land-use planning that includes creating more attractive places that people will want to visit in new and existing developments. This can take the form of well-designed bus stops that serve as gathering places, and multimodal facilities for bus rapid transit or other forms of travel.

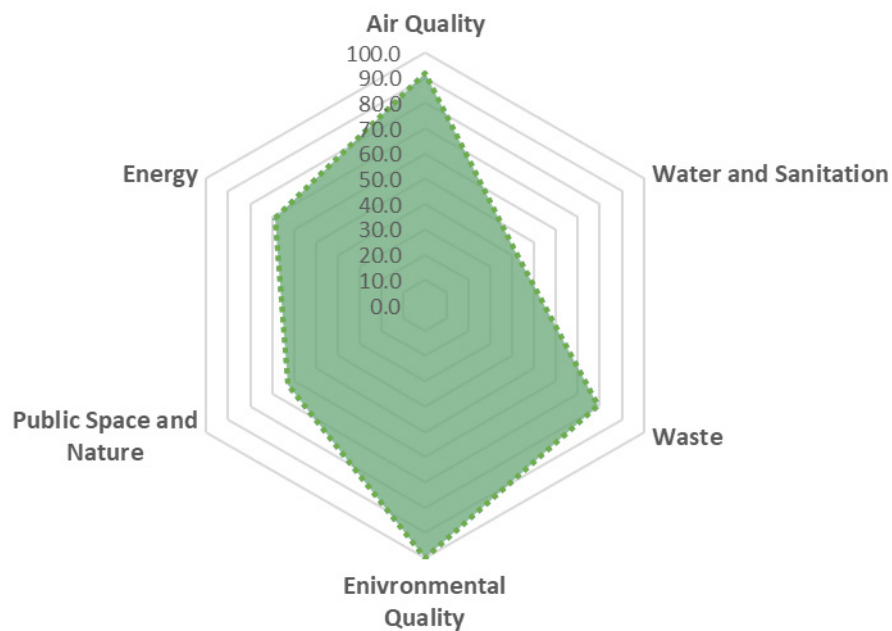
KPI Dimension 2: Environment

The second U4SSC KPIs dimension is Environment. This dimension includes the sub-dimensions of Environment and Energy. The Environment sub-dimension covers a range of indicators classified according to categories, some of which can also be found in the first (Economy) dimension. The KPIs include those for air quality, water and sanitation, waste, environmental quality and public space and nature. They aim to assess the use of ICTs in supporting urban environmental services and improving the overall environmental quality in cities.









The Energy sub-dimension includes all KPIs that report on energy. These KPIs aim to assess the use of renewable and sustainable sources of energy, as well as the energy efficiency and energy reduction measures in a city. This dimension examines the level of ICT integration in supporting environmental sustainability and energy efficiency. These KPIs also provide a key baseline for future comparison, because achieving efficient use of resources via ICTs will be fundamental to Ålesund’s long-term environmental sustainability and to that of every aspiring smart sustainable city.

The following diagram summarizes Ålesund’s KPI performance detailing the categories within the Environment dimension against the current U4SSC benchmarks.

ENVIRONMENT



Air Quality

Category	KPI	Result	Performance to Benchmark	SDG
	Particulate Matter (PM 2.5)	Not Reported		
	Particulate Matter (PM 10)	15.00 µg / m ³		
	Nitrogen Dioxide (NO ₂)	21.00 µg / m ³		
	Sulphur Dioxide (SO ₂)	Not Reported		
	Ozone (O ₃)	Not Reported		
	GHG Emissions (eCO ₂ / capita)	5.70 tonnes		

The reporting of Ålesund’s environmental initiatives starts with the KPIs related to air quality and GHG emissions. While the KPIs fall under a single category of Air Quality, the GHG Emission KPI is most related to climate change implications.

The World Health Organization (WHO) defines the major components of air pollution and sets guidelines for acceptable levels. Meeting these levels is imperative for the overall health of a region’s environment and residents. Small particulate matter (PM_{2.5}) is a pollutant that affects people by increasing mortality and morbidity (daily and over decades).²⁵ Ozone is a major factor in asthma morbidity and mortality, while nitrogen dioxide and sulphur dioxide play a role in asthma, bronchial symptoms, lung inflammation and reduced lung function. Sulphur dioxide also leads to acid rain.

While Ålesund reports a ‘safe’ level for large particulate matter (PM₁₀), (WHO considers an annual mean of 20 µg/m³ safe for PM₁₀ levels)²⁶ small ambient particulate matter (PM_{2.5}) is currently not measured. PM_{2.5} was previously measured, but this was stopped after a few years of consistent within-limits results due to cost considerations. The region may reinvest in measuring this indicator once sensors and equipment become economically feasible to operate and maintain. Nitrogen dioxide (NO₂) is reported to be lower than WHO’s 40 µg/m³ annual mean guideline.²⁷ Ozone (O₃) and sulphur dioxide (SO₂) were not reported.












With respect to GHG emissions, the reported values for per capita emissions are higher than the world average (4.9 tonnes / capita). Ålesund’s GHG emission profile shows major sources as maritime transport (37%), road transport (29%), other transport (construction, tractors – 8.5%) and waste incineration (15%).²⁸

The current benchmark does not yet reflect the goals of the Paris Agreement. Consequently, despite the benchmark rating, the level of Ålesund's GHG emission will need to be improved substantially if the goals of Paris agreement are to be reached. Recommendation ITU-T L.1460: 'Connect 2020 greenhouse gases emissions – Guidelines' and Recommendation ITU-T L.1470: 'GHG emissions trajectories for the ICT sector compatible with the UNFCCC Paris Agreement' are among ITU-T Recommendations that can help in this regard.

Optimizing air quality: An integrated approach to climate change and air pollution should be considered to reduce the risks of applying climate change measures with significant negative impacts on air quality. Continual cooperation with other levels of government is also important, as air pollution is not just a local problem. As transboundary sources are often major contributors to urban pollution, many cities or regions are unable to continue meeting WHO guideline levels for air pollutants through local action alone.

Recommendations such as Recommendation ITU-T Y.4207: 'Requirements and capability framework of smart environmental monitoring' and Recommendation ITU-T Y.4700/F.747.2: 'Deployment guidelines for ubiquitous sensor network applications and services for mitigating climate change' can be of significant help in smart sustainable cities' efforts to monitor and mitigate air pollution.

Public Space and Nature, and Environmental Quality

Category	KPI	Result	Performance to Benchmark	SDG
	Green Areas (per 100 000 inhabitants)	67 240.10 ha		
	Green Area Accessibility	98.86 %		
	Protected Natural Areas	2.88 %		
	Recreational Facilities (per 100 000 inhabitants)	77 745.85 m ²		
	EMF Exposure	100.00 %		
	Noise Exposure	6.09 %		










Ålesund performs very well across these two sets of KPIs.

The presence of such space and their accessibility are important, as green spaces in urban ecosystems help produce oxygen and naturally mitigate levels of air pollution, including airborne particulate matter. Moreover, green areas not only help cool cities and provide refuge from urban noise, they also help facilitate physical activity such as walking and biking, social interaction, recreation and relaxation. WHO has recently estimated that physical inactivity, resulting from poor walkability and lack of access to recreational areas, accounts for 3.3 per cent of deaths worldwide.

Optimizing public spaces: Green spaces also help improve mental wellbeing and health. WHO suggests that physical activity in a natural space can help alleviate mild depression and lessen physiological stress.²⁹

Many ITU Recommendations in the K-series: ‘Protection against interference’ can provide further insight into limiting and managing the effects of EMFs.

Water and Sanitation

Category	KPI	Result	Performance to Benchmark	SDG
	Drinking Water Quality	99.45 %		
	Water Consumption (per capita)	560.72 ℓ / day		
	Freshwater Consumption	100.00 %		
	Wastewater Treatment: Primary	62.85 %		
	Wastewater Treatment: Secondary	31.74 %		
	Wastewater Treatment: Tertiary	00.00 %		

Ålesund's daily water consumption figure is significantly higher than the 2018 average daily national level of 182 litres per capita.³⁰

It is recommended that Ålesund analyses this high variance as a priority. As part of this exercise, it is recommended that the region continues to monitor how much customer water demands (employment and residential) account for of the region's total water production volumes.

Optimizing water consumption and sanitation measures: Ålesund should evaluate peak day and time water consumption trends, in addition to the overall demand and production trends – considering seasonal temperature and precipitation trends. The region should then set average annual daily water production projections and targets based on customer demand and non-revenue water.³¹ As mentioned previously in the Economy dimension, currently 32.21 per cent of all water produced by the region is non-revenue water.









When it comes to the treatment of wastewater, it has been reported that only about two-thirds of Ålesund's wastewater receives primary treatment while one-third receives secondary treatment (with no tertiary treatment reported). This is indicative of a nationwide trend identified in previous research,³² which concluded that a significant percentage of Norway's population live in areas where 'connections to the central sewer network does not offer sustainable solutions'. A significant percentage of these inhabitants 'did not have any connection to municipal wastewater treatment plants', and a smaller percentage 'discharged wastewater directly without any method of purification'.

Therefore, especially with its currently ongoing municipal agglomeration, it is recommended that the Region of Ålesund evaluates its wastewater treatment policies, as well as its measurement and

reporting mechanisms. This is because it is important for any aspiring smart sustainable city (SSC) to adequately treat the water used by homes, industries, and businesses for sustainable release back into the environment. If wastewater is not properly or adequately treated, it can have negative impacts on the environment, wildlife, marine life and human health (including through contamination of drinking water). Wastewater treatment aims to remove as much of the suspended waste solids as possible before the remaining water, called effluent, is discharged back to the environment. 'Primary treatment' removes about 60 per cent of suspended solids from wastewater. This treatment also involves aerating (stirring up) the wastewater, to put oxygen back in. Secondary treatment removes more than 90 per cent of suspended solids, with tertiary treatment taking care of any percentage of the remaining.³³

ITU-T L Suppl. 14: ITU-T L.1500: 'Standardization gap analysis for smart water management' and ITU-T L Suppl. 15: ITU-T L.1500 series: 'Requirements for water sensing and early warning systems' should be utilized by cities when actualizing their smart water management policies.

Waste

Category	KPI	Result	Performance to Benchmark	SDG
	Solid Waste: Landfill	4.10 %		
	Solid Waste: Burnt	0.00 %		
	Solid Waste: Incinerated	59.53 %		
	Solid Waste: Open Dump	0.00 %		
	Solid Waste: Recycled	36.37 %		
	Solid Waste: Other	0.00 %		

All cities are recommended to prioritize, over all other forms of disposal, solid waste recycling in a regulated facility or solid waste incineration that leads to energy production. It is recommended that Ålesund develops its recycling capability and culture further, which should be a focus of its future sustainability strategy. Such a strategic focus will be important in light of globally increasing recycling costs that have resulted due to traditional processors such as China no longer accepting used plastic and paper.³⁴

Optimizing waste recycling: As part of this recommendation, other steps that cities or regions such as Ålesund can take to increase their recycling rates include the following best practices:³⁵







- Enhance (for non-recyclers) and reinforce (for recyclers) public communication and outreach in order to increase overall public participation in recycling. This includes: awareness campaigns, advertising efforts, citizen incentive programmes, and partnerships with local community and civic group leaders and business bureaux.
- Evaluate the recycling markets and pricing levels for materials by researching reprocessors and materials recovery facilities, and by communicating with neighbouring regions or communities to leverage their lessons learned.
- Evaluate haulier contract(s) for the following: level and breadth of services being offered by the haulier; the haulier's collection techniques, equipment techniques, capacity, and residue management; reflection of current market value of the materials being hauled, as well as any supplies on offer by the haulier; adaptability for times of greater volume, varying mix of recyclables and regional growth; community feedback and complaint mechanisms; and incentives for the

haulier to ensure the proper handling of recyclables, as well as measurement requirements for the haulier(s) to report the amounts recycled and other valuable information.

- Modify collection techniques in order to enhance programme efficiency and diversity as part of a strategic plan that includes: flexibility based on vehicle capacity and route optimization; inclusion of materials available for recovery at residences and businesses; the availability and feasibility of sorting and related technology for increased automation; the adequacy of drop-off facilities (if any) and their performance levels; diversified collection in response to events; and partnering with neighbouring communities on hub collection or cooperative programmes that could help pool materials, increase the recycling efficiency of scale and even expand services.
- Legislate and fund smart recycling by introducing and supporting elements such as advanced disposal fees, electronics initiatives and other smart disposal and waste reduction techniques.

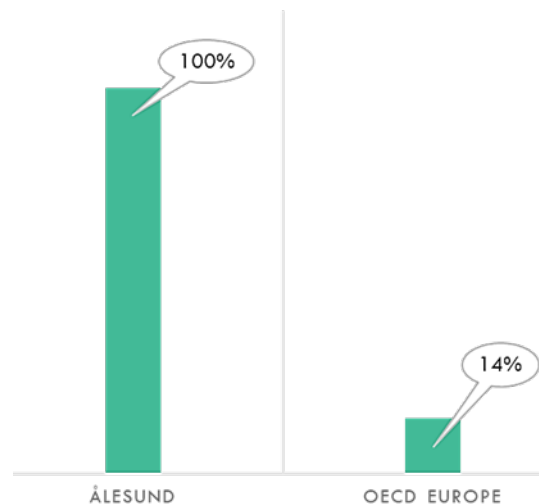
As increasing generation of e-waste is a burgeoning issue, ITU Recommendations such as Recommendation ITU-T L.1030: 'E-waste management framework for countries', Recommendation ITU-T L.1031: 'Guideline on implementing the e-waste reduction target of the Connect 2020 Agenda' and Recommendation ITU-T L.1032: 'Guidelines and certification schemes for e-waste recyclers' (along with Supplement ITU-T L Suppl. 4: 'Guidelines for developing a sustainable e-waste management system') can be vital in governments' efforts to monitor and manage the issue.

Energy

Category	KPI	Result	Performance to Benchmark	SDG
	Renewable Energy Consumption	100.00 %		
	Electricity Consumption (per capita)	14 369.36 kWh / yr.		
	Residential Thermal Energy Consumption (per capita)	0.70 GJ / yr.		
	Public Building Energy Consumption (per year)	157.27 kWh / m ²		

Ålesund has reported relatively high overall electricity consumption per capita and annual public building energy consumption. While 100 % of the region's electricity comes from renewable sources (by the current definition of the KPI) as the Norwegian power grid is largely hydro-based, with solar and biomass energy contributing to the rest of its renewable source makeup, the levels of consumption are considered not sustainable in the longer term. Although this is mainly due to heating needs, in the long-term such high consumption levels may not be sustainable. It is, therefore, recommended that the city encourages best practices in energy management via the appropriate set of policies, incentives, own practices and procedures. In particular, the policies should contain a clear commitment to proactively minimize energy waste, which can then form the basis for a detailed strategy that describes targets, timeframes and responsibilities.

ELECTRICITY FROM RENEWABLE SOURCES



As Norway is a large energy exporter, the International Energy Agency (IEA) recommends that it details how its emission-reduction targets will be met in transportation, oil and gas production and manufacturing. The IEA further recommends a high level of public spending on energy research, development and demonstration (RD&D) and strong efforts to develop carbon capture and storage for Norway.³⁶ To this end, ITU Recommendations that guide modernization and optimization of various public energy use sources should be utilized, including, for example, Recommendation ITU-T Y.4458: 'Requirements and functional architecture of a smart street light service', Recommendation ITU-T L.1210: 'Sustainable power feeding solutions for 5G networks', and Recommendation ITU-T L.1316: 'Energy efficiency framework' (along with Supplement L Suppl. 36: ITU-T L.1310: 'Study on methods and metrics to evaluate energy efficiency for future 5G systems').

KPI Dimension 3: Society and Culture

The third U4SSC KPIs dimension is Society and Culture. This dimension covers the sub-dimensions of Education, Health and Culture, as well as Safety, Housing and Social Inclusion. As with the first two dimensions, each sub-dimension covers a range of indicators classified according to its categories.

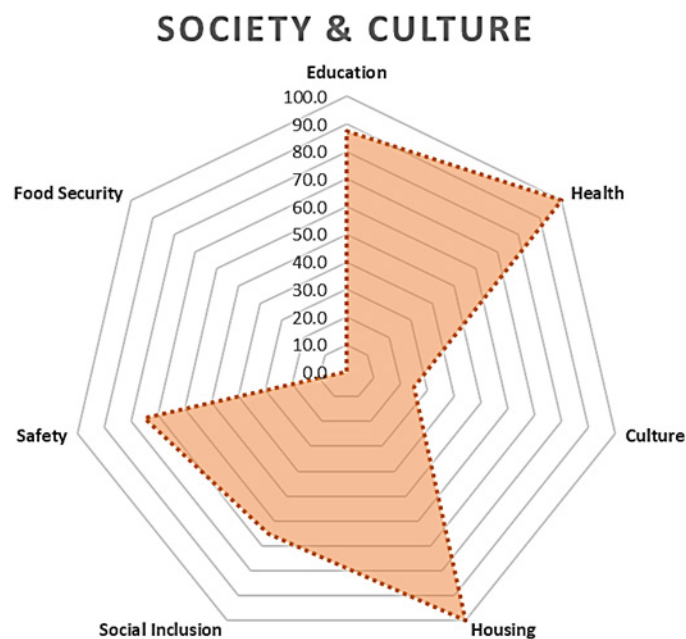
KPIs in Education, Health and Culture aim to assess the impact of the ICTs that improve citizens' quality of life. They focus on various areas including education, health and societal culture.

Safety, Housing and Social Inclusion contains a KPI related to food security, in addition to those related to safety, housing and settlements, along with social encompassment.







These KPIs aim to assess the impact of the use of ICTs to promote urban equity, citizen participation and to enhance social inclusiveness. They focus on the themes of openness, public participation and transparency in governance. The KPIs that measure the quality of life of citizens and the extent of ICT implementation in the education, health and safety sectors are also included here.

There is emphasis on developing the foundation that allows for the creation of electronic platforms for public and private sector use. Such platforms lay the groundwork for more transparent and efficient governance and maintain the inclusiveness of the city inhabitants as stakeholders pivotal to the city's decision-making processes. They ensure that the health, education and safety services are deployed with the minimum disruption, waiting times and manual intervention.

The following diagram summarizes Ålesund's KPI performance detailing the categories within the Society and Culture dimension against the current U4SSC benchmarks.











Education

Category	KPI	Result	Performance to Benchmark	SDG
	Student ICT Access	100.00 %		
	School Enrollment	100.25 %		
	Higher Education Degrees (per 100 000 inhabitants)	25 027.88		
	Adult Literacy	94.80 %		

Ålesund reports a high adult literacy rate and a high rate of higher education degrees per 100 000 inhabitants. This is in line with the national adult (15+) literacy rate of up to 99 per cent and prevailing higher education levels in the country.³⁷ The Ministry of Education and Research covers the tuition costs of public higher education in Norway, with financial support for Norwegian citizens available upon application through the Norwegian State Educational Loan Fund. This affordability of higher education would lead to a positive performance in these Education indicators for most, if not all, Norwegian cities and regions.

Health

Category	KPI	Result	Performance to Benchmark	SDG
	Electronic Health Records	99.90 %		
	Life Expectancy	82.20 yrs.		
	Maternal Mortality Rate (per 100 000 live births)	0.00		
	Physicians (per 100 000 inhabitants)	510.38		
	In-Patient Hospital Beds (per 100 000 inhabitants)	343.08		
	Health Insurance / Public Health Coverage	100.00 %		




This set of KPIs signifies overall positive health-related outcomes for Ålesund's residents.

WHO reports that ‘in Norway, the organizational structure of the healthcare system is built on the principle of equal access to services: all inhabitants should have the same opportunities to access health services, regardless of social or economic status and geographic location. An updated policy to reduce children’s exposure to advertising practices relating to unhealthy foods has been developed by the Norwegian Government and is now subject to public consultation.’³⁸

Publicly funded hospitals and clinics, therefore, provide reliable access to quality universal health care throughout Norway, including in Ålesund. However, while healthcare funding comes from the national budget, regional health authorities are responsible for distributing funding to hospitals and other health services locally.

ITU Recommendations such as Recommendation ITU-T Y.4408/Y.2075: ‘Capability framework for e-health monitoring services’ and Recommendation ITU-T Y.4110/Y.2065: ‘Service and capability requirements for e-health monitoring services’ can help cities optimize their e-health service provision.







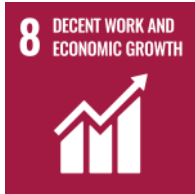








Culture

Category	KPI	Result	Performance to Benchmark	SDG
	Cultural Expenditure	0.00 %		
	Cultural Infrastructure (per 100 000 inhabitants)	116.38	No Benchmark Available	

The cultural heritage in Ålesund is funded by the national and regional government, so that the value reported is not as relevant as it might be for other cities. The actual amount spent on cultural heritage is higher than the report value of 0.00 per cent.

Offerings such as Ålesund’s Norwegian Centre of Art Nouveau Architecture, the outdoor Sunnmore Museum, the Medieval Age Museum and the annual Norwegian Food Festival are sources of cultural, social and economic vitality in the region. The National Tourist route, Trollstigen and the UNESCO Geirangerfjord are among scenic places that visitors and residents can explore.

Housing and Social Inclusion

Category	KPI	Result	Performance to Benchmark	SDG
	Informal Settlements	0.04 %		
	Housing Expenditure	13.93 %		
	Gender Income Equity (ratio of Female: Male)	0.62		
	Gini Coefficient	0.23		
	Poverty Rate	4.34 %		
	Voter Participation	54.66 %		
	Child Care Availability	68.13 %		

Ålesund reports an average annual household income that is more than twice the national average, while housing expenditure in the region is lower than the national average of 17 per cent. Compared with the prescribed maximum range of 25 to 30 per cent globally, this rate is positive and economically sustainable.³⁹

Gender income equity in Ålesund in the form of the ratio of average hourly earnings of female workers to male workers is much lower than the national figure of 87 per cent.⁴⁰ The region has acknowledged that

its workforce tends to be male dominated and that businesses are not often recruiting or retaining highly educated women. These are factors that must be evaluated further, in order to address the resulting disparity between the earning (and subsequent pension) levels between women and men. The region has identified the need to address this ongoing disparity.

Several UN agencies have programmes dedicated to understanding the continuing challenges around gender disparity within, and due to, increasing urbanization.

Optimizing housing and social inclusion KPIs: It is recommended that aspiring SSC cities and regions such as Ålesund engage with these programmes to see how their governments' social and economic policies and programmes can contribute to improved power relations between men and women, the protection of women's human rights and moving beyond traditional limited gender roles. It is recommended that Ålesund follows the example of cities that have successfully engaged in such endeavours. Such cities have conducted gender analysis of their city departments, commissions and boards, and have prioritized urban planning that considers women and their daily lives and commitments across all areas, including transport and safety.⁴¹









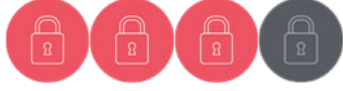









Moreover, the UN Convention on the Elimination of All Forms of Discrimination against Women, and other national plans and international conventions are helpful sources that can provide guidance in this regard.⁴²

Income distribution in Ålesund is more favourable than the median values among OECD countries, and when compared with the national average of 0.26.⁴³ The rate of poverty is lower in Ålesund than the national average. Given its relatively small population size, however, this rate should continue to be monitored and mitigated through mechanisms such as local social services.

The voter participation rate in Ålesund is reported to be 54.66 per cent. While this rate is higher than many cities around the world, because engaging people in decision making improves the quality and inclusiveness of the decisions and also helps improve upon the existing laws and regulations, it is recommended that Ålesund continues its efforts to encourage a higher participation rate. The first step should be an assessment of why a portion of the population is not voting in municipal elections. Polling or research should be carried out to identify which groups are voting less and the reasons why some people choose not to vote. Based on the results obtained from the research efforts, a strategy should be formulated that looks at how best to eliminate barriers and motivate non-voters to vote in the future. Early engagement of young people while they are not yet of voting age, using innovative marketing to capture citizens' interest and offering incentives to vote, and providing ease of voting through efficient, secure voting and a higher number of advance voting days are some of the ways the region can increase municipal voter turnover.⁴⁴

It is also recommended that the region researches active voters, in order to obtain a better understanding of what influences them to vote. This knowledge may help generate solutions for motivating non-voters and could be used to customize future election messaging that may encourage a higher turnout. The regional government could partner with local academia on what would essentially be a positive deviance study to learn which individuals or groups succeed or find successful strategies when their peers or community members do not.⁴⁵

Safety and Food Security

Category	KPI	Result	Performance to Benchmark	SDG
	Natural Disaster-Related Deaths (per 100 000 inhabitants)	0.00		
	Disaster-Related Economic Losses (relative to City GDP)	0.00 %		
	Resilience Plans	Yes		
	Population Living in Disaster Prone Areas	0.00 %		
	Emergency Service Response Time	6.07 Minutes		
	Fire Service (per 100 000 inhabitants)	59.68 FTE		
	Traffic Fatalities (per 100 000 inhabitants)	2.42		
	Police Service (per 100 000 inhabitants)	78.80 FTE		
	Violent Crime Rate (per 100 000 inhabitants)	828.00		
	Local Food Production	Not Reported		

Ålesund is situated in a relatively stable climatic region, with only a small minority of its inhabitants living in a zone subject to natural hazards. Even though the region’s exposure to extreme natural events is limited, and risk and vulnerability plans for disaster mitigation exist, it is recommended that Ålesund brings its existing assessments and plans in line with the Sendai Framework for Disaster Risk Reduction (DRR) 2015–2030, which focuses on the implementation of the following elements:

- a) city infrastructures and systems available for resilience;

- b) risk and vulnerability assessments;
- c) financial (capital and operation) plans to mitigate address the risks and vulnerabilities; and
- d) technical systems to implement the plans.

The violent crime rate reported seems to be significantly high; however, small a change in actual crimes can have a larger effect on the rate in a smaller population centre like Ålesund. More research into the rate and the comparability of the rate to other population centres is probably the first step to be taken towards ensuring that crimes are similarly categorized. This may also be the reason for low benchmark scores for the other Safety KPIs; this being so, more research is most likely the first step to see if the benchmark levels are indeed appropriate for Ålesund.

ITU Recommendations such as Recommendation ITU-T Y.4116: 'Requirements of transportation safety services including use cases and service scenarios' and Recommendation ITU-T Y.4119: 'Requirements and capability framework for IoT-based automotive emergency response system' can help make smart sustainable cities safer and more prepared.

Goals and Projects for a Smart and Sustainable Future

Knowing where it places as a baseline is important to Ålesund in forming goals and strategies that can navigate the region precisely and effectively into a better future for all its inhabitants. It plans to align key strategies and their implementation measures with the U4SSC KPIs for SSC, so that the region's municipalities will track, report, improve and maintain the KPIs. The region and its municipalities will work closely with their inhabitants and businesses, in order to best achieve this.

Ålesund considers the upcoming merger of five municipalities within the region into a single Municipality of Ålesund as of 2020 to be the perfect opportunity to utilize the U4SSC KPIs to better define the region's collective goals and strategies (e.g. those related to its desired regional environment, land use and transport plans) within its new master plan. Ålesund's aim is to achieve a baseline analysis that will serve as the foundation for future actions and also in the creation of new goals, strategies and measures to further improve quality of life for its residents. A related aim is to make the region more attractive – as well as more viable and sustainable – for the businesses depending on its workforce.

In doing so, the region also hopes to align its future progress measurably to the UN Sustainable Development Goals (SDGs). For example, the five councils of the merging municipalities have mandated that there be a focus on SDG 14: 'Conserve and sustainably use the oceans, seas and marine resources for sustainable development' during the development of its master plan. Ålesund plans to leverage the U4SSC KPIs for SSC as a tool to create further awareness about the need for sustainability goals and practices within its local councils, businesses and inhabitants.

Some of the previously approved council strategies that the region hopes to measure or support using the U4SSC KPIs for SSC include those focusing on:

- better public transport to better connect the region within and outside;
- strengthening the role and position of the city of Ålesund as a proactive developer in the region;
- strengthening the region's reputation nationally and abroad; and
- establishing development networks in which municipalities, businesses, R&D environments and society participate.

Ålesund is already making headway in operationalizing these strategies. For example, the Municipality of Ålesund won a prize for most environmental procurer in 2018 for its environmentally friendly procurement practices in a few areas, including everything from track-driven construction machinery and wheelchairs to soft plastics in nursing homes and the conversion of passenger cars. In 2017, Ålesund's purchasers utilized eco-labelling requirements in more than eight tender competitions.⁴⁶ The county of Møre & Romsdal's procurement policy for bus transport in the region has mandated that only environmentally friendly buses be used.⁴⁷

The municipalities in Ålesund now encourage more sustainable and environmentally friendly buildings with low-energy usage when they award new contracts for public buildings. The first nursing home built according to environmental standards was finished in 2012 in Møre & Romsdal. It achieved a 40 per cent reduction in energy requirements for a net value of 109 kWh/m²/year.⁴⁸ Another one was built

in 2017 in the municipality of Haram that also uses environmental standards to reduce energy costs by using solar electricity, for example. It also incorporates innovative features to reduce the workload for the staff.⁴⁹

As mentioned in previous sections, the development of the regional environment, land use and mode of transport plan is the top priority for Ålesund. This effort will be a platform for cooperation within the regional partnership, which will make sure that the current sustainability strategies will work well when the existing seven municipalities merge into three. There are projects underway to develop new visualization techniques for the plan, in cooperation with the technology capability at the local university. The goal of these projects is to innovate the planning process and provide the local councils with high-quality information upon which they can base their decisions.

Digitization and technological development are major focuses in other areas as well. In order to optimize its interaction with stakeholders, businesses and inhabitants, the region is investing in revitalizing and developing different models for local democracy and e-democracy. This will help the local government better interact with communities and provide the best service possible to inhabitants of the region who live at greater distances to municipal offices.

Conclusion

This has been the first year of Ålesund's close working relationship with ITU on this project that is designed, in part, to continue the evaluation of the feasibility of the U4SSC KPIs for SSC. The following conclusions are based on Ålesund's experience thus far in its U4SSC smart sustainable journey:

- As a part of the U4SSC KPIs refinement process, ITU undertook a two-part approach to the indicators by preparing a basic set of core indicators that can be reported easily by most cities, along with a list of advanced indicators. The advanced indicators can be reported by cities that have attained good scores on the basic indicators. Ålesund successfully reported 98 per cent of core U4SSC indicators and 95 per cent of advanced indicators.
- It is expected that the key findings from Ålesund's experience will also help to improve the existing definitions of the U4SSC KPIs, in order to enable a smoother data-collection process for Ålesund and, potentially, other Norwegian cities in the future.
- Ålesund should build on its first year of reporting the U4SSC KPIs by instituting the mechanisms and further development of capabilities to quantify, measure, collect and report data relevant to the remaining KPIs not reported in its first year. Doing so will also allow for year-on-year progress benchmarking and analytics.
- In particular, it is recommended that Ålesund reviews the KPIs reported at the lowest levels of the benchmarks, in particular:
 - Water Supply Loss
 - Private Vehicles
 - Shared Transportation
 - Public Building Sustainability
 - Water and Electricity Consumption
 - Wastewater Treatment

While the benchmarks may not always indicate how a city is actually performing or if a city can actually influence performance, these KPIs may form the basis for an initial plan of action for improvement.

- Ålesund should work closely with other European cities on its SSC efforts in order to leverage any best practices and their shared experience with developing and instituting smart and sustainable policies and initiatives in the region. Regular knowledge sharing and discussions with ITU members and other international cities are also encouraged.
- It is recommended that Ålesund focuses its efforts on further developing certain key economic sectors, including its tourism and technology sectors, as part of its SSC goals.
- Ålesund and its fellow aspiring smart sustainable cities should implement the recommendations and best practices mentioned in this Factsheet to improve the applicability of the KPIs across their regions and accelerate the achievement of their SSC goals in line with international instruments

such as the Paris Agreement, Connect 2020 Agenda, the UN Sustainable Development Goals and the New Urban Agenda.

- The vital knowledge gained through Ålesund’s experience in implementing the U4SSC KPIs will continue to be a part of ongoing efforts to make not only the U4SSC KPIs, but also U4SSC’s upcoming Smart Sustainable Cities Index the most effective methods to measure progress and to provide guidance to cities around the world on their journey to becoming smarter and more sustainable. After the creation of this U4SSC Index, Ålesund should use the index to measure its progress from the time of this pilot project.
- Ålesund’s reported KPIs will also feed into ITU’s new maturity model. [Recommendation ITU-T Y.4904: ‘Smart Sustainable City Maturity Model \(SSC-MM\)’](#) is an additional tool to not only set and measure performance levels of each KPI by Ålesund and other cities, but to also measure the progress of other key dimensions for the development of a SSC including strategy, ICT infrastructure, data, services and applications and assessments, as further detailed in the box below.

Box 1: Smart Sustainable City Maturity Model

The Smart Sustainable City Maturity Model (SSC-MM) defines five levels of maturity in the process of becoming a smart and sustainable city with each level achieved being a higher level of maturity. The requirement to reach the intended maturity level is to achieve the target KPI values set for each maturity level.

As an example, for KPI Household Internet Access, a level 1 maturity level could be to collect the initial benchmark data. The further four levels could then be set as performance levels such as level 2 achieved at 30 per cent access, level 3 at 50 per cent access, level 4 at 70 per cent access and level 5 at 90 per cent access.

This can then be overlaid with maturity level performance for the other dimensions to provide insight into the issues that need to be addressed within each city to become smarter and more sustainable.

Ålesund and other cities are encouraged to use Recommendation ITU-T Y.4904 as a framework to determine their interim target values for KPIs by taking into consideration their priorities, constraints, resources and optimal KPI performance levels. The SSC-MM is another tool that can be used to communicate progress to stakeholders, help to develop and then execute a SSC strategy and encourage the effective use of ICTs.

More information on the SDGs, the U4SSC initiative and the U4SSC Smart Sustainable Cities Index can be found in the Appendix.

At this time, ITU would like to invite cities around the world to implement the U4SSC KPIs for SSC. Using the U4SSC KPI definitions and data-collection methodologies, all cities will be in a better position to establish clear data-collection methodologies, collect data consistently in a structured way, develop goals and targets for each KPI and collect data regularly to track their progress towards smart sustainable goals.

GLOBAL GOALS



United for Smart Sustainable Cities (U4SSC)

United for Smart Sustainable Cities (U4SSC) is a UN initiative coordinated by ITU, UNECE and UN-Habitat, and supported by CBD, ECLAC, FAO, UNDP, UNECA, UNOPS, UNESCO, UN Environment, UNEP-FI, UNFCCC, UNIDO, UNU-EGOV, UN-Women and WMO to achieve Sustainable Development Goal 11: ‘Make cities and human settlements inclusive, safe, resilient and sustainable’.

U4SSC advocates public policy to encourage the use of digital technologies toward facilitating and easing the transition to smart sustainable cities (SSC) by catapulting key successful smart city measures into the spotlight for consideration.

It currently works on 11 thematic groups:

- Guidelines on tools and mechanisms to finance SSC projects
- Economic and financial recovery in cities and urban resilience building in the time of COVID-19
- Guiding principles for AI in cities
- Blockchain 4 cities
- Impact of frontier technologies in cities
- Simple ways to be smart
- Practitioner guide to measure smart cities and communities (SC&C)
- Practitioner guide to monitor SC&C
- Procurement guidelines for SSC
- City platforms
- United for Smart Sustainable Cities Index

To find out more on the U4SSC initiative, visit: itu.int/go/u4ssc.

U4SSC Implementation Programme (U4SSC-IP)

The U4SSC Implementation Programme (U4SSC-IP) supports the implementation of projects and builds partnerships, which aim to build smarter and more sustainable cities worldwide.

To find out more on the U4SSC Implementation Programme, visit: <https://www.itu.int/en/ITU-T/ssc/united/Pages/U4SSC-IP.aspx>.

U4SSC Smart Sustainable City Index

The U4SSC indicators for SSC will form the basis for the U4SSC Smart Sustainable City Index. The Index will utilize the reported indicator values, along with supporting data profiling each city, to provide a comparative ranking amongst a selection of cities.

U4SSC in the International Context

The United Nations Sustainable Development Goals (SDGs)

‘A smart sustainable city is an innovative city that uses information and communication technologies (ICTs) and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social, environmental as well as cultural aspects.’

(ITU and UNECE, 2015)

The Sustainable Development Goals (SDGs) are a collection of 17 global goals set by the United Nations (UN) in 2015 as an urgent call for action by all countries – developed and developing – in a global partnership. They recognize that ending poverty and other deprivations must go together with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests.

The goals are broad and somewhat interdependent, yet each has a separate list of targets to achieve. The SDGs cover social and economic development issues that include: poverty, hunger, health, education, climate change, gender equality, water, sanitation, energy, economic growth, innovation, sustainability, responsible consumption, environment, social justice and partnerships. There are 169 targets for the 17 goals; achievement of all targets signals the accomplishment of all 17 goals. Twenty of the targets are quantitative in nature, while the majority are more qualitative.

The SDGs were presented as part of the ‘Transforming our World: 2030 Agenda for Sustainable Development’. The 2030 Agenda was developed to succeed the Millennium Development Goals (MDGs), which ended in 2015. Unlike the MDGs, the SDGs framework does not distinguish between ‘developed’ and ‘developing’ nations; instead, the goals are meant to apply to all countries.

Localization, i.e. implementation of the SDGs started worldwide in 2016. To further the progress of this localization, the SDGs are being promoted globally through several initiatives and advocacy platforms that are coordinated and supported by various UN programmes and agencies, including U4SSC in cities.

Meeting the SDGs is important for any city – particularly aspiring smart sustainable cities – because the SDGs framework is designed to help cities recognize priorities and establish long-term goals. The SDGs are designed to reveal the interdependent dynamics within various facets of sustainable development such as economic, social, and environmental conditions. The goals are meant to show, for example, how continued reliance on fossil fuels affects not only climate change and air quality but also public health, which then impacts poverty rates and economic opportunities. By working within the SDGs framework, policymakers can get to the root of their cities’ issues.⁵⁰

Also, the analytical framework of the SDGs lends itself to the use of clear baselines to improve internal planning and implementation. Other benefits include gap analysis, infusing priorities into a budget process, cutting programming redundancies and saving resources, and tracking outcomes. Cities can also engage across the global network of other governments and institutions that are pursuing the

same goals. The SDGs framework is also effective at different scales, offering the opportunity to align and harmonize policies and common goals vertically (up and down government jurisdictions), as well as horizontally (across city agencies). Therefore, if integrated and managed well, the SDGs can help strengthen local communities through values such as transparency, inclusion, and engagement.⁵¹

New Urban Agenda⁵²

The [New Urban Agenda](#) represents a shared vision for a better and more sustainable future. It was adopted at the UN Conference on Housing and Sustainable Urban Development (Habitat III) in Quito, Ecuador, on 20 October 2016. Habitat III had the convening power to bring together all actors to identify solutions for the complex challenge of urbanization, including Member States, multilateral organizations, local governments, private sector and civil society. It helped to systematize the alignment between cities and towns and national planning objectives in their role as drivers of national economic and social development.

Urbanization is an unprecedented challenge, indeed. By the middle of 21st the century, four of every five people might be living in towns and cities. Urbanization and development are inextricably linked, and it will always be necessary to find a way to ensure the sustainability of growth.

The New Urban Agenda is premised on the basis that if well-planned and well-managed, urbanization can be a powerful tool for sustainable development and poverty reduction for developing and developed countries. Governments can respond to this key development opportunity by promoting a new model of urban development that is able to integrate all facets of sustainable development to promote equity, welfare and shared prosperity. The model would focus on all levels of human settlements, including small rural communities, villages, market towns, intermediate cities and metropolises for social and economic growth.

U4SSC Partners

ITU

ITU is the United Nations specialized agency for information and communication technologies (ICTs). Founded in 1865 to facilitate international connectivity in communications networks, it allocates global radio spectrum and satellite orbits, develops the technical standards that ensure networks and technologies seamlessly interconnect, and strives to improve access to ICTs to underserved communities worldwide. ITU is committed to connecting all the world's people, wherever they live and whatever their means.

OiER

OiER is a non-profit, non-governmental global network that focuses on building partnerships and identifying trends in a global context and in addressing key future-oriented issues in areas of sustainability, innovation, communication, environment, energy and mobility. The organization is a global network of businesses, governments and international organizations. It enables access to information on business and project development, and focuses on financing and resource mobilization, strategic marketing and communication support.

Endnotes

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