

Research Article

The necessity to focus on the development of low carbon cities in urban management structure

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ABSTRACT

Urbanization is developed along with the economic growth and development of countries. This phenomenon has led to increasing the energy consumption in urban areas and consequently, the emission of greenhouse gases. Increasing greenhouse gas emissions with carbon source in urban areas and its adverse effects due to universality have affected all countries. This became a concern for the international community. Thus, the idea of low-carbon cities has been raised at the international level. Efficient use of energy, better use of public transportation systems, improving recycling and increasing public awareness are the important factors in achieving the low-carbon cities. Urbanization is increased in all developing countries in the process of moving on the path of economic growth and development. In this path, our country is faced with rapidly increasing urbanization. Some shortcomings in urban management created many problems such as environmental problems especially for big cities. Due to the importance of sustainable urban management and urban development, focusing on the establishment of a comprehensive program to reduce carbon emissions in cities is a prerequisite for the development of public transport increasing the efficiency of energy consumption, financing the emission reduction projects, improving the recycling system of municipal solid waste on the role of urban management and taking a step in the direction of low-carbon cities. Thus, developing the carbon emission reducing plans is inevitable in urban management structure along with the growth and development of cities.

Keywords: urbanization, urban management, energy consumption, greenhouse gas emissions, low-carbon city

INTRODUCTION

Nowadays, the effects of global climate change are as a real phenomenon that has attracted the attention of the international community. The economic and social development caused by this phenomenon has put all communities at risk and they are not immune from damage. Low-carbon economy is a concept that focused the minds of all officials on the entire world, the idea of low carbon cities has also been raised. Undoubtedly, the damage caused by global climate change will affect developing countries to higher levels because these countries are forced to apply some changes such as on the path of economic growth

and development. Accordingly, uncontrolled expansion of cities is one of the problems that require thorough planning and a good urban management. In fact, cities are the growth engines and industrial development stimulator in each country, and high urban infrastructures are needed to respond to the population. Therefore, it should be said that generally, energy consumption in cities is high and thus, it will lead to serious damage to the environment. The various statistics show that urban development has caused about 50 percent of greenhouse gas emissions that are widely affected the global warming [1]. Therefore,

cities and sustainability are two inseparable components. One of the prerequisites of sustainable urban development is urban management, which responds the present generation and future generations within the framework of a healthy environment. In such conditions, the managers' task is a comprehensive planning that can maximize the economic growth, people's well-being by removing the negative environmental effects. Sustainability will be achieved in this way for urban development and for this generation and future generations.

Low-carbon cities are the subset of sustainable cities, in which the emissions of greenhouse gases are minimal. The purpose of carbon emissions reducing in such a city covers all aspects of production, transport, energy, and so on. Moving towards a low-carbon city on the one hand requires high levels of energy efficiency and the development of products with minimal carbon emissions, processes and services that can even bring income and employment on the other hand. Given that the low carbon economy strategies have been approved recently by the board of government, some of its requirements directly considered emission reduction in urban areas. In this paper, the concept of carbon city in sustainable urban development is expressed, and the overall conditions of urban areas were evaluated and then, some solutions are provided for moving towards low-carbon urban areas.

The concept of low-carbon city based on sustainable urban development

The concept of low-carbon city based on sustainable urban development is an issue that has attracted the attention of the international community, and gradually, it has opened a new model in the current scientific literature on development and urban planning. Although, this model has different perceptions and interpretations, but totally, it can insist on stability and continuity of development for all people and future generations over time and over all aspects of economic, social, and environmental development of the city [2].

Totally, priorities for sustainable development are focused on environmental friendly technologies and minimizing the effects of development on the environment. The policy is based on four dimensions: energy, environment, economy, and society and follows the following objectives [1]:

1. Reduction of energy consumption, while improving economic development
2. Facilitating the growth of industrial production using green technology and improving its contribution to the national economy
3. Enhancing the capability and operational capacity to innovate in the development of green technology and improving green technology competitiveness in the global arena
4. Ensuring sustainable development and protecting the environment for future generations
5. Increasing training and public awareness of green technology and promoting its widespread use

These priorities require appropriate policies and strategies to achieve sustainable development and their success is measured due to three coordinated set of indicators, i.e. environmental, social, and economic indicators.

Although there are different definitions for green cities, but the most important definition is a city that has three pillars of sustainability, namely the definition of the urban environment, economy, and society. Therefore, the green and low-carbon city is placed in the same direction of a sustainable city and many tools are available to support it. While its objectives in line with the objectives of sustainable urban development encompass the following:

- In a low-carbon city, all the resources (especially energy) should be used as an effective and efficient energy conversion equipment, combined heat and power should be used to produce fuel.
- Producing the required energy should be produced using resources and methods with

minimum carbon production, such as clean fuels.

- In a low-carbon city, it is essential to minimize or recycle all waste.
- In a low-carbon city, there should be a high level of information about the priorities of social and environmental responsibility among individuals and institutions.

In order to move on the path to sustainable urban development, which is defined as the subset of low carbon cities, it is required to evaluate the performance of cities in measuring the levels of carbon emissions. For this purpose, the relevant institutions adjusted a framework and helped stakeholders and different urban levels by considering the purpose of the national emissions reduction to identify their priorities in cities and determine specific measures to reduce carbon emissions. Accordingly, if the purpose of the national emissions reduction to be defined at the national level and the programs to be on the path of the realization of low-carbon city, then, all institutions and organizations in urban areas such as municipality and so on assess their performance indicators after determining strategies [1].

Urbanization, energy consumption, and greenhouse gas emissions

Expansion of cities is defined as a development with low density of population growth. Uncontrolled urban expansion destroys open spaces, and it leads to an overall reduction in urban congestion, and encourages the greater use of the car. In addition, by the expansion of the urban area, societies are tended to combine weak housing, jobs, and services. They have limited commercial areas, and activity centers and limited options for walking and cycling (Ewing, et al. 2002). The rate of vehicle ownership is dramatically higher, compared with urban areas, while the use of public transport is significantly lower. People often pass longer distances, the facilities of transport are many times larger and a range of air pollutants related to transportation is higher. Reduction of open spaces, air pollution, energy consumption, loss of agricultural lands,

reducing the diversity of plant species, increasing runoff and flood risk, ecosystem fragmentation, increasing noise pollution and increasing the surface temperature are the most important effects of urbanization [3].

According to the Intergovernmental panel on Climate Change, more than three-quarters of the world's greenhouse gas emissions from fossil fuel consumption are as the most important source of energy in the world. Many studies have confirmed that urbanization affects the energy consumption pattern and causes the indiscriminate use of it [4]. In fact, since energy consumption is a major factor in production, it can transfer the workforce from agriculture to industry. On the other hand, due to concentration of industrial production in urban centers, the transfer of labor to the industrial sector is associated with urbanization. It seems that the main reason for the increase in energy consumption following the urbanization is changing the consumption pattern of people, increasing the demand for goods and services, and thus, increasing the scale of production and increasing the energy consumption in the transport sector to produce personal cars and changing in the public transport system, both passenger and cargo. Therefore, it can be said that urbanization has led to high-energy consumption and a significant share of energy demand [5], [6].

Such a result is consistent with the economic literature because the process of development and industrialization needs to consume more energy. In addition, based on the Lewis model, industry sector requires rural labor force released from agriculture sector. Along with migration and urbanization, an excessive pressure is imposed on energy demand due to the need develop infrastructures and changing domestic consumption patterns [4]. On the other hand, there is the fact that cities are the biggest consumer of energy and the biggest emitter of greenhouse gases (Ishii et al., 2010). In fact, the relationship between energy consumption and greenhouse gas emission levels have been demonstrated in many studies because more than 90% of the energy

consumption in the world is due to fossil fuels and inefficiency in using these fuels leads to very high dosage of greenhouse gas in the atmosphere.

Expansion of cities and their problems in Iran

Like many developing countries, Iran has experienced rapid growth in urbanization. Whereas the country's population has increased from about 70 million in 2006 to 75 million people in 2011 with the growth rate of 3.1%. At the same time, the urban population increased with the growth rate of 1.2% compared with 2006 to 53 million in 2011 while the rural population of the country has experienced a negative growth in and it has reached 21 million in 2011 from about 22 million in 2006 [7]. These statistics show the

more willingness of the public to urbanization. Therefore, by inverting the ratio of urban population to rural areas, the challenges of urbanization and social and environmental problems, especially air pollution from the excessive growth of cities became a trouble and emptying the old population centers, particularly in border areas damaged the country.

Whatever the energy consumption to be higher the greenhouse gas emissions are increased, this trend will continue if no adequate reduction policies be considered. Based on the energy balance of the Ministry of Energy in 2013, the amount of carbon dioxide emission has been increased by increasing the energy consumption in the country (Fig. 2) [8].

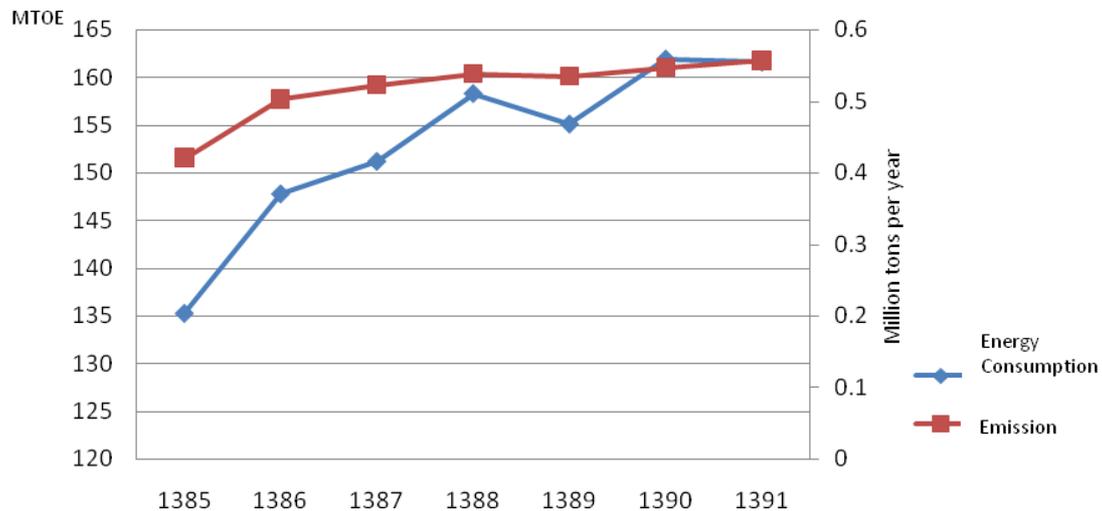


Figure 2. Energy consumption and carbon dioxide emissions (2006-2011) [9]

In the past decade, Iran was affected by urbanization phenomenon and it has abundant energy resources. Thus, it has experienced a rapid growth in energy consumption especially fossil fuels. Along with the low level of environmental friendly technologies, it has numerous environmental problems in cities, especially in metropolitan areas in recent years. Therefore, the bulk of greenhouse gas emissions (carbon source) in the country can be due to the cities.

In general, urban development in Iran has its own characteristics. Urban spaces have not been developed proportional to urban population

density and access to the north, south, and center of the city. Therefore, although the population density in the city centers is declined, but the access to services has not been formed proportionally. Such a condition has affected the pattern of urban transport and travels. Therefore, the transport demand has been affected through the number, length, time, and type of travel. In the recent decades, many Iranian cities especially in metropolitan areas have experienced uncontrolled expansion. The current trend has caused decentralization of population to longer trips and dependence on cars, development of transport

infrastructure, increasing urban tough levels and decreasing the green spaces in the city center. Such problems will increase the unplanned development of new areas, especially around big cities. Due to the lack of public transport systems that entails more use of personal vehicles, many environmental effects, including the loss of urban open spaces, increasing air pollution, increasing surface temperature and noise pollution, especially in urban centers [9].

Municipal solid waste can be added to all the above-mentioned problems that have affected the level of greenhouse gas emissions in urban areas by increasing the frequency of methane emissions. Other problems are the lack of unified urban management, lack of balance to prevent excessive concentration of population in metropolitan areas, inconsistency of planning regulations with the objectives of sustainable urban development, inefficiency of urban management at the local level, the lack of consistent in urban development plans and as an important tool for urban planning with the situation in Iran [10] and financial resources. These problems have caused that Iranian cities, especially large cities have the huge gap with the principles of a low-carbon city. However, strategies for low-carbon economy are approved by the government in accordance with the policies of f resistive economy that has paid special attention to the cities, especially large cities.

CONCLUSION

In general, the development of human societies, urbanization, and population growth will increase environmental problems by increasing demand for energy. The rapid increase in urban population and consequently, the development of its surrounding areas in large cities in developing countries are growing concerns about the environmental impacts of unplanned urban impacts. Therefore, due to the huge impact of cities on the amount of greenhouse gas emissions, low-carbon urban development should be a priority for city planners and politicians. Because

the low carbon cities with the approach of reducing greenhouse gas emissions at all levels are trying to coordinate urban life and sustainable development.

Thus, the urban population is still increasing and the structure of urban life requires more use of energy and fuel, particularly in the field of shipping and handling. On the one hand, the increase of urban population has increased the levels of greenhouse gas emissions and on the other hand, this population is now facing with very grave problems that have influenced their lives. Therefore, based on this study, some suggestions are proposed for moving towards low-carbon cities of the country:

- Providing a proper ground and developing rural area while maintaining an appropriate balance of population in order to encourage the rural population
- Comprehensive planning in cities, especially in metropolitan areas
- Development and transfer of new technologies and especially environmentally friendly waste and municipal solid waste
- Increasing the efficiency of energy consumption in dependent or direct urban industries
- Financing projects that reduce energy consumption and carbon emissions
- Development and improvement of public transport in cities, especially in metropolitan areas
- Increasing the recycling of produced waste
- Equality in access to urban services
- Public education to the citizens to use public transport and garbage and waste separation at source

Thus, the Board guidelines based on developing low-carbon economy in accordance with resistive economy policies and the tasks of municipalities and relevant organizations represent the wisdom and insight of the government in this way. However, all the programs in these guidelines can be achieved if the authorities properly in this

regard. On the other hand, the required financial resources of the listed projects are supplied in these guidelines. In addition, it is recommended to evaluate the scope of the guidelines and their implementation and the former policies.

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