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The principles of the green economy in the context of agglomeration: evidence from Big Ekaterinburg

N A Vukovic¹, V A Larionova² and V V Biryulina²

¹ Ural State Forest Engineering University, Ekaterinburg, Russian Federation

² Ural Federal University named after the first President of Russia B. N. Yeltsin, Ekaterinburg, Russian Federation

e-mail: shpak17121978@gmail.com, viola-larionova@yandex.ru, vivvvv99@gmail.com

Abstract. The authors consider an urban agglomeration as a more integral informal economic subject uniting economic interests of its municipalities and expressing interests of the territory which can become a driver of the “green economy” strategy. High level of social and economic development of an agglomeration kernel, and high capabilities related to minimization of environmental risks and multiplying natural capital of the small cities allows synchronization of economic growth, optimal use of natural resources and decreasing decoupling effect. Using Big Ekaterinburg as an example of urban agglomerations the authors have shown that strategic planning documents on the municipal level require cardinal revision in the context of complex development of the territory, “green” economy principles implementation and harmonization of relations among the economy, society, and environment.

1. Introduction

Creating modern habitat environment and extensive program of Russian Federation spatial development, including development of the cities and other settlements relates to complex resolution of multiple issues. City environment renovation is tightly connected with compliance to the high standards of ecological prosperity, and is a priority task with regard to stability and sustainable development of the country, which was reflected in the Address to the Federal Assembly by the President of Russian Federation, dated March 1, 2018 [1] and determines actuality of this study.

It is important that urban development becomes motive force in developing the country as a whole. Active and dynamic life of Russia with its vast territories cannot concentrate within the several metropolitan cities. Large cities shall distribute their energy, and become cornerstones for the balanced and harmonic spatial development of the whole country. Well developed communications of the centers allow small cities enjoying all opportunities of the modern services while integrating into the common economic and social space, and at the same time preserving distinctiveness, and abilities to unveil their unique potential.

Nowadays it is possible to achieve sustainable socioeconomic development and safe habitat only through increasing efficiency of using public resources, and transition to the innovative development path, use of scientific achievements and transition to new technologies.



2. Methodology

“Green” economy is a strategically important direction providing stability and sustainable growth of national economy [2]. In terms of modern definition of the “green” economy the authors consider necessary to base upon the synthesis of economic, industrial, technological, and civilization approaches presented by V. Bochko [3]. That would allow defining “green” economy as a sustainable growth economy with domination of environmentally-friendly industries that use alternative sources of energy, and resource-conserving technologies. In this type of economy public environmental and economic policies actively stimulate economic growth and improving environmental culture of the population in order to preserve human civilization on Earth [4]. Schematic representation of the “green” economy is presented on Fig. 1 [2].

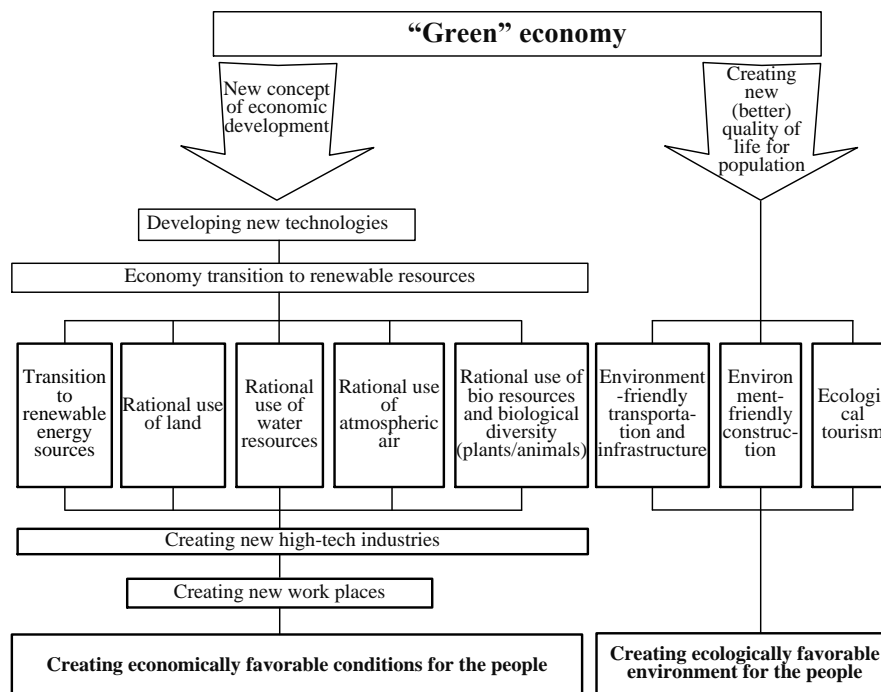


Figure 1. Environmental and economical model of the “green” economy [2]

Technological approach suggests “...transition of all production to the technologies that provide creation of environmentally friendly industrial products and foods” [3]. This approach does not cover tourism and new “green” industries, for example, “green” construction. At the same time priority positions in transition to the “green” economy in this approach are given to business, which contradicts the main business goal of profit generation, and the state role is neglected and not considered to be critical. However the state is a key stakeholder of a “green” economy, because in today’s definition the “green” economy is aimed primarily at achieving public goals.

In authors’ opinion the weakness of an industrial and technological approaches is in neglecting “green” economy development interdependencies with development of the “green” eco-cities, which actively generate demand for “green” technologies, and act as key drivers for “green” economy development. Important role of eco-cities in developing “green” economy, along with importance of developing efficient “green” budgeting and financial policy, is stressed by modern authors, such as I. Monasterolo and M. Raberto [4] and P. Baranova and F. Paterson [5].

P. Newton and P. Newman [6] state that “green” agenda for the cities and economy as a whole is a key direction for international organizations’ efforts, and national and municipal priority of increasing value. Using Australia as an example, authors illustrate interdependencies and mutual effects of “green” city infrastructures, eco-cities and “green” sector of economy. The survey results demonstrate

that 85% of the participating companies consider “green” growth to be among the priorities. Also the companies included in the survey recognize opportunities for increased involvement of the industries into a transition to a low-hydrocarbon (“green”) economy that would appear in case of increased stimulation by the government [7].

Criteria for assessing “green” economy in international practice were reviewed by A. Nahman, B. K. Mahumani and W. J. De Lange [8]. These criteria formulated with regard to “green” economy declared principles are listed in Table 1.

Table 1. Declared principles of the “green” economy with corresponding assessment criteria

Item	“Green” economy principle	Assessment criteria
1	A tool for achieving sustainable development	Inter-sector principles
2	Measuring principles outside of GDP use bounds (corresponding indicators)	GDP indicators
3	Respect for planetary boundaries, ecological limits and deficits (absolute compartmentalization)	
4	Requirement for good governance (inclusion; democracy; participation; responsibility; transparency, and stability) and use of integrated ecological, social and economical basis for decision-making	Efficient government Complex decision making
5	Internationalization of external effects, stimulation of investments and innovations, sustainable development, behavior and way of living	Ceasing harmful subsidies Internationalization of external effects “Green” investments, “Green” innovations
6	Investments into environment-friendly economy and infrastructure	Sustainable production (agriculture, wood industry, fishing, mining, and manufacturing) Green infrastructure (power, buildings, cities, and) Sustainable consumption
7	Actions aimed to improve energy use efficiency, and resource conservation	Water use efficiency Materials use efficiency
8	Low carbon content, low emissions, zero waste, and generally low-carbon character	Zero waste Air quality Water quality
9	Protection of biological diversity and ecological systems, investments into natural capital	Biological diversity of ecosystems
10	Lowering poverty level and increasing prosperity	Fighting poverty Satisfying key demands Human capital investments Subjective well-being
11	Creating decent jobs and “green” vacations	High quality of employment
12	Fairness among the countries and generations	Fairness within the generations Fairness among the generations Reform of international institutions

Nowadays new economic reality dynamically all over the world, where ecological priorities turn from formal requirements into real conditions required for transition to sustainable development, and new economy model, and for development of new projects. These issues need to be reflected in the national ecological policy. Economic and legal mechanisms of Russian economy shall consider ecological factors correctly, in order to mitigate risks of transferring to sustainable development and leaving the export-oriented raw materials export development model.

International practice presents a certain amount of “green” economy development experience. It is necessary to thoroughly analyze the multitude of methodologies recommended by international organizations and used in international agreements related to regulation and monitoring of anthropogenic environmental impact occurring in course of international economy globalization.

The understanding of sustainable development, “green economy”, and ways of forming said economy differ from country to country. Though any countries implement crisis-response programs based upon the principles of “green” economy, methodological approaches for reflecting “green” economy parameters and indicators in forecasts substantially differ for European countries, North America, Asia-Pacific, and CIS states.

Success of dispersing sustainable development ideas based upon “green” economy principles and active participation in formulation of best practices requires adoption of the methods that considers national specifics. At the same time general goal remains the same – providing and improving complex approach based upon three cornerstones of sustainable development – i.e. economic growth, social protection, and environmental protection.

Sustainable development methodology outlines four groups of the indicators showing the role of “green” economy as an engine of economic growth that is reflected, among other parameters, by the increase of GDP value [9].

First group of indicators describe potential opportunities for “green” economy transition, including productivity increase for natural resources (forest resources, fisheries, arable land); efficient capital management (decreasing economic damages related to the loss of capital by improving management of environmental risks); increasing human potential quality, specifically by improving environmental conditions (morbidity decrease and increase of longevity).

Second group includes indicators for increasing efficiency of key industrial sectors, including power, construction, utilities, etc., such as energy efficiency improvement, lowering greenhouse gas emissions, and introduction of alternate energy sources.

Third group describes investments into “green” ecology development, including water supply and sewer systems, alternative-fuel oriented public transportation, etc.

Fourth group of indicators stimulates innovations in the field of “green” economy development (including company-level innovations) aimed at creating favorable competitive environment, and obtaining innovation impact by implementing related standards and regulations.

At the same time evaluation of these indicators cannot take place at municipal, and regional levels due to lack of systematic approach, and contradiction of sustainable development goals for these public management subjects.

3. Results and Discussion

As it was shown in [10] a contradiction exists in the very concept of "region", which denotes a certain territory with historically formed and legally fixed administrative borders, but which does not have signs of integrity from the viewpoint of economic activity subject. As a rule, the economic potential and competitiveness of the region is determined by one or several large cities located on its territory and producing a large part of the gross regional product (GDP), as well as the degree of agglomeration processes occurring in this territory. Small cities around the agglomeration kernel are experiencing strong problems connected with outflow of population, lack of qualified personnel, decreasing the economic growth rate, deteriorating the investment climate and quality of living environment. And only a small part of these cities can follow a sustainable development strategy by choosing one of the alternative favorable scenarios, which include, in particular, the development strategy of a small city as part of an agglomeration with positioning and clear definition of its role and functions.

In this sense, an agglomeration is a more integral economic entity uniting economic interests of its municipalities and expressing interests of the territory as a whole. In the opinion of the authors the best segment for evaluation of “green” economy maturity level is the level of urban agglomeration.

Modern understanding of complex systems requires new approach to the functioning of their subsystems – when these subsystems are viewed not as elements subordinate to the whole system, but as synergistically interacting parts that create the system. Synergy law is expressed by the fact that any complex dynamic system tries to maximize its effect by means of integrity and cooperation. Thus synergy effect is displayed not only in the favorable combination of resources, but also in form of

consistent behavior, connections, and relations, i.e. by the set of parameters that describe complex and developing system [11].

With regard to agglomeration processes synergism reveals itself in form of a skill of assessing and producing joint effects related to higher-scale development of a territory. Agglomerative thinking allows considering tight economic, social and cultural interactions that exist among the territorial units forming a complex object of management. Complete overall agglomeration management structure helps aligning interests of its territories.

At the same time the position of considering interests of separate territories or personalities instead of the ones of the agglomeration, causes chaotic development of agglomeration processes, and substantially damages social and economic life of the municipality, region, and country.

In order to set organizational, economic, and institutional conditions for transitioning to the “green” economy which in turn would become a local level sustainable development tool, it is necessary to reveal existing ecological, and economic interests of the whole agglomeration and its municipal entities, and interactions of various elements of the economy, society and environment that are required to fulfill these interests, and provide ground for the development of the mechanism for synchronizing interests [12].

In a practical sense “green” economy is tightly connected with resource preservation strategies, and in a methodological sense it is related to expanding the traditional parameter set that describes economic dynamics. It is possible to assess production modernization results considering environmental imperatives using the so-called decoupling effect. The effect occurs in situations when the processes that were previously demonstrating a certain degree of conjugation, start changing development trajectories. Therefore, analysis of the data describing these processes that did previously demonstrate correlation or other dependencies, starts showing antagonistic trends. Speaking of environmental and economic problems of state development, decoupling factor characterizes the phenomenon of separating trends for economic parameters, and use of natural resources. Whatever are the decoupling factors in economy-environment sphere, its occurrence is favorable for environment and population [13].

High level of social and economic development of an agglomeration kernel, and high capabilities related to minimization of environmental risks and multiplying natural capital of the small cities assist in appearance and decrease of decoupling effect, which, in turn, would assist to economic growth of an agglomeration as a whole (not of its single subjects), and allows synchronization of economic growth and use of natural resources.

In case of Ekaterinburg agglomeration, that is the fourth in size in Russia after Moscow, Saint-Petersburg, and Samara-Togliatti, it is possible to track the following trends.

Agglomeration kernel is Ekaterinburg – one of the largest economic centers on Earth, and a member of top-600 largest cities that produce 60% of global GDP [14]. Satellites of the first belt include Aramil', Berezovskiy, Verkhnyaya Pyshma, and Sredneuralsk. Satellite-cities of the second belt are Degtyarsk, Zarechny, Novouralsk, Pervouralsk, Polevskoy, Revda and Sysert'. Third belt peripheral cities are Rezh, Asbest, and Nizhniye Ser'gi.

Revealing synergic effect of agglomeration thinking assist in equalizing levels of subjects' social and economic development and organize mutually beneficial collaboration in the area of distributing economical and ecological benefits of the kernel and satellites.

Emergence principle for the kernel and small cities in case of developing “green” economy can be implemented by developing recreational territories in satellite cities and implementing development projects with administrative support provided by the kernel (touristic projects in Revda, Sysert' and Pervouralsk, natural reserve in Rezh, farmers market and gastronomy festival in Sysert', providing waste processing facilities by small cities – Berezovskiy and Polevskoy) if the ecological and economic interests of the subjects are fulfilled. As it is illustrated in Table 2 a synergy effect can be achieved in the project of tourism development in the satellite cities of the second belt around Yekaterinburg if.

Table 2. Synergy effect in case of agglomeration subjects interaction and parameters of fulfilling their economic and ecological interests

Project	Responsibilities of the parties	Parameters describing ecological and economic interests of the subjects
Tourism development in the second-belt satellites (Revda, Sysert', Pervouralsk)	Agglomeration kernel – Ekaterinburg: providing administrative support to municipalities, ensuring the small cities' population ability to meet the needs of environmental well-being Small cities – Revda, Sysert', Pervouralsk: provision of the environmental resources (optimization of an access to natural assets), income generation, the ability to preserve the identity of the cities and open an unique potential, while integrating into a single economic space of agglomeration	Tourism development in the second-belt satellites (Revda, Sysert', Pervouralsk) Ensuring the best quality of life of the agglomeration population by maximizing the income received by municipalities

Strategic goals of providing ecological security by means of transition to “green” economy that define modern trends in national environmental policy were listed in the Concept of the Russian Federation long-term social and economical development for the period until 2020, in the National Security Strategy of Russian Federation, in the Basics for state policy in the area of Russian environmental development until 2030 and other strategic planning documents that exist on federal, regional and municipal levels [8].

The future long-term challenges mentioned in the Concept of the long-terms social and economic development include strengthening the environmental impact upon all aspects of life. For example, global economical environment features acceleration of technological challenges, and transition to a new technological base featuring nanotechnologies, biotechnologies, energy and resource saving technologies. “Green” economy sector is expanding rapidly, and environmental requirements for technological processes and production organization become stricter. All these factors reflect in transformation of priorities, goals and tasks related to social, economic, and environmental policies. Harmonization of ecological, economic, and social goals during the innovative modernization of Russia becomes a key goal of state policy.

Federal level strategic planning documents describe providing environmental safety and “green” economic growth as key priorities of territories development. There is a required list of strategic planning documents that has to be developed at each planning level. For example, developing strategies for social and economic development of each macro region and subject of Russian Federation is mandatory.

The value of economic factors for sustainable development of a territory makes actual the analysis of Sverdlovsk oblast and Ekaterinburg strategic planning documents describing kernel and satellites aimed at defining the importance of introducing “green” economy in the strategies of social and economic development, and degree of coordinating the listed events.

Sverdlovsk oblast strategy of social and economic development for 2016–2030 is based upon the following political priorities:

- Creating competitive conditions for accumulation and preservation of human potential;
- Creating conditions for increasing competitive abilities of the Sverdlovsk oblast economy industrial, innovative, and entrepreneurial;
- Balanced development of Sverdlovsk oblast territories.

Paragraph 27 of the said strategy specifies a special direction in social and economic policy of Sverdlovsk oblast for 2016–2030 named “Sustainable environmental development of the Sverdlovsk oblast territory” aimed at lowering the scale of negative environmental effects caused by industrial and other activities.

Strategy states that it is possible to harmonize economic and environmental goals, lists the tasks related to making economy more ecological, performing transition to the model of “green” economic

growth, for example, by supporting implementation of power and resource saving technologies in manufacturing, agriculture, housing and utilities, introducing economic stimulation measures in the area of environmental protection aimed at limiting emissions and dumping of pollutants and microorganisms into the environment, increasing the share of processes and neutralized production and consumption waste.

Ekaterinburg strategic development plan that was actualized up to 2030 with target values set until 2035 defines strategic goal of city development to provide stable, high and improving life quality for current and future generations of citizens. Strategic development directions and programs list features Item 6 – “Forming comfortable, environmentally favorable city environment”. Key tasks include stabilization and improvement of the city ecology, crating favorable conditions of habitation, increasing levels of ecological literacy and culture of the citizens, providing territory cleanness, and improving public amenities. However this direction is not listed among the priorities and it is evident that there is no synergetic interaction among the mentioned strategic documents.

Municipal level strategic documents are still being developed, however published intermediary results allow making a conclusion that strategic planning level of satellite cities can be characterized by the lack of goals related to harmonization of relations among the economy, society, and environment. For example, the strategy of social and economic development for Berezovskiy city municipality lists a strategic priority development direction named “Ecology. Developed Environment. Recreational zones”, however, environmental aspects are not considered when defining key strategic goals for development of economy and social sphere. There are no activities aimed at implementation of “green” economy. Therefore, this strategy does not reflect strategic goals of “green” economy development that were defined on national level, and the level of agglomeration at the whole.

Positive dynamics in the system of setting strategic goals on federal level aimed at harmonization of ecological, economic and social goals and providing “green” economic growth is not developed further on municipal level. Besides that there is a contradiction related to achievability of parameters related to “green” economic growth. The absence of possibility of jointly using natural assets by municipalities and organizing mutually beneficial cooperation leads to creating and increasing decoupling effect.

There is a right time to resolve these problems now keeping in mind the current stage of developing strategic documents on municipal level. That would require further improving of strategic planning system, and increasing degree of its alignment in terms of goals and priorities.

4. Conclusion

While forming institutional conditions of regional transfer to the “green” economy that would become a tool for local sustainable development, and considering unequal implementation of green economy principles over the country, agglomeration becomes the most efficient level of assessing “green” economy development status.

Recommendations regarding the system for assessing the “green” economy development level would help forming complex approach for providing “green” economic growth at all levels.

Key directions of maximizing profits in terms of ecological and economic interests of agglomeration subjects include:

- Improving consumer qualities of resources and assets, increasing their long-term use efficiency;
- Efficient collaboration among the municipalities with regard to optimizing the mode of accessing to natural resources and benefits;
- Considering interests of all agglomeration subjects in course of “green” economy implementation, and preserving agglomeration thinking in course of developing strategic documents.

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References

- [1] *Address of the President of Russian Federation to the Federal Assembly* on March 1, 2018
- [2] Vukovic N 2018 Green Economy: Definition and Contemporary Ecological-Economic Model *Bulletin of Ural Federal University. Series Economics and Management* **17(1)** 128–45
- [3] Bochko V S 2014 Green economy: the second eternal problem of mankind *Bulletin of Ural Federal University. Series Economics and Management* **3** 113–9
- [4] Monasterolo I and Raberto M 2018 The EIRIN flow-of-funds behavioural model of green fiscal policies and green sovereign bonds *Ecological Economics* **144** 228–43
- [5] Baranova P and Paterson F 2017 Environmental capabilities of small and medium sized enterprises: Towards transition to a low carbon economy in the East Midlands *Local Economy* **32(8)** 835–53
- [6] Newton P and Newman P 2015 Critical Connections: The role of the Built Environment Sector in Delivering Green Cities and a Green Economy *Sustainability* **7(7)** 9417–43
- [7] Newton P 2014 City transitions, infrastructure innovation, green economy and the eco-city *Resilient Sustainable Cities: A Future* ed L Pearson, P Newton, P Roberts (New York: Routledge) 91–104
- [8] Nahman A, Mahumani B K and De Lange W J 2016 Beyond GDP: towards a green economy index *Development Southern Africa* **33(2)** 215–33
- [9] Matova N I 2016 Contents of the “green” economy term in conditions of today's Russia *Proc. Russ. Sci. Pract. Conf. “Russian regions in new economic conditions“ (Sochi, Russia)* 66–75
- [10] Vukovic D B 2016 Regional competitiveness: misconceptions *Proc. Int. Conf. Problems of development and enhancing the competitiveness of the economy in a multipolar world (Cholpon-Ata, Issyk-Kul, Kyrgyzstan)* *Karaganda economic university bulletin* **3(37)** 20–3
- [11] Biryulina V V and Yurasova I I 2016 Features of agglomeration thinking: national and foreign experience *Proc. XI Int. Conf. Russian regions in focus of changes (Ekaterinburg, Russia)* **2** 217–26
- [12] Rodionova I A and Lipina S A 2015 Green economy in Russia: model and development forecast *Fundamental research* **2** (part 24) 5462–6
- [13] Samarina V P 2015 Green economy of Russia: some issues of theory and methodology *National Interests: priorities and security* **2(287)** 2–9
- [14] Mishulina S I 2017 Environmental safety in the Russian system of strategic goal-setting *Environmental law* **1** 39–43

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