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POSSIBILITIES OF DIGITALIZATION OF RUSSIAN CITIES USING PUBLIC-PRIVATE PARTNERSHIP TOOLS

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Abstract

According to the UN, over the next 20 years, about 40% of the world's population will move to cities, and by 2050, 66% of the world's population will already be urban residents (World Urbanization Prospects, 2014). Modern cities face overpopulation, pressure on the environment, traffic load, growing social discomfort. Already, cities consume 65% of the world's energy and emit into the atmosphere 70% of all carbon dioxide produced by industry. However, in the future, cities should become a place for solving problems of inequality, poverty and unemployment. Achieving the limits of reliability and functionality of the existing urban infrastructure will lead to the need for another management of energy, materials and transport flows based on digitalization. In the scientific literature, such changes in the functions of a city are called intellectualization, and the city itself, under the new paradigm, is “smart.” A smart city is an innovative city, the effective existence of which is ensured by information and telecommunication technologies. The interaction of “city-service, city dweller - consumer” in a smart city turns into cooperation. A public-private partnership (hereinafter - PPP) can provide a more dynamic implementation of tools of a smart city and bring significant social and economic benefits. The attractiveness of investments in tools of a smart city is due to the profitability of public sector investments, since these tools can quickly and easily scale (platform and network effects).

Keywords: Economy digitalization, smart city, environmental problems of cities, public-private partnership.

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1. Introduction

According to experts of McKinsey Global Institute, urbanization is one of the main subversive forces that influence the global landscape. By 2030 the 750 largest cities will account for: 35% of the world population, 30% of all jobs, 61% of world GDP (Future trends and market opportunities in the world's largest 750 cities, 2016).

By 2025, 75% of economic growth will be in cities. One of the world's leading urbanists, professor Edward Glaser (Harvard University), argues that "there is almost an absolute correlation between urbanization and economic prosperity of countries: on average, along with an increase in the country's urban population by 10%, the per capita income in this country increases by 30%" (Glazer, 2014). According to urbanist Anthony Townsend, modern cities need a transition to an integrated digital urban ecosystem, in other words, digitalization (Townsend, 2014).

The roots of the concept of "smart city" go to the concept of the Smart Community, which first appeared in 1993 in Silicon Valley. A smart community is a focused cooperation of society, state and market players to improve working and living conditions using information technology. Over the past 10 years, the emphasis on the concept of a smart city has shifted more and more from the technological "equipment" of the city to the institutional one. Now a truly smart city is a place where conditions are created for the development and build-up of human and social capital (Mapping smart cities in the EU, 2016).

Various international organizations and companies share the view that the development of the city should be integrated through effective use (Smart cities Ranking of European medium-sized cities, 2007) of:

- Natural resources (energy efficiency, renewable energy, saving resources, environmental protection);
- Human and social capital (public participation, access to technology, access to learning, social interaction);
- Activity of its citizens (proper consumption, healthy lifestyle);
- Economic resources (productivity, creation of new urban services and business models, interregional and international cooperation);
- Transport systems (environmentally friendly urban transport and infrastructure for it, integrated transport systems);
- Administrative resources (involvement of citizens in making socially important decisions, open data, convenient services).

The development of "smart" cities in the next ten years will add about 5% to the growth of global GDP. According to forecasts of Kaspersky Lab, in 2025 there will be at least 88 smart cities in the world, and according to Frost & Sullivan's calculations, by 2020 the global technology market for smart cities will reach $ 1.565 trillion (Strategic Opportunity Analysis of the Global Smart City Market, 2016). At the moment in Europe there are more than 240 cities applying for smart status. The International Expert Council of the World Economic Forum on Future Software conducted a survey among 800 senior executives to find out when, in their opinion, the turning point, and the technology of the fourth industrial revolution will be

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in the public domain. Regarding the smart city, the conclusions were as follows: the first city with a population of over fifty thousand people and without traffic lights will appear by 2025 (Schwab, 2016).

2. Problem Statement

According to research by McKinsey Global Institute (Technologies of smart cities: what influences the choice of citizens, 2018), modern solutions for a smart city can have the following socially significant effects:

- Reduce mortality by 8-10%;
- Reduce the incidence of 8-15%;
- Reduce greenhouse gas emissions by 10-15%;
- Increase emergency response to emergency situations by 20-35%;
- Reduce the average time spent on the way to work by 15-20%.

There are also threats to digitalization of the urban ecosystem: a decrease in confidentiality, threats to leakage of personal information, risks of technological collapse, increased vulnerability to cyberattacks (Elmaghraby & Losavio, 2014).

The authors of the article are interested in the tools of smart cities related to the protection and improvement of the quality of the environment, such as: digital solutions for organizing work with waste, including payment mechanisms, waste monitoring, optimization of household waste collection, intelligent public garbage presses.

In countries where smart cities have a more developed infrastructure, 70% of the tools are managed by the state. According to McKinsey (Technologies of smart cities: what influences the choice of citizens, 2018), private companies can provide up to 60% of the initial investment needed to realize all the possibilities of applying such solutions. Moreover, over half of the initial public sector investment in this area turns out to be profitable, which opens up additional prospects for cooperation between public and private enterprises. The purpose of this article is to analyze the practice of implementing projects of a public-private partnership in the environmental field as tools of a smart city.

3. Research Questions

The service approach underlies economy digitalization and platformization. The transition to smart cities can be considered as one of the elements of the accelerated pace of economy digitalization. For Russia, this is extremely important, since the pace of transition to a digital economy is quite low. In connection with these it is necessary to formulate the following research questions for this study:

1. How can environmental problems be solved in a smart city?

2. What challenges do Russian cities face?

3. Is it possible to use the practice of a public-private partnership in the field of environmental protection to finance the tools of a smart city and economy digitalization?

4. Can PPP projects in Russia be a real tool for developing the components of a smart urban environment

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4. Purpose of the Study

The purpose of this study is to analyze environmental tools of smart cities, as well as the possibility of their financing on the basis of public-private partnership tools.

5. Research Methods

5.1. Hypotheses development

In Russia, approximately 74% of the population lives in cities, many of which are close to the limiting values of reliability indicators of their infrastructure (Priority areas for the introduction of smart city technologies in Russian cities, 2018). Many cities in Russia face large-scale challenges (high levels of deterioration of urban infrastructures, increased environmental pressure, a shortage of budgetary resources, etc.), which, based on international experience, can be overcome if they are intellectualized and digitized.

The digital transformation of the city involves solving the problems of socio-economic development using information and communication technologies. The introduction of tools of a smart city depends (if it is not a green-field project) on the economy of the urban space and accumulated structural imbalances in the development of infrastructures.

Challenges for Russian cities. A rare Russian city does not experience the consequences of the legacy of a command economy in terms of space organization. First, this is reflected in the lack of transport and engineering infrastructure. The existing approach was not aimed at creating a comfortable urban environment. The main principle was the effective placement of the population and labor resources as close as possible to production centers. At present, accumulated structural imbalances in the economy of Russian cities are: dead zones with non-functioning industrial enterprises in the city center, lack of business districts, the undeveloped road network.

A public-private partnership (hereinafter - PPP) as a complex but a promising tool for financing projects of a smart city. World experience shows that environmental stress and accumulated environmental damage can be reduced through the use of PPP.

5.2. Data collection and analysis

The procedure for collecting and analyzing data is an integral part of any research. In this study, the data were obtained on the basis of a study of the statistical information of Rosstat, analytical reports of the United Nations, McKinsey, BCG, PwC, and the Center for strategic development.

6. Findings

1. The term “smart city” first appeared in the early 2000s. The points of view regarding the essence of a smart city were modified as follows:

- A smart city is the virtual space of a city using the IT infrastructure and the Internet (Ishida & Isbister, 2000);
- A smart city has “smart” management (e-governance) - local authorities involve other urban space participants in the development and implementation of information and communication technology policies (improving information accessibility, the adequacy of its content and infrastructure (Van der Meer & Van Winden, 2003);

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- A smart city is a city that can attract high-level specialists (Murray, Minevich, & Abdoullaev, 2011);
- A smart city is a city that can attract and accumulate innovation (Florida, 2005);
- A smart city is a city which has transport and telecommunications infrastructure, information technology, creative industries, digital media, and citizens' initiative provide political stability and economic development (Hollands, 2008);
- A smart city is the interaction of citizens and authorities, the active involvement of citizens in the life of the city (Lombardi, Giordano, Farouh, & Wael, 2012);
- A smart city is a smart environment that opens up the possibility of innovation strategies for each person and company through mobilization and networking (Komninos, 2015).

In its most general form, we can say that a smart city is a set of information-technological and communication technologies for solving social problems, improving the quality of life, increasing competitiveness of a city based on the interaction of business, government and society on the principles of sustainability, which implies satisfaction of current generations without detriment for the future. Such a city was named a smart sustainable city (SSC).

2. In most countries of the world, the infrastructure of “smart” cities takes place on the basis of a public-private partnership (Technologies of smart cities, 2017). For example, according to the company Deloitte, the project “100 smart cities” in India worth 150 billion dollars will get only $ 30 billion from the federal budget.

Global practices for solving environmental problems using tools of a smart city (including using public-private partnerships):

1) Songdo City, South Korea. Efficient flexible energy grid, adapting to changing demand (energy consumption decreased by 30%), free parking for low-emission vehicles, a system for saving water, resulting in 10 times less clean water consumption than in ordinary cities, Pneumatic refuse chutes in Songdo dwelling houses automatically remove rubbish from the apartments and sort household waste, some of which will be recycled and used to generate renewable energy.

2) “Green” city Masdar, United Arab Emirates. A grand plan for the city in 6 square km - zero emissions into the atmosphere. It was meant infrastructure for electric vehicles, buildings that give a natural shade, installation of street controllers to maintain a comfortable temperature. The crisis has suspended funding for development projects. Construction is completed by 5%, emissions in the atmosphere are reduced only by 50% compared with other cities in the UAE.

3) Innopolis, Kazan, Russia. Green-field project. Rent of electric vehicles instead of public transport, there are no gas stations in the city (only points for charging electric cars), there are no traffic lights, since traffic flows are weak.

4) Barcelona, Spain. The Sentilo platform, developed by the Barcelona Informatics Institute in 2012, allows different sensor systems at urban infrastructure sites (9 thousand sensors) to exchange data. Platform services record air temperature, noise level, trash container load level, parking load level, water level in reservoirs, road traffic, electricity consumption, gas consumption, soil moisture. The project is funded through a public-private partnership.

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5) Vienna, Austria. The city administration, in partnership with a local energy company, attracts citizens as investors in solar power plants. Citizens pay the full cost of the solar panel (or half the cost), and then the energy company rents the panels from the citizens and pays them 3.1% of the purchase price annually.

6) Toronto, Canada. Waterfront Coastal Renovation. The Berth project creates an image of a quarter where smart refuse chutes arranged on the principle of "pay after being thrown away" separate recyclable garbage and bill owners according to the amount of garbage they throw away. The project is funded through a public-private partnership - a partner of the city administration is a subsidiary of Alphabet (Google) Sidewalk Labs, ready to invest in the project $ 50 million.

7) Dallas, USA. Dallas Water Company has partnered with renewable energy company Ameresco to open an innovative biogas energy recovery facility. Dallas expects to annually save at least $ 1.5 million and compensate for about 60% of the electricity that the Dallas water company "takes" from the network.

8) Singapore. The use of "smart" lighting systems on the streets and in large buildings allows reducing energy costs by 40%.

9) Shenzhen, China. Chinese government analysts predict that by 2020 the volume of water shortages in the city will be 694 million cubic meters. To solve this problem, the city water supply system was equipped with two million sensors combined into a single system based on Huawei's eLTE technology. Sensors allow collecting data on how water is consumed and to redirect its flow in real time.

10) London, United Kingdom. London's authorities are set to achieve an ambitious goal by 2025 - to reduce carbon dioxide emissions by 60% by reducing power consumption, reducing the average time cars spend for daily movement in the city, as well as reducing the amount of fuel used to control the climate in urban areas, transport and public buildings. To do this, in the British capital there will be installed several million "smart" sensors that will collect information on the energy consumption of different urban systems.

11) Dubai, UAE. Intelligent garbage collection: the route of machines that take out garbage is planned on the basis of sensor readings that convey information about the fullness of garbage containers.

In general, according to Frost & Sullivan, from 2012 to 2025, the fastest growing segments of the smart city market in the coming years will be charging stations for electric vehicles, intelligent waste management systems, environmental sensors, smart parking systems and smart street lighting - an average of 12% per year as technological solutions become available.

3. In terms of the speed of urbanization, Russia is moving closer to global trends: today, 38% of the state's population is concentrated in 81 of the largest cities, where almost half of the country's GDP is produced. At the same time, the level and pace of digitization of Russian economy is quite low. In 2010-2015 the contribution of the digital economy to GDP was 2.1% of GDP, which is 3-4 times less than the leaders of digitalization (South Korea, Denmark, Great Britain, Sweden, Norway, the Netherlands) and 1.5 times less than the average for the OECD (New technological revolution: Challenges and opportunities for Russia, 2017). Therefore, the Russian experience in developing smart cities cannot be called successful - data from various ratings speaks about this, the patent activity in the field of smart city technologies, a small number of scientific publications, a number of references to technological solutions of cities in media, low events in cities (various conferences to discuss issues of effective spatial development).

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Attention in Russia to the changing role of the city in the economy can be found in several documents at various levels:

1) Message from the President of the Russian Federation V. V. Putin dated March 1, 2018 and in Presidential Decree dated May 7, 2018 No. 204 "On the National Goals and Strategic Objectives for the Development of the Russian Federation for the Period up to 2024" (a radical increase in the comfort of the urban environment raising the quality index of the urban environment by 30 percent, reduction in the number of cities with an unfavorable environment in accordance with this index by half, development of a mechanism for direct participation of citizens in creating a comfortable urban environment, increase in the share of the population involved in addressing the urban environment will be up to 30 percent);

2) The program "Digital Economy of the Russian Federation", adopted by the Government of the Russian Federation in 2017 (creation of information infrastructure);

3) Memorandum on the establishment of the National Consortium for the Development and Implementation of Digital Technologies in the Field of Urban Management, signed in 2017 (definition of pilot territories (50 cities) and development of a roadmap, including: the use of digital platforms for managing smart cities, projects to introduce unmanned vehicles, transparency and efficiency of housing and public utilities, creation of favorable conditions in cities for the development of high-tech companies and projects, other initiatives). Now, a list of 25 pilot municipalities has been approved in which smart city technologies will be introduced;

4) Priority project "Formation of a Comfortable Urban Environment", approved in 2016.

Within the framework of the national program "Digital Economy" it is planned to implement the federal project on digitization of urban ecosystems "Smart City". The two main objectives of the project are to ensure sustainable urban development and improve the quality of life of people living and staying in cities through digital transformation of the urban sector; increasing the efficiency of municipal resources through the use of digital technologies and the expansion of a public-private partnership.

Among the targets:

- The number of constituent entities of the Russian Federation on whose territory the activities of the "Smart City" are implemented, including those in the Knowledge Base of Smart Cities (five in 2019, 85 - in 2024).
- Percentage of residents of urban districts of the Russian Federation over the age of 14 who have the opportunity to participate in decision making on urban development using digital technologies (1% in 2019, 60% in 2024).
- The average value of the intelligence index of Russian cities ("IQ Cities").
- The number of cities whose urban management is carried out using smart systems (integration of information and communication technologies for managing urban resources is implemented) (0 in 2019, 70 in 2024).
- The share of cities in which more than 80% of apartment buildings are connected to intelligent accounting systems of utility resources (0 in 2019, 80% in 2024).

It should be noted that in the world practice there is no single approach to the criteria of a smart city. In general, it is the availability, accessibility, completeness, convenience and involvement of society in the technological and information infrastructure of the city. For example, in the Smart City Index rating (500

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cities, 19 criteria) in 2017, only two Russian cities are represented: Moscow ranked 77th, and St. Petersburg - 88th. In this rating, the environmental aspect is expressed in the following indicators (Table 01):

- Clean energy (percentage of electricity production from renewable sources);
- Smart construction (investment in research and development, as a percentage of GDP, energy efficiency of buildings, GDP per unit of energy use);
- Waste management (percentage of waste to be disposed of);
- Environmental protection (greenhouse gas emissions per capita, CO2 emissions per capita).

Table 01. Comparison of sustainability indices for individual cities according to the Smart Cities Index rating

Country (place in rating)	Sustainability indicator			
	Clean energy	Smart construction	Waste disposal	Environmental protection
Copenhagen (1)	7.92	9.83	8.24	6.11
Singapore (2)	2.26	8.44	7.62	7.15
Stockholm (3)	8.44	6.88	8.94	8.79
Zurich (4)	8.62	10.00	10.00	8.70
Tokyo (5)	3.86	8.36	8.24	4.25
Moscow (77)	4.20	1.43	5.41	1.69
St. Petersburg (88)	4.20	1.43	5.41	1.95
Mexico City (100)	4.03	3.08	1.44	8.10

4. At the moment, the ecological situation in Russia is not uniform across regions and cities, but in general it can be said that the main environmental problems are related to the accumulated environmental damage from past aggressive production and business activities and to an extremely high anthropogenic load in the existing system of production of goods and services and mining. Such a situation did not arise in one decade, but it was aggravated afterwards by a significant weakening of the environmental policy and negative changes in the institutional environment in the field of environmental protection (EP) in the early 2000s (Larin, Mnatsakanyan, Chestin, & Schwartz, 2003).

Russian cities face the following challenges (Table 02):

- High environmental load;
- Wear urban infrastructure;
- Lack of financial resources (in rare cases, the development of a smart city does not depend on budget opportunities, for example, Kazan and Yekaterinburg (Smart Cities Index, 2017));
- Increasing demands of citizens for environmental quality (ecological migration, secondary urbanization).

Table 02. Challenges for Russian cities (statistical evidence)

Indicators	Years				
	2005	2010	2015	2016	2017
Failing housing stock, million m^2	11,2	20,5	19,6	22,7	24,6
The ratio of failing housing in the total area of the entire housing stock, percent	0,5	0,6	0,5	0,6	0,7

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The degree of depreciation of fixed assets by type of economic activity “production and distribution of electricity, gas and water”, in%	52,2	51,5	44,5	45,6	43,8
The degree of depreciation of fixed assets by type of economic activity “the provision of other utilities, social and personal services”	39,8	44,5	40,8	41,0	45,4
Street water supply network that is to be replaced, thousand km	125,5	147,7	165,4	168.2	169,4
Number of accidents in the water supply system, thousand	197,7	170,0	86.7	74.5	64,4
Use of sewage treatment plant capacity - total, percent (in urban area)	59	54	46	47	46
Street sewer network that is to be replaced, in% as a percentage of the entire length (in urban areas)	30,5	37,4	43,6	45	44,7
The number of sewage accidents, thousand (in urban areas)	38,4	39,2	37.2	31.3	31,7
The length of heat and steam networks in double-pipe terms that are to be replaced - total, km	34743,9	38704,2	138405.8	139680,8	138095,8
The number of accidents at heat sources, steam and heat networks - total	18460	8885	3819	3954	3994
Heat losses in networks, as a percentage of heat supply	9,0	10,5	10.9	11,6	11,0
Waste production and consumption - total, million tons	3035,5	3734,7	5060,2	5441,3	6220,6
Disposal of waste at the facilities owned by the enterprise - total	2077,3	2227,5	2333,1	2620,8	3204,5
of them in:					
Waste storage	1670,9	1634,5	1978,1	2105,3	2378,5
Waste burial	406,5	593,0	354,6	503,8	826,0
Emitted pollutants - total	35835	32353	31269	31617	320831)
The share of emissions from stationary sources in the total volume of pollutants,%	57,0	59,1	55,3	54,9	54,5
Investments in fixed assets aimed at environmental protection and rational use of natural resources, million rubles	58738	89094	151788	139677	152996
Commissioning of protection capacities from water and atmospheric air pollution: Wastewater treatment plants, thousand m^3 per day	1292	462	360	411	1197
Water recycling systems, thousand m^3 per day	1090	1050	1906	464	1216
Installations for the retain and disposal of harmful substances from exhaust gases, thousand m^3 per hour	4209	4563	3318	1598	2609

5. The introduction of “smart” technologies in the city requires significant financial costs from the government and business. According to Microsoft estimates, the cost of creating the technological basis for intellectualization of 100 large cities in Russia could amount to $ 3-4.5 billion. Profitability of more than half of the state’s initial investment in the tools of a smart city opens up additional prospects for public-private partnerships. Private companies can provide up to 60% of the initial investment needed to realize all the possibilities for applying such solutions.

A public-private partnership is a contractual agreement between a federal, regional or local government and private sector entity (or non-profit organization) in which a private partner provides infrastructure maintenance services to or on behalf of the state (Jescombe, 2015). This tool is one of the

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most difficult from the point of view of achieving a balance between all parties (exposure to risk and joint benefits) under the conditions of a high demand for project supervision (Saldaeva et al., 2016). The use of this mechanism for the development of smart cities is very often considered as the most difficult tool for raising funds (Smart Cities Financing Guide, 2015).

Despite the relatively insignificant experience in implementing PPP projects (as compared with the UK, Australia, Germany, France), the PPP sector in Russia has actively passed the generation stage in the following sectors: social sphere (medical facilities, pre-school and school education facilities), transport (motorways and airports), energy (water supply and sewage, heat supply), municipal sphere (objects of solid household waste). There is no separate category of PPP projects "Environmental Protection" in Russia - these or other issues of environmental protection and liquidation of accumulated environmental damage are contained in the projects of "waste recycling", "water supply and wastewater disposal", "waste management" - these projects have significant potential for solving environmental problems for various territories.

At the federal level (Figure 01), communal-energy (2429 projects), social (368), transport (87 projects) remain priority sectors. At the same time, environmental management facilities should be considered as one of the priority areas for the use of PPPs. The scope of such projects: PPP projects in the field of environmental protection can be aimed at environmental modernization of enterprises, waste management, conservation and restoration of biological diversity, restoration and increase of recreational potential of territories, development of tourism infrastructure, integrated development of territories, development of urban and suburban parks, national parks and reserves, unique natural objects, combined with the right to exploit natural or recreational resources.

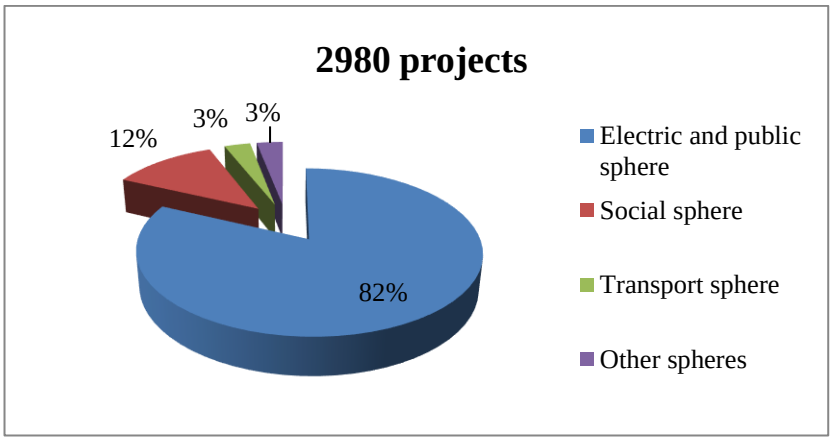

Figure 01. Distribution of PPP projects in Russia by spheres

The regulatory framework for a public-private partnership in Russia does not spell out the possibility of integrating elements of the IT infrastructure into projects (only physical infrastructure), and there is no mention of a smart city. For example, when considering PPP projects, for example, in the field of solid waste management, it becomes obvious that these projects are far from "intellectual". Of the 120 projects, the majority is the transfer of a landfill for solid municipal waste disposal. It is unprofitable to recycle garbage in Russia (low tariffs, low content of components valuable for recycling and energy production). Plants in Europe take household waste at a price of 120 Euros per ton, while in Russia this tariff is several times less - 612 rubles per ton. Construction of waste

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treatment facilities is possible only with significant amounts of incoming waste or an attractive tariff for recycling, ensuring a return on investment. Recycling garbage in Russia almost does not develop. Not a single region has moved to recycling of waste on an industrial scale. The plant in Levashovo, which is being built near St. Petersburg, is one of the few examples of PPPs that are being implemented in the waste treatment sector. But this project cannot be attributed to a digital one. None of the ongoing projects in the field of solid waste management has digital tools. It should be noted that it is the high tariff policy that makes the country energy efficient, and the cities - "smart".

There are certain "backlogs" of smart technologies in the urban environment in energy saving: 25 stations have been installed in St. Petersburg to receive housing and utility data, which can receive information from 4 million sensors installed at industrial facilities and apartments; in the Sverdlovsk region, a regional energy saving information system was introduced, which consolidates data on municipal systems of the region, allows forming an energy efficiency rating of municipalities, carrying out heat and hydraulic calculations online, developing an interactive regional heat and water supply scheme.

7. Conclusion

The changing role of the city in the modern economy and the extremely dynamic processes of urbanization necessitate the need to improve the efficiency of the urban infrastructure through its technological transformation. A smart city provides a safer environment, higher quality education, reduced carbon dioxide emissions and an increase in recycling rate, greater employment opportunities, easier access to public services, turning from habitat into a service that a citizen actively "consumes" and improves. The technological basis of smart cities forms the Internet of things, various devices are connected to a single platform that allows managing the urban infrastructure. The principles of creating a "smart city" include a comfortable and safe environment, traffic and pedestrian traffic management, "smart utilities", quality management of urban resources, and the economy of service and sharing.

Scaling technological solutions of a smart city makes them attractive for the state, business and local communities. The tools of a smart city can be: automation systems of public buildings, smart street lighting, automated power distribution systems, personalized training, telemedicine, a system for monitoring infectious diseases, environmental monitoring tools, early warning systems for natural disasters, crime maps, wearable devices connected to the Internet, intelligent traffic lights, unmanned vehicles, paid entry to areas of the city overloaded with transport and much another. The functioning aspects of the urban ecosystem of a smart city may be different, but they are all united by a technological and information infrastructure that optimizes interaction processes. The service approach (city - service, city dweller - consumer) underlies economy digitalization and platformization. The transition to smart cities can be viewed as one of the elements of accelerated digitization of Russian economy. Intellectual resource management will improve the environmental situation, increase resource savings, environmental friendliness and comfort of living in cities.

Within the framework of the national program "Digital Economy" in Russia, it is planned to implement the federal project on digitization of urban ecosystems "Smart City". The two main objectives of the project are to ensure sustainable urban development and improve the quality of life of people living and staying in cities through digital transformation of the urban sector; increasing the efficiency of the use

of municipal resources through the use of digital technologies and the expansion of a public-private partnership. PPP projects in Russia can become a real tool for intellectualization of the urban ecosystem if they are able to integrate IT solutions, thereby denoting the priority of digital transformation and transition to new generations of technologies in the areas of utilities, energy and transport.

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