

Boris Dziura¹

GREEN ECONOMY AND BLUE ECONOMY AS ALTERNATIVE ECONOMIC MODELS IN CHINA (PRC) *

In this article the author provides an overview of the most recent changes in the People's Republic of China related to green and blue economies' development. Detailed literature and legislation analysis as well as sectoral development examples (namely, from the maritime and energy sectors) clearly demonstrate that China has reached certain progress on its way to sustainable development.

Keywords: alternative model; sustainable development; environment crisis; PRC (China); green economy; blue economy.

Peer-reviewed, approved and placed: 3.05.2016.

Борис Дзюра

«ЗЕЛЕНА» ТА «БЛАКИТНА» ЕКОНОМІКИ ЯК АЛЬТЕРНАТИВНІ ЕКОНОМІЧНІ МОДЕЛІ ДЛЯ КИТАЙСЬКОЇ НАРОДНОЇ РЕСПУБЛІКИ

У статті надано детальний огляд останніх змін у Китайській Народній Республіці відносно розвитку «зеленої» та «блакитної» економік. Аналіз літератури, законодавчих змін, а також прикладів з різних секторів та галузей (зокрема, з морської економіки та сектору енергетики) доводить суттєвий прогрес Китаю на шляху до стійкого розвитку.

Ключові слова: альтернативна модель; стійкий розвиток; екологічна криза; КНР (Китай); «зелена» економіка; «блакитна» економіка.

Табл. 1. Літ. 27.

Борис Дзюра

«ЗЕЛЁНАЯ» И «ГОЛУБАЯ» ЭКОНОМИКИ КАК АЛЬТЕРНАТИВНЫЕ ЭКОНОМИЧЕСКИЕ МОДЕЛИ ДЛЯ КИТАЙСКОЙ НАРОДНОЙ РЕСПУБЛИКИ

В статье представлен подробный обзор самых последних изменений в Китайской Народной Республике в отношении развития «зелёной» и «голубой» экономик. Детальный анализ литературы, законодательных изменений, а также примеров из различных секторов и отраслей (в частности, морской экономики и сектора энергетики) доказывает значительный прогресс Китая на пути к устойчивому развитию.

Ключевые слова: альтернативная модель; устойчивое развитие; экологический кризис; КНР (Китай); «зелёная» экономика; «голубая» экономика.

Introduction. It is expected that by 2050 the world population might reach more than 9 bln people (unep.org, 2010), with very high probability that an immense number of people will be living in coastal regions. This situation will with high probability make the sea itself a necessary field of resources, that have to be yet discovered. Currently seas serve not only as transportation routes, but as well as the future main sources of oil and gas production (unep.org, 2010). On the other hand, oceans and seas produce a large share of oxygen for the planet, while economic development is going to raise the extinction danger level for many coral reefs (Ocean Development Strategy Research Study Group, 2012).

¹ University of Economics in Bratislava, Slovakia.

* This article was published as a part of the result of the research/scientific project VEGA 1/0267/15 "Phenomenon of the Chinese investments and the potential of their use for the national economies".

With the expected population growth it is essential to find the balance between economic growth potential and the use of resources in and around the sea regions. This concept is particularly known under the name of "Blue Economy".

The first countries to deal with this issue, is the group of Small Islands Developing States (SIDS) (Morrissey and O'Donoghue, 2012). However, China does not belong to them as the major state, which still is not depending so much on the sea itself, but with the growth of potential risks, both economic as well as ecological ones, China is trying to find ways to deal with this new kind of problems.

On the other hand, we can also speak about green economy here, which means all ecologically related projects leading towards improvement of the environment.

The objective of the current research is to reveal the needs for development of both green and blue economies in China and outline the relevant projects called for achieving the goals of green and blue economy development in the country and the region.

Literature review. There have been a lot of debates recently concerning green and blue economy development. Literature review reveals the key priorities of green and blue economy development in China in particular. Namely, it states that green economy development in China is both important for central government and also at the level of city/provincial governments. H. Yi and Y. Liu (2015) have studied clean energy economy at the city level in China. For estimation of green jobs and firms analytical approach has been used, and the research has shown that distribution of green employment in the economy of China is uneven in different regions. It has been also revealed that "cities located in a province with clean energy policies have 61.8% more green businesses and 54.3% more green jobs, compared with cities located in a province without such policies".

The researchers tend to emphasize the importance of green economy for China due to rapid development of bio-industries across most of Asian countries. D.-H. Lee (2016) has modified dynamic GTAP model and built 4 bio-industries database to forecast the path of transitioning toward bio-based economy through developing such industries as: bio-hydrogen, bio-pharmaceuticals, GM crops and bioplastics – in China, India, Japan, South Korea, Malaysia and Taiwan up to 2050. It has been revealed that India and China will be the leading countries in bio-plastics industry development.

One of today's green economy imperatives in China is large-scale development of renewable energy sources. The results of the study by H. Dai et al. (2016) have shown that large-scale renewable energy development in China would not have significant macroeconomic costs. These researches have concluded that "there would be significant green growth effects that benefit the growth of upstream industries, change the energy structure, and bring considerable environmental co-benefits". It has been additionally estimated that "the share of RE reaches 56% in the total primary energy in 2050, then non-fossil power sectors will become a mainstream industry with the value added accounting for 3.4% of GDP, a share comparable to other sectors such as agriculture (2.5%), iron and steel (3.3%), and construction (2.1%)".

H. Li et al. (2014), J. Li and L. Ma (2009) have researched energy efficiency of China and found that regional economic disparities must be taken directly into account in the policy-making process, as inland provinces should be assigned higher

energy intensity reduction targets. In these authors' opinion: "this will increase the likelihood that national targets, and hence China's broader climate change mitigation goals, will be met". The problem of high prices for primary energy sources is explained by the huge energy consumption volumes in China as it has been explored by Y.-J. Xu et al. (2016).

X. Tao et al. (2016) have found that energy and CO₂ emissions are the crucial factors for green economic efficiency in China. These researchers have revealed that different Chinese regions have different energy-saving and CO₂ emission reduction potentials.

C. Qi-Min and X. Hua-Qing (2014) have studied the relevant development pathways for China beyond 2020 while modelling the major target choices related to carbon emissions. These authors have found that "the period of 2025–2030 is the window of opportunity to achieve a peak in carbon emissions at the level below 12 Gt CO₂ and 8.5 t per capita".

The importance of blue economy development in China has been emphasized by the researchers first of all due to high contribution of maritime industries to Chinese economy. R. Zhao et al. (2014), C.S. Colgan (2007) have estimated that the main ocean industries in China have contributed 239.09 bln USD to the national economy. Ocean economy of China employs over 9 mln persons. X.-Z. Jiang et al. (2014) have found that "between 2000 and 2011, the contribution of Chinese marine economy to the national economy increased from 6.46% to 13.83%, and the ratio of marine capital and labor contribution to national economic growth is 2:1".

X. Wang et al. (2016) have studied how policy evolution affected the so-called "water footprint" in China from 1997 to 2007 using the input-output analysis and also structural decomposition analysis. These authors have indicated that "the total water footprint in China decreased from 495.5 bln m³ in 1997 to 447.6 bln m³ in 2007". The key factors of the water footprint changes have been decomposed into sectoral connection, technology, gross economic scale, economic structure, and population.

T.G. Mallory (2016) has outlined that China is the world's largest producer of seafood. At the same time the country needs appropriate blue economy recovery as "about 95 percent of China's fishery subsidies are harmful to sustainability".

R. Mu et al. (2013) have found that "how to increase the effectiveness and efficiency of marine management is a common topic among nations". The researchers have reviewed all ocean-related zoning and planning schemes in China and analyzed their features and roles in detail.

J. Ding et al. (2014) have analyzed the competitiveness of marine economies by provinces/districts along the Eastern coast of China. These authors have found that Chinese marine economy is mainly oriented towards heavy industry: "local governments focus on land reclamation and often neglect environment protection, which resulted in similar dysfunctional structures of regional industrial policies in these provinces".

The main results from our literature findings summarized are in Table 1.

China's green economy. According to the official Chinese state plan for the years 2011–2015, the main task is not only to foster economic growth but taking into account its environmental component. The projects focus e.g. on the use of renew-

able energy, better technologies which are not devastating the environment and technologies leading to better use and lesser consumption of the drinkable water.

Table 1. Literature review on the development needs of green and blue economy development in China, author's compilation

Study	Development needs of the green economy	Development needs of the blue economy	Study
H. Yi and Y. Liu (2015)	Uneven green employment distribution between the regions	High current contribution of ocean economy to the economy of China	R. Zhao et al. (2014), X.-Z. Jiang et al. (2014)
D.-H. Lee (2016)	Fast bio-industries development	Water footprint regulation	X. Wang et al. (2016)
H. Dai et al. (2016)	Changing energy structure	Elimination of harmful effects from fishery subsidies	T.G. Mallory (2016)
Y.-J. Xu et al. (2016)	High prices for primary energy sources	The importance of development of ocean-related zoning and planning schemes	R. Mu et al. (2013)
H. Li et al. (2014), J. Li and L. Ma (2009)	Taking into account regional economic structure in energy policy development	Including the environment aspect into the local development projects	J. Ding et al. (2014)
X. Tao et al. (2016), C. Qi-Min and X. Hua-Qing (2014)	Energy and CO ₂ emissions' reduction		

There is also a plan which potentially leads to lesser use of carbon and greater use of other solutions which may eventually lead to the increase of renewable energy consumption by the year 2020 already.

China is also cooperating with the United Nations Environment program (unep.org), since the times of preparation for Rio+20 conference in the main Chinese economic industries (first of all constructed and energy sector) (World Population Trends, 2013).

As China's prime minister H.E. Wen Jiabao (2009) once said: "China is ranked number one in the world in terms of the coverage by solar panels or water heaters and cumulative installed photovoltaic power capacity ... These are the major achievements in China's efforts to adjust economic structures and transform development pattern. They also contributed positively to the global attempt to develop green economy and tackle climate change".

Furthermore there are high expectations that China is going to try to cut its imports of oil as well as coal as demanded, by several dozen percentages by 2030 (unep.org, 2015).

China's blue economy. Blue economy is mostly known in the world as the economic business models of a number of authors from Europe and North America, but in China these words, blue economy, have been used not only as the alternative economic model but as a tool for sustainable development promotion that will help avoid the potential environmental damages with the focus on waters, namely, seas and oceans.

There are 3 sectors under development in PRC in the context of blue economy: Marine, Maritime and Naval. It is also important to mention that these sectors somehow get clustered in the selected coastal areas of China (Walsh, 2014).

Herewith we would like to describe the first sector (Marine), with all the opportunities which this sector is offering for the near future period.

We can briefly describe this sector as the one focused on the world Ocean and marine conservation and environmental protection, including rivers, lakes, and other smaller water resources. It also including ocean and marine science, technology and the related research with a significant impact on oceanography development and ocean further exploration.

The maritime sector relates to industrial development in such areas as fishing, aqua-culture, ship-building, shipping and ports, oil and gas drilling.

The alternative source of energy development and tourism provide additional points to the development of this sector.

China's naval modernization efforts include a broad range of platforms and weapon acquisition programs. These programs cover surface ships, anti-ship cruise missiles (ASCMs), anti-ship ballistic missiles (ASBMs), surveillance, submarines, and supporting C4ISR (computers, command and control, intelligence, communications, and reconnaissance) systems. China's naval modernization efforts also include the measures aimed at improving education and training for better personnel quality. We have well grounded reasons to believe that this development direction might follow the way of innovation through civil-military integration and spin-on/spin-off technologies (Walsh, 2014).

All three sectors united are building together a strong web of knowledge and practices based on profound scientific researches in the PRC.

For PRC, development of coastal regions is highly important, since it aims to find a balance between healthy environment and economic growth, without causing additional damages to the environment (Global Market Outlook for Photovoltaic Until 2014).

The related scope of activities includes cooperation with the cities around the world from the economic areas with similar background, strengths and problems. One of the examples here is the agreement on friendship between the cities of Qingdao in China and Dunedin in New Zealand (Walsh, 2014). This agreement covers not only discussion rounds of the experts in the field but also mutual exchange of data and best practices, including (environmental legislation).

Conclusion and future development expectations. Chinese economy has (and according to the projects we are involved in) started to use the presented here new economy models (green and blue economy) rather late as compared to the rest of the world. On the other hand, the results that have been already achieved, have been actually gained with immense, impressive speed.

Further achievements would, according to our projections, cover the following directions:

Firstly blue and green economy development may contribute to increasing economic performance of the Chinese entrepreneurial subjects (both private and state-owned).

Secondly, further development would partially promote the creation of new employment possibilities in the energy sector.

We also do strongly believe that the current development will be boosted up and future figures will confirm the accuracy of experts' expectations (Chinese and foreign as well) on one side, and the expectations of Chinese government, on the other.

All of the currently running programs should bring relevant results already in 2020–2030. But due to the data we already have, we have reasons to believe in fast fulfillment of all the related expectations as well as growing investments in the Blue/Green economy models development in PRC.

We must also add that PRC is changing their laws towards better environmental protection in a very rapid way. From the "Environmental Protection Law for Trial Implementation" as of 1979, through "Water Pollution Prevention and Control Law" and later "Water and Soil Conservation Law" in 1991 up till the renewed "Law on the Prevention and Control of Air Pollution" as of 2002.

It is also important to mention that China (PRC) has joined and follows the Montreal's and Kyoto's protocols (Kyoto Protocol ratification, 2016).

There is also strong commitment from the side of Chinese government to cut the use of coal and energy produced from it. The milestone should be the year 2030, until 20% of all energy should be produced from "clean" sources. In this respect with such a massive support from the central as well as local authorities is almost impossible not to implement various economic methods or at least initiate research with such massively and freely available material, financial as well as human resources, with the sincere try to shape different economic future for the country (2030 Building a modern, harmonious and creative society).

References:

2030 Building a modern, harmonious and creative society. By the Development Research Center of the State's Council (PRC, The World Bank) // www.worldbank.org.

China Briefing (2013). China releases 12th Five-Year Plan for the Marine Economy // www.china-briefing.com.

China's environmental laws // www.china.org.cn.

China's pathway to a Green Economy // www.unep.org.

Colgan, C.S. (2007). Measurement of the ocean and coastal economy: Theory and methods. National Ocean Economics Project, USA.

Dai, H., Xie, X., Xie, Y., Liu, J., Masui, T. (2016). Green growth: The economic impacts of large-scale renewable energy development in China. *Applied Energy*, 162: 435–449.

Ding, J., Ge, X., Casey, R. (2014). "Blue competition" in China: Current situation and challenges. *Marine Policy*, 44: 351–359.

European Photovoltaic Industry Association (2010). Global Market Outlook for Photovoltaic Until 2014 // www.epia.org.

Jiang, X.-Z., Liu, T.-Y., Su, C.-W. (2014). China's marine economy and regional development. *Marine Policy*, 50: 227–237.

Kyoto Protocol ratification 2016 // unfccc.int.

Lee, D.-H. (2016). Bio-based economies in Asia: Economic analysis of development of bio-based industry in China, India, Japan, Korea, Malaysia and Taiwan. *International Journal of Hydrogen Energy*, 41(7): 4333–4346.

Li, H., Wu, T., Zhao, X., Wang, X., Qi, Y. (2014). Regional disparities and carbon "outsourcing": The political economy of China's energy policy. *Energy*, 66: 950–958.

Li, J., Ma, L. (2009). Chinese Renewables Status Report. Chinese Renewable Energy Industry Association Background paper, October 2009.

Mallory, T.G. (2016). Fisheries subsidies in China: Quantitative and qualitative assessment of policy coherence and effectiveness. *Marine Policy*, 68: 74–82.

- Morrissey, K., O'Donoghue, C.* (2012). The role of the marine sector in the Irish national economy: an input-output analysis. *Mar Policy*, 29(3): 371–383.
- Mu, R., Zhang, L., Fang, Q.* (2013). Ocean-related zoning and planning in China: A review. *Ocean & Coastal Management*, 82: 64–70.
- Ocean Development Strategy Research Study Group (2012). *China's Ocean Development Report* State Oceanic Administration. Beijing: Maritime Publishing House.
- Qi-Min, C., Hua-Qing, X.* (2014). Modeling an emissions peak in China around 2030: Synergies or trade-offs between economy, energy and climate security. *Advances in climate change research*, 5: 169–180.
- State Oceanic Administration of China (2012). *National Island Protection Plan*. Beijing: State Oceanic Administration Publication.
- Tao, X., Wang, P., Zhu, B.* (2016). Provincial green economic efficiency of China: A non-separable input-output SBM approach. *Applied Energy*, 171: 58–66.
- UN Population Fund (2013). *World Population Trends* // www.unfpa.org.
- Walsh, K.A.* (2014). *Understanding China's Blue Economy Concept*. The Bridge (Fall 2014, Vol. 17). Naval War College Foundation.
- Wang, X., Huang, K., Yu, Y., Hu, T., Xu, Y.* (2016). An input-output structural decomposition analysis of changes in sectoral water footprint in China. *Ecological Indicators*, 69: 26–34.
- Wen Jiabao, H.E.* (2009). *Develop Green Economy, Promote Sustained Growth* // www.china-embassy.org.
- Xu, Y.-J., Li, G.-X., Sun, Z.-Y.* (2016). Development of biodiesel industry in China: Upon the terms of production and consumption. *Renewable and Sustainable Energy Reviews*, 54: 318–330.
- Yi, H., Liu, Y.* (2015). Green economy in China: Regional variations and policy drivers. *Global Environmental Change*, 31: 11–19.
- Zhao, R., Hynes, S., Shun He, G.* (2014). Defining and quantifying China's ocean economy. *Marine Policy*, 43: 164–173.