A solutions landscape for Turku Finland

The Urban Infrastructure Initiative – UII

wbcsd urban

Introduction

In the first engagement of its kind, experts from leading global businesses worked with officials from Turku, Finland, to accelerate the city's sustainable development.

The businesses are part of the Urban Infrastructure Initiative (UII), a unique project which provides multi-sector expertise to help transform a city's sustainability vision into effective action plans. In Turku, six companies active in transport, logistics, energy, water and technology pooled their resources to identify practical, cross-cutting solutions.

Opportunities to tackle the city's inter-connected challenges include specific infrastructure developments such as traffic management and building control systems. The UII team also proposed organizational approaches including municipal energy management.

The solutions emerged from a series of workshops held in Turku City Hall in March 2011. The workshops addressed an issues landscape identified in a previous dialog between UII members and city officials.

The ground-breaking engagement demonstrated the value of providing early business input to city thinking. It allowed city officials to consider a variety of ideas and to engage with businesses collectively in a broad context rather than in relation to specific tenders.

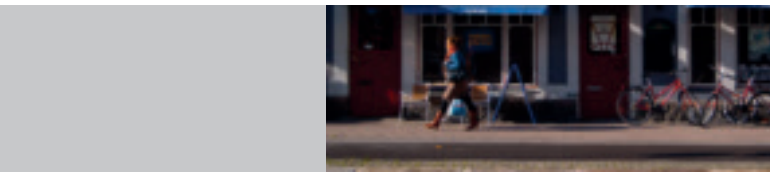
Turku is the first of several cities around the world to work with UII. The specific solutions identified for cities with very different circumstances and challenges will help to advance urban sustainability everywhere.

Turku – an urban sustainability leader

Turku is one of Finland's leading cities with a population of approximately 180,000. Sustainable development is a core value and the city is a signatory to the Covenant of Mayors. It plays an important part in the region's economy and in advancing sustainability within the region.

The city has well-developed transport infrastructure. A Bus Rapid Transit (BRT) system is under development, a cycle route network is being completed and the city council has agreed to create a light rail system, subject to funding and land use constraints.

Turku is experiencing the same megatrends as other cities, which add to the sustainability challenge. It has a growing and ageing urban population with rising expectations for personal mobility. The rise of internet shopping creates more local deliveries, adding to congestion and emissions.



Energy security and climate change considerations require energy saving as well as cleaner energy sources. An agreement with the Ministry of Employment and Economy commits the city to advance energy efficiency and the use of renewable energy.

The Climate and Environment Program launched in 2009 targets greenhouse gas emissions per capita 30% below the 1990 level by 2020. The city has already achieved significant progress in renewable energy. Approximately 60% of electricity and 30% of district heating comes from renewables. A biogas project is also underway, generating fuel from local renewable sources for use in public transport vehicles.

The Climate and Environment Program is supported by detailed targets and resource budgets. Actions on Sustainable Energy focus especially on buildings, equipment and transport but also influencing markets and citizens' consumption patterns.

Changing people's behavior is a big challenge but co-operation with other cities is producing communications on energy efficiency which are beginning to change attitudes and behavior. The energy company is also promoting energy saving actions and there is plenty of interest in new technical solutions, which will also support behavior changes.

For more information and data on Turku please check:
www.turku.fi

Designing and implementing sustainability solutions in partnership between cities and companies requires the city to have a solid sustainable development strategy – or process to develop one – and the companies to have sustainability at the core of their business models and service. Our experience with the World Business Council's Urban Infrastructure Initiative has been very encouraging and has brought new solutions and cooperation possibilities to our awareness.

Jarkko Virtanen
Deputy Mayor, City of Turku

The issues landscape

Dialog between the UII team and the city identified the issues for UII to address.

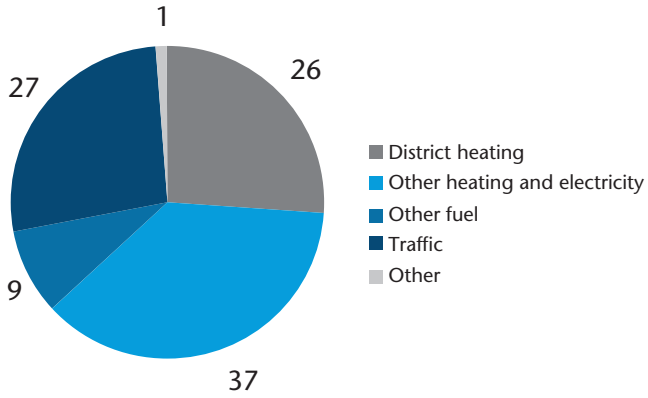
The dialog considered three broad topics: city center development, land use and energy. It concluded that Turku's Sustainable Energy Action Plan (SEAP) would be the focus for UII's involvement. Focusing on SEAP met one of Turku's key requirements and was the best fit to UII's aim of acting between vision development and detailed planning.

The dialog identified key areas where business input could help to develop new solutions, enhance and accelerate existing action. They span three broad themes:

- transport and logistics
- energy supply
- energy use

These areas represent the major sources of greenhouse gas emissions in the city and the major opportunities to achieve sustainable energy targets as well as improving the quality of life for citizens.

Figure 1: Turku emission sources in % (2007)



The solutions landscape

UII uses a structured workshop approach to develop a solutions landscape.

The workshops bring together UII companies and city officials, combining know-how across departments and specialties. They provide a platform to jointly identify focus topics relevant to the issues emerging from the initial dialog.

The objective in Turku was to support the development of the SEAP by identifying innovative ideas and the next steps needed to prepare the actions further.

The UII member companies presented six ideas on each of the three workshop themes (detailed below) and the group jointly explored each option. The city representatives prioritized the opportunities based on their potential sustainability impact and their feasibility in Turku.

Figure 2: Thematic clusters and ideas

Energy Use	Heat machines and chillers Heat metering and management Building control and management Municipal energy management Public lighting Performance contracting
Energy Supply	Combined heat and power (CHP) Geothermal energy Biogas Heat machines and chillers Smart grid Material and energy flow analysis
Transport and Logistics	Smart parking Traffic management Green logistics Light rail Green procurement Public private parnertships

Infrastructure opportunities

UII proposed that Turku further improves its energy, buildings and transport infrastructure by integrating traffic and supply chain management and innovating in energy generation and management.

Priorities

The city participants agreed on four high priority infrastructure solutions, summarized here. They would have a relatively high impact on the city and would be relatively easy to implement. Two longer-term solutions would further accelerate sustainability in Turku.

1. Green Logistics

Innovating with technology, supply chain features and collaborations could cut congestion and reduce greenhouse gas emissions. Examples are operating in Utrecht (Netherlands), Milan (Italy), and Brussels (Belgium).

The key levers to improve supply chains in Turku are:

- Increase vehicle utilization through bundling deliveries (e.g. city consolidation)
- Collect and deliver goods 24 hours a day
- Downsize vehicle fleets and infrastructure in the city center and upgrade vehicles to zero emission technology (e.g. electric vehicles)
- Build tailored solutions for customers requiring zero emissions for their products or service

A high priority for Turku because:

- It can start small and grow with the benefit of experience
- It will have important impacts on noise and pollution, especially in the city center
- It can link to the biogas project (see page 5)

2. Traffic Management

Traffic management systems reduce bottlenecks and congestion and encourage co-modality (making the most of all transport modes). They collect dynamic public and private traffic and parking information. This can be used to provide real-time information with advice on current conditions, the best route and parking options, and possible links to public transport. The information can be conveyed using roadside information displays, in-vehicle displays, portable signage and the internet.

Turku could use traffic management systems to encourage Park and Ride, guide drivers to the best parking places, charge for entry to congested areas, and to make car and bike sharing easier.

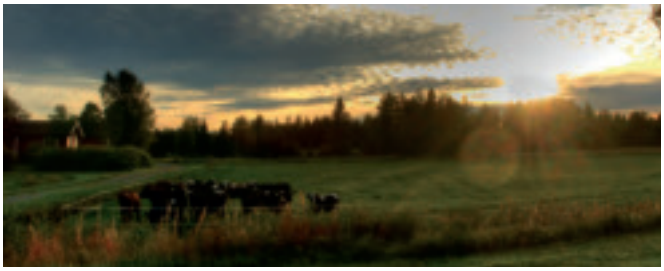
A high priority for Turku because:

- It could be combined with smart parking (see page 6)
- Some aspects are relatively easy to introduce, such as information for travelers
- It could integrate common ticketing

3. Biogas

Biogas plants capture and burn methane from decomposing vegetation and garbage, animal and human manure. Sewage treatment plants and landfill sites can be sources of methane. The process produces compost as a by-product.

Burning biogas not only generates "clean" energy but prevents the methane from entering the atmosphere where it is a potent greenhouse gas. The gas can be piped for use directly as a burnable fuel or used to power an electricity generator.



A high priority for Turku because:

- It offers significant potential to reduce the city's total emissions
- A preliminary project is already underway

4. Building control and management

Building Automation and Control network (BACnet) enables electronic communication between equipment from different manufacturers so that building and energy managers can collect and report information across different systems.

It is used to manage and automate systems such as HVAC, lighting, security and fire safety.

A high priority for Turku because:

- It could eventually link to smart grid development
- It could enable energy efficiency in new buildings and renovations
- It could be operated by an energy service company (ESCO – see page 8)

Longer term solutions

Two of the solutions presented by UII are very attractive for Turku but clearly need substantial work and funding. These longer-term solutions would build on the immediate opportunities to create a sustainable transport and energy infrastructure.

Light rail

Filling the gap between bus services and conventional or underground railways, light rail can be the backbone of the transport network. It requires huge investment but can be developed in stages from a tram operating on mixed streets alongside cars and buses, to a pre-metro system running on a dedicated right of way. The trains are quieter than motor traffic, produce no local air pollution and use a quarter of the energy of a bus and a tenth of average car consumption per passenger/km.

Smart Grid

The smart grid concept brings together the electricity and communications infrastructure to help match supply and demand. It will be essential for power companies to manage a more complex grid, including power from users' small-scale production. Smart meters help consumers manage and reduce energy consumption.

Other opportunities

Several other opportunities identified by UII could be attractive for the city but with a lower priority because they would have less impact or be more difficult to implement. Furthermore, some of these solutions have already been initially applied.

Geothermal/ground heat – using heat stored in soil, rock or water systems, transferred to a water-based heating system using a heat pump. The energy supplied is several times greater than the input energy to the heat exchanger.

Heat machines and chillers – capture heat that would otherwise be wasted, either from cooling equipment or heat production in boilers or power plants, and use it to warm water for district heating or other purposes.

Public lighting – technical and operational options can cut energy use, including sodium-vapor lamps instead of mercury, LED technology and improved control systems.

Micro combined heat and power (CHP) – small-scale power generation producing electricity from heat at low temperatures using a fluid such as silicon oil instead of water.

Smart parking – using parking regulation to encourage lower emissions vehicles and co-modality.

Operational opportunities

Improved infrastructure will go some way to achieving Turku's energy goals. UII also identified other opportunities relating to how the city operates.

Sustainability leadership is an important element. The city's current plans and actions focus on the aspects it directly controls, such as public transport and public buildings. The Turku council could have an even greater impact on total energy and emissions by changing the behaviors of citizens and organizations in the city. (For example, see Municipal Energy Management below).

Organizational and financial innovations will achieve further progress. UII proposed ideas in areas ranging from procurement to partnerships. Turku officials suggested four priorities based on their impact and applicability.

Priorities

1. Green procurement

Turku can use its purchasing power to choose goods and services with lower impacts on the environment. City requirements will also impact other purchasers as well as vendors, influencing the market and providing incentives to develop more favorable technologies and products.

Environmental requirements could be especially relevant to the city's car fleet, other public vehicles, transport construction and maintenance operations and support services.

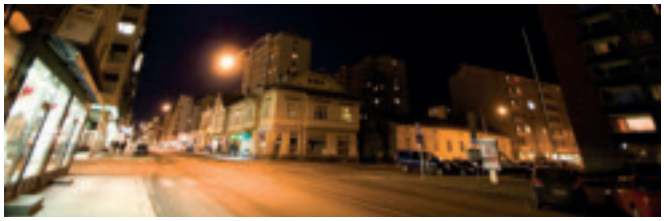
A high priority for Turku because:

- It is already happening to some extent but more can be done

2. Municipal energy management

A management focus on energy can achieve effective action by improving understanding, planning and control of energy consumption in areas such as public lighting, public buildings and municipal facilities.

Turku could create an Energy Committee of the city council to oversee energy management, appointing an Energy Manager responsible for day-to-day management across the city. This stronger focus would intensify energy saving projects, coordinate action across departments, and stimulate public awareness campaigns on saving energy.



A high priority for Turku because:

- A coherent structure would improve the effectiveness of existing elements
- It would provide feedback to building users and encourage energy saving

3. Material flow analysis

This technique is similar to a lifecycle analysis but applies to an area or activity rather than a process or product. It quantifies inputs and outputs in the area studied to understand the flows and identify possible improvements. It could help to identify the importance of people's behavior in determining environmental outcomes.

Turku could use this kind of analysis to:

- analyze the environmental performance of a geographical or functional area
- assess the effectiveness of a policy
- compare alternatives
- communicate environmental policies and performance

A high priority for Turku because:

- It could be appropriate to City's own operations or specific area such as biowaste

4. Public private partnerships

Collaboration could help Turku achieve sustainability targets. For example, the public sector can provide a suitable regulatory framework and political support, while the private sector contributes physical infrastructure and resources. Turku would benefit from lower emissions while corporate partners make a return on their investment.

A high priority for Turku because:

- It is essential for introducing ideas such as green logistics
- The impact could be increased by applying the concept regionally

Other ideas

Some other opportunities identified by UII were lower priorities for Turku because they would have less impact, be more difficult to implement or (in the case of ESCOs) are already in place.

Performance contracting

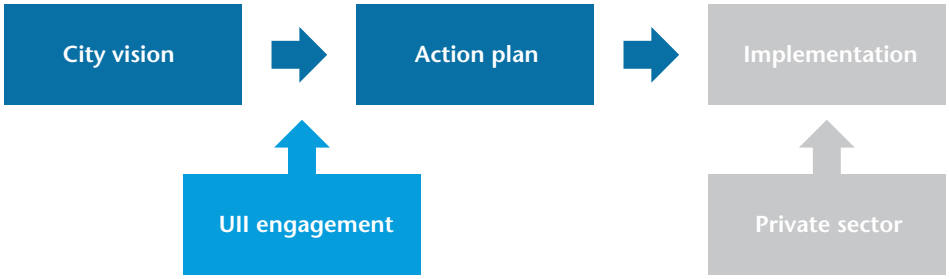
Energy Service Companies (ESCOs) agree a contract with the city to manage specified sites or activities, such as public buildings or lighting. The contract stipulates a maximum energy consumption and any savings below that level are shared between the ESCO and the city. The ESCO could engage users (in the case of buildings and other facilities) to inform people about energy-saving activity and encourage changes in behavior.

Utility metering and management

Bringing together and reporting all relevant energy consumption data to enable improved energy management, including alerts for users when consumption is approaching and exceeding desired limits.

The Urban Infrastructure Initiative

The UII vision is a world where cities provide a sustainable environment for people to live, work, move and play. The aim is to work with cities to implement more effective and affordable sustainable solutions.



The initiative was launched in 2010 by the World Business Council for Sustainable Development (WBCSD) as a business contribution to urban sustainability. It brings together companies with vast knowledge, skills and experience in sectors including energy and water, mobility and logistics, building materials, engineering, equipment and support services. They have global coverage and are active in all stages of the infrastructure lifecycle. The UII member companies have proven track records in sustainability, understand the inter-connected nature of the challenges and already work with urban planners and engineers.

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About the WBCSD

The WBCSD is a CEO-led, global coalition of some 200 companies advocating for progress on sustainable development. Its mission is to be a catalyst for innovation and sustainable growth in a world where resources are increasingly limited. The Council provides a platform for companies to share experiences and best practices on sustainable development issues and advocate for their implementation, working with governments, non-governmental and intergovernmental organizations. The membership has annual revenues of USD 7 trillion, spans more than 35 countries and represents 20 major industrial sectors. The Council also benefits from a network of 60 national and regional business councils and partner organizations, a majority of which are based in developing countries.

www.wbcsd.org

Disclaimer

This publication is released in the name of the WBCSD. Like other WBCSD publications, it is the result of a collaborative effort by UII senior executives and members of the secretariat. UII members reviewed drafts, thereby ensuring that the document broadly represents the perspective of the WBCSD membership.

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A global building materials company that provides high-quality products and sustainable solutions to customers and communities in more than 50 countries throughout the world

Provider of highly efficient and innovative solutions to individuals, cities and businesses in the sectors of electricity, natural gas as well as energy efficiency and environmental services

Global partner for cities when it comes to the sustainable development of urban infrastructures with green, efficient products, solutions and financing models

The WBCSD is a CEO-led, global coalition of some 200 companies advocating for progress on sustainable development. It aims to be a catalyst for innovation and sustainable growth in a world where resources are increasingly limited

Members

A leader in the creation, development and management of renewable energy, sustainable infrastructure and water services, contributing actively to sustainable development

A provider of professional, technical and management support services, working to enhance and sustain the world's built, natural and social environments

A global materials and components supplier based on core technologies of glass, fluorine chemistry, ceramics and related fields

A leading player in the energy industry, active in all areas of the electricity value chain, from generation to energy supply, trading and network management, with expanding operations in the natural gas chain

The world's largest motorcycle manufacturer and a leading automaker, providing a wide variety of products, ranging from mobility to power and clean energy production products

A global manufacturer of automotive products and marine equipment, and provider of related services

A diversified health and well-being company, serving professional and consumer markets in healthcare, lifestyle and lighting

A global leader in energy management that provides solutions to make energy safe, reliable, efficient, productive and green in homes, buildings, industrial facilities, data centers and across the electrical networks

A leading company in the transfer of goods and documents around the world with a focus on time- and day-definite service

A global vehicle manufacturer contributing to the sustainable development of society through manufacturing and provision of innovative and quality products and services

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