УДК 621.321

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ВАЖЛИВІСТЬ ВПРОВАДЖЕННЯ ПРАКТИКИ ЕНЕРГЕТИЧНОГО МЕНЕДЖМЕНТУ В СМАРТ МІСТАХ

Проаналізовано сучасні методи та програми впровадження енергетичного менеджмену в різного типу міст та смарт міст.

Ключові слова: енергетичний менеджмент, енергозбереження, смарт місто, інформаційні та комунікаційні технології.

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THE IMPORTANCE OF ENERGY MANAGEMENT PRACTICES IN SMART CITIES

It has been analyzed modern methods and programs of energy management implementation in different types of cities and smart cities.

Keywords: energy management, energy saving, smart city, information and communication technologies.

The role of energy management has greatly expanded in cities. Around the globe, innovation with integrating information and communication technologies (ICT) with physical infrastructure is a top priority for governments in pursuing smart, green living to improve energy efficiency, protect the environment, improve the quality of life, and bolster economy competitiveness. Cities today faces multifarious challenges, among which energy efficiency of homes and residential dwellings is a key requirement. Achieving it successfully with the help of intelligent sensors and contextual systems would help build smart cities of the future. In a Smart home environment Home Energy Management plays a critical role in finding a suitable and reliable solution to curtail the peak demand and achieve energy conservation [1].

The city is a core aggregation and socialization paradigm for the mankind, where trade, technology, art and culture can help in designing and building the solutions to many core global issues (i.e. economical double dip, fossil energy and other resources exhaustion, environmental climate change and pollution, social pressed by unemployment, poverty and demographic growth, cultural for radical changes in communication in digital life and globalization, biodiversity loss, etc.). We can better face these threats by leveraging our ability to improve the efficiency and re-invent the organization and ICT enabled nervous system of smarter cities, because we know that human population growth cannot be stopped easily and quickly, nor the expectation of a better life, that keep on moving people to bigger towns in search of work and other services [2].

There are many dimensions that describe the scope of a smart city such as: • Integration and interaction of different services and infrastructures, both physical and virtual • Smart utilities grids (not only the distributed electricity and gas grids with bidirectional flow in a distributed generation, that requires real time exchange of information, but also remote heating/cooling to leverage co/tri-generation, clean and grey water with detailed per user/usage billing that encourage collection and reuse, underground pipes for differentiated waste collection). • Public transportation and road network that aim to manage the mobility needs with an appropriate Intelligent Transport System (ITS) that takes care of congestion charging, reduce pollution and accident rate, manage parking, car and bike sharing, reserved lanes, digital signing, integrated payments by vehicle pollution category, etc. • ICT network that leverage high speed services, mobile advanced location based services, social networking

and collaborative crowd sourcing, info-tainment, teleworking, remote assistance and medical surveillance for disabled or elderly people, touristic orientation and guidanc Integration of public local administrative services with central private ones, to improve coordination, information sharing and dematerialization, cooperation with not for profit sector, accessibility and reduce the transaction cost and environmental payload. As microcosms of the smart cities, smart and green buildings and homes stand to benefit the most from connecting people, process, data, and things [3].

The Internet of Things (IoT) is a key enabler forsmart cities, in which sensing devices and actuators are major components along with communication and network devices. Management of smart homes often requires analyzing IoT data from the interconnected networked devices to optimize efficiency, comfort, safety, and to make decisions faster and more precise [2]. Internet of Things (IoT) is a decade-old term for the interconnection of a plethora of heterogeneous objects and things over a global network so that they can exchange data and interact in real-time. Technologies, such as radio frequency identification, wireless sensor networks, artificial intelligence and machine learning, form the backbone of such interactions. The telecommunications sector estimates that by 2025 more than a half billion devices will be connected with each other [2]. The increasing consumption of energy, soil and other nonrenewable resources, difficulty in waste management, acoustic pollution; altered microclimate, urban traffic congestion, hard to provide home care for the elderly, poor security and social integration are some examples of the growing cities' issues that require timely and effective solutions, with more and more difficult to find resources for local government, called upon to assume direct responsibility. A good carbon management strategy in the town government is also essential for managing the potential risks associated on a global scale with climate change, that very often can have a massive impact on high density urban areas. These risks include: • Physical risks from the direct impacts of climate change, like severe weather events: heating is often up to 6 C higher in the city center (urban heat land effect), soil erosion and extreme precipitation, most towns are near to river or the coast and therefore are exposed to flooding , ecosystem alterations that favor new invasive plants and pests with habitat destruction, fire exposure, etc. • Regulatory and Litigation risks from tightening national and international regulations like in EU: pollution due to concentrated traffic and buildings' heating is a serious concern not only for health consequences on citizens but also for penalties that can be applied. Climate change-related law suits and public actions by NGOs like GreenPeace are now being seen in the US, EU and some other states. • Competitive risks from cities that have a better environmental reputation and a shared sustainability approach versus ones whose citizens perceive a lack of action to address climate change and pollution. Consumer sustainability awareness is a growing topic in the local political agenda, where the link with territory is stronger. As the sustainability mandate expands, cities committed to social and environmental causes are likely to attract the top talent; also investors now look at sustainability performance. There could also be consequences for economies dependent on tourism. • Operational risks from changes like rising electricity prices or transportation costs linked to fossil fuels and other depleted natural resources, like potable water (exposed to exhaustion and pollution), can have a direct impact on the OPEX of the local public administration. The increased "environmental refugees" pressure might also affect cities [3].

To help comparing and integrate different contribution there was built the following taxonomy of the ICT and innovation role in the Smart City extending the original one from the Eurocity charter and European Smart Cities, an EU project led by the Vienna University of Technology: 1. Info-mobility and ITS: smart mobility, logistic and technology 2. Developing human resources and social capital: Smart People. 3. Economics: Smart Economy for competiveness 4. Quality and Sustainability of living 5. Ecosystem: Sustainable Environment, renewable energy and other resources 6. E-democracy, Government, Smart

Government [3].

So, other words its Smart Community inside of smart cities. "Smart Community" is a new form of social system that comprehensively manages the supply and demand of energy in the distributed energy systems, optimizes the use and application of energy, and incorporates lifestyle support services including monitoring service for the elderly, through the energy management system utilizing IT and storage energy technologies, while making use of distributed energy resources such as renewable energy and cogeneration. The Smart Community as the comprehensive approach for the above mentioned social issues will be implemented by the integration of advanced technologies related to environment and energy.

Smart Community being addressed in Japan has the concept involving smart grid. Whereas smart grid refers to the state being smarter by ICT for electric power system, Smart Community is the effort of changing social system of a defined area into smarter state with technologies not only for electric power system but also for a variety of public infrastructure including heat supply, water and sewerage, transportation and communications [3].

The concept of the Smart Community provided above is viewed from the present perspective. However, as the solutions to implement Smart Community continue to take the shape, the concept is beginning to further expand, allowing us to expect that these evolutions will add richer value to the social system in the next generation.

The next steps of this research will be the collection of detailed descriptions of several emblematic best practices of smart city (e.g. Freiburg, Stockholm, Curitiba, Masdar, Songdo, Melbourne, Amsterdam, Boulder, etc.), innovative towns and eco-districts. Those examples allow to proof the feasibility of smart cities, where ICT and innovation are the enabling components of the new paradigm of sustainable, ICT empowered city, on multiple dimensions: economical, environmental, social and cultural. Additionally, many European and Global Organizations and Companies, with a specific, but not exclusive, focus on ICT ones (e.g. IBM, CISCO, ACCENTURE, etc.), that drive the Smart City revolution, have already proposed very interesting models but that till now they are available only on separate documents. There are also some technologies and vertical solutions, such as in building, transportation and energy management or e-government that are strongly involved in the transformation of a town in a smart city, with ICT that is often a winning additional tool to find new, cheaper and smarter solution to old and rising problems. Finally a stakeholder map will be provided to identify most of the actors involved in a smart city [3]. The final scope of this broad research is that of taking the best of each point of view, indentify low hanging fruits and long term strategies, in order to support a general framework, that is still flexible enough to be applied to specific needs and scenarios.

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