Report on actualization (further strengthening) of measures to reduce GHG emissions in the industrial sector of Azerbaijan.

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Abbreviations

AZN – Azerbaijani Manat

BAU- Business as usual

CJSC – Close Joint-Stock Company

EU4climate – European Union's Climate Project

GDP – Gross Domestic Product

GHG – Greenhouse gas

HFCs – Hydrofluorocarbons

IPPU – Industrial processes and product use

LLC – Limited Liability Company

MENR – Ministry of Ecology and Natural Resources

NDC – Nationally Determined Contributions

ODSs – Ozone depleting substances

OJSC – Open Joint-Stock Company

PFCs – Perfluorocarbons

PU – Production union

SOCAR – State Oil Company of Azerbaijan Republic

SSC – State Statistical Committee

UN – United Nations

USA – United States of America

INTRODUCTION

Global climate change is one of the most challenging environmental issues faced by humanity, and its prevention requires joint action and cooperation from all countries of the world. The Republic of Azerbaijan actively supports international efforts to mitigate the negative consequences of global climate change and takes appropriate measures to this end.

The Republic of Azerbaijan ratified the UN Framework Convention on Climate Change as one of the Non-Annex 1 countries of the Convention in 1995, the Kyoto Protocol to the Convention in 2000, the Doha Amendment to the Kyoto Protocol in 2015, and the Paris Agreement on October 28, 2016.

In previous years, the Republic of Azerbaijan submitted its First National Communication (2000), Second National Communication (2010) and Third National Communication (2015), First Biennial Update Report (2014), and Second Biennial Update Report to the Convention Secretariat. The Fourth National Communication is about to be completed.

In accordance with the Paris Agreement, the Republic of Azerbaijan submitted its Nationally Determined Contributions (NDC) document to the Convention Secretariat in 2015 and set the target to reduce greenhouse gas emissions by 35% by 2030, as compared to 1990, the baseline year as a contribution to global climate change prevention initiatives.

As required by the provided terms of reference, this report analyzes the development of the country's industrial sector, its place in the country's economy, strategies and plans for the sector's future development, investments in the sectors; and the sources of greenhouse gas emissions based on given National Reports; and provides recommendations assessing the possibilities for the sustainable strengthening of the capacity of the contribution that the industrial sector can make to the development and implementation of low-carbon development strategy and the strengthening, upgrade and implementation of NDC every 5 years, in line with the country's commitment under the Paris Agreement.

The main list of references used for the development of this report included national programs for industrial development, strategic road maps and existing international documents dealing with this issue; sub-sectors related to the country's industrial emissions in 2013 (as the last year of inventory shown in the second biennial report) and not related to electricity and heat generation processes (use in the production of cement, lime, ethylene, iron, steel, aluminum, glass, and lubricants, as well as substitutes and fixed cooling systems).

In the context of climate change, an industry-specific area is defined as the activities ranging from the production of GHG-related industrial products to the final demand in industrial products and related services throughout the supply chain.

1. Background

In terms of raising competitiveness and improving the structure of the economy of the Republic of Azerbaijan, one of the main priorities of the economic policy of the country is industrial development. Industrial development is important not only economically, but also in terms of a range of social, scientific, and cultural aspects, such as employment, non-oil sector development and economic diversification, income levels, urbanization, skilled labor, research, and development.

After gaining independence, one of the important challenges faced by the Republic of Azerbaijan was to establish a national economy based on market principles that meet the requirements of a sovereign country and effectively integrate into the modern world community.

Due to the crisis that began with the collapse of the Soviet Union and continued during the early years of independence, industry, like all other sectors of the economy fell into stagnation. On the one hand, the transition from a planned economy to a market economy, on the other hand, the occupation of Azerbaijani territories by Armenia led to a sharp decline in the volume and range of industrial production.

Since 1997, with the establishment of political and economic stability, industrial production has been growing in the country. During the years of independence, mainly foreign investments in the oil and gas sector played a crucial role in the development of industry, and in its turn, the development of this sector, both directly and indirectly, gave impetus to the revival of other industries. During this period, industrial enterprises were also privatized and market economy institutions were founded.

After 2000, as in all sectors of the economy, the Republic of Azerbaijan has also achieved great success in the development of the industry. In 2015, industrial production increased by 3.1 times as compared to 2000. Over this period, numerous projects have been implemented to create competitive modern industrial areas, and to improve the infrastructure of industry, new jobs were created, and the country has stepped into a new stage of industrial development.

Between 2005 and 2015, the economy of Azerbaijan grew dynamically. In 2016, 37.1 percent of GDP of the country fell to the share of industry (i***ncluding oil and gas sector***), while agriculture, forestry, and hunting accounted for 5.6%, construction for 10.5%, transport and communication for 8.5%, other fields for 30.2%, and net taxes for 8.1% of GDP.

In recent years numerous important measures have been implemented in order to develop the economy, improve the investment and business environment, create favorable conditions for entrepreneurs and strengthen state support, increase non-oil export, and replace imports. i.e, important decisions were adopted to improve the business environment, reduce the number of activities requiring a license from 59 to 37, reduce the number of permissions for entrepreneurial activities by almost 4 times from 330 to 87.

Subject to the Law of the Republic of Azerbaijan On Suspension of Inspections in the Field of Entrepreneurship, on November 1, 2015 inspections in the field of entrepreneurship were suspended for 2 years. In October 2017, the term for the suspension of inspections was ***extended until 2021***.

The establishment of Azerbaijan Industrial Corporation OJSC and Credit Guarantee Fund of the Republic of Azerbaijan in order to expand entrepreneurs' access to financial resources with the view of channeling natural and economic resources to the economic turnover, and for more effective management of the state-owned legal entities and the entities, the controlling stake of which is owned by the state is also part of the reforms. The adoption and implementation of ***state programs on social and economic development of the regions of the country*** are of exceptional importance for ensuring the sustainability of social and economic development, accelerating the progress in the non-oil sector of the country, diversifying the economy, achieving balanced regional and sustainable social and economic development, and further improving the living standards in the Republic of Azerbaijan.

Such programs that have been successfully implemented since 2004, have radically changed the appearance of cities, towns, and villages in the regions, created conditions for raising the capacity of socio-economic development in the regions, improving the business and investment environment, infrastructure, housing, and utilities, and people's welfare and environmental safety.

The work implemented within the framework of the State programs provided serious support to the general policy of social and economic development of the country, and as a result, in 2004-2018 the Gross Domestic Product (GDP) increased by 3.3 times in real terms, including the growth in the non-oil sector by 2.8 times. Over this period, the industry grew 2.6 times in real terms, including 2.4 times in the non-oil sector and 1.7 times in agriculture, and ***as of January 1, 2020, strategic foreign exchange reserves grew 24.3 times compared to 2004 and exceeded $52 billion.***

The achievements gained by Azerbaijan are also reflected in the reports of international organizations and financial institutions. Its no coincidence that ***according to the World Bank's Doing Business 2019 report, Azerbaijan has moved up 32 positions from 57th to 25th place. According to the report, Azerbaijan has improved its position on 8 out of 10 indicators and was included in the list of 10 most reformist countries of the world and declared the most reformist country of the world.***

A lot of work has been done in the country for establishing industrial parks and industrial districts in the regions in order to create favorable conditions for the development of competitive industrial production on the basis of innovative and high technologies, to organize industrial enterprises based on modern technologies, to raise the level of employment in production. I.e, ***Sumgait Chemical Industrial Park and Mingachevir Industrial Park, as well as Neftchala, Masalli, Hajigabul, and Sabirabad industrial districts, were established under the relevant decrees and orders of the President of the Republic of Azerbaijan***. It is important for supporting the activities of entrepreneurs operating in the industrial sector including small and medium-sized businesses, ensuring a favorable business and investment environment, and creating new jobs.

The implemented works have led the industry to a new stage of development, as the beginning of this stage, ***2014 was declared the Year of Industry in the Republic of Azerbaijan***. To ensure the transformation of Azerbaijan into a powerful industrial center of the region through more efficient use of the existing capacity at the new stage of industrialization, the ***State Program for the Development of Industry in the Republic of Azerbaijan for 2015-2020 was developed taking into account the areas of activity specified in Development Concept Azerbaijan - 2020: outlook for the future***

New industrial facilities and prospects Serious work was undertaken in recent years to commission new production facilities in the field of heavy industry and mechanical engineering for the diversification of the structure and regional coverage of the industry. The establishment of **Sumgait Technology Park, Sumgait Aluminum Plant, Ganja Aluminium Smelter, Sumgait, Gadabay, and Dashkasan gold and copper processing plants, Garadagh Cement Plant, Sumgait Carbamide Plant, agricultural machinery and automobile plants in Ganja, Nakhchivan Automobile Plant, Power Transformer Manufacturing Plant of ATEF Group, Sumgait Plastic Processing Plant, Mingachavir Electronic Equipment Plant**, steel pipe, solar panel and metal construction enterprises, etc. are important developments for the country economy. Recycling enterprises were registered in Balakhani Industrial Park, and a modern shipbuilding facility was put into operation in Garadagh Industrial Park. Works are in progress to involve science-based and innovative productions in High Technology Park. Installation in Pirallahi Industrial Park of new production facilities for the pharmaceutical industry which is a new area for the country. Two yarn manufacturing enterprises of Mingachevir Textile LLC were put into operation in Mingachevir Industrial Park. Preparations are made to create the necessary conditions and infrastructure for local entrepreneurs working in light industry and other areas within Mingachevir Industrial Park.

As noted in the Introduction part, in line with the objectives of the EU4climate project, the report mainly focuses on non-energy sectors emitting GHG emissions from chemical reactions:

1.1 Metallurgical industry

The metallurgical industry is an important part of the non-oil sector. More than 20 ore deposits with established reserves are registered in the state balance of Azerbaijan. Most of them are deposits of copper, gold, polymetallic, iron, and alunite ores. Additionally, precious metals such as silver, cobalt, mercury, molybdenum, chromium, and metal reserves are also estimated.

1.1.1 Iron and steel production

As for ***ferrous metals***, several deposits of iron, manganese, and chromium were discovered in Azerbaijan in different years. Nevertheless, only the ***Dashkasan group iron ore*** deposits can meet the needs of the industry in terms of quality and quantity. Dashkesan group iron ore deposit, which is the most important mineral resource base of ferrous metallurgy in our country includes 3 deposits and 2 occurrences of similar composition (magnetite-skarn type). The established total ore reserves are about 265 million tons.

After the gaining of independence on April 23, 2013, President Ilham Aliyev signed a decree establishing the Azerbaijan Metallurgical Plant CJSC for the creation and development of the metallurgical industry and the application of new technologies given the all the opportunities available in the country for the strong development of metallurgical industry. 2015-2020 State Program for Industrial Development in the Republic of Azerbaijan was approved by Decree no. 964 dated December 26, 2014, of the President of the Republic of Azerbaijan. The part on increasing the competitiveness and capacity of the industry of the action plan of this program, which can be called a road map for industrial development in Azerbaijan includes two important measures related to metallurgy: increasing the production capacity of the Ganja Aluminum Plant foreseen in paragraph 1.15 and building the production process from iron ore mining to steel production at the Azerbaijan Steel Production Complex foreseen in paragraph 1.16.

Since its establishment, in a short period of time, Azerbaijan Steel Production Complex has made some progress. As a result of measures implemented by Dashkasan Ore Dressing Plant which is a part of the complex, the volume of production at the plant has increased and the quality of concentrate has increased to 65 percent.

Moreover, there are several metallurgical entities recycling metals. Such enterprises include Baku Steel Company LLC which is the largest and most modern ferrous metallurgy enterprise in the Caucasus region, Steel Pipe Plant of Azertechnoline LLC established in Sumgait Chemical-Industrial Park in 2013, and the iron foundry of Baku Elektriktokme OJSC which has been operating since 2014. In total, in 2014, ferrous metallurgy enterprises in Azerbaijan produced about 370,000 tons of metal products (fittings, pipes, constructions), about 250,000 tons of it fell to the share of Baku Steel Company LLC.

According to the State Statistics Committee, in 2019, the country produced 375.5 thousand tons of metal products (fittings, pipes, constructions) and 702 tons of cast iron. According to the State Statistics Committee, investments in fixed assets in the ferrous metallurgy sector in 2000-2019 constituted 369.3 million AZN.

1.1.2 Aluminum production

Non-ferrous metals - Although most non-ferrous metals are found in Azerbaijan in the form of occurrences, important deposits of mainly copper, zinc, lead, ***aluminum***, cobalt, mercury, and molybdenum, and from precious metals gold deposits are registered in the country.

Construction of the first phase of DETAL ***Aluminum Complex*** with a production capacity of 50,000 tons per year, the foundation of which was laid by President of Azerbaijan Ilham Aliyev on March 3, 2008, was completed and put into operation on October 1, 2011. The complex was constructed on the basis of the latest technologies in the world. The engineering design was done by GAMI, a leading global company. The complex was constructed by SMEC company of the People's Republic of China, which over the past 35 years has implemented the turnkey construction of more than 45 plants.

The introduction of modern technologies ensures more efficient use of raw materials and electricity. i.e, 13.5 thousand kilowatt-hours of electricity is spent to produce 1 ton of aluminum, and it is about 6,000 kilowatt-hours less in comparison with similar enterprises currently operating in the CIS. The impact of the complex on the environment for the expected construction and operation was carefully studied, the climatic characteristics of the region were taken into account, and the expected amount of emissions into the atmosphere was estimated upon the selection of technology. Modern dry gas treatment systems used in the complex prevent 98.5% of emissions from the electrolysis process from being released into the atmosphere. ***Currently, the DETAL Aluminium Complex is a part of Azeraluminium LLC.***

Azeraluminium LLC is a leading company in the field of non-ferrous metallurgy of the Republic of Azerbaijan manufacturing aluminum oxide (clay-soil), primary aluminum, and semi-finished products (aluminum sheets, strips, coils, billets, ingots, and rolls) products from bauxite and alunite ore. Ganja Aluminium Plant of Azeraluminium LLC is located in Ganja. The Aluminum Complex combines 4 plants (Electrolysis Plant, Anode Processes Plant, Metal Casting and Continuous Rolling Plant, Rolling and Coating Plant), 2 auxiliary facilities (110 kW and Silicon Rectifier Substations, and Mechanical Repair Station), and other facilities. The total number of people employed in the Complex is 1081. Advanced automated plants with an annual production capacity of 52,000 tons of primary aluminum are operated within the Complex. The Complex includes a world-class Metal Casting and Continuous Rolling Plant, Rolling and Coating Plant Products manufactured by Azeraluminium LLC on the basis of advanced technologies meet all the requirements of European Union standards.

1.2 Production of mineral raw materials

1.2.1 Cement production

Special attention is paid to the development of this subsector since cement production is the basis of the rapidly developing construction sector in the country. At the account of the new plants put into operation in recent years, the projected volume of cement production in the country has reached 5.2 million tons.

Looking back at the recent past, we can see that until a few years ago, cement production in our country did not meet the demand for this product. Therefore, the heads of local companies had to turn to foreign markets to buy and import cement products manufactured in Russia, Iran, and Turkey. Thus, millions of funds flew abroad instead of being invested in the economy of our country and spent on the social welfare of our people. Taking all the above-stated into account, the leadership of the country has set the establishment of competitive plants that will meet the most modern requirements for cement production as one of its main objectives.

Firstly, the enterprises of the Soviet-era were reconstructed. As a result of negotiations and agreements reached between the Swiss and Azerbaijani authorities, the Holcim Group of Companies started operating the Garadagh Cement Plant that was established in the 1950s. Holcim, which has been operating the plant for about 10 years, has become a major cement producer in Azerbaijan. In 2009, Holcim-Azerbaijan OJSC with the participation of President Ilham Aliyev laid the foundation stone of a ***new plant worth 300 million euros*** in the Garadagh region. This plant, which meets the most modern requirements, is supplied with equipment from the United States, Germany, Italy,

Switzerland, and other developed countries, ***four old-style wet process kilns are replaced by a dry kiln line***. Cement production will increase by 30 percent from 1.3 million tons to 1.7 million tons per year, and clinker production from 0.86 million tons to 1.24 million tons when the plant employing 500 people is fully operational.

The cement plant put into operation in ***the Kangarli region of the Nakhchivan Autonomous Republic in 2012*** is also a major contribution to the strengthening of the industrial capacity of Azerbaijan. The cement plant, which has been one of the largest investment projects in the Autonomous Republic over the last 20 years, meets modern standards. The enterprise, which includes 18 main production areas, works at full capacity, 210 people are provided with permanent work in three shifts. The quality of products of the plant with a capacity of 800 tons is much higher than the cement imported into the Autonomous Republic. All the raw materials and additives used by the plant, including limestone, iron clay, quartz, gypsum are extracted from the mines in the Kangarli, Sharur and Babek regions of the Autonomous Republic.

The Daily and annual production capacity of the ***Gazakh Cement Plant*** that was put into operation last summer is 2,500 tons of clinker and 1 million tons of cement respectively. ***The automatic control system of the plant is programmed by the specialists of the Siemens company and supplied with the latest equipment.*** 452 hectares of land have been allocated in order to meet the demand for the mineral raw materials required for cement production. Implementation of this project plays an important role in the social and economic development of the western region of our country. In total 700 people are employed in mining, transport, and other infrastructure for the production line, which will have a production capacity of 2,500 tons of clinker per day.

The Norm Cement Plant commissioned in Garadagh district is also extremely important in terms of diversifying the economy of Azerbaijan and producing competitive products. Construction works are carried out by ***CTIEC Construction Company of CNBM Corporation of China.*** Currently, ***the Norm Cement Plant, located not only in Azerbaijan but also in the South Caucasus*** as a whole, is the largest enterprise for cement production. In accordance with the concept of the plant, modern equipment and technologies were used to ensure its productive and efficient operation for many years. The latest innovations in this field were studied with the help of specialists and consultants with rich experience all over the world, and the economic efficiency of the plant was confirmed as a result of engineering and design works. After the commissioning of the Norm Cement Plant, the volume of local cement production reached 5.2 million tons. The Norm Cement Plant has a production capacity of 5,000 tons of clinker per day and 2 million tons of cement per year. The plant also ***produces well cement complying with API standards for the oil industry, this product was never produced in the country and imported from abroad***. The main raw materials for the plant comes from Garadagh, and additives are brought from Shamkir, Goranboy, Aghstafa, and Tovuz regions. Dry process technology is used during production. The advantage of this modern technology is that the high quality of the product is fully secured. Due to the application of this technology, water is not used when grinding raw materials, and almost twice as little fuel is used in the production process. And in its turn, it reduces the cost of the product and at the same time ***minimizes the negative impact on the environment***. The Norm Cement Plant which is one of the largest projects in the non-oil sector due to its volume and was established at the expense of ***about 350 million USD*** contributes to the further strengthening of the economy of Azerbaijan.

1.2.2 Lime production

The former lime factory is currently out of operation. There are only small lime workshops in the country. ***According to the SSC, in 2019*** it increased to 44,600 tons from 10,700 tons recorded in 2013 which was the last year of inventory.

1.2.3 Glass production

Until the 1990s, three enterprises were engaged in glass production in the country: Sumgait Glass Plant, Baku Glassware Plant, and Baku Lamp Factory. Today only the Sumgait Glass Plant operates with a capacity of 40-60%. The Baku Glassware Plant uses only 10-15% of its production capacity, and the Baku Lamp Factory has completely ceased operations.

"ASK Shusha" LLC was established in February 2018. The premises of the enterprise covers an area of 22 hectares and it is supplied with the latest equipment from Italy. Its annual production capacity is 70-75 million glass containers. In total, more than 320 local and foreign experts were involved in the production process at ASK Shusha LLC. It owns a 120-ton glass-melting furnace, additional buildings, and workshops. The production site consists of a new-system packaging workshop, laboratory, and warehouse. All stages of the production process are monitored, the quality of raw materials and finished products is continuously verified. The enterprise is the largest manufacturer in the region. A part of the main raw materials is produced in the country, and the other part is imported from Russia, Ukraine, Turkey, and other countries.

1.3 Chemical industry

Before 1990, there was a large chemical complex operating in the country. Currently, only competitive Ethylene-Polyethylene production is in place.

Subject to the Decree dated April 2, 2010, of the President of the Republic of Azerbaijan on Improving the Management Mechanisms in the petrochemical industry, the State Company Azerikimya was transferred to SOCAR.

Azerikimya Production Union was established under SOCAR as per the Decree of April 22, 2020, on Amendments and Additions to the Decree no. 844, dated January 24, 2003, of the President of the Republic of Azerbaijan on Improving the Structure of the State Oil Company of the Republic of Azerbaijan. An ethylene-polyethylene plant (comprising EP-300, Polymer-120, isopropyl alcohol production unit, steam, and electricity production) and a repair and construction division are attached to Azerikimya PU. After the transfer of Azerikimya to SOCAR, numerous measures were taken to supply PU's facilities with stable raw materials, improve the quality of products and boost production; also l as modern nitrogen-oxygen complex, water-cooling device, absolute isopropyl alcohol section, facilities for removal of propane-propylene fraction from the sulfur compounds and butane-butylene fraction hydrogenation were constructed and put into operation. Following the reconstruction, the central laboratory was supplied with modern equipment.

Consequently, the unit has produced 103 thousand tons of polyethylene for the first time.

Reconstruction and modernization of existing industries, including construction works on new production facilities and auxiliary production have been launched at Azerikimya PU's Ethylene-Polyethylene Plant to provide the Polypropylene (PP) and high-density polyethylene plants, that are under construction within the framework of SOCAR Polymer project, with required quantity and quality of ethylene, propylene, and hydrogen

Modernization works envisage construction of high concentration of hydrogen facility, propane-propylene fraction treatment facility and EP-300 production management center to boost the propylene productivity, as well as replacement of out-dated equipment with more modern ones, modernization of control and measurement system of technological process, increasing the project capacity, and expansion of the use of new raw materials – gas fractions.

After the reconstruction, it is planned to increase the production of both propylene and ethylene. Currently, the premises of Sumgait Chemical Industrial Park, established by Decree No. 548, dated

December 21, 2011, of the President of the Republic of Azerbaijan on the Development of the Chemical Industry in the country covers 508.14 hectares.

Numerous measures were implemented for establishing external and internal infrastructure, delivering office, consulting, laboratory examination, business incubation, training, and vocational training services, and building other necessary infrastructure facilities for the effective implementation of entrepreneurial activities in Sumgait Chemical Industrial Park. The Polymer project implemented by the State Oil Company of the Republic of Azerbaijan in the park is the largest project of this kind and scale in the petrochemical industry of Azerbaijan for the last 40 years. Moreover, enterprises engaged in the production of large-diameter corrugated polyethylene pipes, steel pipes, mechanical equipment, and hydraulic engineering equipment, glass panels based on Float technology (hot bath rolling), the first enterprises to produce plant protection products in the country have received the status of resident in the Park.

In total 18 enterprises have received resident status in Sumgait Chemical Industrial Park. One of the residents of the Industrial Park, Azertechnoline LLC, which produces steel and polyethylene pipes, mechanical and hydraulic equipment has been operating since 2013, and STP LLC manufacturing various industrial products has received the status of a resident of the Industrial Park since 2014. In 2017, 4 more companies - MST Engineering Services LLC producing low, medium, and high-pressure resistant hoses and fittings, Alco Lubricant Company LLC producing high quality synthetic and semi-synthetic lubricants, Agrokimya Azerbaijan LLC manufacturing pesticides and agrochemicals, STDC LLC dealing with data processing, registration and transfer; and in 2018 Labdisc Azerbaijan LLC, the manufacturer of electronic educational equipment, Baku Non-Ferrous and Foundry Company, a plant of construction chemicals, the tobacco factory of Tabaterra Closed Joint-Stock Company, and the polypropylene plant of SOCAR Polymer LLC started operating in the Sumgait Chemical Industrial Park. In accordance with the 2008-2015 State Program on Reliable Food Supply to Population in Azerbaijan, the design engineering of a new enterprise of special importance for our Republic, the Nitrogen Fertilizer - Carbamide Plant is implemented under the Engineering, Procurement and Construction Agreement signed on March 13, 2013, between SOCAR and Samsung Engineering Co. Ltd. of South Korea. Numerous measures are in progress for establishing external and internal infrastructure, delivering office, consulting, laboratory examination, business incubation, training, and vocational training services, and building other necessary infrastructure facilities for the effective implementation of entrepreneurial activities in Sumgait Chemical Industrial Park.

The Polymer project implemented by the State Oil Company of the Republic of Azerbaijan in the park is the largest project of this kind and scale in the petrochemical industry of Azerbaijan for the last 40 years. Moreover, enterprises engaged in the production of large-diameter corrugated polyethylene pipes, steel pipes, mechanical equipment, and hydraulic engineering equipment, glass panels based on Float technology (hot bath rolling), the first enterprises to produce plant protection products in the country have received the status of resident in the Park.

According to the State Statistics Committee, ***in 2019, the ethylene production sub-sector, which is the main source of GHG in the chemical industry has increased 1.5 times and amounted to 117.2 thousand tons compared to 2013 (78.5 thousand tons) which was the last year of inventory. It makes a sign for an increase by 1.5 times in the amount of GHG from the sub-sector in 2019 after 2013.***

1.4 Chemicals and relevant application areas

Hydrofluorocarbons (HFCs) and, to a limited extent perfluorocarbons (PFCs) are considered to be alternatives to ozone-depleting substances (ODMs) that have been excluded under the Montreal

Protocol. (refrigerator and air conditioning, fire and explosion protection, aerosols; dry cleaning with solvents; pressure blowing of foam are the envisaged areas of application.

The issues related to the assessment of GHG emissions into the atmosphere from chemicals substituting ozone-depleting substances are addressed in the category of the use of chemicals in ventilation and cooling systems.

2. GHG emissions by industrial sectors

The GHG inventory data presented in this report covers the period up to 2013 with reference to the Second Binary Report officially submitted by MENR to the Convention Secretariat as the forthcoming 4th National Communications is not officially submitted yet. In the context of climate change, an industry-specific area is defined as the activities ranging from the production of GHG-related industrial products to the final demand in industrial products and related services throughout the supply chain.

GHG emissions are generated as a result of various industrial activities. Emission sources mostly result from chemical and physical transformations during industrial processes (for instance, furnace smelting in the iron and steel industry, the production of ammonia and other chemical products from minerals used as chemical raw materials, and cement industry are the main examples of industrial processes that generate a significant amount of CO2). These processes generate carbon dioxide (CO2), methane (CH4), nitrogen I oxide (N2O), hydrofluorocarbons and (HFCs), perfluorocarbons (PFCs). Moreover, greenhouse gas emissions are caused by refrigerators, foams, and aerosol cans. For instance, HFCs are used as alternatives to ozone-depleting substances (ODSs) in a variety of products. Similarly, sulfur hexafluoride (SF6) and N2O are used in some industrial products (SF6 is used in electrical equipment, N2O as a propellant, mainly in aerosol products in the food industry) or by end users (SF6 in running shoes, N2O in anesthesia).

According to the results of the GHG inventory carried out within the framework of this report, in 2013, ***5.4%*** of total waste fell into the ***category of industrial processes***. The Diagram below shows the trend of change in GHG emissions of this category since 1990:

Diagram 1. Change of GHG emissions by industrial sectors in 1990-2013, thousand tons, CO_2 equiv.

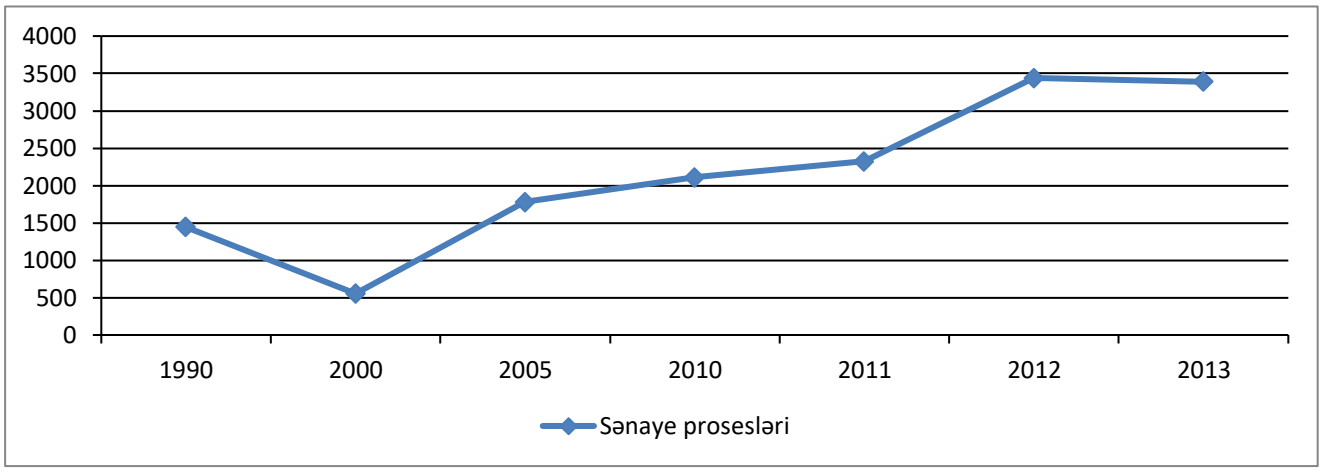
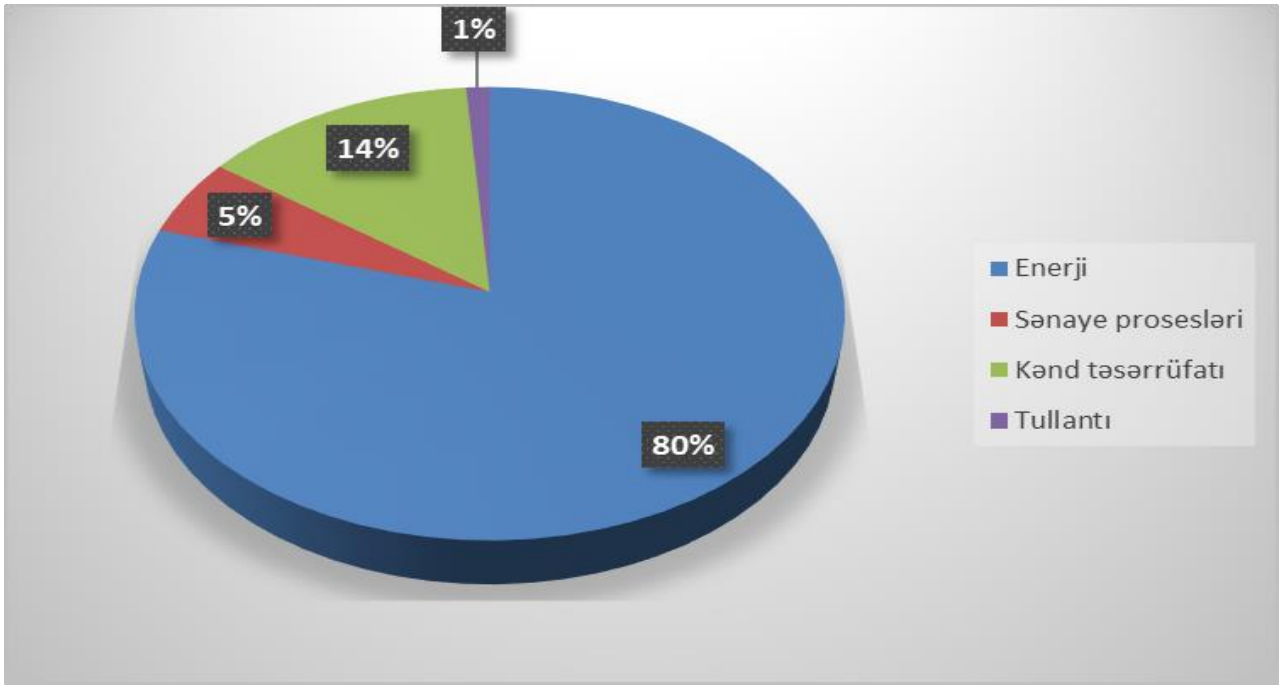


Diagram 2 shows the emissions of 2013 by sectors. Here we can see that in the sectoral distribution of GHG emissions, the share of the industrial sector in the national emissions amounts to 5.4%.

Diagram 2: Emissions by sectors in 2013 (in percent %)



As seen in Table 1, in 2000, the volume of emissions from the industrial sector decreased by about 3 times as compared to 1990, which is the baseline year. However, since 2000, emissions from industrial processes increased by about 2.3 times compared to the baseline year and in 2013 it accounted for ***5.4%*** of total emissions. ***This is mainly due to the increase in industrial development, including increased production of cement, steel, aluminum, which is associated with GHG, and the inclusion of an additional source in the methodology (CO_2 emissions from ethylene production).***

Table 1. GHG emissions by sectors

Sectors	GHG emissions and absorptions (Gg CO2 eq.)						
	1990	**2000**	**2005**	**2010**	**2011**	**2012**	**2013**
Energy	63 928	33 006	39216	36596	46173	47789	49232
IPPU	1447	554	1781	2108	2322	3440	3389
AFOLU	6261	5368	6469	7244	8237	8375	8451
Waste	1694	1837	2023	2260	733	742	770
Total emission	**73 331**	**40 774**	**49490**	**48209**	**57465**	**60346**	**61842**

Direct greenhouse gas emissions (CO_2, CH_4, and N_2O), including CF_4 and C_2F_6 gases, were assessed in inventory.

Table 2 shows the overall results (by sub-sectors) of the inventory conducted as part of the second biennial report.

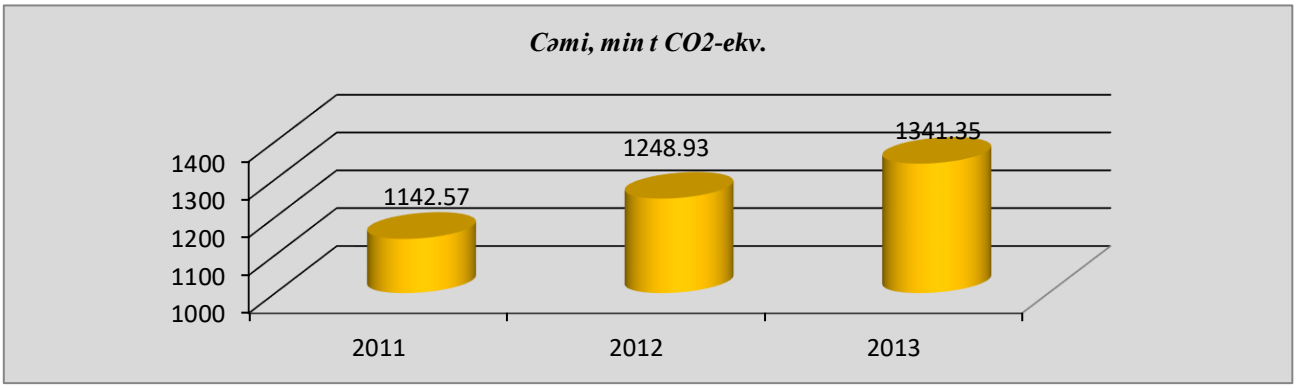
Table 2. Total emissions in the IPPU sector, thousand t CO_2 equiv.

Source:	**2011**	**2012**	**2013**
Cement production	465.09	658.06	721.76
Lime production	1.65	12.68	8.03
Ethylene production	179.30	159.95	181.52
Metallurgical production (steel, iron)	401.85	470.85	270.51
Aluminum production	107.30	864.74	839.50
Use of oil lubricants	24.70	24.76	26.35
Substitutes and fixed cooling systems	1142.57	1248.93	1341,35
Total IPPU	**2322,46**	**3439,97**	**3389,02**

As seen from Table 2, we find it useful to give a brief overview of this subsector, as emissions from the use of chemicals in ventilation and cooling systems account for about 40% of the emissions caused by the entire industrial sector. As stated in the 2nd biennial report, this category of the industry was not evaluated by national GHG inventory experts and it is based on the results of a report prepared by GIZ experts.

In this category, the issues related to the assessment of GHG emissions into the atmosphere from the use of chemicals that are substitutes for ozone-depleting substances were dealt with in a report prepared by the German Agency for International Cooperation (GIZ) in 2013-2014. The inventory results included in the report are shown in Figure 2. In this report, the inventory was estimated by GIZ experts based on the data of the State Statistics Committee for 2012 (for instance, the number of domestic air conditioners - 1,042,207, automotive air conditioner - 958,594, large vehicle air conditioners - 159,666, indoor refrigerators in houses - 3,098,358, centralized cooling and heating systems in supermarkets -128, etc.).

Diagram 2. Emissions from the use of chemicals in ventilation and cooling systems, thousand tons



Rapid growth over the 8-year period since 2012 has led to increased emissions in this subsector, it will probably be more detailed in the 4th National Communications (including 2016).

Recently, the industrial sector in Azerbaijan has been rapidly developing. The use of a wide range of products has begun and this process continues to improve. It is clear that in parallel with the growth of the industry as a non-oil sector, the emissions from its technological processes will grow as well.

3. Development strategies of the industrial sector

Environmental issues, including climate change, are integrated into the main development priorities and strategies of the Republic of Azerbaijan.

A section of ***Azerbaijan 2020: Look into the Future Concept of Development*** specifying the development priorities until 2020 deals with environmental issues. I.e., the Concept document, which specifies the country's development priorities until 2020 reads as follows: "During the period covered by the concept, ***approximation of the amount of energy used and the amount of carbon dioxide emitted per capita in Azerbaijan to the relevant indicator for the countries of the Organization for Economic Cooperation and Development.*** It is envisaged that this is important in terms of achieving the development goals of the millennium".

The implemented works have led the industry to a new stage of development, as the beginning of this stage, ***2014 was declared the Year of Industry in the Republic of Azerbaijan***. To ensure the transformation of Azerbaijan into a powerful industrial center of the region through more efficient use of the existing capacity at the new stage of industrialization, ***the State Program for the Development of Industry in the Republic of Azerbaijan for 2015-2020*** was adopted taking into account the areas of activity specified in Development Concept Azerbaijan - 2020: outlook for the future. The State Program is aimed at strengthening the activities of existing industrial and technology parks, establishing new industrial parks and industrial areas, creating special economic zones, and improving the industrial capacity of the regions.

Economic reforms have been launched since 2016 in order to adapt to the new challenges posed by global processes and to minimize the impact of the current global economic crisis. ***The Main Directions of the Strategic Roadmap for National Economy and the Key Sectors of the Economy*** were approved ***under the Decree dated March 16, 2016, of the President of the Republic of Azerbaijan*** in order to ensure the sustainability of the ongoing economic policy and reforms implemented in the country. Subject to this Decree, strategic roadmaps for the national economy and 11 sectors were developed and approved by the Decree dated December 6, 2016, of the President of the Republic of Azerbaijan. Strategic road maps ***reflect the economic development strategy and action plan for 2016-2020, long-term vision for the period until 2025, and the targets set for the post-2025 period.***

Moreover, the Strategic Roadmap envisages the creation of more than 450,000 new jobs by 2025 in order to meet the average annual real GDP growth exceeding 3 percent and the growing demographic demand. To that end, 150,000 additional jobs are expected to be created by 2025 in the commercial goods and services sectors, such as manufacturing or tourism. Moreover, 20,000 new jobs will be created in the agricultural production and processing sector by the implementation of the envisaged measures in the regions of the country. Also, 7,700 permanent jobs will be created, and new iron ore extraction and steel processing plants will be built in the field of heavy industry and mechanical engineering. The share of SMEs will reach 15% in GDP, 20% in employment, and 10% in non-oil exports.

Strategic Roadmap for the Development of Heavy Industry and Machinery Manufacturing in the Republic of Azerbaijan was developed in pursuance of the tasks set by Presidential Decree No. 1897 of March 16, 2016 on Approval of the Main Directions of the Strategic Road Map for the National Economy and its Key Sectors. ***When developing the Strategic Roadmap***, the goals and objectives specified by the following documents were taken into account: "Azerbaijan 2020: "A

Vision of the Future" Development Concept approved by the Decree of the President of the Republic of Azerbaijan No 800 dated December 29, 2012; "State Program on Regional Socio-Economic Development in the Republic of Azerbaijan for 2014- 2018" approved by the Decree of the President of the Republic of Azerbaijan No 118, dated February 27, 2014; "State Program on Industrial Development in the Republic of Azerbaijan for 2015- 2020" approved by the Executive Order of the President of the Republic of Azerbaijan No 964, dated December 26, 2014. The key purpose of the Strategic Road Map is to achieve the diversification of the country's economy, an increase of value add and employment in the sector of heavy industry and machinery manufacturing, environmental protection and sustainable development, and to ensure improved living standards of people through a dynamic development of the non-oil sector by considering the existing resources and successfully introducing up-to-date regulatory and incentivizing policies in the heavy industry and machinery manufacturing sector.

Guided by the key directions of the strategic roadmap for the national economy to achieve the above goals, the following strategic target shave been set for the sector of heavy industry and machinery manufacturing of Azerbaijan for 2016-2020:

- ***Optimization of existing assets;***
- ***Create a competitive sector;***
- ***Ensure financial support and implement international cooperation***

Within the target of optimizing the existing assets, it is envisaged to take actions to increase efficiency and productivity in the heavy industry and machinery manufacturing sector, ensure optimum efficiency in energy consumption, and create a centralized registry of assets and existing potential. The target to create a competitive sector includes integration in the value chain with high regional demand, support of import substitution, activities with regard to the development of mining industry and manufacturing complex as well as the related service sector. Within the last third target, the role of alternative funding as well as priorities associated with compliance with international standards and governance procedures are highlighted.

In accordance with the Strategic Roadmap for the Development of Heavy Industry and Mechanical Engineering in the Republic of Azerbaijan, the strategic vision is defined as follows:

Strategic vision until 2020:

Strategic vision in the heavy industry and machinery manufacturing sector for 2020 is to enable heavy industry and machinery manufacturing enterprises to meet a large portion of the demand of domestic consumers in low and medium -value product segments and increase the share of Azerbaijani products in the regional market. For the purpose of this Strategic Roadmap, the following areas will be considered as a priority in the heavy industry and machinery manufacturing sectors: mining (excluding oil and gas sectors), metallurgy, production of some construction materials (for example, cement), oil-gas and agricultural machinery complex, production of electrical equipment, development of service enterprises in the machinery sector. As the result of the implementation of this strategic road map, the structure of the industry will be improved, the non-oil industry will become one of the driving forces of economic growth, the contribution of heavy industry and machinery manufacturing to both the industry and employment will increase, the general economic potential will be made ready to realize the objectives envisaged for post-2020 period, and optimal use of the existing resources and introduction of effective methods in enterprises will be launched. Robust progress in the factors (for example, standards, technical regulation, workforce, promotion of innovations, intellectual property), which affect the competitiveness of enterprises, will be achieved and they will match the needs of local large customers in traditional product markets Achievement of 2020 targets is estimated to bring 1 billion 560 million increase in the country's GDP.

Long-term review for the period up to 2025:

The long-term vision for 2025 is to form a value chain in most low and medium-value product segments by using domestic resources, to ensure full competitiveness of the country's enterprises at a

regional level, and to turn the Republic of Azerbaijan into a heavy industry and machinery manufacturing hub of the region.

Interpretation of long term vision. The full use of assets and natural resources of the industry will be ensured by 2025, the effective work experience will be fully implemented in enterprises in order to achieve the planned progress in the heavy industry and engineering industry in the medium term. Closing the production gaps along all the value chain will also trigger efficient use of the existing natural resources in the country. The enterprises operating in Azerbaijan will serve as benchmark enterprises for the neighboring countries in terms of efficiency. By achieving the targets for 2025 through the application of efficient work practices and skills, Azerbaijan will ensure coordinated operation of training facilities and vocational education institutions with industrial enterprises in the mid-term.

Dependency on imports will be decreased significantly; demand for the low and medium value segments of the value chain will be met by domestically produced products. At the same time, completely meeting the demand for some selected goods in the high-value segment of the value chain by domestic products by 2025 has been set as an objective. For this purpose, focus groups for high-value products will be identified and local production capacities will be created for respective directions. Moreover, Azerbaijan will create necessary conditions for the manufacturing of machinery and equipment components with high regional demand. Azerbaijan will become a major regional producer in the heavy industry and machinery manufacturing value chain, especially by being involved in the oil and gas sector.

As the locally established enterprises producing these commodities get financially stronger in the domestic market, they will be able to export these products to other regional markets beyond 2025. By introducing different stimulatory mechanisms, the country will achieve a more enabling environment for investment by 2025. The main priority will be to increase the participation of the private sector in the country's industry.

Aspirational vision for post-2025:

The aspiration vision for the post-2025 period to transform the heave industry and machinery manufacturing enterprises of Azerbaijan into an integral part of the global value chain, participate in the production of well-known brands in high-value product segments, and export technical knowledge, know-how, efficient production practices and governance methodologies to neighboring countries.

In the long run, large-scale companies in the Caucasus region that operate in the highly profitable segments of the value chain will carry out their activity in Azerbaijan.

In order to achieve this goal, alongside supporting the foreign investments, the policy of providing necessary financial and technological support to businesses operating in the sector will be continued. Azerbaijan will incentivize investments into its heavy industry and machinery manufacturing sector through four channels: it will provide capital and other financial incentives, attract venture investments to the equity capital of industrial companies, provide basic materials to its manufacturing enterprises at competitive prices and implement different tax incentives.

Through all these investments focusing on high-value sectors, Azerbaijan in the long term will ensure the transition of its manufacturing sector from mainly producing resource-intensive commodities into producing innovative high-technology products.

The implementation of nine strategic priorities specified in the Strategic Roadmap for the heavy industry and machinery manufacturing sector will result in:

- Increasing Azerbaijan's GDP by AZN 1 billion 560 million in 2020, in real terms;
- Adding 7,700 permanent jobs in the sector.

This will make the heavy industry and machinery manufacturing sector one of the key pillars to build a diversified Azerbaijani economy along the value chain.

Preliminary intermediate targets by 2020 that are set to achieve these aspirations are listed below:

Increase labor productivity by 20 percent in the heavy industry sector;

- Decrease faulty goods in the production of commodities by 17 percent;
- Ensure that at least 5 idle enterprises are revitalized and the production scope of 10 non-competitive enterprises is repurposed until 2020;

-Establish a new iron ore extraction and steel processing plant;
- Substitute 20 percent of the currently imported products in heavy industry with domestic products providing that their quality is not substantially different from imported products;

The above-mentioned actions will have a considerable impact on the development of heavy industry and machinery manufacturing in the country. In order to ensure sustainable development of heavy industry and machinery manufacturing, the country will focus on metallurgy and petrochemical sectors as suppliers of basic products, and take additional measures towards the absorption of new products with high added value in the machinery manufacturing complex and improvement of quality standards.

4. Investments in the industrial sector

In the post-2000 period, in addition to infrastructure projects, state investments had been channeled into several production-oriented projects, a favorable business environment had been created in the country, projects executed by the private sector had been financed by the state on concessional terms, and when necessary government participated in these projects.

Promotion and stimulation of investments in Azerbaijan's economy have become the main focus of its ongoing economic policy strategy, $244.9 billion was invested in the country's economy from 2004 to 2018. At the same time, public investment spending in the state budget has increased dynamically in order to ensure sustainable socio-economic development.

In 2019 alone, $13.5 billion was invested in our country by the state, local and foreign companies. A part of these investments was made by the state. "And this is natural because public investment still plays an important role in economic growth, especially if we consider that a lot remains to be done in connection with infrastructure projects".**(İlham Aliyev)** The establishment of industrial zones in ten regions of the country has given impetus to the process of industrialization. In general, so far residents of industrial zones have invested up to 6 billion manats, more than 9,000 new jobs were created. Last year the total production volume in these zones saw a 2.6-fold increase. (**Ilham Aliyev**)

It should be noted that over 80 percent of production in industrial zones falls on the share of the Sumgait Chemical Industrial Park. Balakhani Industrial Park which is expanding its activities has entered the second phase. From this point of view, it is important to increase the efficiency of activities in other industrial zones as well. The implementation of projects under the investment promotion documents issued so far will contribute with over $4 billion investment in local production, opening up to 28,000 new jobs. The regions account for 87 percent of these projects. Thanks to the state support for the development of entrepreneurship, the Entrepreneurship Development Fund continues to provide concessional loans. It should be noted that in order to implement this process, without creating an additional burden on the state budget, lending is provided at the expense of repaid funds. In 2019, 1,573 business entities were provided concessional loans in the amount of 175 million AZN at the expense of these resources.**(Speech of President of the country Ilham Aliyev at the conference dedicated to the results of the first-year implementation of the State Program on socio-economic development of regions in 2019-2023)** The foundation of Mingachevir Industrial Park was laid on September 21, 2016. Additionally, the state allocated a concessional loan of 10 million AZN for the establishment of factories, the necessary infrastructure was provided and as a resident of the industrial park, the project gained the opportunity to be exempt from profit, land, and property taxes, as well as VAT on imports for 10 years.

The latest event demonstrating the significance, role, and attitude of our country is the establishment of a regional center for the Fourth Industrial Revolution in Baku between the Davos Forum and Azerbaijan within the framework of the Davos World Economic Forum. This is a very outstanding event. Because the Davos World Economic Forum is the number one forum in the world. It is number one both politically and economically, and the election of Azerbaijan as a center in the South Caucasus, in Central Asia, is undoubtedly a great event. I and the president of the Forum signed a protocol of intent, the work will begin, and Azerbaijan should become a leader in the Fourth Industrial Revolution. **(Speech of President of the country Ilham Aliyev at the conference dedicated to the results of the first-year implementation of the State Program on socio-economic development of regions in 2019-2023)**

In 2009, Holcim-Azerbaijan OJSC with the participation of President Ilham Aliyev laid the foundation stone of a new plant worth 300 million euros in the Garadagh region.
The shareholders of Holcim-Azerbaijan include the Holcim Group of Switzerland, the Azerbaijan Investment Company, the European Bank for Reconstruction and Development, as well as a group of local individuals.
The Azerbaijan Investment Company has invested 19 million AZN in this project. This investment in the non-oil sector of the country will further bolster the economic development and give an impetus to the production of quality local products.

Holcim owns the largest share, which is 70% of the company's stock. 10% of the shares of Azerbaijan Investment Company are acquired and the other 10% by many other shareholders. In general, Azerbaijan has a very positive investment climate.

The Norm Cement Plant which was established at the expense of about 350 million USD contributes to the further strengthening of the economy of Azerbaijan.

5. Recommendations for mitigating the effects of climate change on the industrial sector

5.1 Minimizing the impact of climate change on the industrial sector

Global Architecture

In 2015, about 11 billion tons of CO2 emissions were produced by the industrial sector worldwide from technological processes alone, excluding energy purposes, and that's about 21% of global emissions. According to the BAU scenario, by 2050 the share of these sectors will grow to about 16 billion tons of CO2.By 2050, significant reductions need to be achieved in this sector, and mainly in the steel, cement, and chemical industries. This includes mitigation possibilities, high efficiency achieved at all levels, replacement of fuel with other sources, support for the development of a closed-loop economy (particularly for electricity), and measures to reduce demand by replacing raw materials. According to the **GCAM-CWF scenario**, by 2030 emissions will roughly decrease twice as compared to today's levels and amount to about 8 billion tons of CO2, and by 2050 CO2 emissions will go down from 12 billion tons to 4 billion tons.

One of the greatest challenges in achieving the goal of **limiting the global temperature rise to $1.5C^0$ or $2C^0$ above pre-industrial levels** under the Paris Agreement is caused by the industrial sector producing cement, steel, chemicals, plastics, etc. Industry, like all sectors, needs to achieve net-zero CO_2 emissions in order to achieve the goal of goal of limiting the rise to $1.5C^0$ degrees. Fulfilling these commitments requires deep decarbonization of the industrial sector at the global level, regulation of carbon prices, replacement of electrification sources, and addressing key and other cross-cutting issues related to the circular economy.

The activity to be implemented in the next decade, that is, by 2030 is crucial for ensuring the early emission reductions needed for limiting CO_2 gaps in the atmosphere and achieving clean zero emissions from industrial systems by the middle of the century.

Given the solutions that can be applied for mitigation over the next decade and beyond, small improvements of the value chain, such as optimizing the clinker composition should be the focus in relation to cement production. Global studies show that the large-scale replacement of cement with other materials seems unlikely for the next decade.

Studies show that from a technical and economic point of view, the industrial sector can achieve net-zero emissions by the middle of the century at a low cost. Preliminary studies suggest that it will require up to 0.5% of global GDP to address the economic, regulatory, technological, and financial challenges that are key barriers before the industry's transition to a low-carbon global economy. Globally, there was no market for materials that were historically expensive but had greenhouse gas emissions.

In steel and cement production, there are numerous new methods close to commercial options that can help to reduce the intensity of GHG emissions, but they are of little interest or have no investment appeal because there is no market to make them commercially viable.

The Paris Agreement envisages an entirely different context in which GHG emissions from all countries and all enterprises of the sector have to be compensated for by very low-level emissions through reinforcements to minimize emissions.

Given the context of the global political economy outlined above, it suggests a fundamentally different approach to the problem. This requires adapting the existing best technology standard to long-term impact and net-zero emissions and commercialization of technologies by mid-2030.

A review of the extensive literature suggests several methods to reduce GHG emissions from steel, cement, concrete, and other materials, which fall into two broad categories:

1) "Reduction of the demand" by the targeted design of industrial equipment, buildings, and infrastructure. Design considerations for improved material efficiency, easier and more efficient use of components, and higher quality recycling;

2) Decarbonization of production through intensive research, development, and commercialization of technologies in order to ensure very low or zero emissions;

5.1.1 Current opportunities

Globally, the demand for materials, products, and services continues to grow, the private sector is increasingly aware that ambitious climate commitments are the only way to reduce climate risks and ensure the long-term sustainability of their operations. More than 950 companies with $19.3 trillion in the capital, or representing about a quarter of global GDP implement ambitious climate measures as part of the We Mean Business Coalition's Take Action campaign. Among them are more than 590 companies that have set their targets to reduce emissions on a scientific basis in order to meet the goals of the Paris Agreement. Giant companies like Maersk, the world's largest shipping company, Mahindra Sanyo Special Steel of India, and Dalmia Cement can be shown as examples of the industrial companies that have undertaken to reach zero emissions by 2050.

Moreover, Vattenfall producing hydrocarbon-free or fuel-free (using hydrogen) steel has established an associated company named HYBRIT and has joined forces with LKAB mining company and steel manufacturer SSAB to reduce the climate impact of the Swedish steel industry. The main objective of HYBRIT, an associated company established by the three companies in 2017 is to implement a fuel-free steel production process by **2035**. This initiative can reduce total CO2 emissions in Sweden by 10% and Finnish production by 7%. This project is characterized as one of the critical projects that will ensure that Sweden achieves its goals under the Paris Agreement.

The World Business Council for Sustainable Development's Low Carbon Technology Partnership initiative has brought different sectors together in order to establish a platform to apply real solutions by drastically reducing removals. Since 2015, this initiative has brought 235 cross-sectoral companies together in order to develop and implement climate solutions on a global scale. There are many such examples in the modern world. Globally, the UN Climate Action Summit, Mission Possible Platform, and a number of other international organizations continue their efforts in this area.

5.1.2 Key Challenges

Although a number of leading industry sub-sectors have incorporated the principles of the circular economy into their operations to meet ambitious goals in order to address climate change issues, there are still significant technical, economic, and institutional challenges across the various sub-sectors. A globally favorable policy environment for reducing industrial emissions, and a clear and long-term course of action that is not tied to inefficient proposals, will be necessary for companies to to strengthen their markets in a low-carbon future. As stated in the Paris Agreement, developed countries should take the lead on this issue. Thanks to **innovation and new technologies in the industrial sector**, it seems possible to significantly reduce the demand for energy. However, most of these technologies are still not commercially viable. The development of new technologies requires a heavy upfront investment. In the lack of proper incentives, early assets will continue to delay the introduction of new technologies. The transition to low-emission technologies due to their commercial utility within industrial sectors will inevitably have an impact. Thus, it is clear that climate change affects the industry as a whole and ***poses significant risks at the global level*** and it can only be overcome by ambitious measures, such as building sustainable infrastructure, fully developing green industrialization, and fostering innovation.

All these can be achieved by carbon pricing, creating pricing mechanisms ensuring environmental integrity, emission reduction, competitiveness, promoting innovation, ensuring investments, and minimizing social spending, by providing the necessary support to the private sector to improve partnerships, cooperation between governments and the business community, and to accelerate the implementation of ambitious commitments and the climate actions of the industry.

Significant efficiency improvements have occurred in most fields of industry in recent years, it is evidenced for example by the rapid transition to dry kilns with preheaters in cement production. Despite this, commercialization in the steel and cement industries lags relatively behind the energy and transportation sectors. Why? Because this sector has the following peculiarities:

1. Capital expenditures are very specific, targeted, and determined in advance and it increases investment risks.

2. The steel and cement industries operate in very competitive markets with very low margins.

3. Enterprise turnover in this sector is relatively slow.

5.2 National Framework

The above-stated global challenges are no exception for Azerbaijan, and considering the extensive rehabilitation work to be carried out in the liberated territories, we can hardly expect significant progress in reducing GHG emissions from cement and concrete production in the coming years.

In Azerbaijan, the reduction of GHG emissions in this sector will depend on innovative achievements at the international level, reliable ways for sustainable use while balancing public needs, sustainable development, and environmental requirements.

Raising efficiency by promoting the use of advanced technologies available in the world for the development of industry in Azerbaijan is stipulated by the relevant articles of almost all strategic programs.

In 2004 a new period of industrial development started in the Republic of Azerbaijan. Over this period, a part of the revenues obtained from the oil and gas sector was allocated to the development of various sectors of industry, state programs were developed to optimize the industrial structure in regions, significant work was carried out to solve the issue of energy supply, and to improve the overall infrastructure. Favorable business environment established in the country, as well as the important decisions for governing entrepreneurship, have played a significant role in the development of the industry.

The implementation of the elaborate state policy enabled the formation of sustainable financial resources and thus the development of all industrial sectors of the country. i.e, the size of the industry has almost doubled over the last ten years mostly at the account of the non-oil industry. Despite the significant economic growth, the increase in GHG emissions was not as large, due to the closure of many air polluting enterprises and their replacement with new, eco-friendly enterprises.

At the current stage, it is necessary to take a number of measures to modernize the industry and diversify the non-oil sector taking into account modern challenges and new initiatives, including the creation of opportunities that will ensure the involvement of existing natural and economic resources in the economic turnover, the establishment of new priority areas of production and industrial parks along with traditional industries, strengthening the industrial capacity of regions, and the development of industry on the basis of innovations. Closing the production gaps across all the value chain will also trigger efficient use of the existing natural resources in the country and ensure that the enterprises operating in Azerbaijan serve as benchmark enterprises for the neighboring countries in terms of efficiency.

5.2.1 Recommendations for mitigating the effects of climate change in the industrial sector of Azerbaijan

Undoubtedly, all the above-stated will contribute to the achievement of the country's reduction target under the Paris Agreement by 2030. The restoration and reconstruction of infrastructure and settlements that have been occupied and completely destroyed for more than 30 years will also require large-scale cement and concrete production. Thus, estimates at the national level show that demand from industries such as urban planning, cement, concrete, etc. will continue to grow and require serious strategies to restrict the impact on the environment. To accomplish this, it is recommended to implement the following measures in the industry sub-sectors associated with GHG emissions:

1. Considering the proposals on the application of low-carbon methods and techniques in the development of long-term national concepts, national programs, strategic road maps, etc.;

2. Restricting natural fuel use in industrial processes (**green hydrogen** etc.), and stimulating the use of advanced international technologies to replace it with electricity;

3. Developing and adopting proposals to reduce taxes imposed on the import of new low-carbon technologies used in industrial processes, and on the contrary to raise taxes on carbon-intensive technologies;

4. Promoting the adoption of relevant regulatory acts and standards for the application of the most modern methods of energy efficiency in all sectors of industry;

5. Studying the possibilities to create low-interest loan opportunities for the application of low-carbon technologies in the industrial sector;

6.Developing and implementing proposals to ensure the use of carbon-free clinkers in cement production;

7. Developing and implementing proposals to improve the mechanisms of state regulation in the industrial sector;

8. Ensuring the application of scientific and technological advances in the relevant field by taking the best international practices into account and supporting innovation activities in relevant research institutes in order to take joint necessary measures to study and improve areas of activity;

9. Providing university education in global innovative methods for the development of low-carbon industry in the country;

10. Strengthening public-private partnership in order to benefit the possibilities of UNFCCC financial mechanisms (GCF, GEF, etc.) for the use of global innovations and advanced technological innovations in the relevant areas of industry;

6. LIST OF REFERENCES:

1. Speech of President of the Republic of Azerbaijan Ilham Aliyev at the conference dedicated to results of first year implementation of the State Program on socio-economic development of regions in 2019-2023, March 3, 2020

2. Strategic Road Map for the development of heavy industry and mechanical engineering in the Republic of Azerbaijan

3. 2015-2020 State Program on Industrial Development in the Republic of Azerbaijan

4. https://www.stat.gov.az/

5. http://www.ask.gov.az/internal

6. 1st, 2nd and 3rd National Communcations

7. 1st and 2nd Biennial Reports

8. http://www.socar.az/socar/az/company/organization/azerikimya-production-union

9. Emissions and mitigation potential in the refrigeration, air conditioning and foam sectors

Dr. Jonathan Heubes, GIZ, Proklima

file:///C:/Users/Dell/Downloads/NAMA_Azerbaijan_JH_180314%20(1).pdf

10. Climate-friendly Refrigeration and Air Conditioning:A Key Mitigation Option for INDCs

https://www.ctc-n.org/sites/d8uat.ctc-n.org/files/resources/giz2015-en-rac-sector-indcs_0.pdf

11. ***Environmental impacts and decarbonization strategies in the cement and concrete industries G. Habert, S. A. Miller, V. M. John, J. L. Provis, A. Favier, A. Horvath & K. L. Scrivener***

Published: 22 September 2020, https://www.nature.com/articles/s43017-020-0093-3?sap-outbound-id=81068B9AE482CE20E4E471EF66C01D263F5D9CD0&utm_source=hybris-campaign&utm_medium=email&utm_campaign=000_RAQ3753_0000007808_NRRJ_USG_RA01_GL_NREE-nov_USG_RA01_GL_NREE-nov&utm_content=EN_internal_18079_20201109

12. Yearbook of Global Climate Action 2019 (Marrakech Partnership for Global Climate Action)

13. **Low and zero emissions in the steel and cement industries Barriers, technologies and policies**

Dr. Chris Bataille Associate Researcher, IDDRI & Adjunct Professor, Simon Fraser University

(***Greening heavy and extractive industries, 26 & 27 November OECD, Paris 2019***

GGSD Forum)

14. Achieving global climate goals by 2050 ***Actionable opportunities for this decade***

Seth Monteith and Surabi Menon August 2020