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Summary of the investment project for the construction of the "Pervomaiskyi" industrial park

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State institution "NIOCHIM" proposes the construction of an industrial park with the core production of caustic soda (solid and liquid) with a capacity of up to 170 thousand tons per annum in terms of 100% NaOH and evaporated table salt, with a capacity of 50 thousand tons per annum.

According to the State Statistics Service of Ukraine, imports of caustic soda to Ukraine from Russia in 2015 decreased compared to the previous year to 137.66 thousand tons, and in general Ukraine increased the import of caustic soda to 225.39 thousand tons.

Export of these product amounted to 69.33 thousand tons. Thus, the real need of Ukraine for caustic soda can now be roughly estimated by the difference in imports and exports, i.e. 225.39-69.33 = 156 thousand tons per annum, which is close to the previously achieved production capacity of this product at the collapsed Pervomaiskyi State Enterprize "Khimprom" and the proposed investment project - 170 thousand tons per annum.

The project is supposed to be implemented by attracting a venture fund on the terms of a public-private partnership.

Within the framework of the industrial park, in addition to the production of caustic soda, it is planned to place the following additional production facilities:

- Evaporated table salt "Extra";
- Sodium hypochlorite;
- Ferric chloride;
- Calcium chloride.

The combination of chemical industries into a single economic complex will achieve high efficiency and effectiveness. Expected performance indicators are presented in table 1.

Table 1

Product name		Investments, mln. USD	Volume of output, kt/a
Caustic soda (sodium hydroxide)	solid	**73,6,** incl.	85,0
	liquid	**46,0**	85,0
Table salt "Extra"		8,0	50
Sodium hypochlorite		4,6	10
Ferric chloride		6,0	10
Calcium chloride		9,0	10
Total			

The presence of associated industries within the industrial park will allow achieving a double synergistic effect by providing related industries with raw materials at a price lower than the market.

According to the institute's experts, the priority site for creating an industrial park is the industrial site of the former Pervomaiskyi State Enterprize "Khimprom" in Kharkiv Region,

where a complex of chemical plants can be built.

Main characteristics of the industrial site:

- Provision with approved reserves of raw materials (salt reserves for more than 100 years);
- Availability of the idle brine extraction station and the possibility of its further development;
- The ability to use existing waste storage, which reduces investment;
- Availability and proximity of a water supply source;
- Availability of transport and engineering infrastructure;
- The possibility of expanding the industrial park - due to the creation of the production of synthetic detergents, building materials, anti-icing reagents.

Resources required for the functioning of the industrial park (estimated):

- Crude brine (NaCl) of the existing brine extraction station - 70 thousand m3 per year;
- Labor resources - 1 800 people;
- Land resources - 71 ha.

The necessary level of infrastructure parameters and the costs of their development can be estimated at the stage of development of the feasibility study of the industrial park.

Socio economic aspects of creating the Pervomaiskyi industrial park:

- Rehabilitation and improvement of investment attractiveness of the region;
- Multiplying effect in adjacent industries;
- Development and support of a domestic manufacturer;
- Increase in tax deductions to budgets of different levels;
- Creation of about 1 00 new jobs in the region;
- Housing construction - about 50 thousand m2;
- Educational opportunities and vocational guidance for children and youth.

ENLARGED PERVOMAISKYI INDUSTRIAL PARK CREATION PLAN:

The implementation of the project on creation of an industrial park involves the side attraction and participation in it of state, regional and private capital.

1. Development of a concept for the creation and development of an industrial park;
2. Development of a feasibility study for the creation of an industrial park;
3. Search for residents and signing of an agreement of intent;
4. Development of a business plan for the development of an industrial park;
5. Approval of the management company of the industrial park (developer);

Step-by-step planning and implementation of the project (design and construction of industrial park facilities).

ROLE AND FUNCTIONS OF PROJECT PARTICIPANTS:

Central authority:

- Guarantees the exemption from customs duties on the import of equipment, components and materials for arranging an industrial park;
- Coordinates issues of the use of raw materials for the industrial park;

Regional authority:

- Renovation and reconstruction of the transport infrastructure adjacent to the industrial park at the expense of the budget;
- Assistance in resolving administrative issues for obtaining necessary permits.

Private Equity:

- Creation of a venture fund;
- Construction of the enterprise and organization of production;
- Management of an industrial park.

Technical Applications

1. GENERAL PROVISIONS

Analysis of the current state of the chemical industry in Ukraine for the period 2014-2017 demonstrates a significant rate of decline in the production index, compared with 2012, the production index of the main chemical products decreased by (35-38)%. The dynamics of the decline in production became critical. The volume of sales of chemical products in 2015 amounted to 46.8 billion UAH, which is 85% compared to 2013. The actual reduction in sales volumes, taking into account the inflation component and the growth of industrial prices (2014 - 159.4%), amounted to (40-45)% in the industry as a whole. For 8 months of 2015, the decline in industry amounted to -18%, the decline in the chemical industry amounted to 19.9%.

The main reason for this decline was political destabilization, loss of export markets, the actual stoppage of production at a significant part of the enterprises of Donetsk and Lugansk regions, regional re-registration and relocation of chemical plants to other regions of Ukraine.

The recovery of production in the East of Ukraine is possible only with serious state support, which can be realized by creating industrial parks and ensuring a favorable investment climate in the region at the legislative level.

2. STATE OF THE CHEMICAL INDUSTRY

Analysis of import volumes of strategically important types chemical products

The main indicative indicators of the functioning of the chemical industry of Ukraine in 2014 are shown in table 2.

Table 2

Name of indicator	Unit	year 2015	For reference: year 2013
The number of chemical enterprises	units	6348	6500
Number of production staff (average)	Thousand people	124,5	134
Average wages	UAH	3871	3630
Industrial production index in the production of chemicals and chemical products	%	85,3	83,1
Sales volume of commercial products in the production of chemicals and chemical products	Billion UAH	46,8	49,3
The share of industry products in total sales of industrial products	%	5,8	6,1
Export share in commodity production	%	46	47
The volume of sales on the domestic product market	Billion UAH.	38,1	35,9
Volume of domestic consumption of chemical products	Billion UAH	127,5	111,2
Volume of imports of chemical products	Million USD	7587,0	9403,7
The share of imports in domestic consumption of chemical products	%	71	67

As follows from the above data, the volume of imports of chemical products to Ukraine following the results of 2015 significantly exceeded the volume of commodity

production in dollars, which indicates a significant increase in the import dependence of the domestic market of chemical products against the background of its narrowing. The share of imported products in the structure of the domestic commodity market amounted to 71% and significantly exceeded the 2013 figure (67%).

More than 15% of all Ukrainian imports falls for the chemical industry, which over the past decade has been a confident leader in terms of volume and absolute growth in imports.

It is known that if the share of imports of any strategically or socially important product in the necessary domestic consumption exceeds 20%, then there is a threat to national and economic security. For a number of products of basic chemistry, such as soda ash, baking soda, magnesium and sodium sulfates, ammonia - Ukraine crossed this line.

One of the key conditions for a country's economic growth is a decrease in its dependence on imports, especially in industries that have high added value and which products are consumed by other industries. Import dependence of the chemical industry has a negative multiplicative effect on other sectors of the economy and puts them in a similar dependence on imports.

Unfortunately, for the organization of production of soda ash and baking soda in the required quantities (400 thousand tons per year) at the industrial site of the Pervomaiskyi industrial park there are no necessary prerequisites:

1. To create the production of soda in the quantity necessary for Ukraine (about 400 thousand tons per year), a significant increase in the number of brine production wells will be required, in about 3 times, which is a difficult task not only economically, but also technically. The option of working with imported salt does not seem justified.

2. The organization of the production of soda ash in this region will require the creation of sludge collectors, which may create difficult environmental problems.

There are more favorable conditions for the creation of products based on the production of caustic soda (solid and liquid) and sodium hypochlorite.

This is a strong argument for the start of the import substitution program in the chemical industry starting with the creation of the production of caustic soda (sodium hydroxide) and sodium hypochlorite at the industrial site of the former Pervomaiskyi SE "Khimprom".

INTEGRATED CONCEPT OF CREATION OF THE "PERVOMAYSKIY" INDUSTRIAL PARK

Currently, on behalf of the Cabinet of Ministers of Ukraine, a program for the development of production in the east of Ukraine is being developed (5 regions). State Institution NIOCHIM actively involved in solving the problem, and initiated the creation in the East of Ukraine of a network of industrial parks, the enterprises of which are planned to be combined into a single chemical cluster.

The creation of industrial parks is a relevant and highly effective tool for:

- industrial recovery;
- business development in the region;
- attraction of investments;
- filling local budgets;
- solving social issues;
- job creation;
- housing construction.

The main advantages of industrial parks for investors are as follows:

- quick procedure for obtaining permits
- developed transport infrastructure
- availability of vacant territory for construction
- reliable telecommunication channels
- the possibility of building common service centers, for example, storage facilities
- high quality research and development.

According to experts of the institute, the priority site for creating the first industrial park is the industrial site of the former Pervomaiskyi State Enterprise "Khimprom" in the Pervomaiskyi city, Kharkiv Region - the "Pervomaiskyi" industrial park, where a complex of chemical plants can be built, including the production of caustic soda and a number of other products currently purchased abroad.

SI “NIOCHIM” proposes the creation of an industrial park, the basis of which will be an enterprise for the production of caustic soda (sodium hydroxide) solid and liquid, as well as additional productions:

- Evaporated table salt "Extra";
- Sodium hypochlorite;
- Ferric chloride;
- Calcium chloride.

This is justified by the fact that sodium hydroxide is an imported strategic product and the construction of the plant will eliminate the outflow of currency from the country.

Thus, the creation of the "Pervomaiskyi" industrial park will allow to solve the problem of strategic development of the chemical industry in the Kharkiv region comprehensively, to reduce or completely eliminate the costly import of products, and also to begin to implement the overdue social programs.

2.2. Justification of the choice of site, characteristics of the resource base, infrastructure

To organize the production of the chemical industry in the Kharkiv region there are raw materials and energy resources, good geographical location, and qualified personnel available.

Advantages of the industrial site:

- Security with approved reserves of raw materials. The balance of salt reserves in the explored borders is enough for more than 100 years.
- Possibility of using existing (unused) brine wells.

- The ability to use existing storages for production waste, which reduces investment in construction
- Compact location of the factory site and brine exstraction station;
- Availability and proximity of a water supply source;
- Availability of transport and engineering infrastructure;
- Wastes and intermediate products of the production serve as raw materials for the production of synthetic detergents, building materials, feed additives for livestock, anti-icing reagents, chlorine-containing products.

2.3. The planned composition of the industries included in the "Pervomaiskyi" industrial park

Caustic soda (sodium hydroxide) solid and liquid

Evaporated "Extra" table salt

Sodium hypochlorite

Ferric chloride

Calcium Chloride

3. CHARACTERISTIC OF A BASIC ENTERPRISE - PRODUCTION OF CAUSTIC SODA (NaOH)

3.1. Justification of production capacity

The proposed capacity for creating caustic soda production in Ukraine is 170 thousand tons per annum.

The construction of a caustic soda plant and related products will eliminate the outflow of currency from the country, and in the long run will ensure the export of products and the influx of currency into Ukraine.

3.2. Provision of raw materials.

Provision of caustic soda with raw material is carried out from the existing unused brine extraction station.

The production structure of the projected plant includes production units and units of auxiliary and service purposes.

Production units:

1) Caustic soda production:
   - brine treatment unit;
   - the unit of evaporation of electrolytic liquors.

Units of auxiliary and service purposes:

1 Energy source (CHP) - provides the main production and auxiliary units with steam of the necessary parameters, demineralized water, partially electricity;

2 Water supply and sewage;
3 Power supply facilities;
4 Air compressor;
5 Mechanical repair shop - provides repair of technological equipment;

6 Warehousing - includes: material storage, equipment storage, chemical warehouse, etc.

Social facilities are also provided, including a canteen and a first aid post.

3.3. Planned investments

The preliminary cost of building a soda ash plant is determined taking into account the cost of the main technological equipment, construction and installation work and other costs, by analogy with previously completed projects for the production of soda ash of a similar capacity and composition.

4. EXPANDED CHARACTERISTICS OF INDUSTRIAL PARK PRODUCTIONS

4.1. Evaporated table salt "Extra"

Evaporated salt is the product of the evaporation of brines obtained by dissolving rock salt in water pumped through boreholes. The brines are cleaned of impurities and evaporated in a vacuum apparatus, obtaining evaporated edible salt. "Extra" evaporated salt has a fine crystalline structure, is characterized by a high content of sodium chloride, a small amount of impurities and minimal hygroscopicity.

The estimated capacity for the production of "Extra" boiled salt is 50,000 tons per year.

The quality indicators of salt are shown in table 3.

Table 3

Name of indicator	Norm in terms of dry substance
Mass fraction of sodium chloride,%, not less than	99,50
Mass fraction of calcium - ion,%, not more than	0,02
Mass fraction of magnesium - ion,%, not more than	0,01
Mass fraction of sulfate - ion,%, not more than	0,20
Mass fraction of potassium - ion,%, not more than	0,02
Mass fraction of iron oxide (III),%, not more than	0,005
Mass fraction of sodium sulfate,%, not more than	0,20
Mass fraction of water-insoluble residue (n.o.),%, not more than	0,03
Mass fraction of moisture,%, not more than	0,10

Consumption rates of raw materials and energy for the production of food grade salt are shown in table 4.

Table 4

Name	Unit	Consumption / 1 ton of 100% NaCl
1 Brine, purified 310 g / dm3 NaCl	m^3	3,8
2 Steam 0.14 MPa	Gcal	0,85
3 Fuel	t (standard fuel)	13,8
4 Electricity	kWh	64,0
5 Process water	m^3	40,0

4.2. Caustic soda (diaphragm method)

Caustic soda (sodium hydroxide) is a white substance in the form of a fused mass or a colorless liquid. Caustic soda is used in various industries, as well as for domestic needs.

Scope of application:

- pulp and paper industry (manufacturing of paper, cardboard, artificial fiber, wood fiber boards);
- chemical industry (neutralization of acids and oxides, use as a reagent or catalyst in chemical reactions, for titration in chemical analysis, for titration of aluminum, in the production of pure metals, for the production of oils, etc.);
- for the manufacture of biodiesel (extracted from vegetable oils and serves as a replacement for conventional diesel fuel);
- light industry (silk production, fabric bleaching);
- automobile manufacturing (involved in the production of alkaline batteries);
- food industry (washing equipment; limited - for the production and processing of food). It is a registered food supplement E524.

Estimated caustic soda production capacity is 170,000 tons per annum.

Quality indicators of caustic soda are shown in table 5.

Таблица 5

Indicators	Grade solid	Grade liquid	
		Top grade	First grade
Mass fraction of caustic soda,%, not less than	94,0	46,0	44,0
Mass fraction of sodium carbonate,%, not more than	1,0	0,4	0,8
Mass fraction of sodium chloride,%, not more than	3,5	3,0	3,8
Mass fraction of iron in terms of Fe2O3,%, not more than	0,03	0,002	0,02
The sum of the mass fractions of oxides of iron, aluminum, and manganese,%, not more than	Not standardized	Not standardized	
Mass fraction of silicic acid in terms of SiO2,%, not more than	Not standardized	Not standardized	

Estimated cost of the project - 46 million USD.

5. INDUSTRIAL PARK SUMMARY

5.1. Industrial Park Situation Plan

A preliminary situational plan for the Pervomaiskyi industrial park is shown in fig. 1 and fig. 2.

5.2. Brief description of the main industries

Summary preliminary data on the characteristics of the main industries of the industrial park are given in table 6.

Table 6

Name of production	Capacity, tons per annum	Investments, million USD	Energy resources, MW	Number of production personnel, pers.	Area, ha
Caustic soda (liquid, solid)	170 000	46	37,5	1417	50
Evaporated table salt "Extra"	50 000	8,0	Energy consumption of productions due to CHP production of chlorine and caustic	64	5
Sodium hypochlorite	10 000	4,6		74	4
Ferric chloride	10 000	6,0		65	4
Calcium chloride	10 000	9,0		180	8

Total investment 73.6 million USD

5.3. Planned annual volume of products sold

A preliminary calculation of the annual volume of products sold by the industrial park, is about $ 170 million per year, and is shown in table 7.

Table 7

Product name	**Market price, USD for 1 ton**	**Volume of production, t / year**	**Sales volume, USD per year**
Caustic soda	280	170 000	112 000000
Evaporated table salt "Extra"	125	50 000	625 000
Sodium hypochlorite		10 000	
Ferric chloride		10 000	
Calcium chloride		10 000	