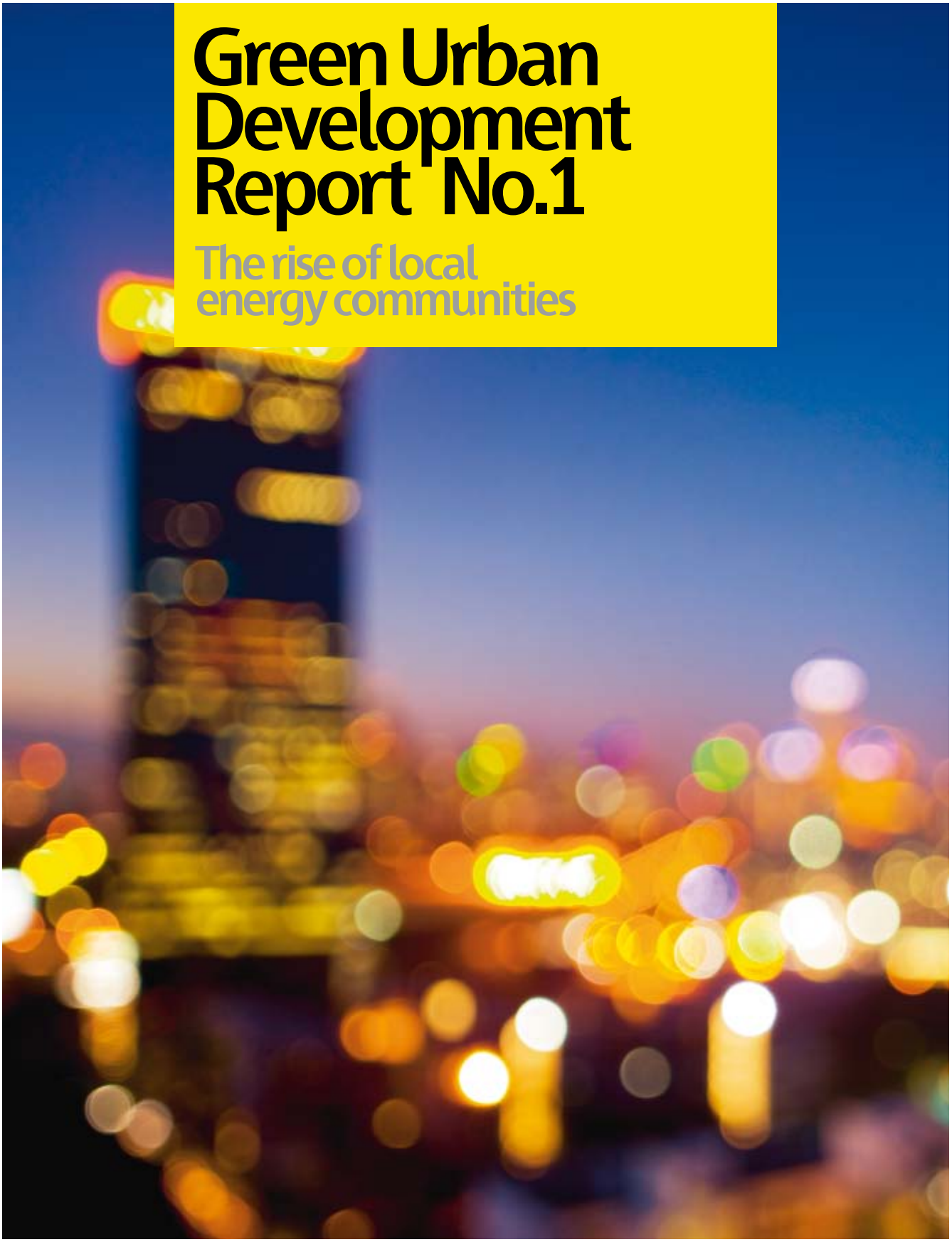
SKANSKA

Green Urban Development Report No.1

The rise of local energy communities



November
2010

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About Skanska Skanska is one of the world's leading project development and construction groups. Based on its global Green experience, Skanska aims to be the clients' first choice for Green solutions. The Group currently has 49,000 employees in selected home markets in Europe, in the U.S. and Latin America. Skanska's sales in 2009 totaled SEK 137 billion.

More information This edition of the Green Urban Development Report is the first in a series planned to be issued regularly.

If you find this useful and want to know more, we would be happy to help you further. Please contact: Noel Morrin, Senior Vice President, noel.morrin@skanska.se

If you are looking for more information on Green Development and Construction in a specific market, please contact our local Skanska colleagues on page 27.

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Foreword

Why green? Why a Green Report?

Some time ago, green was regarded as a topping – today, things are different. Being green is a prerequisite. Green is a major global trend.

The world of urban development is changing rapidly. Individuals, politicians and corporations are all on a journey that will change our roles. Today, we are all energy users; tomorrow the current will change direction, and we will become suppliers.

Regardless of whether you are a small or a large company, or a small or large city, you will all take part in this journey. The green trend will affect how we live, work and travel, how we do business and how we plan our cities.

Being green is essential for any company that cares about its brand and reputation. And for any city, region or country that wants to attract new people and investors. It is as important as having your finances in order.

Already today, non-green buildings cost more to operate and their value is declining, which means that both commercial and public investments are at risk.

Going Deep Green is simply a way to stay sound, prosperous and future-proof in terms of the value of properties.

But being green is difficult to understand, you may say.

I agree, but rest assured that we at Skanska have grasped the meaning of green. We have the expertise and a long green track record. And we are determined to be the leading green project developer and contractor.

To guide you on the Journey to Deep Green™, we offer you this report on green urban development. Here, we will continually update you on how to be green in a financially sound and technically reliable way.

It will serve your business and the wellbeing of our planet and future generations.

Enjoy! And please remember, we are always open to discuss – and learn – what we can do for you.

Johan Karlström
President and CEO

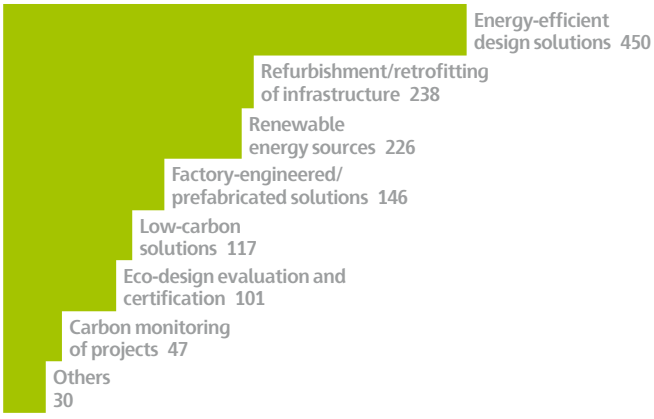
Are you part of the local energy community?

It's an undisputable fact: the world needs to use less fossil energy and to use the energy produced in a more efficient way. It is the only way to decrease the emissions of greenhouse gases. Skanska, as a major development and construction company, has a responsibility to do all it can. Skanska, in partnership with clients, can make an immense difference. McKinsey's global cost curve for greenhouse gas measures shows us that much of what we provide has a negative abatement cost – savings, in reality (Report, Pathways to a low-carbon economy, McKinsey & Co, 2009). Improving building insulation, lighting systems, air conditioning and water heating are the foremost cost-effective measures, and these are at the core of our business.

This shows that starting with carefully contemplated investments may lead to savings in the long run. Thinking in lifecycles – instead of only here and now – makes us and our clients

Green products and services

Skanska's customers – What Green products or services would you like us to focus on in the next 2–4 years?
Source: Skanska's Customer Satisfaction Index, 2009.



Three steps towards energy neutrality

Share energy by creating buildings and urban infrastructure that can generate surplus energy and feed it into an intelligent grid infrastructure.

Produce energy locally from renewable and otherwise wasted energy resources.

Cut buildings' energy demand by, for example, using insulation and equipment that is more energy efficient.

look at function, environmental consequences and costs spread over a product's lifetime. This is a winning proposition.

And our clients are clear about what they want. When we ask them what Green products or services they would prefer Skanska to focus on in the next two to four years, the most desired are energy-efficient design solutions.

Throughout the world, energy efficiency in buildings is not only discussed but also implemented to varying degrees. In order to prioritize measures in an effective way – financially as well as environmentally – energy-efficiency measures can be arranged in a hierarchy.

It is an upward climb to neutrality. The focus, for us and our clients, lies in cutting energy demand in buildings. However, in the years to come, the focus will also be on how to produce energy locally and share that locally produced energy with others.

Energy is increasingly becoming public property. With the escalation of decentralized micro-production of renewable energy, the old system of centrally producing, distributing and consuming energy will change.

Globally, we see how neighborhoods, cities and regions want to empower themselves and their citizens by taking individual measures to decrease the use of energy, to implement energy-efficient measures and increase local renewable energy production. People want to be stakeholders. Consumers become prosumers*, producing energy and selling energy back to the energy companies. Thus, we see an emergence of local energy communities that are declaring their energy independence. ●

* **Prosumer** is a combination of the words producer and consumer. The term is thought of as converse to the consumer with a passive role, denoting an active role as the individual gets more involved in the process.

Skanska's Journey to Deep Green™

Skanska is committed to contributing actively to a green society. The destination is Deep Green – Deep Green buildings and Deep Green infrastructure. To give us a strategic framework and a communication tool for Green Construction and Development (Green Business), we've created Skanska's Color Palette.

The definition of Deep Green is simply near-zero environmental impact by our projects. For example: Net zero primary energy for our buildings. Near-zero carbon in construction. Zero waste. Zero hazardous materials. Zero unsustainable materials. Zero potable water use in civil construction projects.

Skanska's Color Palette

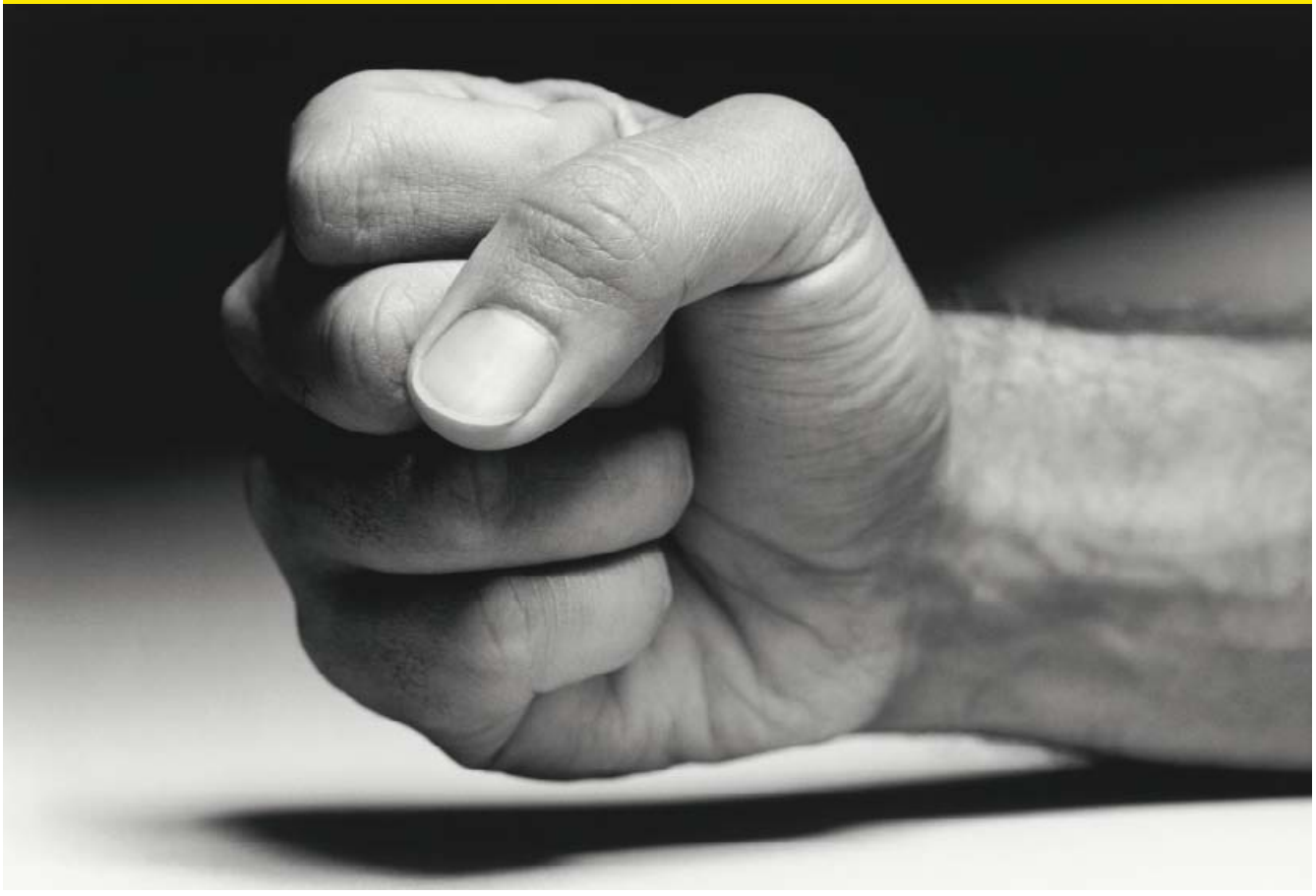
Vanilla: the construction process and/or product performance is in compliance with applicable laws, regulations, codes and standards.

Green: the construction process and/or product performance is beyond compliance, but not yet at a point where what we construct and how we construct it can be considered to have a near-zero environmental impact.

Deep Green: the construction process and our product performance has a near-zero impact on the environment and thereby future-proofs our projects.

Give us feedback on this report!

We want to know what you think, can we improve, what do you want to read more about? Visit us at www.skanska.com/greenreport and give us your feedback.



Request: We want tougher regulations now

As energy efficiency tops global agendas, the Japanese notion dochakuka – glocalization*– is becoming more vital than ever. The champions of thinking globally and acting locally turn out to be those with the keys to the cities. When it comes to green matters, mayors are often more powerful than prime ministers and presidents.

When delegates at COP15, the 2009 UN Climate Change Conference, agreed to simply "take note of" the Copenhagen Accord, it became clear that local authorities, acting on their own, can often be more effective than a global agreement. Many cities see the need to do more than international agreements and national law require in relation to energy efficiency. A nation can set overall goals and regulations and establish incentives. But regulations and incentives stemming from national politics often take a long time to implement, and too many nations are lagging. By issuing local mandates, a city can set tougher, more specific goals that enhance national policies. Since local governing bodies own the most relevant tools for deciding planning and development, implementation can be maneuvered with greater flexibility. Consequently, cities, regions and states are often at the forefront and breaking new ground, bringing innovative energy-efficient solutions to the table.

Local power proof

In San Francisco, Mayor Gavin Newsom has seen his city through one energy crisis after the other. By the end of 2010, San Francisco's energy programs will deliver annual savings surpassing USD 22 million. The city has also adopted a strategy of Zero Net Energy Buildings, which integrates efficiency retrofits with renewable and cogeneration capacity. The constructions – that consume only as much energy as they produce on-site – are being developed and approved in the commercial marketplace. An ambitious goal has been set in the California Long-Term Energy Efficiency Strategic Plan: by 2030, all new commercial construction and 50% of existing commercial buildings will have zero net energy. These goals are reflective of an emerging trend toward low-energy building designs, guidelines and initiatives.

For many decades, Stockholm, the first Green Capital of Europe, has used local policies to upgrade the city's green standards. This is based on a holistic approach that balances growth with sustainable development and a plan to be fossil-fuel-free in 2050. An increased market share for district heating has been the greatest contributor to reductions in greenhouse gas emissions in Stockholm. The conversion from oil heating to district heating has reduced greenhouse gas emissions by 593,000 tons since 1990, about 1% of Sweden's total greenhouse gas emissions. Furthermore, Stockholm has pioneered models for new and reclaimed green housing developments. Construction of a new sustainable area, the Royal Seaport, which will include 5,000 apartments, is being initiated. Stockholm also put up an additional EUR 1 billion for energy-efficiency reconstruction of suburban areas built between 1965 and 1975.

The 2020 vision

However, global and national regulations should not be underestimated. When converted into specific action, the combined forces of countries can effectively make a significant change. At COP15, preliminary goals were set by several countries; by 2020, China will reduce CO_2 emission intensity by 40–45%, India will cut carbon emission intensity by 20–25% and the U.S. will cut greenhouse gas emissions by 17% based on 2005 levels. The European Union aims to cut greenhouse gas emissions by at least 20% unconditionally by 2020 compared with 1990 levels. There are success stories – such as Japan's Top Runner Program, implemented to facilitate the development of energy-efficient equipment. The plan applies to 21 products, such as cars, refrigerators, air conditioners and televisions. Already in 2004, just five years after the program was initiated, the energy efficiency of air conditioners had improved by approximately 55% and refrigerators by about 68%, according to Japan's Energy Conservation Center.

A green arms race

More demanding laws, regulations and innovative economic stimulation are necessary if we are to meet the demands of efficient energy use. Mayors can wield their local power to initiate change and create green history – and a more sustainable future in their area. Local campaigning and initiatives do not only provide a base for sharing best practices with other cities, but also spark good-spirited competition. And what president or prime minister does not welcome a green arms race? ●

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* **Glocalization** is a term that combines the words globalization and localization. By definition, the term "glocal" refers to the individual, group, division, unit, organization and community that is willing and able to "think globally and act locally."

Implementing more energy production based on renewable energy sources means more localized solutions instead of large central solutions, according to Kaarin Taipale, architect, urban researcher and former chair of ICLEI, Local Governments for Sustainability.

Local solutions, global impact

Kaarin Taipale is currently a Senior Visiting Fellow at the Center for Knowledge and Innovation Research (CKIR) of the Aalto Univerity School of Economics in Helsinki, Finland. She is a former civil servant who is now also involved in local politics. Her areas of expertise are sustainability of the built environment, public space, glocalization and the role of cities. We interviewed her about the role of policy measures in increasing energy efficiency.

In many countries, policies are being developed that incentivize energy efficiency. What incentives can politicians and decision-makers put in place to stimulate energy efficiency?

If you talk about incentivizing energy efficiency, the most important thing is that it shows on your energy bill. But incentivizing energy efficiency is a surprisingly complex matter. The actions have to be thought out very carefully, so that they lead to the desired outcome. A problem is that different incentives can be contradictory.

Why does it seem so difficult for nations to put effective measures in place that increase energy efficiency?

Well, first of all, because of conflicting interests. Everybody tries to sell their own solution. Different groups and industries want different ways of reaching energy efficiency. And even with the best of intentions, there always seems to be a problematic side to every suggestion. Secondly, to put ambitious long-term energy-efficiency measures in place, a very strong and unified political will is needed at all levels: local, national, EU and global. And this is a difficult process. The disappointing outcome of the Copenhagen Climate summit showed us how difficult it is.

Who do you think has the most power in deciding how a city becomes green? Is it the mayor of the city or the prime minister of the country?

In some sense, I think the mayor has more power because he or she can sort of bypass the national fatigue. It seems easier to establish cross-cutting, cohesive policy strategies at the local rather than at the national level. So yes, I believe the local level is extremely powerful – if a sincere political will exists.

What key trend policies will emerge that will shape the future of green planning and energy efficiency in the next five or ten years?

One trend is the transformation of the energy production system. The drive to implement more energy production based on renewable energy sources means more and more localized solutions instead of large, central solutions. Energy networks and Information and Communication Technology, ICT, networks, will somehow merge. The same way that the Internet has allowed all of us to become individual producers of knowledge and information, the future "energy net" will also let us become both producers and consumers. In addition, the challenge of job creation will be high on political agendas.

Do you think that industries and companies within these industries, such as Skanska, can serve as leaders when it comes to showing the way? Or do you think this forerunner position should be reserved for politicians and elected officials?

It's fantastic when companies take the lead! But too often we hear "No, no, we can't take the risk". We hear too many excuses. Although I can understand the rationale of the companies to a certain extent – as risk and investment often go hand-in-hand – one excuse I don't accept is that there is no demand for more greener solutions. Politicians will always need pilot projects and industry benchmarks to show the way. ●

The issue of energy efficiency has risen to the top of political and societal agendas all over the world and is now considered an issue that affects each and every one of us.

A comparison of five European countries on selected targets for low-energy buildings by 2015 shows the difference in ambitions.

How good is your country?

Policy meter

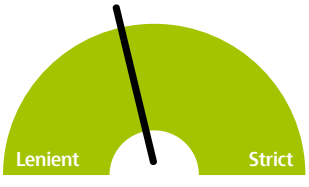
Denmark

United Kingdom

Finland

Netherlands

Sweden



Source: European Commission, Directorate for Energy, Report: "Low-energy buildings in Europe: Current state of play, definitions and best practice." Brussels, September 25, 2009

Kristina Alvendal, former Vice City Mayor of Stockholm, talks about the city's ambitious green policies.

Cities at the forefront

Östermalmshallen, a historic indoor market in Stockholm, has recently undergone energy-efficient retrofitting. Today, the energy and heat produced by customers in the building brings down the need for external heating.

Stockholm is the EU Green Capital 2010. Why is Stockholm a forerunner?

In Stockholm, we have a long tradition of taking an environmentally responsible approach. From the establishment of modern Stockholm, with its parks and many trees, to the subway being built in the 1950s and 60s, we always try to make sure that everything is in close proximity. This is why we encourage cycling and walking by building bike paths and safe paths for walking in all parts of the city. As a politician, I tried to continue this revered tradition.

Also, because Stockholm is growing. By 2030, we will have grown by 25% and thus reached one million citizens in the municipality of Stockholm. (The Greater Stockholm area will have approximately 2 million inhabitants.) We need to make sure this growth – with new workplaces, new houses and new roads – doesn't lead to unwanted growth in the harm we do to the environment. New solutions are necessary.

In what way do national policies affect Stockholm? Are they sufficient, or could more be done?

There is a responsibility at the national level to set national goals,

regulations and guidelines. But we don't let this restrict us. If we see the need for greater ambition, we are not afraid of taking the lead. The extensive development of public transport is an example. We want more Stockholm residents to stop using their cars and instead use public transport. Of course, this cannot be pushed in all parts of the country, especially not in rural areas, where the distances are long and a car is almost essential.

Stockholm, like all capital cities, is part of globalization, and seeks economic capital and human capital in order to grow and prosper. Is Stockholm's green profile an important part of attracting such capital?

A city like Stockholm does not compete with other cities in Sweden but first and foremost with other major cities in Europe. This makes it essential to offer a qualitative way of living, whether it be a workplace you can reach in a five-minute bike ride, or outdoor activities such as canoeing around the islands of Stockholm. At the same time, we are trying to build innovative clusters in Stockholm that will attract investments. We did it with Information and Communication Technology (ICT). Now we are doing it with Green Tech.

At present, the Royal Seaport is being built in Stockholm. It is a new urban area with high ambitions when it comes to environment, energy and sustainability. How were you able to attract businesses to get involved in this project?

Even from the outset, we met nothing but positive reactions. But we have learned over the years that the best way of cooperating with industry is if the politicians set the goals and the framework and let the companies find the solutions. This inspires the companies to come up with the best viable solutions, and brings about healthy competition. They see the Royal Seaport as a "think tank" for testing new ideas.

How do you think the people in Stockholm will live their lives from an environmental perspective in the coming 10 to 20 years?

I think it will be easier to be environmentally responsible. City life is characterized by stress and a need for more quality and time in everyday life. Accordingly, Stockholm's citizens will not accept environmental solutions that take time or resources. Solutions need to be automated. And all use of resources, such as electricity, will probably be metered on an individual basis, to help build understanding of each person's ecological footprint.

Which of your accomplishments during your tenure makes you most proud?

It is a program for refurbishing Stockholm's older buildings. Through massive investments of about EUR 1 billion, we are in the process of refurbishing old residential areas all over Stockholm. On top of that, the city is also refurbishing offices, schools, pre-schools, elderly homes, etc. This will lead to enormous energy savings.

Looking ahead in the years to come, what is the major challenge?

Public transport, in coordination with modern residential and commercial development. A holistic approach to building society so that we get the very best when it comes to energy-saving solutions. ●

"We have learned over the years that the best way of cooperating with industry is if the politicians set the goals and the framework and let the companies find the solutions"


Kristina Alvendal

Green Building Councils serve as credible discussion partners for policymakers

Green Building Councils are member-based, non-profit organizations and are governed in accordance with the guidelines laid out by the World Green Building Council. The mission of most Green Building Councils (GBCs) are to drive market transformation of the building industry through member consensus and cooperation. The combination of knowledge contained in these GBCs, together with building certification schemes that have been adopted by industry consensus, make GBCs credible discussion partners for policymakers. At the moment Skanska is active in our home markets' GBCs and has senior executives on the boards of eight of these councils. ●
Read more at www.skanska.com/greenbuildingcouncil

Tendering to push regulations

Planning Project in brief

Skanska is currently tendering for Kalasatama Center in Helsinki, one of the largest urban re-development projects in Finland's history. The project will comprise retail and office facilities, residential development, health care facilities as well as a transport hub, and is to be completed in 2018. Skanska works actively to become partner to the major cities in Finland, and together set up ambitious targets for environmental and energy efficiency that may become regulations later. To gain this trust, Skanska has gathered a group of frontline technology partners to look at sustainable energy solutions. Through this kind of cooperation, giant steps can be taken in developing sustainable urban communities. ●

(Please note that the picture does not show the Kalasatama Center.)

Skanska's Green Business Officer, Cecilia Fasth, is in charge of finding solutions and business models for green construction, focusing on refurbishment.

Refurbishing Green is a financial investment

Many cities are ahead of nations when it comes to green building. Is this something Skanska faces?

Certainly. Throughout the world, we meet demands from cities and regions that are stricter than those posed by national policies. In California, development and construction must commit to building LEED-certified buildings to be allowed to purchase land and build. In Stockholm, a requirement of the Royal Seaport project is energy use that is half that of regular residential areas. Skanska welcomes this.

Are all stakeholders "on board" when it comes to green building, from politicians down to individual residents?

I think we have passed the tipping point. One proof of that is that the credit market is now starting to come on board. Of course, banks are dependent on sound investments. Therefore, it is logical that they encourage investments in green buildings, as they are energy and environmentally responsible. An example is Finland, where the Nordic Investment Bank now grants more beneficial loans for investment in LEED-certified buildings.

How do you see Skanska's Green Business in the years to come?

In five years' time, we want to offer net zero primary energy for our buildings. In a longer perspective, Skanska will probably be a stakeholder when it comes to renewable energy production. For instance, in Sweden the technique of turning waste into energy through district heating is highly developed. And Skanska is involved in building such solutions. Now we are seeing this way of producing energy spreading throughout the world.

What will guide the market when it comes to the environment?

If you are a developer or a property owner, and want to have a solid and liquid portfolio, any old building with old standards will decrease the value and diminish opportunities. Green investments in refurbishments increase the value of the portfolio for investors. Taking sustainable parameters, such as carbon taxes and high energy standards, into the market valuation is a way of future proofing the buildings and extending the lifespan of the investment. ●

cecilia.fasth@skanska.se

"In Finland, the Nordic Investment Bank now grants more beneficial loans for investment in LEED-certified buildings"

LEED?

(Leadership in Energy and Environmental Design)

LEED is an internationally recognized green building certification system, providing third-party verification that a building or community was designed and built using strategies aimed at improving performance across all the metrics that matter most: energy savings, water efficiency, CO_2 emissions reduction, improved indoor environmental quality, and stewardship of resources and sensitivity to their impacts. LEED Platinum is the highest certification level. ●

Building the green urban ecosystem

The energy-independent, self-sustaining green neighborhood is emerging. Embracing a comprehensive and holistic approach is necessary when building new, smart districts, where urban ecosystems have near-zero impact on the environment.

By 2030, about 60% of the world's population will live in cities. Therefore, green urban landscapes, with near-zero carbon impact on the environment, must become increasingly dominant. When building and refurbishing the urban ecosystem – the system of cities, towns and urban strips constructed by mankind – the aim must be to emulate natural ecosystems. The solution is taking shape in the emergence of energy-independent, self-sustaining green neighborhoods.

Building the green urban ecosystem

An increasing number of communities are striving for energy independence, where the neighborhood or city itself has secured its energy production and created a closed, green urban ecosystem. Localized energy networks and smart grids are the key to the development of the self-sustaining urban area. The modern networks are further enhanced by local decisions concerning retrofitting of houses and different tools for residents to manage their energy consumption. Emerging self-sufficient neighborhoods are a significant step in reaching the ultimate goal – near-zero impact on the environment.

Holistic housing

Embracing a comprehensive and holistic approach is necessary in order to build the green urban ecosystem and self-sustaining cities or neighborhoods of tomorrow. All aspects of the area must be taken into account, and every perspective is of equal importance. Sourcing, construction, use and recycling are just a few parts that make up the multifaceted challenge of city development. With a holistic approach, when planning and building a

Royal Seaport is a new urban district being developed in eastern Stockholm by the Royal National Urban Park. The former brownfield site is the largest sustainable redevelopment project currently underway in Stockholm.

city, area or neighborhood, all systems are analyzed and built in relation to each other, whether it is electricity, heating and cooling, water consumption, waste or transport. For instance, localized renewable energy production such as micro solar energy farms can give energy not only for heating, cooling and lighting but for electric vehicles that can be charged throughout the neighborhood, thus decreasing the use of fossil fuels and acting as storage units. Modern energy production and modern transportation go hand in hand. By seeing the bigger building picture, rather than just seeing one system at a time, additional opportunities will arise – economical as well as environmental.

Cooperation key to energy independence

The construction and development sector is characterized by fragmentation. Many stakeholders with different responsibilities create a complexity of interaction between the systems involved in an urban area, resulting in a considerable barrier for green development. Multidisciplinary workshops in the early design phase, instead of working using the traditional "silo" approach, can serve to bring together owners, architects, engineers and other key players to create a shared vision. This also leads to improved building performance with lower costs and fewer disruptions during later project stages. ●

The world's smartest neighborhood?

At the moment, just outside Stockholm, Sweden, the Royal Seaport is being built. It will be ready in 2025 and is being promoted as one of the world's smartest neighborhoods. The Royal Seaport is one of 16 projects all over the world with which the Clinton Climate Initiative is cooperating to demonstrate models for sustainable growth. When the initial 16 projects are completed, nearly one million people will live and work in Climate Positive communities.

The Royal Seaport is among the first in the world to have a smart electricity network, a smart grid. The network will be able to receive energy in small portions and provide the inhabitants the possibility of actively saving energy.

Stockholm politicians have defined a framework of demands for the new area. The goal is for energy use to be half of what it is today. Today, the standard is 1.0 parking spaces per apartment. In the area of Royal Seaport, there will be 0.5 parking spaces and 2.2 bicycle parking spaces for every apartment, thus encouraging the tenants to choose the more environmentally friendly bicycle over the car. A large number of charging posts for electric cars will be placed in the neighborhood. The streets will be constructed to ensure a minimum of traffic.

Several companies are involved in this project, including Skanska. The Royal Seaport is an example of a city deciding to venture into uncharted territory, applying holistic views to what the future could be, and actually executing its plans. However, this challenge is combined with perhaps the greatest challenge of all – retrofitting our already built urban systems to become fully functional green urban ecosystems. ●

Read more at www.stockholm-royalseaport.com

Building for better grades

The Bristol school project in the U.K. is a long-term partnership between Skanska and Building Schools for the Future (BSF), a national program. The objective is not only to construct schools, but to ensure that we create an environment where students learn more, get better grades and get a better start in life. The project provides new approaches to teaching and learning for students who previously only had access to schools that were perceived as failing and producing poor exam results. Environmentally, the buildings and refurbishments are constructed from sustainable materials that contain at least 12% recycled products. Energy-efficient materials, heating systems and lighting are all engineered into the building. Flat screen monitors displaying the energy and water consumption that enable the building to become a learning resource for the students and teachers. ●

Read more at www.skanska.com/case/bristolschools

Creating green dense urban structures is not only a challenge but a necessity, says the founder of the Sustainable City Concept, Professor Ulf Ranhagen.

Beyond fossil fuels

Professor Ulf Ranhagen is Chief Architect at SWECO FFNS, where he is head of business and idea development of planning activities. He is also Professor of Sustainable Urban Development at the Royal Institute of Technology, Stockholm. Professor Ranhagen has been involved in many award-winning urban planning projects and is the founding father of The Sustainable City Concept – A Swedish Partnership Initiative, developed on behalf of the Swedish Trade Council, the Ministry of the Environment and the Ministry for Foreign Affairs.

What are the most interesting tools for green construction at the moment?

Building a green city is about the cooperation between different disciplines and experts. It is very important to use multidisciplinary methods. There are soft, medium and hard tools to use. I am a big fan of lifecycle analysis, which allows one to make predictions and then measure them after construction is complete. Soft tools need to be developed, such as workshop methods to create cooperation between all experts and politicians as well as citizens. We also need process tools. Most importantly, there need to be proper tools for visualizing different types of environmental and sustainable aspects. It can be the transport flow, energy flow, different types of material management or different types of cycles.

What trends do you see ahead?

I sit on the delegation for sustainable cities, which was established by the Swedish Government. There, we have a very strong interest in supporting the transformation of the so-called Million Program, one million apartments in Swedish suburban areas built between 1965 and 1975. The aim is to make the large bulk areas built during the program energy-efficient, yet also take social aspects into account. This reflects a current trend – when building an area, it must be made attractive in all respects. Another trend, when building now, is to think far into the future, beyond fossil fuel, and see that it is profitable to invest in sustainable structures. The winners will be those who don't take a three-year perspective, but instead take a 20-year perspective. Or even a 50-year perspective. A third trend is seeing a house as part of a bigger context and not just as an independent component. It has to be put into context with other buildings and the systems of a city. If we look at low-energy houses, or "passive" or "plus houses," it is important to understand how the houses can interact and how we can create systems, for instance, for the cold periods of the year, when other houses can be used to support each other.

"The winners will be those who don't take a three-year perspective, but instead take a 50-year perspective"

What areas have been most successful in applying green thinking?

Of course, Hammarby Sjöstad in Stockholm and Västra Hamnen in Malmö are both very good examples. Here we see whole districts working as a green system. I also think the first passive house area in Lindås in Gothenburg is a good role model. Additionally, the retrofitting of houses according to the passive house concept in Brogården in the city of Alingsås is admirable.

What are the greatest green challenges ahead?

Compact cities are a great challenge. Creating dense urban structures, and at the same time making them green, is not only a challenge – it is a necessity for a green future. ●

Brogården Alingsås

The Brogården renovation project has reduced the average total apartment energy consumption, from 216 kWh/m² to 92 kWh/m².
Read more at www.skanska.com/case/brogarden

A building is never just a building. It is part of a complex urban eco system that needs to be maintained and tended during the entire life-cycle. The tools for this are already here and ready to use. Ready, set, build.

Green in a high-rise leads to black on the bottom-line

Net zero primary energy for our buildings. Near-zero carbon in construction. Zero waste. Zero hazardous materials. Zero potable water use in civil construction projects. The tools to reach these goals are many. Solar panels on roofs are becoming more effective. Charging posts for electric cars are becoming a reality. Smart grid technology connects buildings and becomes a way for an entire community to connect and take control of energy use. Smart electricity meters make energy visible and tangible for end users. Environmental labels, such as LEED (Leadership in Energy and Environmental Design), BREEAM (BRE Environmental Assessment Method) and EU GreenBuilding, enable developers as well as users to make active green choices. The challenge lies in creating a functioning toolbox. Long-term commitment, in all parts of the lifecycle, is needed in building a green and cost-effective future. Construction companies,

owners and tenants must dare to dedicate themselves to the structures they build, through regular check-ups and maintenance. A building, even though made of lifeless material, is far from dead. Through technical systems, continuous improvement is possible.

Deep Green buildings in vanilla cities

Much more is possible today than simply complying with regulations, norms and environmental systems. In order to implement Skanska's Journey to Deep Green™, a tool called Skanska's Color Palette has been developed. According to this, a compliance approach would be defined as a "vanilla" approach. Goals should be set in the Deep Green zone, where the entire chain – from raw materials to completed construction – is near-zero environmental impact. At the moment, vanilla cities and vanilla buildings are the norm. Yet there are examples of green construction in many places all over the world. The Nike Campus in the Netherlands, designed by renowned architect William McDonough, is a striking structure. The flexible, adaptable workplace, designed to convert to housing in the future, includes strong connections to the outdoors through daylighting, natural ventilation and access to views. Renewable energy sources provide 30% of the total supply, due in large part to one of northern Europe's largest geothermal heating and cooling systems. Skanska's own offices on the 32nd floor of the Empire State Building in New York show that Green refurbishment can be achieved even in an 80-year-old skyscraper, without compromising on design, function or maintenance.

Empire State Building New York

Refurbishment of the 32nd floor of Empire State Building lead to a 57% reduction of energy consumption. The investment will pay off in the first five years of the 15-year lease. Skanska will save half a million dollars over the last 10 years of the lease.
Read more at www.skanska.com/case/empirestate

Active choices make passive houses plus houses

Although the idea of the passive house has been around since 1988, it is not until now that it is becoming a reality in the marketplace. And now it is time to move on. In the years to come, we are going to hear more about "plus houses." While a passive house reduces the energy demands of a building to approximately one-twentieth of the norm (without compromising on comfortable conditions), the plus house does more. It produces more energy from local renewable energy sources, on average over the course of a year, than it imports from external sources. This is achieved through active measures using a combination of micro generation technology and low-energy building techniques such as passive solar building design, insulation and careful site selection and placement. Adding localized energy production connected to the house or the neighborhood will make the house an energy contributor. ●

Construction Project in brief

Hagaporten 3, in Stockholm, Sweden, is an energy-efficient, "climate smart" office building and a certified EU GreenBuilding. Skanska, as the development and construction contractor responsible for building Hagaporten 3, and also for the application of the EU's GreenBuilding certification, cannot just pack up and leave when the last brick has been laid. The certification for EU GreenBuilding stipulates that the energy levels be followed over the course of two years. This follow-up process and long-term commitment lets Skanska and the tenant continuously tweak and improve the systems, thus saving more kilowatt-hours. Just by making sure the ventilation and heating adjusts whether it is daytime or nighttime saved more than 5 kWh/m². ●
Read more at www.skanska.com/case/hagaporten3

Hagaporten 3

Demonstrating the value of long-term commitment

One of the most respected voices in the building industry when it comes to building green is Harvey M. Bernstein, Vice President of Global Thought Leadership & Business Development at McGraw-Hill Construction. He leads the company's thought leadership and green building initiatives and manages its Research and Analytics division.

The green movement is a change in construction industry DNA

When it comes to building green, what state is the industry in now?

I think we are very rapidly moving toward green becoming the standard in the construction industry. In the U.S., the retrofit has grown from 2% of the total market in 2008 to an estimated 30% this year. So it's a rapid shift. And one of the reasons is the skill set of firms such as Skanska that have developed expertise. Many companies that are experts in green design and construction are delivering buildings that are at the same cost or even less cost than conventional building. And by that, I use LEED as a benchmark. So, I'd equate the green movement to a change in the construction industry DNA.

Are there still some sectors of the business where the green perspective hasn't quite penetrated?

Well, I don't think everyone is on board yet, but it is present at all levels and in all groups of stakeholders. For instance, at the local level, local governments are now legislating or establishing standards and codes that require government facilities to be built equivalent to a LEED certification. And at the federal level, federal buildings are required to be built according to LEED. As the governments at local, regional and national levels begin to require green in government buildings as a standard, it's logical that private developers are trying to at least meet those requirements so that they're competitive.

What trends do you see ahead?

First, there's a bigger push toward prefabrication and modularization. A streamlining of the construction process that creates competitive market solutions, better control over labor and a better way to standardize the elements introduced into a building.

Second, a focus shift from constructing the building to those occupying that building. So for me, the next challenge is effective operations and management of the buildings. There will be development of tools for transforming the workforce and ways of making sure the buildings actually perform to how they are built or remodelled. A third factor is how building new spectacular buildings in new sustainable urban settings, such as skyscrapers, will probably be a major driver for technology development. More and more designers and constructors are reaching for the stars and trying to use these projects as test sites to try new advanced concepts and solutions. ●

Elizabeth Heider is Senior Vice President Integrated Solutions' Green Practice Area in Skanska USA Building. She is a member of the Board of Directors of the U.S. Green Building Council (USGBC), which created the LEED certification standards.

A shift to Deep Green and life cycle value requires corporate bravery

Currently, the U.S. is under tremendous economic stress and is experiencing high unemployment, as well as tough times on the credit market. To what extent is the market for green construction thriving?

Of course, the dire economic times are affecting the whole building sector, whether it is green or not. However, we find that clients are adding more and more "Green" to the value equation. And the way forward for us is to help owners and clients change the value argument from merely initial cost to life cycle value.

Could you give us an example?

It is about taking into consideration the payback on green investments – because that is really what they are. When doing the tenant fit out of our own offices on the 32nd floor of the Empire State Building in New York, we worked very diligently to look at a whole variety of energy conservation and environmental performance features from a cost and performance perspective. Our projections showed that the incremental cost of attaining LEED Platinum was roughly an additional quarter of a million dollars. Our senior leadership challenged our team to make this investment pay off over the life of the lease. We have a 15-year lease. After two years of operation, our energy bills indicate that the investment will pay off in the first five years of the lease. So simple math shows that over the last 10 years of the lease, we'll save half a million dollars. That goes directly to our bottom line. But it took a certain amount of "corporate bravery" on the part of Skanska to enhance energy and environmental performance because of the initial hit of a quarter of a million dollars. Hopefully, this success will embolden more "corporate bravery."

What paths towards green buildings can your clients choose?

Well, the path can generally be divided into two major routes. First, there is the evolutionary way, which involves raising your game a little bit in incremental steps. For example, when it comes to refurbishing, existing buildings have windows, mechanical equipment, all kinds of infrastructure that will reach the end of its useful life, and you have to replace them. To be evolutionary is to replace them with higher-performing equipment, and the additional cost at that point is generally so modest that the return is nearly immediate. It's just common sense. In addition to the evolutionary path, we're seeing a desire on a limited scale to take a revolutionary path: the Journey to Deep Green™, pursuing net zero primary energy, zero unsustainable materials and zero potable water use in construction projects. This frequently pertains to new buildings, often pilot projects that symbolize greater vision, usually from a desire to show leadership.

What trends ahead can you identify?

I think that in the wake of the recent recession, we're seeing a return to value and to the authentic, even when it comes to buildings. There is a desire to look at lessons learned in the past. How were buildings designed in the days before air conditioning? They were built using local materials respecting local climate conditions, passively taking advantage of natural light, ventilation and shading. At the same time, we see a wish to leap forward, rapidly using new technology and smarter integration of design and construction efforts. But these two movements do not contradict one another. Our view is that you should just eat your energy conservation "vegetables" before you add more costly photovoltaic "cookies." Then you'll deliver the best solution possible within your budget and investment horizon.

The other trend is increasing focus on operating buildings more thoughtfully. A study by the New Buildings Institute for USGBC showed that some buildings that were designed to be LEED Gold and Platinum were now actually not running better than standard buildings, but worse. A lot of that has to do with occupant behavior and how the building was being operated.

"If you drive your Prius like a Maserati, you're not going to get great fuel performance, and the same goes for buildings"

If you drive your Prius like a Maserati, you're not going to get great fuel performance, and the same goes for buildings. Potentially, a third of the energy that is wasted in a building can be managed simply by modifying user behaviour and proper operation. ●

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Skanska's approach to Green Construction

Skanska's Commercial Development has a four-point strategy that helps us find the best technical solutions and systems for each project. It is a comprehensive and holistic approach that tries to look at the possibilities from all angles. We use our Color Palette as a way to visualize this.

1 Low environmental impact during the entire life cycle

We want our customers to benefit from our know-how. Accordingly, we always try to find the solutions closest to near-zero environmental impact operations and management of the buildings.

2 Life cycle cost

What does it cost to construct these buildings and what does it cost to operate them? We then implement the system that will lead to effects that show up on the energy bills of our clients.

3 Flexibility

The buildings cannot be too specific or special if, in the years to come, they need to be altered or transformed. Flexible solutions that allow for continuous development are key.

4 Simplicity

Complex systems may lead to difficult and expensive operations. Therefore, robust and functional solutions that remain effective over the course of the whole life cycle are essential. ●

Skanska is one of 14 contributing companies to the international Energy Efficiency in Buildings (EEB) project, a project started in 2006 under the auspices of the World Business Council for Sustainable Development (WBCSD). The vision of EEB is to arrive at a net zero energy building stock by 2050.

Energy Efficiency in Buildings project

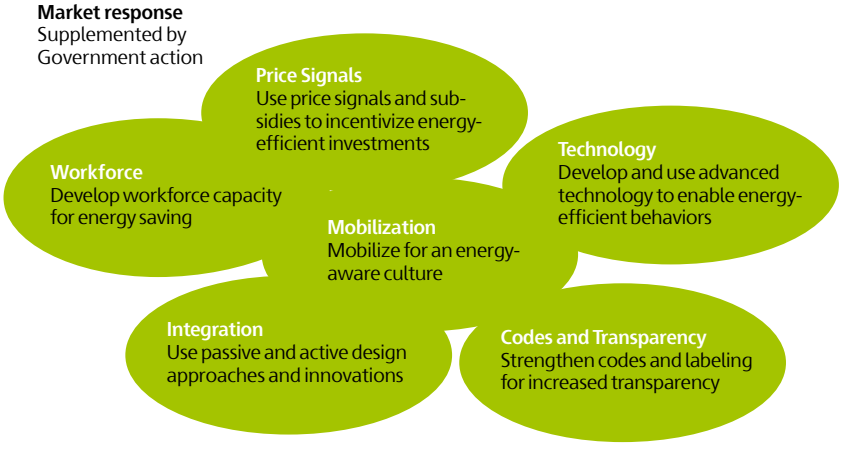
Contributing companies within the project represent a variety of industry segments and jointly represent a significant part of the global built environment.

The final report, entitled "Energy Efficiency in Buildings – Transforming the Market" (2009), presents the recommendations in six broad categories. The recommendations overlap and interrelate and are mutually reinforcing. They are relevant globally, although the emphasis may be different from country to country. Strengthen codes and labeling, encourage an integrated design approach and develop and use advanced technology to enable energy-saving behavior are three of the six categories of recommendations that have been detailed in the report and translated into an actionable roadmap. "The Roadmap for a Transformation of Energy Use in Buildings" specifies short, medium and long-term actions for the majority of the building industry stakeholders, including government authorities, developers and contractors.

The EEB project closed with a call for action, a Manifesto for Energy Efficiency in Buildings, that asks signatory companies to lead by example and define a strategy and targets for the improvement of their commercial buildings, the offices they own and/or occupy, and report on their energy consumption annually. This manifesto has since its launch been signed by over 80 WBCSD member companies, including Skanska.

Skanska has been a member of WBCSD since it was founded in 1995 and is committed to stay actively involved in the joint WBCSD/IEA (International Energy Agency) efforts of producing a roadmap for energy efficiency in buildings based on both the IEA's and WBCSD's previous individual efforts. ●

Read more at www.wbcsd.org



We are on the brink of a true green revolution. New smart technology empowers every man and woman to become urban energy farmers, "reaping" what sunlight they "sow" and selling the remaining "crop" back to energy companies. In the near future, citizens will be stakeholders in the local energy community.

The rise of the Urban Energy Farmer

A new global middle class with common consumption patterns is emerging. This new middle class wants to be part of and be more active in a sustainable society. Consumers feel empowered when it comes to the environment and are taking action in their daily lives to reduce consumption and waste, according to a survey by the National Geographic Society and GlobeScan, a research consultancy based in Toronto. As major opportunities in the energy sector are developed at local, residential and regional levels, commitment from local communities will follow.

Welcome to the energy farm

At first glance, the small community of Heritage Springs, California, does not appear to differ much from any other average American town. However, this is no ordinary place. Comstock Homes, developer of The Villages at Heritage Springs, claims its current project to be the largest solar-powered community in the nation, whose center and 511 homes are optimized for energy efficiency and use roof-integrated technology. The smart homes are said to exceed the National Energy Standard by 50%, and Comstock Homes promises that the SunPower solar power system can save residents up to 60% on their electricity bills.

When the system produces more electricity than the home is using, the excess electricity is sent back to the utility company and the residents receive a credit that helps offset the monthly electrical bill.

Prosumers of the 21st century

Consequently, every single resident of Heritage Springs becomes an energy farmer, reaping what sunlight they sow, and selling the remaining crop. Solar power is a base of energy farming, but other tools further maximize energy efficiency. Smart meters, tankless and instant hot-water heaters, roof tiles that act as both insulators and protectors, double-glazed windows and energy-efficient fluorescent lighting are a few telling examples. This development revitalizes the term "prosumer," coined by futurologist Alvin Toffler, who in the 1980s defined the prosumer as someone who blurs the distinction between a consumer and a producer. Energy Farmers are prosumers of the 21st century – urban citizens that are stakeholders in a local energy community. Systems like that of Heritage Springs build an intrinsic understanding of electricity by directly involving, engaging and empowering citizens in the abstract concept that is electricity use.

The Internet of Electricity

Energy Farmers are truly empowered by emerging smart grid technology. The grid has been dubbed "the Internet of Electricity"– just as the Internet enabled a dramatic improvement in the efficiency of commerce and communication, the smart grid will enable the electric grid to efficiently produce and deliver the ideal amount of power exactly when and where it is needed. Using the smart grid, consumers can create an online energy profile that automatically manages energy according to their personal consumption preferences. Additionally, smart grid software provides utilities with a network operating system to integrate and optimize various new technologies, including smart meters, batteries, solar panels and plug-in electric vehicles.

From grassroots to global

Siding with state-of-the-art technology, grassroots movements also shape the future. What were once one-off projects or minor initiatives have grown to function in the global arena. Transition Towns is one such example. The aim of Transition Towns, or the Transition Initiative, is to equip communities for the dual challenges of climate change and peak oil, and has become an example of socioeconomic localization. As of May 2010, there are more than 300 communities recognized as official Transition Towns in a multitude of countries, from the U.K. to Chile. In the U.S. the national hub's vision is "that every community in the U.S. will have engaged its collective creativity to unleash an extraordinary and historic transition to a future beyond fossil fuels." Energy farming is definitely on the rise. ●

Coming generations are going to take charge of local energy development with pride, says Heather Clancy, an award-winning business journalist with a passion for green technology and corporate sustainability issues.

Automatic for the people

What do you see as the long-term trends when it comes to how people want to live their lives in an environmentfriendly way?

For me, the environmental movement is very much a quality of life movement as well. From a U.S. perspective, quite frankly ever since 9/11, quality of life has become so much more important. That includes a lot of things: being in your car less often, getting to know your local community more and using the technologies around you that help you do that, such as smart phones, broadband Internet connection, wireless access from just about anywhere. I do think there is a movement going on here in parallel: Technology development in symbiosis with the environmental development.

Is there a tendency to be too tech? That technical solutions for energy efficiency that rely on the interface with the users might not be user-friendly?

Many of the companies trying to do smart electricity metering, for example, really haven't had a good interface design mentality. Companies need to understand that people are reluctant to do things manually. If it becomes another chore for them to do, they won't do it. But if it happens automatically, if it becomes part of their normal behavior already, then it is going to happen.

Do you think that construction companies, urban planners, developers, occupants are cooperating more to get things like this done? And is it necessary that it be so?

The progress I've seen has involved state, community and commercial interests. So I would have to say yes, all parties need to be involved for there to be any progress.

Some local communities are now gravitating towards new ways of thinking when it comes to sustainability and environmentally responsible solutions. Have there been any real concerted efforts to promote these kinds of communities on more of a national basis?

There are some local and government organizations that are trying to promote that at the community level. For example, Local Governments for Sustainability (ICLEI) has 1,200 members. They are a leading, local, non-profit government association addressing climate change and sustainability. There are a lot of organizations like this cropping up in the U.S. It shows the will and need for local commitment.

If you are looking beyond this immediate financial crisis and double-digit unemployment, how do you think people are going to change the way that they look at urban living, the way that they live in everyday life, looking 15–20 years ahead?

I think it's going to become a matter of pride for your community. People are going to have to actually do some of the things they say are good to do. They are going to have to fix the transportation system, they are going to have to get smart water usage in place, they are going to need to build out smarter projects for real, even if they are on a small scale. They are just going to have to do some real work and trumpet it. I think people are motivated to do things that are right, and that might have an impact on other people.

There is talk about an emerging global middle class that wants to live environmentally friendly and play an active part in building the sustainable society. Do you think this global middle class is going to become more active as we go forward?

I think it's more of a generational perspective rather than class perspective. I think it will take an entire generation because that's the way things work. I mean, you are never going to get my in-laws to deal with a Smart Electricity Meter. You never will. But their kids may. And I can tell you without a doubt that all of their grandchildren will. ●

"Companies need to understand that people are reluctant to do things manually. If it becomes another chore for them to do, they won't do it"

The green revolution will be discreet. Only subtle outer attributes, such as solar panels, will be a tell-tale sign. Urban Energy Farming is a win-win situation, says Johan Gerklev, Environmental Manager, Skanska Sweden.

An undramatic revolution

What are your reflections on Urban Energy Farming?

Today, farming your own energy is voluntary, but in the future it will be mandatory. Within the EU, legislation is underway that, by 2019, could result in all newly built or refurbished houses must be zero-energy, meaning that they having to be both energy-efficient and produce their own energy. The movement is currently being driven by individuals, but in the near future, the drivers will be regulations and standards.

How will Skanska implement energy efficiency and production?

The possible new EU standard for 2019 is in line with Skanska's Green Initiative and the model that we use to implement green qualities in our construction. Our Color Palette, which spans from Vanilla to Deep Green, visualizes the journey from today's situation to a Deep Green future, in which zero impact is the goal.

How do you implement the Journey to Deep Green™ today?

We already have projects in the pipeline that will meet our zero vision. When it comes to energy, some of the projects will even end up on the plus side. Reaching the zero vision is a great step forward and important to take note of. We also have a number of projects in which we have lowered energy consumption, compared with today's construction norms. What we do is move our projects forward into the green area as a whole, and not just aim to construct individual green buildings.

How will Urban Energy Farming affect the individual?

Basically, most of these solutions will not be seen or noticed. Only subtle outer attributes, such as solar panels or meters inside the building showing the energy that are produced, will be tell-tale signs. The most noticeable aspect will be on your bill. However, people will probably become more aware of their energy consumption, but not in a forced way. This new development is comparable with the development of computers. At first, only a few people used the Internet. Today, the great masses are dedicated to the Internet, since it is easy to use. Urban Energy Farming is a win-win situation, in which people can live their lives as they have before and seamlessly move into a new era. This is not a dramatic revolution when it comes to the individuals but a dramatic revolution when it comes to society and to the energy infrastructure.

Another way that the individual will be affected is on a mental level. Skanska was a driving force in developing environmental labeling of small houses in Sweden. People were extremely proud to receive such a label, something that you wanted to talk to your friends about. Even old house buyers came to us wondering if they could also have their houses labeled. I am convinced that producing your own energy and being energy-efficient is something that in the future will become more of a status symbol. ●

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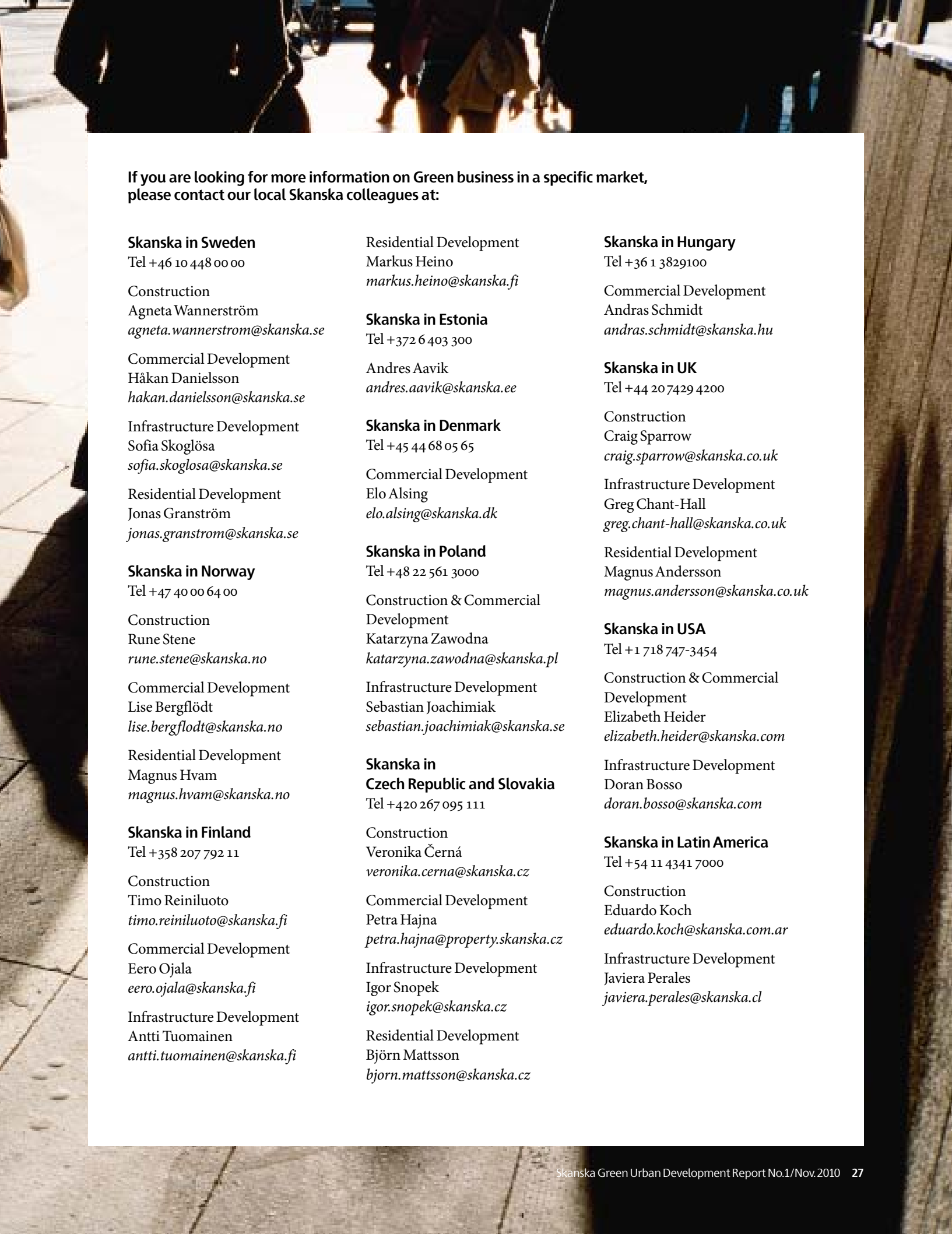
Do you want to know more about the different aspects of Green Urban Development?

Keep in contact!

This is the first in a report series devoted to issues on Green Urban Development. To make sure you receive the next issue contact us at www.skanska.com/greenreport.



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This is the first in a series of Green Urban Development Reports from Skanska, showing trends and developments that will make our society greener.

In this first issue we discover how energy consumers turn into producers. In the near future citizens will be stakeholders in the local energy community. Smart technology empowers citizens to become urban energy farmers.

The report also covers several trends around this theme, including:

A part of Skanska's Green Initiative