Urban sustainability in Vuores, a new Housing Development in Tampere

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Key words: Sustainability, housing development

SUMMARY

Vuores is a new urban quarter, which will be implemented on the border of Tampere City and Lempäälä municipality. The total population of Tampere urban region is 350 000 inhabitants. By the year 2030 the population of Tampere itself is expected to grow by 40 000 and that of the surroundings by 50 000. The planning of Vuores forms part of the preparation for this growth. The construction phase of the area started 2008 and will be completed by the beginning of 2020's.

The total population of Vuores will be about 13 000. The amount of jobs is 3000-5000. The main goal is to create a "small town", which is active throughout the day and will provide high quality services and a variety of residential options as well as attractive work-place areas to serve the needs of commerce and trade.

Eco-efficiency is the most important starting point of planning and implementation. This means that energy supply, energy-efficient buildings, sustainable transport system, material-efficiency and reduction of greenhouse gas emission are essential parts of the city development in Vuores.

Several research and development projects are underway in Vuores, ensuring the buildings' energy efficiency and promoting the use of renewable energy such as wind and solar power and geothermal heat. New possibilities in timber construction are also being explored. Another goal is to handle the storm water in an ecologically sound manner. A pneumatic waste collection pipe system will be implemented in Vuores, which significantly lowers the need for energy and reduces emissions compared to the traditional collection method.

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1. BACKGROUND

Vuores is a new urban quarter, which will be developed on the border of Tampere City and Lempäälä municipality. The goal is to build a structurally and functionally harmonious urban district on the territory of these two municipalities. Tampere and its surroundings is the second largest urban region and growth area in Finland. The total population of the area is 350000 inhabitants. By the year 2030 the population of Tampere itself is expected to grow by 40 000 and that of the surroundings by 50 000. The planning of Vuores forms part of the preparation for this growth.

The total population of Vuores will be about 13 000. The amount of jobs is 3000-5000. The extent of the area is 1256 hectare. The main goal is to create a “small town”, which is active throughout the day and will provide high quality services and a variety of residential options as well as attractive work-place areas to serve the needs of commerce and trade. Natural environment and ecology are an essential part of the area identity. The environmentally valuable areas will be protected. The traffic system emphasises public transport, walking and cycling.

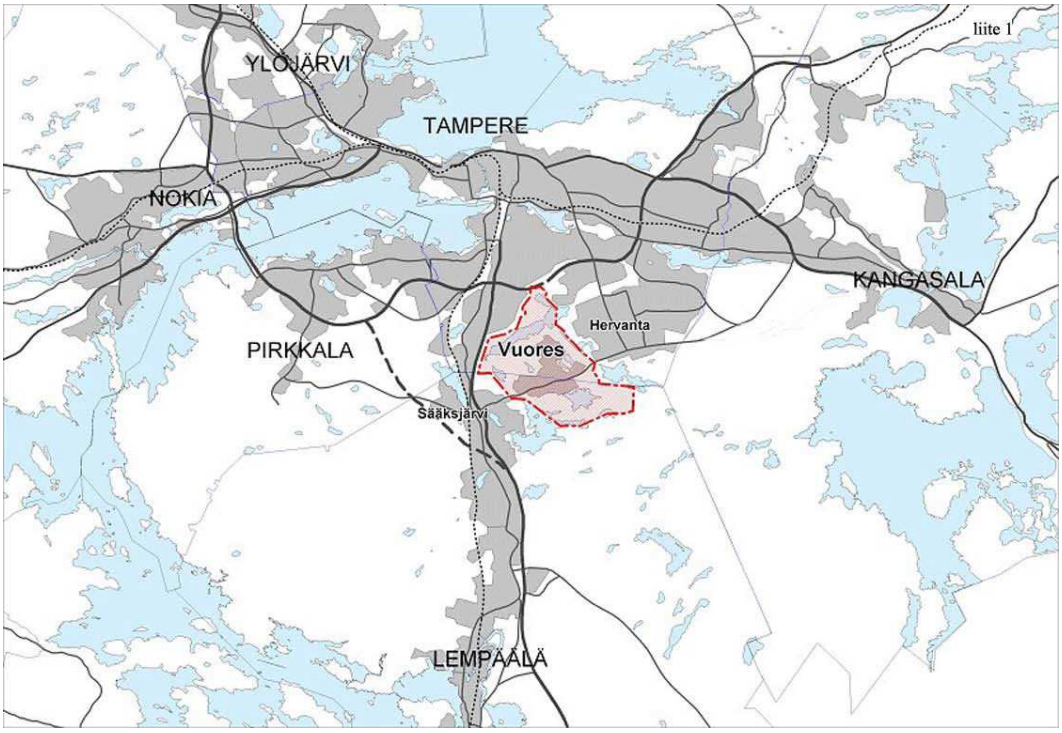

Figure 1: Vuores in urban framework

Figure 2: Oblique (2011), 330 dwellings have been constructed

2. Objectives

2.1 The Vuores Vision – A Small Town in the Midst of Nature

The City Board has adopted the vision formed as a basis for the planning and implementation of the Vuores area:

"The Small Town in the Midst of Nature: Vuores is a combination of high-quality housing and urban greenery. The smooth flow of the everyday lives of the residents is combined with sustainable housing and transportation. The area offers innovative construction and housing solutions and utilizes cutting-edge technology. The diversity of the area, a strong sense of unity, and natural interaction between generations create an excellent basis for an active and sociable lifestyle."

2.2 Starting points for the planning

The City of Tampere has in its City strategy committed itself to the Aalborg Charter for Sustainable Development. Urban structure and environment are strategic goals, which place emphasis on unified urban structure and combating climate change. The objectives include smooth public transport, diverse and high-quality living environments, efficient energy consumption, and increasing use of renewable energy sources.

Vuores has participated in various projects to find means to implement ecological construction and planning. The ECOCITY project, implemented between 2002 and 2005, was a significant background analysis supporting the preparation of the principles used in the planning of the Vuores area.

The project belonged to EU's fifth Framework Programme under the Thematic Priority of "Strategic approaches and methodologies in urban planning towards sustainable urban transport". The starting point for the project was to unite urban planning and transport planning in a sustainable manner. Based on this, the main objective of the project was to define design concepts for settlement structures according to the principles of sustainable development.

The main aim of the design concepts is to create a multifunctional, dense urban structure, which has mixed use and an environmentally friendly and effective transport system that is based on walking, cycling, and public transport, and to unite the area with the existing urban structure as an integral part of it, as well as to promote environmentally friendly and effective energy solutions.

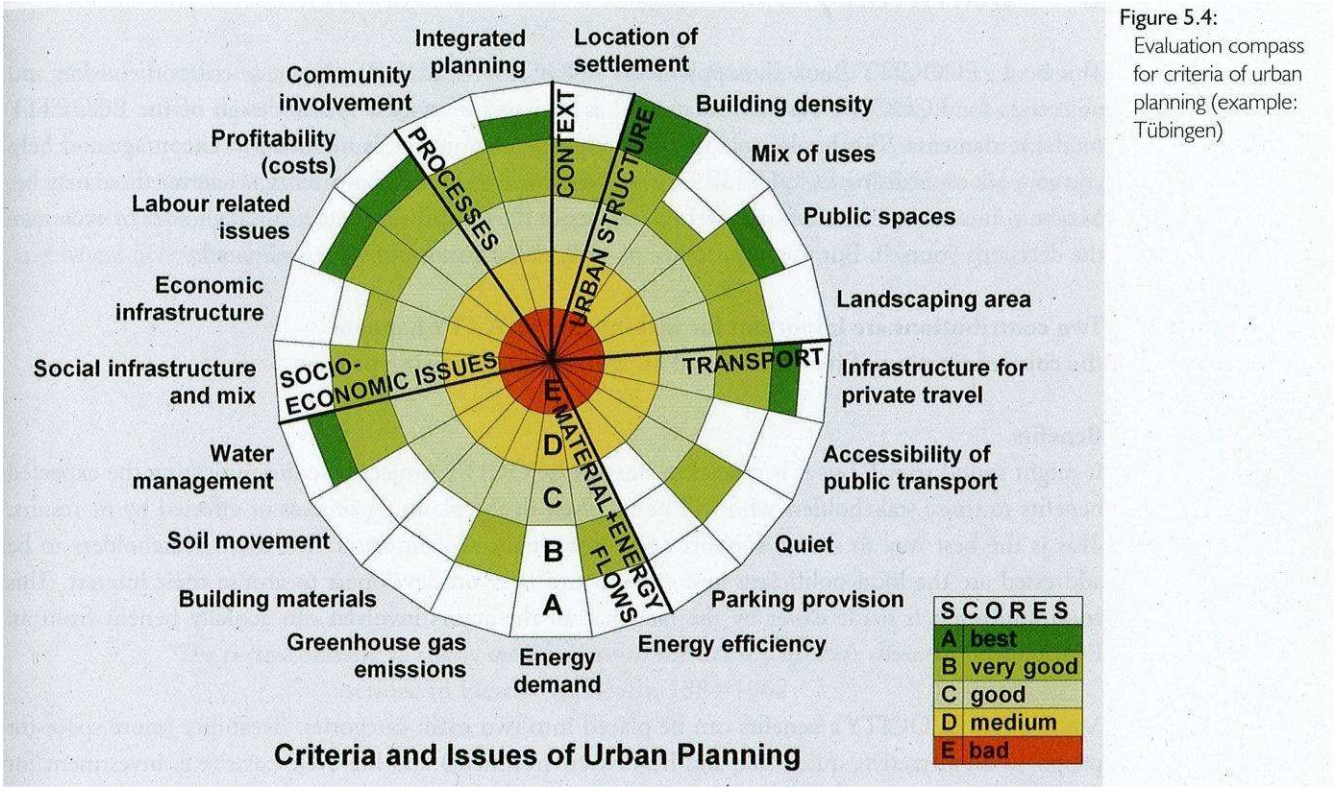

Figure 5.4: Evaluation compass for criteria of urban planning (example: Tübingen)

Figure 3: Criteria and Issues of Urban Planning (ECOCITY, Book II, How To Make It Happen)

3. Environmental programme of the Vuores area – Eco-efficient Vuores 2030

A workgroup consisting of experts from various units of the City of Tampere and the Tampere University of Technology has prepared an environmental programme for the Vuores area, *Eco-efficient Vuores 2030*, based on the objectives and vision of the City of Tampere's strategy and a background memo prepared on a few sample projects. The programme implements the environmental commitments and policies of the City. The objective of the eco-efficient planning and construction is to construct high-quality urban environment with all the services but using fewer natural resources. Raw materials, construction materials, energy, and technology are used correctly and with maximal efficiency.

The environmental programme renders the main environmental objectives relating to the Vuores area into measures in the various phases on its planning, construction, and utilization. The programme will be part of the annually updated Vuores project plan. The Planning Section of the City Board will monitor the implementation of the programme.

3.1 Natural environment and constructed green areas as part of the park and garden network

The objective is that the valuable nature areas in Vuores together with their diverse fauna and flora and the excellent state of the environment will be preserved throughout the various planning and implementation stages. The ecological and operative connections of the park and garden network will be secured.

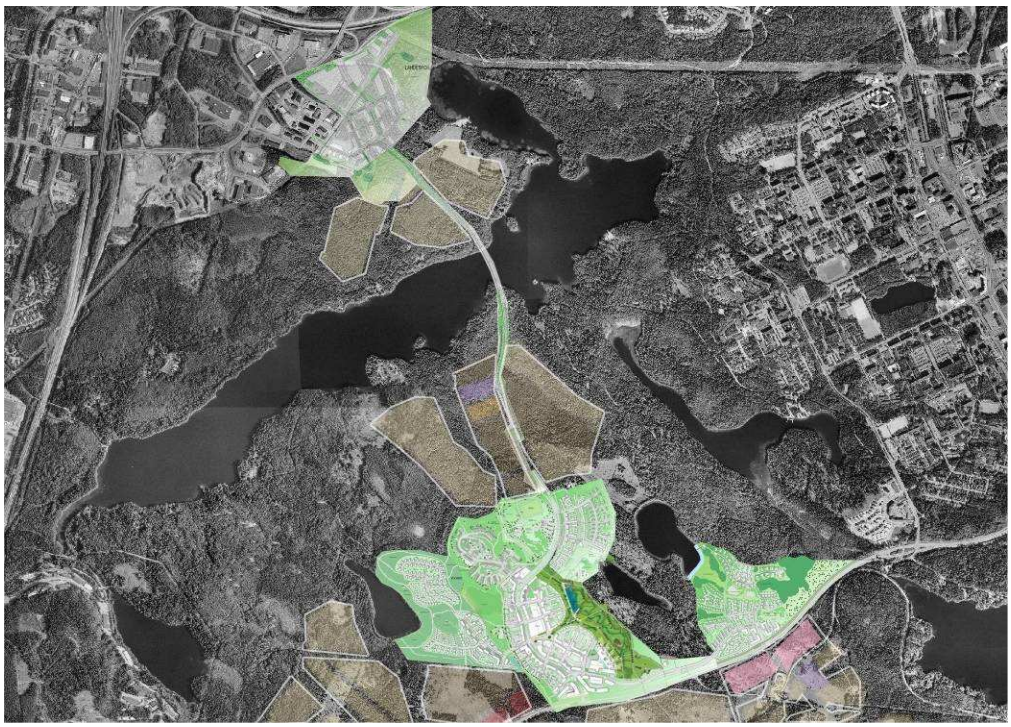

Figure 4: Masterplan, Vuores Urban Structure

The closeness of nature and the natural heritage of the area are included in the Vuores vision. Before construction was started, the Vuores area had a rich natural heritage. The aim has been to preserve and secure the functionality and quality of the various elements of the natural environment in the planning of the area. The challenge is in preserving the values set down in the initial assessments prepared on the natural environment, park and garden network, and green areas.

According to the planning guidelines prepared for the Vuores area, special attention will be paid to maintaining the special features of the landscape and the diverse natural heritage. Construction will be designed to blend with the landscape and the environmental impacts will be controlled taking into account the capacity of the surrounding environment as far as possible. Areas that will be preserved in their natural state will be secured with protective zones, and by preserving the existing ecologic corridors and securing moisture equilibrium.

The qualitative objective of environmental construction is to create a beautiful and diverse environment that emphasizes the original features of the area while also generating new urban values. The quality and functionality of the green areas must be top class, and they must be resistant to erosion. Sustainable development, ecology, accessibility, safety, and maintenance costs must be considered in their planning. Functions must be multiple and easy to create. A special target is to promote self-motivated exercise among the residents.

3.2 Material and energy efficiency in planning and construction

Improvements in the material and energy efficiency in new construction required by national and EU regulations will impose material changes in the planning and material requirements of urban environment in the next decade.

The main objective of material and energy efficiency is to facilitate cost-effective reduction of greenhouse gas emissions and of the level of consumption of natural resources. Measures are being taken to improve the eco-efficiency of products, buildings, and services; to enhance the production and distribution of energy; to reduce the impact of traffic on the consumption of energy; to facilitate easier financing and investments in the sector; and to motivate and steer consumer behaviour towards preserving natural resources.

The objective is to make Vuores a carbon neutral residential area where material and energy efficiency and energy systems are taken into consideration from the very first step in the design process. In the planning processes, the aim is to provide accurate advance estimates of the carbon dioxide (CO_2) emissions and to describe the changes in the emission flows during the life cycle of the area.

In addition, the City of Tampere will prepare for the efficient utilization of materials in accordance with the EU strategy on the sustainable use of natural resources by calculating the carbon footprint of the buildings during their entire life cycle, and by favouring the use of wood in their construction.

3.3 Ways of producing renewable energy and of utilizing district heating

Improving the energy efficiency of buildings will affect the requirements set by the urban environment to the energy system significantly. District heating, which is the traditional solution in new construction in Finland, will only cover the most efficiently built areas. On the other hand, the electricity consumption of the buildings and living will increase due to advances in building technology and household electronics. Therefore, opportunities for building- and area-specific production of renewable energy should be analysed during the city planning process.

Figure 5: Koukkuranta residential area (530 housing units), annual solar energy potential of the houses in the area

District heating is generated as a side-product in electricity production. The most common heating solution in apartment blocks and terraced houses in residential areas, district heating is the most eco-efficient form of heating in the efficiently constructed areas in Tampere. The eco-efficiency of district heating in Tampere will improve in the future, as the availability and practicality of renewable fuel sources increases. Previously, the feasibility of the energy systems has not been considered systematically in the planning of land use, and therefore there are no suitable models for the planning of energy systems in the municipal planning of land use.

The production of renewable energy by the building for its own use is likely to be included in the building regulations as a means of enhancing energy-efficiency. Regulations that came into effect from the beginning of 2012 already favour renewable energy in the calculation of

total energy consumption and, with the tightening regulations, it might become obligatory that a certain proportion of the heating energy used in new buildings be renewably generated.

In Vuores, district heating will be utilized in the buildings where possible. Outside the district heating network, other heating systems will be assessed and considered in the planning of the areas. One of the objectives is to analyse, facilitate, and enhance the use of renewable energy in the buildings.

3.4 Sustainable transport solutions

The vision of the traffic system in Vuores is to minimize the carbon footprint of its residents. The objective is to minimize the need for moving from place to place by favouring a mixed and dense community structure, in which jobs, services, and activities are located near the residents. Measures relating to community and traffic planning sets an example that facilitates, encourages, and commits the residents to a more environmentally sustainable way of life. Planning ensures that Vuores can be reached by all forms of transportation and that walking, cycling, and public transport are used more than elsewhere in the inner city. Vuores provides the option to choose a life without a car.

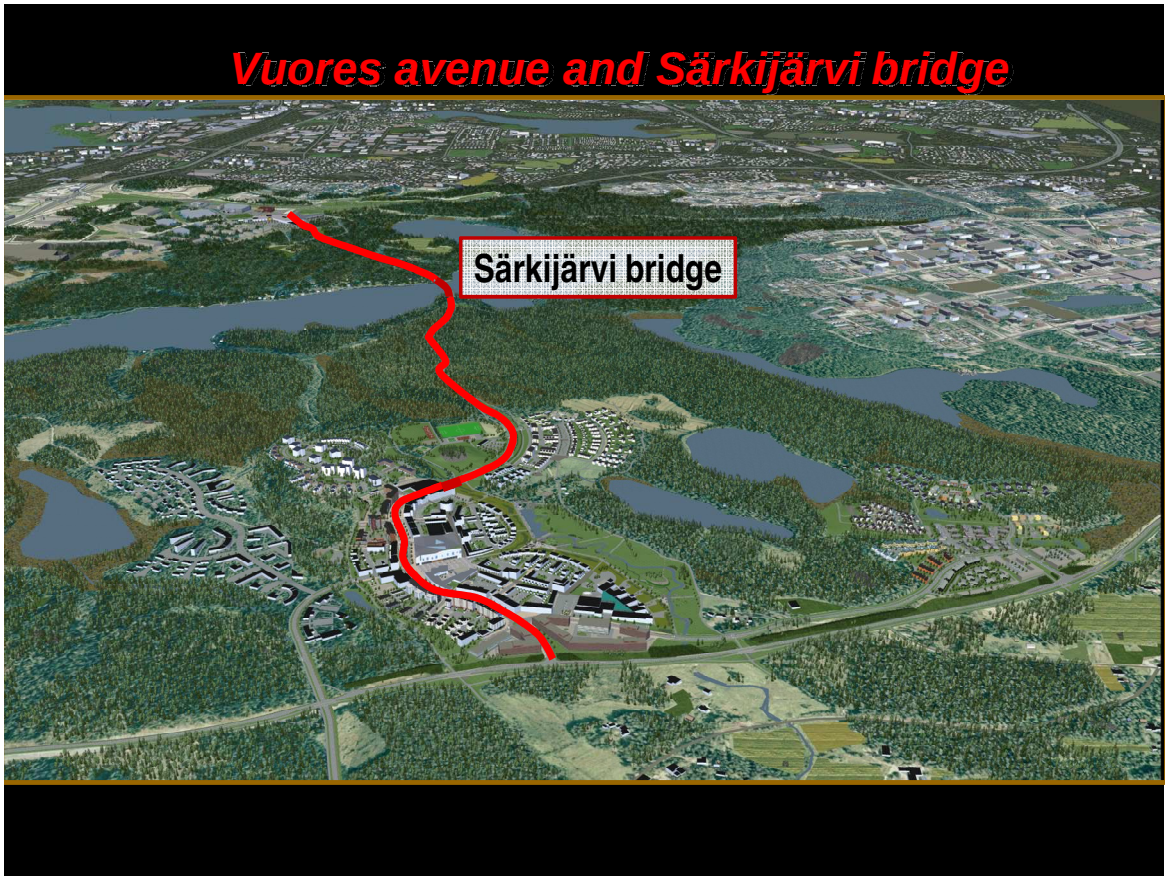

Figure 6: Vuores avenue, the major public transportation corridor (buses, tram 2020)

3.5 Sustainable lifestyle

In the Vuores vision, the option to choose a sustainable lifestyle is a central element. The aim is to make it easier for the residents to make choices that are better for the environment. Merely providing information on ecological choices is not enough to change people's behaviour. Consumption patterns are determined by habits, routines, and social norms and behaviour that are considered common-sense and acceptable. Also, the availability of sustainable options and their ease of use influence our choices.

If public transport seems a lot more troublesome than using a private car, informing the residents of the benefits of public transport is pretty useless. If the objective is to encourage people to make more sustainable choices, the best way is to modify in various ways the environment in which consumers operate, instead of trying to change the attitudes of individual consumers.

4. Assessing eco-efficiency

The structure of the community is comprised of buildings, infrastructure, and related natural areas. Features of the community structure such as the shape of the community, efficiency of the area, fragmentation of the built-up areas, and the location of various functions within the community define the scale of the infrastructure networks, the average distance between various functions (home, workplace, and services), and the required properties of the traffic and energy production systems and the water supply and sewage network. A dense community delimited to a relatively small area facilitates public transport and centralized energy production systems and favouring walking and cycling as a means of transport. The developers of traffic and energy systems currently need information of the future development policies relating to community structures, available technologies, and the taxation of fuel to allow for the large investments in infrastructure to be made in time based on sound information. Large centralized facilities and systems should not be built if the potential residents are likely to move to using decentralized and self-sufficient systems. Public organizations should safeguard the interests of the community as a whole regardless of the independent decision-making of various operators. To facilitate this, generally accepted and reliable evaluation methodology and related tools are needed to assess overall efficiency.

There are international assessment tools such as BREEAM, LEED, and CASBEE in the market, but their suitability for the conditions in Finland has not been tested yet. For the time being, these commercial or other tools have not aroused much interest in Finland, probably because operators in the public sector do not wish to commit themselves to complex and expensive assessment processes, which include many elements that are considered strange or useless from the point of view of Finnish urban planning and which lack many of the elements that are considered necessary. The commercial tools listed above have been criticized for producing contradictory results depending on the tools used, which does not create trust in the reliability of the indicators. In addition, they are considered far too complex and expensive for use, except in special cases.

A new tool to assess eco-efficiency is being developed in Finland. This tool, KEKO, is suitable for use in Finland and Vuores is the pilot project of this development work. KEKO is based on the division of the assessed indicators into those relating to land and soil, water, energy, traffic, services, and the carbon and material cycles. The principle of the tool is illustrated in the Figure below.

5. Wood construction

Wood construction has not developed as expected in Finland. The market share of wood has decreased steadily in public and commercial construction, as well as in industrial and warehouse construction. The proportion of wood is currently close to 10 percent as regards framework and façade construction in these segments. In apartment block construction, the market share of wood has remained low, at around two percent. In small house and leisure construction, however, wood continues to have a very strong role: the total market share of wood in framework and façade construction in these segments continues to be 80-90, percent and in leisure construction is nearly 100 percent.

Well-built and well-planned wooden buildings are beautiful and pleasant. The ecological properties of wood together with its being a renewable natural resource must be considered as a strength. On a longer time-span, as the non-renewable natural resources become scarcer wood will have a genuine competitive advantage over other materials, and will consequently increase proportionally in price.

The City of Tampere is initiating the land use and block planning of the largest wooden town area in Finland, Isokuusi, in Vuores. Isokuusi will be a unified residential area of 3000-4000 residents, characterized by energy and material efficiency and carbon neutrality. The principal construction material will be wood, combined with other construction materials in a durable and efficient manner.

Several wooden apartment blocks and small residential areas of wooden houses have previously been constructed in Finland, but systematic development and land use planning of entire towns based on and characterized by wooden construction has not been attempted before. A starting point for the Isokuusi research and development project is to create new expertise and solutions for the planning and implementation of this wooden town, which is unique on a world scale, so that the high wooden apartment blocks, wooden commercial buildings, and wooden small house construction forms a unified and integrated entity.

6. Conclusions

The objective of the eco-efficient planning and construction is to construct high-quality urban environment with all the necessary services, but using fewer natural resources. Raw materials, construction materials, energy, and technology are used correctly and with maximal efficiency.

The main objective of material and energy efficiency is to facilitate cost-effective reduction of greenhouse gases and the consumption of natural resources. Measures are being taken to improve the eco-efficiency of products, buildings, and services; to enhance the production and distribution of energy; reduce the impact of traffic on energy consumption; to facilitate easier financing and investments in the sector; and to motivate and steer consumer behaviour towards preserving natural resources.

The objective of the City of Tampere is to make Vuores a carbon-neutral residential area where material and energy efficiency and energy systems are taken into consideration from the very first step in the design process. In addition, by favouring wooden construction the City of Tampere will prepare for the efficient utilization of materials in accordance with EU directives on the sustainable use of natural resources.

Combining material efficient construction systems, energy systems, and eco-efficiency requirements for construction and public transport in urban planning will allow Vuores to become a beacon for eco-efficient suburbs of the future.

REFERENCES

BIOGRAPHICAL NOTES

Pertti Tamminen was born in 1950 and graduated from the Department of Surveying at the Helsinki University of Technology in 1975. He started working for the Tampere Branch Office of Plancenter Ltd. as a Planner and Project Manager in town and land use planning in 1976. In 1985, Mr. Tamminen was appointed the Head of the Branch Office. His tasks have included extensive master planning and urban planning projects both in the capacity of a Planner and a Project Manager. Since 2002, he has been working in the Economic and Urban Development Office of the City of Tampere as the Director of the Vuores project. Vuores is a new urban development, which will be developed between 2008 and 2020.

Tamminen is a member of the Finnish Association of Surveyors and the Finnish Association of Urban and Regional Planners.

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