

Energy efficiency in urban management: Russian and world experience

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Abstract. The article discusses the role of energetics in creating a comfortable and safe environment of modern megacities, and the problem is considered in the socio-economic aspect. The object is the energy security of the city, and the subject is the influence of urban society on the formation of energy security. In particular, the problems are raised: ecological problems of urban energy supply, the condition of surface layer of the atmosphere near electric power lines. The author assesses the actions, implemented by the urban authorities in Mytishi, in the south-western areas of New Moscow. The author assesses these sample areas on the basis of Ch. Landry's concept of self-training, designated for municipal authorities and urban communities, and offers several successfully implemented self-study cases and in the light of modern methods of ensuring energy security. The forecasts of creation of energy-safe space, made by modern sociologist-urbanist Leo Hollis, are taken into account. The author also considers some of the economic aspects of biosphere safety. In particular, he insists that biosphere safety, convenience, and comfort have developed into competitive advantages in the housing market.

1. Introduction

At present, the problem of ensuring energy security is considered as one of the most important. The districts of a modern city are entangled by power transmission lines, supports of their overhead lines, energy equipment systems, distribution substations and other electrical installations, antennas that receive radio signals, etc. The megacities supply systems are becoming increasingly complex. In these conditions, the role of energy management increases. One of the purposes of such management is the neutralization of negative impacts of energy systems on the environment, as well as the task of reducing the parametric pollution of Geospheric shells in a city, specifically surface layers of the atmosphere, soil, water bodies. This ecological component of the problem of energy management will be discussed in the article.

Presently, economic aspects of a comfortable architectural urban environment have been turning all the more relevant. Any environmental protection expenses are added to the cost of any urban restructuring, planning or development project. Wind roses, average air temperatures, proximity of highways, malls, industrial enterprises, and water supply facilities determine the position of any building and structure. Each of these factors boosts the cost of construction of residential housing and industrial facilities. Any urban industry generates cash flows, on the one hand, and costs associated with the restoration of environmental quality, on the other hand, in order to meet any applicable environmental safety requirements.



It is noteworthy that environmental safety as well as energy security are turning into a competitive strength in the market of commodities and services. Higher ecological standards, tougher housing quality requirements, accompanied by the growing competition between developers, force them to apply “green” standards and environmental self-control techniques in the course of development of new residential houses.

This article is based on a wide range of sources, including the works, written by Charles Landry, a British sociologist, in which he analyses socio-ecological problems of large megalopolises in the era of post-modernism. Ch. Landry emphasizes self-organization as a factor of comfort in the architectural space of contemporary megalopolises [1]. Ch. Landry believes that self-teaching is a must in urban design; therefore, architects and representatives of the civil society must improve their skills themselves. In the course of preparing this article, the author also studied the works, written by J. Baudriard; they helped him to realize the first-hand importance of the anthropological value of urban spaces; the correlation between traditional spaces, commensurable with human beings; and the space of the post-modernist era, which suppressed or ousted traditional spaces either partly or completely [2]. Humans get de-humanized in the era of post-modernism and in the times of post-industrial cities; humans turn into functions, instruments, serving technological systems. This process has both social and economic consequences. Therefore, there is a pressing need for the assessment of humanitarian issues as part of the cost analysis made in respect of urban design projects.

Critics, condemning the post-industrial global civilization, emphasize the fact that several types of economic activities are purposefully and intentionally converted into outlaws. Thus, the civil society’s ability to control the business community is limited. Major megalopolises are the top places where environments get de-humanized.

The author also employs a classical approach to sociology, which assesses the present-day urban space as the medium rich for social deviations. This is how the economic approach is coupled with the social one, formulated by Emile Durkheim, a classic of the sociological thought, and to his ideas of the deviant behaviour. Here, we find it important to track the link between urban deviations and the condition of the urban environment in major megalopolises [3].

Contemporary approaches to the social essence of urban design feature the viewpoint, formulated by Leo Hollis, a contemporary British researcher of cities and the author of the widely known book entitled “Cities are Good for You” [4]. In this book he says that a well-elaborated and functional urban space is the key to comfort, safety, and abundant life. The objective of Hollis’s research project is to generate effective and advanced principles for the design and restructuring of major cities, capable of improving the social and economic “survivability” of urban areas and their residents. The principles, formulated in the founding documents of the international organizations, and the most vital environmental protection laws serve as the basis for this project. Changes in the urban architectural space, identified in the course of study of numerous research papers, make it possible for us to compare the present-day trends with the assumptions made by the futurologists of the past, including T. Campanella, a Catholic utopian of the Renaissance, who believed that people would live in accord with nature and that they would master its laws with the help of magic; and L.-S. Mercier, a French enlightener, who wrote a book about the future constitutional monarchy [5].

2. Methods

The author employs a retrospective analysis method and a comparative method; he analyses mass media publications on environmental issues. The author also analyses the works, tackling the problems of social ecology. He employs examples, describing the condition of the urban environment in Russian megalopolises, to illustrate his statements and arguments. The generation of awareness about the concentration of pollutants in the atmosphere of particular towns by means of publishing respective values in the local newspaper entitled “Podmoskovye Segodnya” (The Moscow Region Today) is a positive action aimed at the prevention of environmental emergencies. Climatologists use the printed media to inform their readers about the meteorological condition of the region and the condition of the atmosphere [6]. We analyze the Russian language sources, covering the condition of the urban ecology,

by employing a set of approaches, developed by the scholars enlisted in the previous paragraph. These sources cover the influence of the natural environment on the social medium in major Russian cities.

This project also takes advantage of the opinion poll, conducted by the Centre for Political Technologies among Moscow residents in February 2016. The number of the poll respondents reached 5,000, and the error margin was below 1%.

Presently, a biosphere compatible urban environment is a most relevant objective to be attained within the framework of the accelerated development of the urban civilization. Today urban living is a dominant lifestyle for most humans. According to the UNESCO, in 2008, the number of urban residents exceeded the number of rural residents. L. Hollis believes that if the present-day trend remains unchanged, by the end of the 21st century all residents of Earth will have lived in the cities. That's why the present-day human civilization is defined as the urban one.

Any social tension pollutes the environment. The top pollutants, active in respect of the atmosphere, are sulfur dioxide, sprays, nitrogen oxides, carbonic oxide, carbon dioxide, ammonia, nitrites, nitrates, nitrosamines, photo-oxidants, volatile hydrocarbons, mercury, lead, cadmium, chlorine and fluorine-organic compounds, crude oil, associated gas, mycotoxines capable of penetrating into the organic tissue, and microbes. The aforementioned items get mixed with suspended particles to generate the photochemical fog over major megalopolises, and the wind takes these pollutants to adjacent territories, preventing any agricultural activities in metropolitan areas.

Even scarce examples offer enough material for a thorough analysis; findings of environment monitoring actions are published by numerous media agencies and, thus, made available to the general public. If we analyze them carefully enough, we will find out that acceptable pollution standards are exceeded in terms of the atmosphere in the following major Russian metal processing centres: Norilsk, Cherepovets, Novokuznetsk, Lipetsk, and Magnitogorsk [7]. The same happens worldwide: the worst air composition is registered in the areas where heavy industry is concentrated. As for the Russian capital, some of its areas, for example, Kapotnya, have a badly polluted atmosphere and soils [8]. Pollutions are also typical for other major Russian cities and towns.

However, not only the atmosphere suffers from pollutions in urban areas. Urban hydrology is at risk. Liquid pollutants flow into the water, and the latter turns unfit for the local flora and fauna. However, back in the 70ies of the 20ieth century, Moscow rivers had a plenty of fish even in the areas close to the Kremlin, or at the heart of the city. Moreover, heaps of rubbish, thrown into the Moscow water bodies, prevent them from serving as urban leisure areas. The situation turns critical, when the water is high in spring. Let's track the situation in the Russian capital. The concentration of rubbish in the Moscow water bodies is maximal in spring, when rain water accumulates in the Moskva river [9]. Rublevskoye water storage basin, operated by Mosvodokanal, accumulates spring water. A section of the water route between Karamyshevsky and Perervinsky waterworks facilities is unable to accommodate all the water there; therefore, the capital suffers from floods and the water level difference. St. Petersburg suffered from floods in the 19th and 20ieth centuries for the same reason. The same happens in the area close to the Mekong river in South-eastern Asia, where floods are frequent in spring and autumn. However, the water level is frequently regulated in Moscow; this action reduces the impact of floods, but it cannot reduce water pollution.

We are worried by the fact that pollutants, penetrating into the environment together with the industrial waste, trigger chemical reactions, participate in physical and chemical processes and generate the compounds which are as toxic, as their source ingredients. The concentration of pollutants in the urban atmosphere is exceeded by far. The most dangerous pollutants include nitrogen dioxide, hydrogen chloride, phenol, hydrogen fluoride, and formaldehyde. Back in the 30ies of the 20ieth century, smog appeared over Los Angeles, and it contained highly toxic substances, capable of causing damage to breath organs and the nervous system [10].

Ecological calamities may occur in each of the four seasons of the year in urban areas. The urban environment must be safe twelve months a year. According to the local media agencies, city halls of megalopolises and minor towns of the Moscow agglomeration pay sufficient attention to the removal of snow from urban streets in winter and street washing in summer. It is noteworthy that snow adsorbs

various components of the urban living environment. Timely removal of snow is an important factor, because it improves the well-being of urban residents. For example, municipal authorities of Mytishi, a satellite of Moscow, have established a strong relationship with private cleaning businesses. According to their contracts with the municipal authorities, each snow cleaning machine has the GLONASS satellite tracking system installed, and the location of every machine can be detected twenty-four hours a day and seven days a week. In contrast, some municipal and regional authorities fail to take care of the snow: back in February 2015, the Governor of the Kamchatka Region insisted that the mayor of a Kamchatka town resigned because of his inability to organize street cleaning after intensive snowfalls [11].

Are these actions efficient and, if so, how efficient are they? Whenever we attempt to answer this question, we realize that tracking snow transportation with the help of GLONASS is highly expensive though efficient. At least, it helps to track the snow route, because sometimes snow is unloaded into water bodies and left along highways, thus, contaminating soil in the suburbs and water in the regions. Environmental enlightenment could turn into an alternative or a supplement to the aforementioned costly control methods. Environmental enlightenment means that every citizen, whether an executive or a minor employee, realizes his or her personal responsibility for the condition of the environment.

3. Results

In this section, we are going to analyze the above-mentioned facts and to offer our suggestions how to improve the condition of the environment.

In the course of the recent two centuries, the industrial civilization has been producing an adverse impact on the urban biota. Contaminated urban air, soil, and water question the existence of the humankind as the biological species: researchers believe that the destructive character of international industrial development represents a major global problem to be resolved internationally [12]. Being a social phenomenon, the city was initially shaped as the place for the convenient life of people, their co-existence and communication, joint housekeeping and spare time. However, these functions turn next to unfeasible in the present-day environment. Thus, a megalopolis, where population density is high and where residents, having different professions and lifestyles, co-exist in close proximity, has turned into a place of disunity: it is not easy to cover extensive urban destinations due to the traffic, and therefore, a car is being transformed into the item which extends the travel time, rather than reduces it in a city. The concentration of toxic (hazardous or dangerous) substances in the atmosphere is a consequence of urban transport operation. The design of comfortable urban areas for versatile groups of urban residents is another relevant issue [13]. L. Hollis drew attention to these social and ecological contradictions of the urban life [4].

J. Baudryard, a French researcher of the society, believes that any artificial simulation of international processes, undertaken in the postindustrial era, boosts the amount of rubbish, and industrial pollutants should not be blamed for it [2]. Human life centres produce a destructive effect on humans; they ruin the mental health, generate numerous stresses and produce a fake imitation of a happy life. In the late 18th century it was identified that perversion was kind of inseparable from inhabited cities [5]. Here we should take account of the negative consequences of gentrification, which serves as a means of ousting representatives of mass professions from cities and rises the share of “the leisure class” representatives. Human ecology is at risk, and it boosts social tension.

In the late 20th century the humankind had an opportunity to realize that natural resources were not unlimited. Unlimited growth is no longer the target objective of numerous economists, who concentrate on the concept of “zero growth”. This concept was specified in the minutes of the Earth Summit, held in Rio de Janeiro in 1992. Twenty years later, in his speech delivered at the UN Conference “Rio+20” D.A. Medvedev, Chairman of the RF Government, said that “society, economy and nature are inseparable” [14]. The 21st century has formulated the position that there should be no market competition between the company, sparing natural resources, and the other one, trying to save them. Competition is only possible between the companies that do their best to restore and to preserve the environment.

Environmental safety has shaped up as the new area of theoretical and applied research. Environmental safety is defined as a state of safety of the natural environment and a matter of vital human concern, preventing any negative impact from being produced by economic or other activities, natural and man-made calamities and their consequences (the law “On Environmental Protection” has been in effect since 2002 in Russia). The legal framework of environmental protection represents an important constituent of environmental protection actions implemented today.

Sociological surveys have proven that the environmental culture is still insufficiently high. This trend may only be reversed by civil activists, public movements, in fact, by any partial urban residents. Some of them have showed up, although the process is too slow. A. Peccei, head of the Club of Rome, wrote that if we wanted to take control of the technological revolution and to forward the humankind to some better future, we had to think about changing ourselves and about initiating revolutions inside human beings [15]. Thus, there is a need to develop a person having a new mode of thinking and appreciating the environment rather than thinking that he is the nature’s king.

The willingness to make cities cleaner is evident at the level of municipalities. Each year, the Moscow Region holds a contest for the best yard planning project. The Moscow city hall has launched “My Street” programme. The city centre is being improved. Any restructuring and greening efforts take account of the findings of the opinion poll, conducted in 2016 by the “Center for Political Technologies” headed by B. Makarenko. According to the poll findings, 20% of residents of far-away districts of Moscow acknowledge that the city centre has become cleaner. 10% of Moscow residents, who visit the city centre very seldom, go there to see what happens to its streets. 86% of the respondents want the programme to be continued [16].

Actions, taken within the framework of the Year of Ecology in Moskovsky, have become annual. Trees, bushes and grass are planted by the residents and representatives of the local legislative authority, or deputies of the Council of Deputies. These actions comprise a minor portion of the projects aimed at the improvement of the capital’s urban environment.

4. Discussion

In this section, we will try to assess the concepts of ecological economy. Indeed, today the ideas of the “green economy”, the use of renewable sources of energy, and the launch of production facilities, preventing or limiting the discharge of pollutants into the atmosphere, are very popular. However, some experts believe that traditional sources of energy have no alternative. Many experts think that the power saving and biosphere compatible economy is a matter of the distant future. Other economists, including N. Yaskova and A. Golovanov, say that the ecological factor is now being considered as a competitive strength. These experts also insist that the construction industry should switch to international environmental standards [17].

Some authors believe that any actions, taken by the local authorities, are inefficient. And indeed, any trees and bushes, planted by the Moscow residents within the framework of the Year of Ecology, can only reverse part of the damage inflicted by insects. Critics of the municipal authorities are convinced that these actions, initiated by the local authorities, represent mere PR campaigns, unable to generate any visible results. The author is hopeful that the facts, provided here, can refute this opinion.

5. Conclusions

In this article, the author raises the issue of development of urban areas with account for the global problems of interaction between the postindustrial civilization and the environment. In the beginning of this article, the author offered several examples, describing the pollution of various geosphere shells in the urban areas of several Russian regions. Particular attention was paid to the condition of the environment in the towns of the Moscow Region. Then the author considered the actions to be taken at different levels in order to balance the relationship between the man and the environment.

The author provides the assessments, made by the representatives of the Club of Rome, sociologists and environmentalists.

Ch. Landry, a British sociologist, believes that the city of the future should be educating itself on the ongoing basis, and that it should reflect over its attainments and respond to any obstacles. He thinks that the city's creative potential is inexhaustible, if each of its elements demonstrates the willingness to learn and reflect [1]. Let's hope that the words of this social thinker will be duly heard by the representatives of urban authorities, developers, and any decision makers.

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