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To cite this article: Chunqing Jin and Zaixu Zhang 2018 *IOP Conf. Ser.: Earth Environ. Sci.* **189** 052004

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Regarding the role of oil & gas industry on social infrastructure development in Azerbaijan and the solution of ecological problems

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Abstract. Republic of Azerbaijan is rich in oil & gas resources, it has laid a solid foundation, in the field of infrastructure construction, in the aspect of regional politics, in associating with superpower diplomacy since independence. It is adding a lot of weight for its economic development. However, the social development structure based only on oil economy is imperfect and lacks the ability to minimize the associated risks. The country is well aware of this and in recent years, great progress is made in using oil & gas funds to increase infrastructure construction and develop the non-oil economy. In addition, the environmental problems resulting from the oil & gas development are one of the important problems facing Azerbaijan. For a country with economic development through more than one hundred years, the environmental pollution issues from on-shore and off-shore are prominent. This article is about how to develop the oil economy and solve ecological problems.

1. INTRODUCTION

Due to successful domestic & foreign policies carried out, Azerbaijan plays a significant role in the geopolitics of Caspian and Caucasus region, and became the most leading and influential state in the region. This is not just about the oil factor. Thus, the country has become an object of strategic interests of leading European, Asian states and the United States, for its important position in the Euro-Asian corridor, favorable position in Black-Caspian sea basin. All this has created a favorable investment environment on the basis of economic and political stability created in the country. As a result, the interest of the world's largest transnational oil companies to Azerbaijan has increased. Provision of economic and energy security of the country, development of industry, integration into world economy, establishment of relations with the states as equal partners, and the solution of other similar challenges was put in the forefront. Need to note that, in terms of national interests, the main strategic objectives of foreign economic activity include: increasing country's export potential by development of existing industries that can compete on world market; increasing opportunities for expanded reproduction through modernization of processes & technology with involvement of foreign investment; creating production that meet world standards, achieving relevant sales segment in the market; achieving a positive import-export balance by bringing strategic products to world market.



2. ECONOMIC SITUATION

Oil & gas resources are one of main factors in Azerbaijan's economy, cultural development, and improvement of welfare of the population. [1, 2] The increase in oil & gas resources in recent years and their rational use resulted in signing new contracts with other countries in this area. The oil & gas industry, which incorporates a large part of fuel & energy complex, also promotes economic revival of socio-economic development. Due to world economic crisis, the increase of economic recession trends has significantly increased the economic tensions. In such situation, determination of new economic development targets became an urgent issue for all countries.

2.1. *Economical Reforms*

From this prospective, important decisions adopted by Country President in line with realities of Azerbaijan and the reforms applied to different segments of national economy based on decrees & orders have positive effect. Competitiveness in the world economy needs to reconsider problems of security of economy of each state under condition of globalization. Azerbaijan is no exception and the economy of the Country integrates continuously to world economy and carries out international projects with international companies. Azerbaijan takes a rightful place in world community for implementation of bilateral & multilateral humanitarian, political & economic initiatives.

To meet growing social & economic demands of society, setting full & rational usage of existing production potential is an important task. Raise of macroeconomic (national) measures requires gradual increase of role & significance of leading industries, especially, strategic industries, including the non-oil sector in structure of gross national product. [8]

2.2. *Economical analysis*

In 2016, 53.3% of Gross Domestic Product (GDP) with total volume of 60 393.6 million AZN (manat) fell to share of goods production, 39.1% to share of services and 7.6% to share of net taxes on product and imports. Compared with previous year, the value added production in non-oil sector decreased by 4.5% in real terms, and there was no change in oil sector on this index. The main reason for recession in GDP was recession (22.9%) observed in construction sector. Simultaneously, relative stability in services sector has been achieved. Last year, the leading role of industrial sector in structure of economy of Azerbaijan was strengthened compared to 32.9% in 2015, its share in GDP increased up to 37.2%.

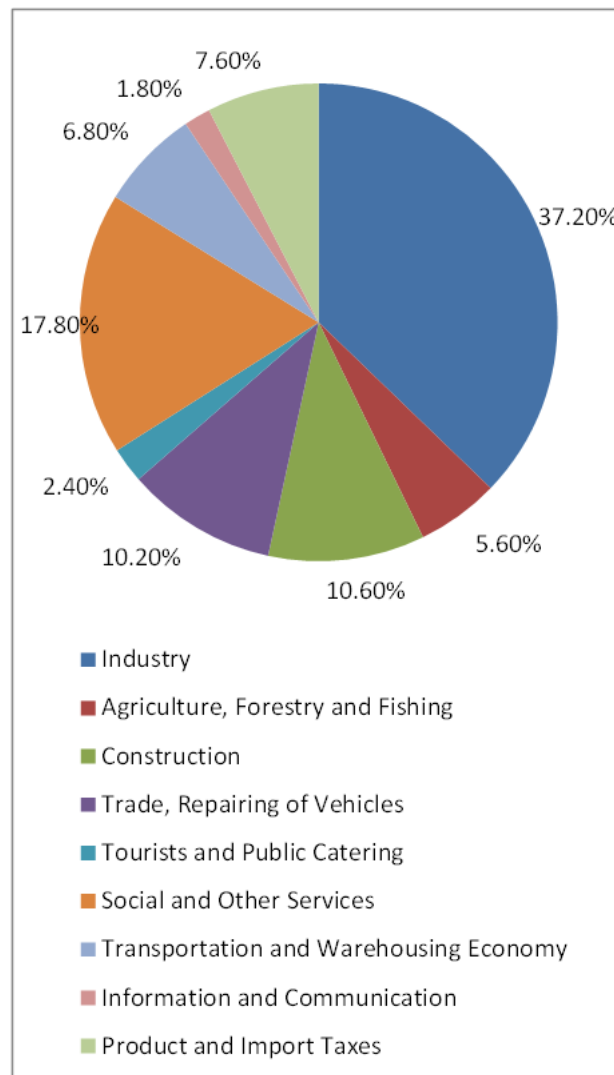


Fig.1. Production Structure of GDP [8]

In 2016, 65.9% of GDP produced in the country fell to the share of non-oil sector. The share of the non-oil sector in GDP is shown in the following charts for years.

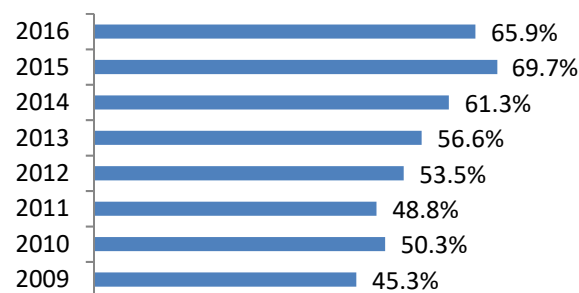


Fig.2. The share of the non-oil sector in GDP, with % (Source: SSC)

2.3. *SOCAR's investment activities*

Along with measures taken to increase the focus on non-oil sector in the Country, it should be noted that leading position of oil & gas industry remains in the investment policy. From this point of view, the investment activity of State Oil Company of the Republic of Azerbaijan (SOCAR) has significantly increased, as well as, the high important is assigned to investments in foreign countries. At the same time, the involvement of natural and economic resources of country into economic turnover will be expanded to develop non-oil industry, and usage rationality will be improved. As an obvious example of all this, in order to ensure sustainability of economic policies & reforms carried out in country, for deep analysis of current state of economy and elaboration of new economic development strategy, the "Main Directions of Strategic Road Map for National Economy and Major Sectors of the Economy" has been approved by an Order of the Country President. Strategic road maps include economic development strategy & action plan for years 2016-2020, a long-term vision for period up to year 2025 and a targeted view for the period after year 2025. The country President stated that country's goal is to successfully use oil factor and develop all other spheres.

In this regard, it is important for Republic to regulate the revenues from oil projects by the state and to ensure that these revenues are directed to the development of the non-oil sector of the economy. On the one hand, it is intended to increase the export potential of the country based on the involvement of the foreign investments and on the other hand it is intended to gradually expand the foreign economic relations.

Efforts directed to form an investment environment with the implementation of the oil strategy have created favorable conditions for the successful application of the market economy in the country and the economic development of the economy has been entirely ensured through directing oil revenues to the non-oil sector. Azerbaijan that participates in the world energy market with 7 oil-gas pipelines and strengthens its position in the energy security, it proves to the world community that it has got diversified export-transportation capabilities. Azerbaijan which is known as a country with a rich energy potential of the Caspian Basin and protects the status of a leading state in the region, it justifies the confidence earned as a strategic partner for the world states with its resoluteness to the realization of new projects. Particular attention is paid to the factor of Azerbaijan also in the discussions on the political and economic prospects of the oil & gas pipelines intended for natural gas supply to EU countries.

2.4. *Potential Oil Reserves*

The scale of the existing hydrocarbon reserves of Azerbaijan in onshore and offshore is diverse. The calculations show that most of the oil & gas resources discovered in onshore areas are extracted. The operation in the onshore fields is at the final stage. In some fields, also secondary recovery does not produce enough. Current rates determine that the production will continue for 70-80 years in existing fields. The scale of reserves in Azerbaijani sector of Caspian Sea is subject to changes every year. Taking into account the reserve balance in old subsea fields and the prospect of new contracts to be concluded, it is assumed that there will be more reserves. According to geological data, at least 15% of territory of the republic has not yet been fully studied in terms of existence of oil & gas fields. There is also a high probability of existence of significant reserves in these areas. Nevertheless, 40-45% of potential oil reserves and 80% of gas resources remain undiscovered. 24% of discovered oil and 15% of natural gas fall on the share of onshore.

3. ECOLOGICAL PROBLEMS

3.1. *Ecological aspects for consideration*

In the oil & gas sector, the large volume of investment in this area, and the scale of the work carried out also envisage a systematic solution of ecological problems. The dynamic development of oil & gas industry ensures the development of other industries as well and by increasing the dynamics of processes and technology this is an objective cause of environmental pollution. Along with other

conditions, these are determined by the following: the unsatisfactory organization of production and labor; permitted deviations in use of processes & technology; poor training of personnel and so on. Analysis of economic and special literature shows that atmospheric emissions associated with the oil & gas and petrochemical industry create a tense ecological environment. [3,4,5] The initial contact with the environment in oil & gas industry occurs during drilling wells. Soil, clay, sludge and other wastes occur during the drilling process, which leads to the environmental pollution. The impacts which cause serious ecological problems for soil, atmosphere and water basins occur during oil & gas production, in their export process as well.

Economic analysis show that opinions regarding the project cycle and its formation are different. Nevertheless, in all cases implementation of the project envisages "environmental aspect". Given that the oil & gas industry is a high-cycle area, it is of great importance to carry out environmental analysis and environmental monitoring here. It is evident that all aspects of the analysis are touched on financial and economic issues to a degree and in this sense, even though the ecological analysis is related to the "non-economic" aspect, but in the latter case this analysis is related to finance as well.

It should be noted that pollution of sea and oceans during drilling & operation of oil & gas wells takes the second place after marine transportations. In some cases, oil spill on sea surface occurs during oil extraction. However, in order to prevent these cases, a number of measures have been developed at "Azneft" PU: special structural divisions have been created to protect the environment; special waste treatment plants have been set up in "Oil Rocks" Oil & gas Extraction Department to ensure collection & disposal of formation water and other waste water; compressor stations operated at "Gum (Sandy) Island" and N. Narimanov Oil & gas Extraction Departments; transportation of drilling sludge to shore is organized; special means have been set up to carry out repair work with a closed cycle; reconstruction of oil & gas collection and transportation systems has been carried out at "Absheronneft", "Oil Rocks" Oil & gas Extraction Departments; maximum disposal of associated gas is carried out; special process units have been allocated on fixed platforms and bridges to prevent pollution; Compressor stations have been built for the disposal of low-pressure associated gas at "28 May" Oil & gas Extraction Department.

3.2. *Main influential pollution factors*

One of important factors influencing pollution of Caspian Sea is cargo shipment. Some of the shipped cargos fall on the share of oil carried by tankers. Sources of wastes which belong to tankers include: washing tankers and throwing ballast water into the sea; oil wastes in transportation and embankment. The sources of oil spill at sea from passenger & cargo vessels are following: ballast water from fluid & fuel tanks, washing the cargo tankers with oil lubricants. Mixed sources of oil spilled from vessels include: from vessel engines; from washing the tanks and discharge of wastes from fuel tanks; oil sedimentation in settling tanks; discharge from structural facilities; during loading/unloading; accidental spill in result of long standby or collision; emergency discharge for saving personnel. It is known that 1 ton of crude oil can cover up to 2.5 km² area on water surface. The process of sedimentation of oil to seabed leads to "chronic" pollution.

4. POTENTIAL SOLUTIONS

4.1. *Allocation of economic resources*

It is known that the economy deals with optimal allocation of limited resources. In general, the market mechanism effectively allocates limited resources. Therefore, the efficiency of allocation is obtained if the effect (revenue & expense) associated with production and consumption of this or other asset is taken into account by the market or, to be more precise, it is taken into account in the price. At the same time, the market system in some cases faces "external effects". The negative external effect is caused by the fact where production or consumption of any asset generates the unrecovered expenditures on the third party. The classic example of negative external effect is environmental pollution. A number of projects are implemented in oil & gas production enterprises of Azerbaijan,

especially in offshore sector. Manufacturer, in our case, i.e. oil & gas industry sectors, discharges the production wastes: clay, sludge and so on to the sea, as if it hands over a part of expenses associated with the production of that asset to society and does not compensate it anyway. In this case, actual costs of the manufacturer intended at the price are less than full costs, taking into account the negative external effect. This means that the market cannot take into account negative external effect and involves more resources for production of that commodity. All of this causes certain economic complications in the market economic relations.

4.2. *Balanced economical & ecological analysis*

Oil & gas industry is related to high "environmentally hazardous" activity according to its characteristics. This hazard is bigger than projects implemented in Caspian Sea aquatorium; therefore, the implementation of "environmental analysis" here is more important. Ecological analysis is also important for oil & gas projects due to the fact that, if the interaction is not studied properly, decisions can lead to great disaster.

Usually, analysis of projects is done in terms of "expense-profit" aspect and "ecological analysis" is often not covered. The task of environmental management is to balance capability of environment to meet industrial demands. It is obvious that environmental protection costs are far less than expenses for disaster recovery. Therefore, to solve environmental problems generated by oil & gas industry it is important to apply corrective actions.

For decades, perhaps for centuries, people's indifference has made them to face environmental problems. Some of these problems are related to oil industry's activity and existing environmental status is a result of this activity. Therefore, the oil extraction & treatment should be conducted in an environmentally friendly manner.

The offshore & onshore drilling technology is similar and main difference is that in first case pollution object is sea and in second case contamination object is land.

Absheron peninsula is most developed region of the Country. [6,7] 60-62% of Gross Domestic Product (GDP) falls to share of this region. Fuel & energy complex, petrochemical, metallurgy, machine-building industry, transport, construction and food industry form the basis of the economic potential. All large industrial enterprises of Country are here. Approximately 40% of population and 70% of industrial facilities are in Absheron peninsula. Therefore, fixing ecological problems of the region is very important for implementation at a state level. One of the main problems accumulated over many years is the oily wastewater pollution. Providing these lands (After clean-up & remediation) to population for house construction & agricultural purposes, for creation of resorts, parks and forest belts is important from both the health & social point of view.

4.3. *Required improvements*

It should be noted that in order to effectively use the lands in accordance with principles of sustainable ecological development, following actions are required:

- Taking corrective actions to prevent soil erosion and improve the reclamative status of saline soils;
- Continue remediation of oil-polluted soils, give priority to creation of industrial facilities to clean the oil contaminated soils;
- Inventory of existing drainage-collector and irrigation networks and improvement of their technical condition;
- Periodic monitoring on soils fertility that was violated in result of mining, construction of underground & ground-surface pipelines and taking appropriate soil remediation measures;
- Eliminating adverse effect on environment from the sludge & wastes stored in vicinity of large industrial centers (cities) (Sumgayit, Ganja);
- Elimination of ponds & marshes resulting from anthropogenic factors and fertilization of land plots.

Development of State Program which is an integral part of overall development strategy of the Country is targeting protection of natural resources at national, regional and international levels by means of strengthening the coordination of activities in field of environmental protection and ensuring the sustainability in use of economic & human resources by ensuring interests of current and future generations. In this sense, Azerbaijan has achieved significant progress in social & economic development in recent years, and this progress is confirmed by national & international documents. It is anticipated that more optimistic results can be achieved through implementation of the State Program for years 2016-2020.

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