# PROJECT «PHOSPHOGIPS - CONVERSION AND CAPITALIZATION» («ENLIGHTENMENT»)

Presentation

scientific and technical work



*Author: Petrochenkov V.G.*


sbi315000@gmail.com, +38-067-4073537

# «ENLIGHTENMENT»

***Only the obvious can be invented.***
***What is becoming apparent is revealed.***
***Vision comes with knowledge.***
***Knowledge is limitless, like the universe.***
***The path to knowledge is formal logic.***
***Logic is a way of organizing thinking.***
***Great is simple. This is the basis of the universe.***
***Filling the World - a superposition of the obvious.***
***Civilization is the result of the invention of superposition.***
***Civilization moves along the path of aspirations.***
***Aspirations - objective functions - motives.***
***Motives are the result of morality and being.***
***Morality is the result of education.***
***Logic and morality -***
***perhaps what should be taught a reasonable person,***
***otherwise everything else will lose its meaning***
***and the root cause will turn - Brownian motion***
***without promoting the system as a whole.***
***You see, where can logic lead us?***

*New economic model for the application*
*of new technology*
*to address the global environmental situation*
*while obtaining a positive macroeconomic effect*

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sbi315000@gmail.com, +38-067-4073537

# ANNOTATION

***Based on our own analysis and materials of practical activity, scientific, technological and economic methods are proposed:***

***- the conversion of industrial waste production of "phosphogypsum" in raw materials with the subsequent capitalization of its value 200 times on the balance sheet of the enterprise;***

***- transfer of this raw material to other enterprises for processing raw materials into marketable products with great economic efficiency;***

***- lending and purchase of new lots of waste, its conversion and capitalization in a closed cycle of the "closed" economy of the Company;***

***- the use for this of the mechanisms of an ICO company, a Smart contract, the generation and placement of Equity tokens on the Ethereum, BitShares or Waves electronic platform.***

***A new technological and economic model is proposed - the process of "pulling into the funnel" of man-made waste for its processing with super-profits, based on new industrial technologies of the International Scientific and Technological Program "ECOLOGY - IT IS PROFITABLE".***

***Certain materials The works and articles were published in the journal "Inventor and Rationalizer", were used as conference materials, on the website http://ecoprofit.mozello.com/, were published in the scientific work "ANALYSIS AND PRACTICAL RECOMMENDATIONS FOR SOCIETY DEVELOPMENT" ("Initiative", Copyright Certificate No. 62450 of November 10, 2015). All materials were published both on their own behalf and on behalf of SBI CJSC, the ECOLOGY IS VIGILNO Program in the person of the head - author of the Work.***

***This work has a scientific, practical and social character, it is a symbiosis of scientific solutions for the development of industrial technologies, solutions to global environmental problems, creating economic priorities and deep social transformations through the formation of a new basis for national and industrial cooperation.***


sbi315000@gmail.com, +38-067-4073537

# RAW MATERIALS OF PHOSPHOGIPS. OVERVIEW

- PHOSPHOGYPSUM
- Production volumes
- Stocks, maintenance costs
- Processing profitability
- Phosphate raw materials
- Apatity
- Phosphorites
- Phosphoric acid
- Production leaders
- Development prospects
- Russian market
- CIS market
- Phosphoric Fertilizers
- Phosphorus Application
- Phosphogypsum. Ecology problems


sbi315000@gmail.com, +38-067-4073537

# PHOSPHOGYPSUM

**$CaSO_4*2H_2O + H_2SO_4 + REE$**

- phosphoric acid production waste obtained by treating phosphate feed with sulfuric acid.

Contains more than 60% gypsum and 2-5% phosphoric acid.

Some wastes contain up to 3% rare earth elements (REE).

Often has increased radioactivity.

It is less profitable to produce building materials from phosphogypsum than from natural gypsum.

There are no effective methods for separating REE concentrate.

Use as a fertilizer is limited.


sbi315000@gmail.com, +38-067-4073537

# PRODUCTION VOLUMES

1.35 tons of sulfuric acid are consumed per 1 ton of apatite concentrate, resulting in 1.6 tons of phosphogypsum, which goes to dumps.

**The amount of phosphogypsum produced per 1 ton of P2O5** (1.45 tons of H3PO4) is different and is:

- **4.5-5.0** tons, containing 90-95% of two-water gypsum, in terms of dry phosphogypsum;
- 6.0-6.7 t - per filtered cake with a moisture content of 25%;
- 9.3-9.5 t - the same with a moisture content of 56%.

**The expected phosphorus consumption** (by P2O5) in 2015 amounted to about 45 million tons, therefore, phosphogypsum production - **from 225 million tons per year.**

**Until 2008, this figure was from 150 million tons *I* year.**

# STOCKS, MAINTENANCE COSTS

Reserves of phosphogypsum in Uzbekistan amount to more than 80 million tons and occupy an area of 500 hectares; in Russia - more than 500 million tons of phosphogypsum, in Ukraine - more than 20 million tons, in Belarus - more than 20 million tons.

Given the annual accumulation of waste, its **volume of world reserves should be at least 3 billion tons,** and the occupied **area should be more than 250 square meters. Km**

In most Western countries, phosphogypsum is stored in underground mines.

**European companies pay € 15-30, or $ 19.8-39.6 / t per year.**

**The norm for payment** for waste disposal of the 4th hazard class is established:

**- in Ukraine** at the level of 0.3 hryvnia, **or $ 0.0 4 / t;**

**- in Belarus** for placing the current output of phosphogypsum **- 271 Belarusian rubles,** or 3.1 Russian rubles, **or $ 0.09 / ton** and 27.1 bel. rub., or 0.31 rubles. rub., **or $ 0.01 / t** for phosphogypsum taking into account the accumulation;

**- in Russia** - 248.4 rubles., **or $ 7.45 / t.**


sbi315000@gmail.com, +38-067-4073537

# PROCESSING PROFITABILITY

When processing phosphogypsum in a new way, the expected production **profitability should be from € 562 to € 1162 over 20 years.**

Lower returns correspond to:

1. The conversion of waste into raw materials is € 162 / t.
2. Processing of raw materials into marketable products - potassium sulfate K2SO4 and calcium chloride CaCl2 with a yield of € 400 / t

High profitability due to the sale of rare-earth element concentrate (REE) up to € 600 / t.

Taking into account the annual production of phosphogypsum with a volume of 225 million tons or more, the smallest annual **yield can be from € 126.45 billion, over 20 years - € 2529 billion.**

**The potential minimum yield from** processing 3 billion tons of accumulated man-made deposits will be from **€ 1,686 billion.**

**Total return - € 4,215 billion.**


sbi315000@gmail.com, +38-067-4073537

# PHOSPHATE RAW MATERIALS

Raw materials are of industrial importance: **apatites** and **phosphorites**.

Countries are world leaders in the extraction of raw materials: Russia, Morocco, USA, Jordan, China, Tunisia.

The USA, China and Morocco account for 67% of the global production of natural phosphates, and the top ten producing countries account for 90% of the market.

In 2011, 190.8 million tons of raw materials were produced - apatite and phosphorite concentrate.

The volume of world consumption of $P_2O_5$ amounted to 40.7 million tons.

Annual growth in production and consumption is about 3-5%.

World requirements for phosphorus ($P_2O_5$) in 2015 will amount to about 45 million tons.

About:

- 82% of phosphoric acid is used for the production of fertilizers.
- 18% - for the production of feed phosphates, medicines, food products.

Phosphorus is also used in metal processing, medicine and dentistry.


sbi315000@gmail.com, +38-067-4073537

# PHOSPHATE RAW MATERIALS

The quality of the produced apatite and phosphorite concentrate is estimated by the content of P2O5 in it.

From 1 ton of 39-40% apatite concentrate, up to 0.4 ton of P2O5 can be produced.

For example, PhosAgro produced 26.6 million tons of apatite-nepheline ore in 2011 and produced:

- 7.7 million tons of apatite concentrate (K = 3.45);

- 1 million tons of nepheline concentrate (k = 26.6).

| Companies | Content of $P_2O_5$,% in 1 ton of concentrate produced |
|---|---|
| **Fos Agro, Russia** | 39-40 |
| **Eurochem, Russia** | 37-38 |
| **Agrium** | 33 |
| **OCP, Morocco** | 32 |
| **PCS Canada** | 29,5 |
| **CF Industries** | 29 |
| **GCT, Tunisia** | 29 |
| **Mosaic, USA** | 28,5 |


sbi315000@gmail.com, +38-067-4073537

# APATITY

Apatity Ca5[PO4]3(F, Cl, OH).

Depending on the content in the feed, fluorine, chlorine, and hydroxyl apatite are released; fluorine apatite is more common. Sr, Ba, Mg, Mn, TR can be present as impurities (cf. lat. Terrae rarae - “rare earths”), and others. Apatite is noted in all intrusive, many metamorphogenic, sedimentary, and less often effusive rocks. Often associated with nepheline, aegirine, ilmenite, sphene.

Quality is determined by the phosphorus content in terms of P2O5.

The world's largest deposit is the Khibinsky deposit on the Kola Peninsula in Russia, where apatitonefelin ore, consisting of fluorapatite and nepheline, is mined. Large well-formed apatite crystals are known in Transbaikalia from the Slyudyanka deposit (near the city of Slyudyanka, Irkutsk region). Apatite deposits are also known in Brazil, Mexico, the USA, Chile, South Africa, Finland, Spain, Norway and other parts of the world.

# PHOSPHORITES

**Phosphorites 3Ca3(PO4)2*CaCO3*Ca(OH, F)2**

are sedimentary rocks, a significant part of which are phosphates and numerous inclusions of other minerals (quartz, glauconite, calcite, clay minerals, etc.). The content of impurity elements is often observed: U, TR (cf. lat. Terrae rarae - “rare earths”), Sr, less often V, Ti, Zr, etc.

Quality is determined by the phosphorus content in terms of P2O5.

Phosphorites are predominantly marine rocks, but in rare cases they can also form on land, for example, in the weathering crusts of limestone in an arid climate. Only a few countries in the world have large deposits of phosphorites - the USA, the Russian Federation, Morocco, Tunisia, Algeria, Egypt, and some “phosphorite” islands of the Pacific and Indian oceans. Countries that do not have their own phosphate deposits are interested in developing subsea production.

# PHOSPHORIC ACID

Phosphoric acid is produced from apatite and phosphorite concentrate, and phosphoric fertilizers, feed phosphates, medicines, and food products are produced from it.

The **extraction method** for producing phosphoric acid with sulfuric acid is the most applicable and economical.

**When $P_2O_5$ is extracted as $H_3PO_4$,** phosphates are treated with $H_2SO_4$, and the resulting pulp is filtered off from a precipitate of Ca sulfate, thus obtaining pure phosphoric acid and precipitated phosphogypsum $CaSO_4*2H_2O$ with impurities of sand, trace elements (ME), rare-earth elements (REE).

**World production of phosphoric acid in 2010** amounted to **38.9 million tons** in terms of P2O5.

The ten largest producers of phosphoric acid account for about 45% of the total global capacity.

# PRODUCTION LEADERS

Leaders - integrated companies located near sources of raw materials:

- Moroccan company OCP has the world's largest deposits of phosphorus ores;
- in second place - the North American Mosaic;
- on the third - Canadian PotashCorp, although it should be noted that;
- Chinese Yunnan Yuntianhua International Chemical Co. practically close in volume to the

Canadian leader.

- Russian "Fosagro".

In recent years, companies have been able to significantly increase their capacities for the production of phosphoric acid for fertilizers, (more than, million tons / year):

**China - 16.3;**

**USA - 9.5;**

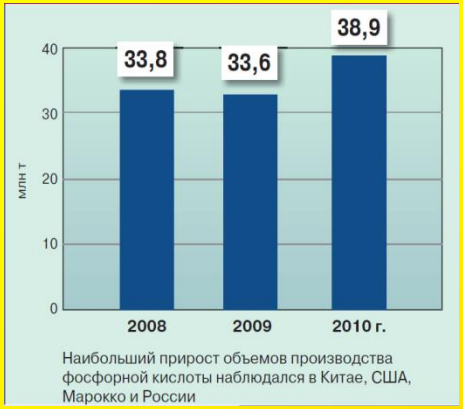
**Morocco - 4.4;**

**Russia - 3.**

Until 2015, the total production volume of $P_2O_5$ will reach **57.6 million tons.**


sbi315000@gmail.com, +38-067-4073537

# DEVELOPMENT PROSPECTS




World production of phosphoric acid in 2008–2010, mln. $P_2O_5$.

World production of phosphorus ores in 2010, %


The world's largest producers of phosphate fertilizers.

Morocco: OCP SA, Bunge Fertilizantes.

Tunisia: joint venture Tifert, Skhira, Groupe Chimique Tunisien.

Jordan: Jordanian Phosphate Mines Company, JPMC & Indo-Jordan.

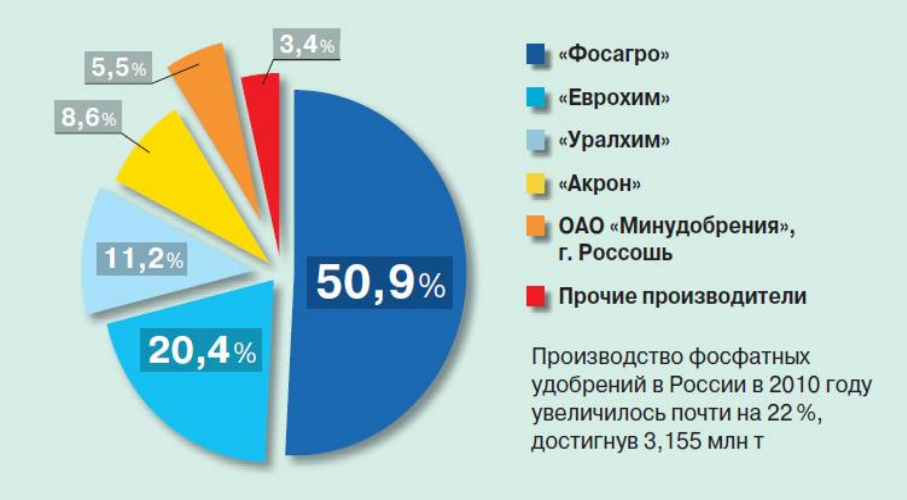
India: Indian Farmers Fertiliser Cooperative Limited (IFFCO).

Saudi Arabia: Saudi Arabian Mining Company (Ma'aden), SABIC, Ras Az Zawr.

Russia: Phosagro, Eurochem, Uralchem, Akron, Mineral Fertilizers, Rossosh.

# RUSSIAN MARKET

Key players in the Russian phosphate fertilizer market




| Компания | 2009 г. | 2010 г. | Прирост, % |
|---|---|---|---|
| «Фосагро» | 1506 | 1606 | 6,6 |
| «Еврохим» | 450 | 643 | 42,9 |
| «Уралхим» | 140 | 353 | 151,9 |
| «Акрон» | 263 | 273 | 3,8 |
| «Минудобрения», г. Россошь | 165 | 173 | 5,0 |
| Прочие производители | 53 | 107 | 100,9 |
| Итого | 2578 | 3155 | 22,4 |

The structure of production assets of Phosagro includes two production sites - Ammofos OJSC (Cherepovets) and Balakovo Mineral Fertilizers LLC (Balakovo) - BMU.

MCC Eurochem includes a subsidiary - PG Phosphorit.

Uralchem is the owner of Voskresensk Mineral Fertilizers OJSC and in Dagestan - Dagfos OJSC.

# CIS MARKET

In Kazakhstan, up to 50 phosphorite deposits have been identified with an estimated ore ore reserves of 5 billion tons.

**Kazphosphate LLP** will invest in development up to $ 800 million until 2013, increase, thousand tons / year:

- production of phosphorus-containing ore - up to 4300;
- release of ammophos - up to 550;
- complex fertilizers - up to 180;
- thermal phosphoric acid - up to 178.9;
- sodium tripolyphosphate - up to 165.8.

**Belarus.** The Belarusian producer of phosphate fertilizers - Gomel Chemical Plant OJSC plans to increase production capacities by 1.8 times by 2015, up to 1.26 million tons per year.

By 2017, a new player may appear - Chilisai Chemicals LLP, with an investment project for the production of mono (MAF) and diammonium phosphate (DAF), with a total value of $ 304 million.

# PHOSPHORIC FERTILIZERS

According to the International Industry Industry Association (IFA), in 2010, the consumption of phosphate fertilizers reached a record 40 million tons.

Production of three main types of phosphate fertilizers:

- monoammonium phosphate (MAF), $NH_4H_2PO_4$, $ 900-1100 / t;


- diammonium phosphate (DAP), $(NH_4)_2HPO_4$, $ 575-725 / t;


- triple superphosphate (TSF), $Ca(H_2PO_4)_2$, $ 300-510 / t.




sbi315000@gmail.com, +38-067-4073537

# PHOSPHORUS. APPLICATION

**Phosphorus plays a key role in most life processes.**

**Phosphorus is important for human health:**

- participates in the formation of bones and teeth;

- plays a crucial role in energy metabolism at the cellular level and, therefore, in the body as a whole;

- is a necessary element in the structure of DNA;

- is part of many proteins;

**Phosphorus is the second most abundant mineral element in the human body (after calcium):**

- 85% of the phosphorus in the human body is found in bones;

- 1% - in blood and other fluids;

- 14% - in the soft tissues (mainly in the muscles).

# PHOSPHORUS. APPLICATION

**Plants accumulate phosphorus and are its source for people and animals:**

- found in all parts of green plants - stems, trunks, roots and leaves, but most of all - in fruits and seeds;

- plays a crucial role in photosynthesis and all processes associated with energy recovery;

- promotes the growth of plants and their roots;

- participates in the process of assimilation of nitrogen by plants;

- helps to accelerate the maturation of plants;

- necessary for plant propagation;

- increases the strength of the stems;

- Helps increase plant resistance to cold and drought.

The proportion of phosphoric acid-based fertilizers increased from 75% in 2000 to 82% in 2010 and is expected to increase to 84% by 2015.

# PHOSPHORUS. APPLICATION

**Phosphorus is necessary for the formation and strengthening of animal bone tissue. It plays an important role in digestion and other metabolic processes:**

- necessary for the formation and maintenance of the integrity of teeth and bones - they contain 80% of all phosphorus present in the body;

- participates in the formation of the skeleton;

- plays an important role in energy exchange processes;

- participates in protein synthesis and metabolism;

- is present in nucleic acids that carry genetic information, and also regulates protein biosynthesis and immune processes;

- enhances reproductive function;

- necessary for lactation;

- increases appetite.

# PHOSPHORUS. APPLICATION

**Phosphorus is also found in the products we use every day, including:**

- in food additives (for baking, drinks, cooking meat dishes, cheese, canned food, etc.);

- in medicines and personal care products (toothpaste, cosmetics, etc.);

- in chemical goods and chemicals (detergents and cleaning products, fire extinguishers, water treatment products, batteries for hybrid cars and electric vehicles, ceramics, cement, paints, etc.).

About 82% of the world's phosphoric acid is used for fertilizer production. Another 18% - for the production of feed phosphates, medicines, food.

Phosphorus is also used in metal processing, medicine and dentistry.

# PHOSPHOGYPSUM. ECOLOGY PROBLEMS

Phosphogypsum is the main source of environmental pollution (OS) in the areas where mineral fertilizer production is located (in Ukraine it is the cities of Armyansk, Sumy, Rivne). With the sulfuric acid method of opening apatite concentrate per 1 ton of $H_3PO_4$, depending on the raw materials and the **adopted technology, 4.3-5.8 tons of phosphogypsum is formed.**

With dry storage of phosphogypsum (without preliminary neutralization), **an average of 10 g of fluorine per 1 ton of phosphogypsum is released into the gas phase; approximately 10% of fluorine is washed out by atmospheric precipitation.**

**Phosphogypsum should be stored in specially equipped storage facilities, as isolated from water bodies as possible.**

**Before storage, phosphogypsum must be neutralized with milk of lime.**


sbi315000@gmail.com, +38-067-4073537

# RARE EARTH ELEMENTS

- Rare earth elements
- Minerals and Concentrates
- Production and stocks
- Application
- Need and cost
- Russian phosphogypsum and REE
- Belarusian phosphogypsum and REE


sbi315000@gmail.com, +38-067-4073537

# RARE EARTH ELEMENTS

| | | | | | |
|---|---|---|---|---|---|
| | | | 31 | Y | Yttrium |
| 57 | La | Lanthanum | 64 | Gd | Gadolinium |
| 58 | Ce | Cerium | 65 | Tb | Terbium |
| 59 | Pr | Praseodymium | 66 | Dy | Dysprosium |
| 60 | Nd | Neodymium | 67 | Ho | Holmium |
| 61 | Pm | Promethium | 68 | Er | Erbium |
| 62 | Sm | Samarium | 69 | Tm | Thulium |
| 63 | Eu | Europium | 70 | Yb | Ytterbium |
| | | | 71 | Lu | Lutetium |

**“Rare earths” (TR, compare Latin terrae rarae - “rare earths**”) are rarely found in the earth's crust (1.6-1.7) * 10−2% by mass), form refractory, almost insoluble in water oxides (until the 19th century they were called "lands").

Elements of two subfamilies - **cerium (light - La, Ce, Pr, Nd, Sm, Eu)** and **yttrium (heavy - Y, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu)** - are rare in the earth's crust .

In terms of raw material reserves, which are highly dispersed, REEs are not rare, in their total prevalence they exceed lead by 10 times, molybdenum - 50 times, tungsten - 165 times.

Place 61 was taken by promethium isolated from uranium fission products.

# MINERALS AND CONCENTRATES

- **Of the 250 minerals, only 60-65 contains $Me_2O_3$ with an excess of 5-8%.** Most important: monazite (Ce, La)$PO_4$, xenotime YPO4, bastnesite $Ce[CO_3](OH, F)$, parisite $Ca (Ce, La)_2[CO_3]_3F_2$, gadolinite $Y_2FeBe_2Si_2O_{10}$, orthite $(Ca, Ce)_2(Al, Fe)_3Si_3O_{12} (O, OH)$, loparite $(Na, Ca, Ce)(Ti, Nb)O_3$, eschinite $(Ce, Ca, Th)(Ti, Nb)_2O_6$. The most common in the earth's crust is cerium, the least - thulium and lutetium.
- **The main REE concentrates are** bastnesite ($CeCO_3F$) and monazite ($CePO_4$).
- **70% of the extracted REE** is accounted for by these ores. The richest deposits of bastnesite in China and the USA, monazite - in Australia, Brazil, India, Malaysia, South Africa, Sri Lanka, Thailand, USA.

30% of the reserves are concentrated in xenotime deposits, ion-absorption clays, loparites, apatites, phospharites, secondary monazite, eudialyte, etc.

A promising source of REE is the waste production of phosphoric acid from apatites and phosphorites - phosphogypsum.


sbi315000@gmail.com, +38-067-4073537

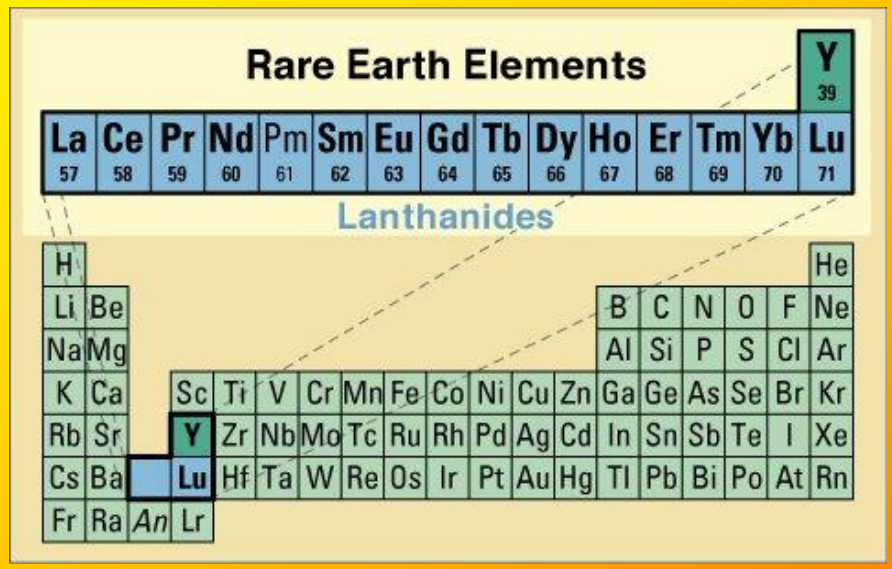
# PRODUCTION AND STOCKS

**In 2007-2008 124 thousand tons of REE were mined in the world.**

The leaders, thousand tons: China - 120.00; India - 2.70; Brazil - 0.65.

**Explored world reserves of REE** at the end of 2008 amounted to about 130 million tons, including: China - 89, CIS - 21, USA -14, Australia - 5.8, India - 1.3, Brazil - 0, 84 thousand tons).

**In July 2011, at the depths of 3500-6000 m in 78 places of the Pacific Ocean** west and east of Hawaii, as well as east of Tahiti and French Polynesia, **extensive deposits of rare-earth metals (REM),** which amount to 80-100 billion tons of rare-earth metals, were discovered.




Terbium, lanthanum and neodymium, of which 97% are located in China, are especially valuable from the scattered elements.

**The total world demand for REE is 120 thousand tons / year,** however, China annually exports less than 30 thousand tons.

According to the British publication Independent, by 2012 **the Chinese government plans to stop exporting rare elements.**

# APPLICATION

**Cerium** - catalytic filters - exhaust gas neutralizers.
**Dysprosium**, neodymium, samarium - magnets.
**Yttrium**, europium, terbium - phosphors.
**Lanthanum** - capacitors.
**Lanthanum**, cerium - special optics.
**Yttrium** - ceramics.
**Cerium** - high-tech abrasives.
**Gadolinium**, dysprosium, lanthanum - X-ray films.

REE use: in **electronics, instrumentation, nuclear technology,**

**mechanical engineering, chemical industry, metallurgy**, etc.; La, Ce, Nd, Pr - in the form of oxides are used to obtain translucency of special-purpose glasses that transmit infrared rays and absorb ultraviolet rays, acid and heat-resistant glasses; in the production of pigments, varnishes and paints, in the oil industry as catalysts; in the production of certain explosives, special steels and alloys, as getters; single-crystal REE compounds (as well as glasses) are used to create laser and other optically active and nonlinear elements in optoelectronics.

# APPLICATION

Rare earth elements (REE) have unique properties.
The level of REE application is an indicator of the scientific and technical development of a particular industry; it contributes to the saving of mineral raw materials, improving the environmental situation, and ensuring national security.

**REE cannot be replaced with other raw materials or technologies.**

**The availability of REEs determines the provision of strategic, valuable types of components**, the preservation of their reserve for future generations.

REE have unique properties.

| Spheres consumption | Consumption in 2005, thousand tons | Average annual growth in 2001-2005,% |
|---|---|---|
| Catalysts | 28,5 | 3-5 |
| Glass industry | 24,0 | 3-5 |
| Metallurgy | 16,0 | 8-10 |
| Magnets | 18,0 | 17-22 |
| Ceramics | 3,5 | 13-15 |
| Phosphors | 6,5 | 7-8 |
| Other | 3,5 | 7-9 |
| Total: | 100,0 | 6-9 |


sbi315000@gmail.com, +38-067-4073537

# NEED AND COST

Until 2035, the demand for dysprosium and neodymium will increase by 2600 and 7000%, respectively.

For this, the **production of dysprosium should increase 2 times every year. This can be achieved by parallel processing of production waste - phosphogypsum.**

Neodymium and dysprosium are the most sought after. They are used in permanent magnets (Nd2Fe148).

If REE concentrate with a volume of 1-3% can be extracted from phosphogypsum, then its cost can be € 100-600 per 1 ton of phosphogypsum.

**Much more cost will be separated from the REE concentrate separately, or products made from them.**

**1 kg of REE** - cerium, lanthanum, neodymium, europium and yttrium on the world market is **$ 11.6-1640.**

**1 kg of metallic neodymium costs $ 22-32,** and **already 1 kg of neodymium-iron-boron magnets - $ 100-120**, with a neodymium content of about 25%.


sbi315000@gmail.com, +38-067-4073537

# RUSSIAN PHOSPHOGYPSUM AND REE

Khibiny apatite - the best phosphorus raw material in the world, contains: rare earths (up to 1%), strontium (2.3%), fluorine (3.1%). Despite the low content of RE elements in apatite concentrate (0.7-1%).

**The volume of apatite of this concentrate in Russia is up to 10 million tons / year.**

| Raw materials | REE oxides of the Khibiny apatites and loparites | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | La | Ce | Pr | Nd | Sm | Eu | Gd | Tb | Dy | Ho | Er | Tm | Yb | Lu | Y |
| Loparitis | 25 | 53 | 6 | 14 | 0,9 | 0,08 | 0,6 | 0,4 | 0,12 | 0,08 | 0,02 | 0,003 | 0,008 | 0,002 | 0,008 |
| Apatite | 27 | 43 | 5 | 14 | 2,1 | 0,7 | 1,7 | 0,1 | 1,1 | 0,1 | 0,4 | - | 0,1 | - | 4,8 |

For almost 90 years, **1 billion 550 million tons of ore (about half of industrial reserves) have been extracted in Khibiny, 620 million tons of apatite concentrate have been produced.**

**Moreover, not a single ton of rare-earth metals was recovered on an industrial scale.**

**That is, at least 6 million tons of the most valuable metals and about 20 million tons of strontium have been practically written off from the balance sheet, which makes up the triple world balance of this strategic metal.**

**Thus, tens of billions of dollars were lost to the Russian economy ...**


sbi315000@gmail.com, +38-067-4073537

# BELARUSIAN PHOSPHOGYPSUM AND REE

At the republican unitary enterprise **"Gomel Chemical Plant" 450 thousand tons of phosphogypsum are formed annually.** During the operation of the plant, **15.4 million tons were accumulated**, more than 60 hectares of land are occupied under dumps.

**Dumps contain about 65 thousand tons of REE**. Among them are cerium, lanthanum, neodymium, europium and yttrium. The prices for them in the world market are $ 11.6-1640 per kilogram.

Phosphogypsum contains about 95% calcium sulfate, 3% fluorine, 0.6-0.9% REE and 2.6% strontium and 1.2% $P_2O_5$. When processing apatite concentrate into phosphoric acid, about 80% of the rare earth elements go into a by-product - phosphogypsum.

Phosphogypsum contains about 95% calcium sulfate, 3% fluorine, 0.6-0.9% REE and 2.6% strontium and 1.2% $P_2O_5$. When processing apatite concentrate into phosphoric acid, about 80% of the rare earth elements go into a by-product - phosphogypsum.

Based on the cost and weight of the REE contained in it, the Gomel mountain can be estimated at $ 6.6 billion.

With the existing technology at the plant, $ 1 is produced from 1 ton of apatite concentrate; as a result of the proposed new technology, **this volume of production can be increased by $ 900.**


sbi315000@gmail.com, +38-067-4073537

# USE OF PHOSPHOGYPS

- Agriculture
- Building
- Other applications

# AGRICULTURE

Ways to use phosphogypsum for agricultural soils:

- for land reclamation (TU U 24.1-31980517-002: 2005) solonetzes (desalinization of the soil);

- mixed with lime for the reclamation of acidic soils;

- as fertilizer ameliorants (1 ton of phosphogypsum contains about 10 kg of phosphorite);

- for composting with biological products and organic fertilizers.

Phosphogypsum contains up to 1.5% strontium, which can accumulate in soil and plants.

The threshold value of the Ca / Sr ratio in the diet is 140. In drinking water and food products in a “healthy” area, the Ca / Sr ratio in the water supply sources is 130–920, in the “sick” one it is in the range of 15–160, causing endemic disease , the so-called level disease (or strontium rickets).

# AGRICULTURE

Strontium is an alkaline-earth element, widely distributed in the earth's crust, with a content of 0.04%.

The average content of stable strontium in soils is 0.01-0.28%.

Strontium, like calcium, easily passes into the soil solution and is sorbed by the soil absorbing complex, from where it enters the roots of plants. Plants contain 0.0001-0.017% stable strontium.

When 10 tons of phosphogypsum is applied per hectare, 110-130 kg of P2O5 in assimilable form enters the soil.

Phosphogypsum is used to produce slow dissolving fertilizers of prolonged action.

The ability of urea to form complexes with phosphogypsum is used to granulate simple superphosphate without drying.

A soil modifier is also obtained with slowly acting nitrogen fertilizer by the interaction of phosphogypsum with urea at a temperature of 95-160 ° C.

Phosphogypsum is introduced: before plowing and after it under cultivation. The dose is according to the amount of sodium in the root layer of the soil, which must be replaced with calcium and is 3-15 t / ha.

**Cement industry:**

- cement setting period regulator;
- mineralizer in the process of firing cement clinker;
- hydraulic additives.

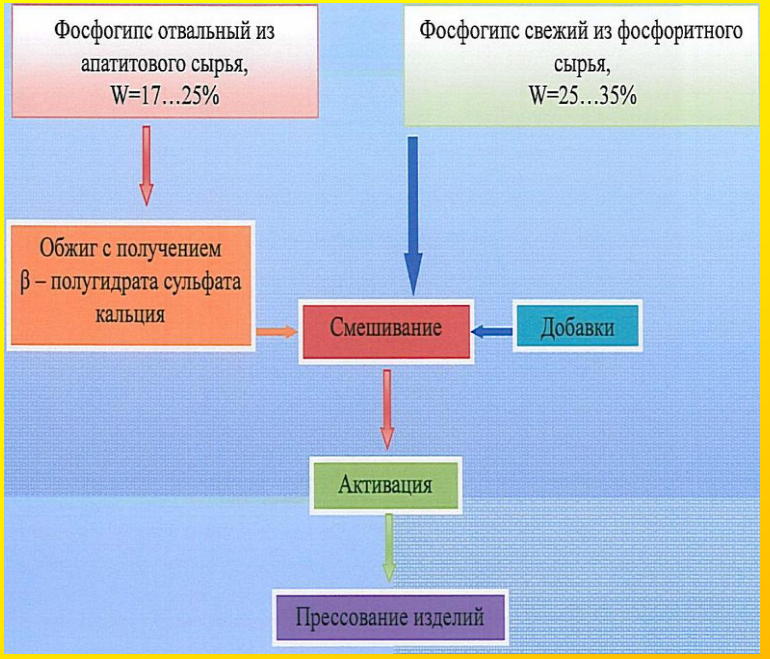
**Road construction:**

- material for the foundation of roads.

**Production of building materials:**

- gypsum binders grades GZ, G5 and G10, G15;
- products based on them (partition and ceiling plates, building blocks, putty and plaster mixes, etc.);
- high strength anhydrite binder;
- drywall;
- mineral filler production of difficult to combustible heat-insulating rigid polyurethane foam.

# BUILDING




In the manufacture of products from phosphogypsum and phosphogypsum binder obtained from dump phosphogypsum, natural resources are used by 5-10%, and 90-95% of the product composition is represented by the secondary product of the chemical industry - fresh phosphogypsum and dump phosphogypsum.

For example, to save natural raw materials, gypsum materials are used in the proportions:

Natural gypsum: 50 weight. h
Phosphogypsum: 15 weight. h
Fluorogypsum: 10 weight. h
Gypsum obtained by desulfurization of flue gases: 20 weight. h
Plaster from recycled waste: 5 weight. h

# OTHER APPLICATIONS


Production of paper and paints: as a filler.

Filler for paint helps to dilute the tone, is used to save expensive pigments, to improve the technical and operational characteristics of paint coatings.

Production of a sulfidizer for mine smelting of oxidized nickel ores.

Synthesis of low temperature phosphite-based belite.

# NEW TECHNOLOGY




sbi315000@gmail.com, +38-067-4073537

# ЦЕЛЬ. ЗАДАЧИ. УЧАСТНИКИ ПРОЕКТА

**TARGET.**

Apply a new phosphogypsum processing technology for world production and storage volumes

**TASKS.**

Conduct an ICO company.

To create enterprises for the conversion of technogenic deposits and the processing of phosphogypsum.

Get patents from world manufacturers for new technology.

Certify new technology.

Confirm the value of the intangible asset (intangible asset) conversion of man-made deposits.

To buy up the world production and storage of phosphogypsum.

Introduce a new technology based on domestic and foreign enterprises.

Spread the new technology to other objects of world production and storage of phosphogypsum.

**PARTICIPANTS OF THE PROJECT.**

Team of SBI CJSC, Kiev, Ukraine, ECOLOGY IS FAVORABLE Programs, PEOPLE'S COOPERATION Consumer Society

Authors of the project and technology

Investors

Crowdfunding, crowdfunding


sbi315000@gmail.com, +38-067-4073537

# PROJECT ORGANIZATION

The project is functionally divided into 3 parts and is based on 2 sites - 3 enterprises with their own tasks, working in a single complex.

**ENTERPRISE "0":**

Conversion of technogenic waste into secondary raw materials.

Quick return on investment.

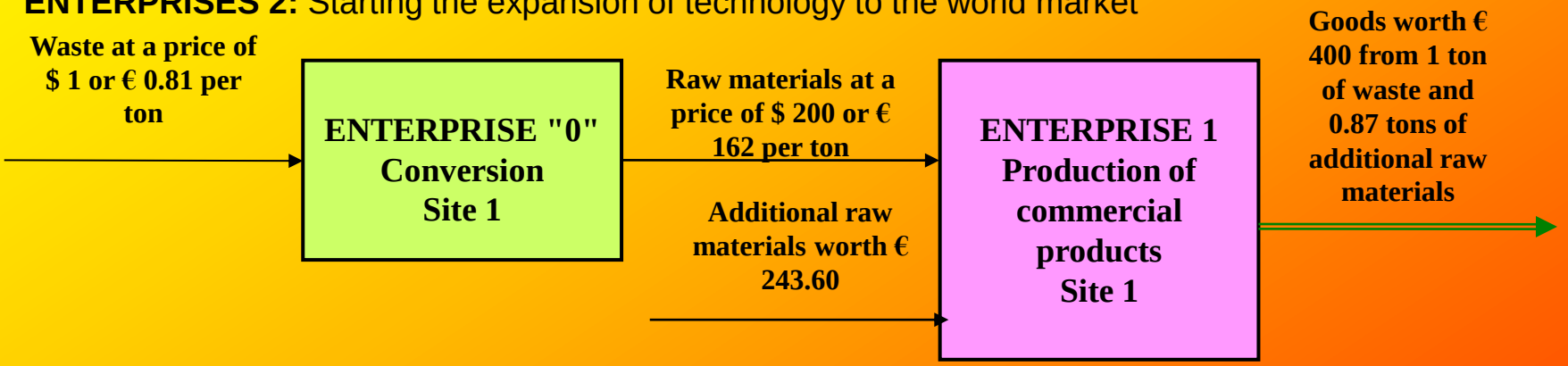
International patenting.

Technology certification.

Purchase of world raw materials.

**ENTERPRISES 1:** Implementation, development of technical solutions.

**ENTERPRISES 2:** Starting the expansion of technology to the world market




ENTERPRISE "0" allows for 2 years to reach payback and profit in the equivalent of a tangible asset - raw materials demanded under the contract by ENTERPRISE 1


sbi315000@gmail.com, +38-067-4073537

# WORLD PRODUCTION AND OUR STRATEGY

**225 million tons per year -** the expected production of phosphogypsum back in 2015.

With the growth of the world's population, the need for phosphorus fertilizers will increase, and, consequently, the production of phosphogypsum as well.

**3 billion tons** (or more) - world reserves of technogenic waste

**OUR OFFER** is similar to the prototype - “treatment of ammonium phosphogypsum with the production of ammonium sulfate and industrial calcium carbonate”, but differs in addition to the processing of calcium carbonate for marketable calcium chloride and potassium sulfate, which have a wider demand and higher price in the market. Our profitability is an order of magnitude greater than any analogues.

**STRATEGY.**

Expand ICO Companies from 3 enterprises, the work of which is organized in parallel at 2 sites: the 1st for certification of technology, conversion of waste into raw materials, development of technical solutions in Ukraine, and the 2nd for production abroad.

**At the ENTERPRISE “0”** (platform 1), certification and conversion, purchase of global reserves of phosphogypsum

**AT ENTERPRISE 1** (site 1) to work out the technology.

**From ENTERPRISE 2** (platform 2), begin the expansion of technology to the international market.


sbi315000@gmail.com, +38-067-4073537

# ECONOMIC EXPEDIENCY

**More than 3 billion tons** - a deposit of man-made deposits.

**4.5 billion tons** - the minimum increase in waste over the 20 years of the license (225 million tons per year).

**7.5 billion tons** - total raw material base.

**€ 162 / t** - ENTERPRISE "0" income from the conversion of industrial waste into raw materials (€ 0.81 * 200)

**€ 400 / t** - ENTERPRISE 1 income from the production of marketable products.

**€ 562 / t -** total income of both enterprises.

**€ 4,215 billion** is the profitability potential for 20 years of the entire company.

**BONUS** - we did not determine the presence of rare-earth elements (REE), but the yield of its allocation is

**€ 100-600 per tonne** of phosphogypsum from apatites of the Kola Peninsula.


sbi315000@gmail.com, +38-067-4073537

# BASE. AN OBJECT. PERFORMANCE

**BASIS** - initiative development.

World priority, confirmed by patents of Ukraine 41069, 60983, 92756.

**OBJECT - ENTERPRISE 1 - "VINNITSAKHIMPROM" (preliminary) - is privately owned and is offered for sale. All documentation for the purchase is.**

**More details at: http://vinnytsia.all.biz/prodam-fosfogips-g1457247#fulldescription, http://vinnytsia.all.biz/prodam-fosfogips-g1457247**

**500 thousand tons - an estimated amount of technogenic waste;**

**$ 400 thousand - the cost of phosphogypsum;**

**$ 60 thousand - the cost of the workshop is 1240 m2 with a height of 5 m.**

*** HOWEVER, THE VINNITSAKHIMPROM OBJECT IS EXCLUSIVELY EXCLUSIVELY AS AN EXAMPLE CONVENIENT FOR THE PROCESSING OF TECHNICAL SOLUTIONS, DEMONSTRATION AND CERTIFICATION OF TECHNOLOGY AND CAN BE OPERATEDLY REPLACED !!!**

**The total cost of the Property may be up to € 0.5 million.**

**PRODUCTIVITY OF THE COMPANY 1**, thousand tons per year

**18.72** - RAW MATERIALS:

**10.00** - phosphogypsum in terms of $CaSO_2*2H_2O$;

**8.72** - potassium chloride KCl.

**16.56 - PRODUCTS;**

10.08 - potassium sulfate $K_2SO_4$;

5.89 - calcium chloride $CaCl_2$;

0.56 - REE concentrate (if any)

2.16 - industrial water

With a working time of 8000 hours per year, production capacity will be 2.07 tons per hour, and for phosphogypsum - 1.25 tons per hour, for REE concentrate - 0.07 (?) Tons per hour.


sbi315000@gmail.com, +38-067-4073537

# PROJECT COST. TOTAL PROCESS

**€ 50.00 million - the total cost of the Project, including:**

**€ 2.50 million - ENTERPRISE "0"** - conversion of waste into raw materials

**€ 22.50 million - ENTERPRISE 1** - implementation and development of technical solutions, including:;

**€ 0.5 million** - the value of the OBJECT

**€ 22 million** - the cost of introducing technology

**€ 25.00 million** - ENTERPRISE 2 - pilot production in Europe, including:

**TOTAL PROCESS**

$[CaSO_4*2H_2O_4 + РЗЭ] + 2KCl = CaCl_2 + K_2SO_4 + 2H_2O + РЗЭ$


sbi315000@gmail.com, +38-067-4073537

# ENTERPRISE 1

| № | Naming of expenditures | € million |
|---|---|---|
| 1. | Property Cost | 0,5 |
| 2 | Organization and project management: (at $ 0.5 million / year) | 1,5 |
| 3 | Design | 5,0 |
| 4 | Licensing obligations (royalties and first payment 0.25 * 3 + 0.05), author's support and overhead costs (0.06 + 0.07 + 0.07), | 1,0 |
| 5 | Technological equipment (manufacturing, commissioning and testing of a pilot plant). | 10,5 |
| 6 | Construction (buildings and structures, roads and communications) | 3,4 |
| 7 | Commissioning works | 0,6 |
| | **TOTAL:** | 22,5 |

# RAW MATERIALS AND PRODUCTS

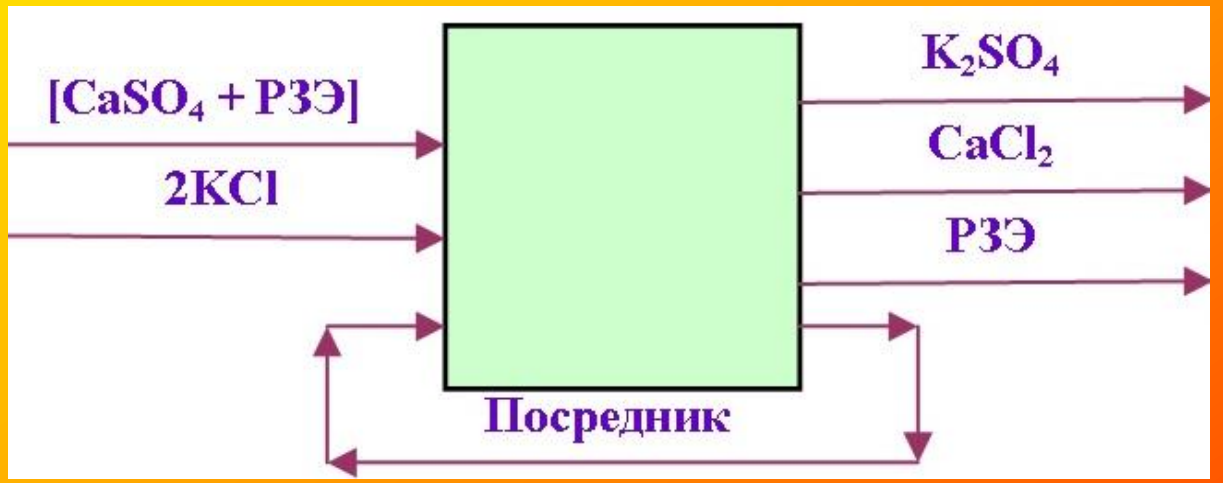
Raw materials phosphogypsum. Overview

Additional raw materials. Potassium chloride

Products. Potassium sulfate

Products. Calcium chloride

Rare earth elements



# ADDITIONAL RAW MATERIALS. POTASSIUM CHLORIDE

**Potassium salt** (or Potassium salt) - a mineral resource is a raw material for the chemical industry for the production of potash fertilizers

**Potassium chloride KCl** is used: to bind sulfates to form a marketable product - potassium sulfate fertilizer.

Scope of supply: **8.7 thousand tons / year** (about 0.5 wagons per day).

There is an option to exclude the supply of imported raw materials - potassium chloride and a proportional decrease in the production of potassium sulfate, the use of sodium with the production of sodium sulfate.

This will completely eliminate dependence on imports, but significantly reduce profitability.

This production option can be considered in case of adverse domestic and foreign policy for ENTERPRISE 1 and the need to exclude competitive pressure on production.

The correct solution to the issue of KCl supply is the purchase of the Dombrovsky quarry, an industrial deposit in Kalush, Ivano-Frankivsk Oblast, Ukraine

# PRODUCTS POTASSIUM SULFATE

**Potassium sulfate $K_2SO_4$**, or potassium sulfate, is one of the most widely used chlorine-free fertilizers in the world. It can be used on all types of soils, for all crops, as well as for balcony and indoor floriculture. It is recommended to apply under crops that do not tolerate excess chlorine (potatoes, beans, peas, beans). It is highly recommended for vegetables of the plain family (cabbage, turnip, radish, radish).


Suitable for all methods of application: for feeding during the growing season and when digging the soil in autumn and spring (the main method).


Potassium sulfate is widely used in foliar treatments by spraying in any irrigation systems and in any spray systems. Dose - 20-25 g per 1 sq.m.

Our planned production volume of potassium sulfate at the Facility is the Dombrovsky quarry, about 240 thousand tons / year (about 18 railway wagons per day).


sbi315000@gmail.com, +38-067-4073537

# PRODUCTS CALCIUM CHLORIDE


Calcium chloride $CaCl_2$, or calcium chloride, the most common and used product in the world.

It is applied in:

- chemical,
- forest and
- woodworking,
- oil
- oil refining and
- petrochemical industry;
- in refrigeration equipment;
- in the construction and manufacture of building materials;
- in non-ferrous metallurgy,
- during the construction and operation of roads;
- as a desiccant;
- to accelerate the hardening processes and increase the strength characteristics of soils;
- for the installation of curtains in sandy rocks by alternately injecting sodium silicate and calcium chloride solutions into the pores of rocks, etc.

Our planned volume of calcium chloride production at ENTERPRISE 1 is about 5.9 thousand tons / year (about 0.3 railway wagons per day)

# CALCULATION OF PRODUCTION EFFICIENCY

| Total reaction: $[CaSO_4*2H_2O + РЗЭ] + 2KCl = CaCl_2 + K_2SO_4 + 2H_2O + РЗЭ$ | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Name of costs, €** | **$CaSO_4$ + РЗЭ * $2H_2O$ waste / raw materials** | **2KCl** | | **$CaCl_2$** | **$K_2SO_4$** | **REE, about 5,6% $La_2O_3$** | **$2H_2O$** |
| **Molecular weight** | 172,15 | 149,10 | | 101,34 | 174,27 | 9,64 | 36,00 |
| **Weight sum** | **321,25** | | | **321,25** | | | |
| **Estimated coefficient (EC) per unit of $CaSO_4*2H_2O$ - 172.15 → 1** | 1,00 | 0,87 | | 0,589 | 1,01 | 0,056 | 0.21 |
| **Amount EK** | 1,87 | | | 1,87 | | | |
| **Rate** | **1,00** | **280,00** | | **365,00** | **688,50** | **110,00-600,00** | |
| **Raw materials and products** | **1,00** | **243,60** | | **215,00** | **695,39** | | |
| **Planned production costs** | **100,00** | | | | | | |
| **Amounts of raw materials and revenue** | **344,41** | | | **910,39 without REE** | | | |
| **Capitalization of raw materials** | **162,00** | | | | | | |
| **Conversion amounts** | **506,41** | | | **910,39 without REE** | | | |
| **Balance: raw materials / products** | **403,98** | | | | | | |

* **€ 1** - the cost of phosphogypsum along with the cost of its storage area

** **€ 100** - costs accepted including royalties of € 25 / t (5%)

*** **€ 162 / t** - 200 times the capitalization of raw materials from its value € 0.81

**€ 110-600 / t** - REE yield - BONUS.

**€ 400 / t - profitability accepted by us for further calculations**


sbi315000@gmail.com, +38-067-4073537

# DESIGN COSTS. COUNTERPARTY

| Stage of work | Percentage to total,% | Costs, € million. | Duration |
|---|---|---|---|
| **Stage "0"** | 10 | **0,5** | 3-6 |
| **Stage "1". Feasibility study of investments (feasibility study).** | 12 | **0,6** | 3-6 |
| **Stage "2". Project.** | 30 | **1,5** | 3-6 |
| **Stage "3". Working documentation (WD).** | 48 | **2,4** | 3-6 |
| **Stage of work** | 100 | **5,0** | |

**The basic structure of counterparty works and services.**

1. Development of initial data for design.
2. The project.
3. Expertise and approval.
4. Production.
5. Commissioning.
6. Pilot operation.
7. Author support.

# ORGANIZATION AND MANAGEMENT COSTS

| № | Name of costs | Cost, thousand € |
|---|---|---|
| **1** | **Salary of key specialists** | |
| 1.1 | Project Manager, President of SBI CJSC | 3,0 |
| 1.2 | Chief Accountant | 2,0 |
| 1.3 | Chief Technologist | 2,0 |
| 1.4 | Chief chemist | 2,0 |
| 1.5 | Chief Designer | 2,0 |
| 1.6 | Expert chemist | 2,0 |
| | **TOTAL, monthly salary fund:** | **13,0** |
| 1.7 | * Taxes per month, about 65% | 9,0 |
| | **TOTAL**, monthly salary: | **22,0** |
| | **TOTAL, for the year:** | **264,0** |

| | | |
|---|---|---|
| 2. | **Current expenses** | |
| 2.1 | **Consulting work** | 1,0 |
| 2.2 | **Representative** | 1,0 |
| 2.3 | **Travel** | 5,0 |
| 2.4 | **Communication** | 1,0 |
| 2.5 | **Transport costs** | 2,0 |
| 2.6 | **Rent** | 5,0 |
| 2.7 | **Overhead** | 1,0 |
| | **TOTAL, per month:** | **16,0** |
| | **TOTAL, for the year:** | **192,0** |
| **3** | **One-time organizational costs** | **30** |
| | **TOTAL, for the year:** | **486,0** |
| **4** | **Reserve Fund for the year** | **14,0** |
| | **BUDGET FOR THE YEAR** | **500,0** |

** The composition of the working group, the structure and amount of costs are indicative.

Within the budget, the project manager has the right to adjust both the expense items and the costs themselves.


sbi315000@gmail.com, +38-067-4073537

# BUSINESS DEVELOPMENT 1

| Expenditures | €, million |
|---|---|
| **1st year. Acquisition of the Object and design** | |
| Property Acquisition | 0,50 |
| Stage "0", term 3-6 months | 0,50 |
| Stage 1, period 3-6 months | 0,60 |
| Stage "2", term 3 months. from 9 months | 0,40 |
| Project organization and management costs | 0,50 |
| The first payment for the transfer of documentation of an intangible asset | 0,05 |
| License Obligations (Royalty) | 0,25 |
| Author support and its overhead | 0,06 |
| Technological equipment | 1,00 |
| Capital expenditures | 0,20 |
| **TOTAL for the first year:** | **4,06** |

| **2nd year. Production and testing of a pilot plant** | |
|---|---|
| Stage "2", the second stage of 6 months. from 9 months | 1,10 |
| Stage "3", 1st stage 9 months. from 15 months | 0,90 |
| Project organization and management costs | 0,5 |
| License Obligations (Royalty) | 0,25 |
| Author support and its overhead | 0,06 |
| Technological equipment | 3,70 |
| Capital expenditures | 1,50 |
| **TOTAL for the second year:** | **8,01** |

| **3rd year. Pilot operation, revision, adjustment of project documentation** | |
|---|---|
| Stage "3", second stage 6 months from 15 months, cost | 1,50 |
| Project organization and management costs | 0,5 |
| License Obligations (Royalty) | 0,25 |
| Author support and its overhead | 0,06 |
| Technological equipment | 5,80 |
| Capital expenditures | 1,72 |
| Commissioning works | 0,10 |
| **TOTAL for the third year:** | **10,43** |
| **TOTAL project costs:** | **22,50** |

# CALCULATION OF THE PAYBACK OF THE COMPANY 1

| Year | Implementation costs, € | Sum of costs at the end of the period, € | Income for the year and return credit funds | Balance at the end of the period, € |
|---|---|---|---|---|
| 1 | -4,06 | -4,06 | 0,00 | -4,06 |
| 2 | -8,01 | -12,07 | 0,00 | -12,07 |
| 3 | -10,43 | -22,50 | **1,80** | -20,70 |
| 4 | 0,00 | -20,70 | 4,00 | -16,70 |
| 5 | 0,00 | -16,70 | 4,00 | -12,70 |
| 6 | 0,00 | -12,70 | 4,00 | -8,70 |
| 7 | 0,00 | -8,70 | 4,00 | -4,70 |
| 8 | 0,00 | -4,70 | 4,00 | -0,70 |
| 9 | 0,00 | -0,70 | 4,00 | 3,30 |
| 10 | 0,00 | 3,30 | 4,00 | 7,30 |
| **ИТОГО:** | **-22,50** | | **29,80** | **7,30** |

**€ 0.5 million** - purchase of the Object

**€ 22 million** - technology implementation

**2nd year** - the conversion of 0.5 million tons of waste into raw materials with a capitalization of 200 times and share income **€ 81 million**

**9th year** - payback on production

**10th year** - output on production income **€ 7.30 million**

**€ 88.3 million - TOTAL INCOME OF COMPANY 1 for 10 years**

# CONVERSION OF ENTERPRISE “0”




sbi315000@gmail.com, +38-067-4073537

# IMPLEMENTATION METHOD

**MAIN IDEA**

Justification of the viability of the technology in the way:

- confirmation of the real existence of technological redistribution of the main part of the technology in the existing industry; demonstration of a pilot plant of a new technological redistribution, which closes the entire technology into a non-waste ring.

**SEQUENCING:**

- purchase of the Object at Vinnitsakhimprom * (platform 1) for € 0.5 million;
- collection and development of initial data for design;
- Negotiations with the owners of existing technological processes;
- Introduction of technological redistribution of commercial CaCl2 production;
- An international conference demonstrating and certifying technology;
- revaluation of phosphogypsum on the balance sheet of the COMPANY "0";
- lending for a new tangible asset - raw materials - phosphogypsum in the amount of $ 100 million, or € 81 million;
- patenting technology in countries producing phosphogypsum;
- purchase of new deposits;
- introduction of technology at an industrial level.

*** VINNITSAKHIMPROM OBJECT IS EXCLUSIVELY EXCLUSIVELY AS AN EXAMPLE CONVENIENT FOR THE PROCESSING OF TECHNICAL SOLUTIONS, DEMONSTRATION AND CERTIFICATION OF TECHNOLOGY AND MAY BE OPERATEDLY REPLACED !!!**


sbi315000@gmail.com, +38-067-4073537

# TECHNOLOGICAL REDISTRIBUTION

Any technology existing in the World is just a new superposition of existing technological conversions (parts). New technology - a set of new redistributions, united by new communication protocols. That is why: in order to prove the viability of a new technology, it is enough to confirm the viability of each of its repartitions and the feasibility of their new connections.

For our new technology, the technological changes are as follows.

1st — raw material preparation and supply for processing;

2nd — ammonization and carbonization of raw materials;

3rd — potassium sulfate production;

4th — production of calcium chloride;

5th - allocation of REE concentrate.

1, 2, 3, 5 - used by industry for a long historical period of time, millions of tons of products are produced and consumed by them.

The 4th technological redistribution is justified and carried out in laboratory conditions by us and third parties in great detail. Based on this redistribution, we have patented a number of technologies. The passage of reactions for industrial production is fully justified and is beyond doubt. It is necessary at stage "0" to either select an existing reactor, or create your own reactor and conduct demonstrative field tests, as a pilot industrial complex (OPUK).

The demonstration of the OPUK will be held in the presence of an impressive authoritative commission, drawn up by the relevant act and widely publicized in the media.

The implementation of these tasks is assigned to the COMPANY "0".

To launch ENTERPRISE "0", and then ENTERPRISE 1 and ENTERPRISE 2, ICO is held.


sbi315000@gmail.com, +38-067-4073537

# 4-TH REDISTRIBUTION DESIGN COSTS

| Stage of work | Percentage of the amount, % | Technology costs, € million | 1/5 - the cost for one redistribution, million. € | Period of execution |
|---|---|---|---|---|
| **Stage "0"** | 10 | 0,5 | 0,10 | 3-6 |
| **Stage "1". Feasibility study of investments (feasibility study)** | 12 | 0,6 | 0,12 | 3-6 |
| **Stage "2". Project** | 30 | 1,5 | 0,3 | 3-6 |
| **Stage "3". Working documentation (RD)** | 48 | 2,4 | 0,48 | 3-6 |
| **Reserve** | | | 0,08 | |
| **TOTAL Design Cost** | **100** | **5,0** | **1,20** | **24** |


sbi315000@gmail.com, +38-067-4073537

# PROJECT MANAGEMENT COSTS

| № | Name of costs | Cost, thousand € |
|---|---|---|
| **1** | **Salary of key specialists** | |
| 1.1 | Project Manager | 2,00 |
| 1.2 | Chief Accountant | 1,00 |
| 1.3 | Chief Technologist | 1,00 |
| 1.4 | Chief chemist | 1,00 |
| 1.5 | Chief Designer | 1,00 |
| 1.6 | Technical translator | 1,00 |
| | **TOTAL monthly payroll:** | **7,00** |
| 1.7 | * Taxes per month, about 18% | 1,26 |
| | **TOTAL salary per month:** | **8,26** |
| | **TOTAL, for the year:** | **99,12** |

| | | |
|---|---|---|
| 2. | **Current expenses** | |
| 2.1 | Consulting work | 1,00 |
| 2.2 | Representative | 0,50 |
| 2.3 | Travel | 2,50 |
| 2.4 | Communication | 1,00 |
| 2.5 | Transport costs | 2,00 |
| 2.6 | Rent | 5,00 |
| 2.7 | Overhead | 1,00 |
| | **TOTAL, per month:** | **13,00** |
| | **TOTAL for the year:** | **156,00** |
| **3** | **One-time organizational costs** | **30,00** |
| | **TOTAL, for the year:** | **285,12** |
| **4** | **Reserve Fund for the year** | **14,88** |
| | **BUDGET FOR THE YEAR** | **300,00** |
| | **BUDGET 2 years** | **600,00** |

* Management costs may be partially paid with deferred payment of the difference during the development of the full production cycle


sbi315000@gmail.com, +38-067-4073537

# AUTHOR'S ACCOMPANIMENT

| № | Description of costs | Per year, mln. € | For 2 years, mln. € | € Pay for 2 years, mln. € | Loan before the start of production, mln. € |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 |
| 1 | Depreciation of intangible assets for the production of 10 thousand tons / year | 0,250 | 0,500 | 0,240 | 0,260 |
| 2 | First payment upon transfer of documentation | 0,050 | 0,050 | 0,050 | 0,000 |
| 3 | 0.05 million / year | 0,050 | 0,100 | 0,050 | 0,050 |
| 4 | Authoring overhead | 0,017 | 0,034 | 0,012 | 0,022 |
| | **TOTAL:** | **0,367** | **0,684** | **0,352** | **0,332** |

* The cost of author support may be paid partially with deferred payment of the difference (column 6) during the development of the full production cycle

# THE TOTAL COST OF THE COMPANY "0"

| № | Name of expenses | Planned value, € million | Deferred payments, € million | Mandatory payments, € million |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
| 1 | Property Purchase | 0,500 | 0,200 | **0,300** |
| 2 | Project organization and management costs: (at $ 0.15 million / year) | 0,600 | 0,300 | **0,300** |
| 3 | Design | 1,200 | 0,400 | **0,800** |
| 4 | Licensing obligations | 0,684 | 0,434 | **0,250** |
| 5 | Technological equipment (manufacturing, commissioning, testing of gas treatment plants), € 10.5 / 5 mln. | 2,100 | 1,600 | **0,500** |
| 6 | General construction works (buildings and structures, ways and communications), € 4/5 = 0.8 million | 0,500 | 0,300 | **0,200** |
| 7 | Pre-commissioning robots, € 0.6 / 5 = 0.12 million | 0,120 | 0,040 | **0,080** |
| 8 | Reserve | 0,296 | 0,226 | **0,070** |
| | **TOTAL:** | **6,000** | **3,500** | **2,500** |

Graphs: 3 - planned costs; 4 - possibly deferred costs; 5 - the necessary costs.

€ 2.5 million - necessary expenses;

€ 3.5 million - possibly deferred conversion costs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# BUYING PHOSPHOGYPSUM MARKET

| Stages | Year | Purchasing, million tons at 1 € / t with storageхранение ния | Division on the balance sheet of the COMPANY "0" in the proportion of 0.19: 0.81, million € | | The conversion of waste into raw materials and capitalization of 200 times, € million | 12% loan for the purchase of a new batch of waste, € million | ROI conversion - the ratio of income (gr. 6 - € 50 million) to € 50 million |
|---|---|---|---|---|---|---|---|
| | | | Fixed assets 0.19 | Conversion waste, 0.81 | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 1 | 1, 2 | 0,5 | 0,09 | 0,41 | 81 | 9,72 | 0,62 |
| 2 | 3 | 9,72 | 1,85 | 7,87 | 1 574,64 | 188,96 | 30,49 |
| 3 | 4 | 188,96 | 35,90 | 153,06 | 30 611,52 | 3673,38 | 611,23 |
| 4 | 5 | 3 673,38 | 697,94 | 2 975,44 | 595 087,95 | 71410,55 | 11 900,76 |
| **ИТОГО:** | | **3 872,56** | **735,78** | **3 136,78** | **627 355,11** | **75 282,61** | **12 546,10** |
| 5 | 6 | 3 627,62* | 689,22 | 2 938,22 | 587 644,89 | 70 517,39 | 11 571,90 |
| **ВСЕГО:** | | **7 500,00** | **1 425,00** | **6 075,00** | **1 215 000,00** | **145 800,00** | **24 299,00** |

# MARKET BUYING TACTICS

The project has 2 sources of revenue:

1) the capitalization of a tangible asset (MA) on the balance sheet of the COMPANY "0", which can be used as collateral for lending - "short money";

2) sales of products by ENTERPRISES 1, 2 and others - "long money".

The presence of certified technology allows the ENTERPRISE "0" to refine the waste and convert it into raw materials, which can be transferred to other enterprises for processing. The economy of ENTERPRISE "0" and other enterprises is balanced in such a way that allows processing enterprises not only to accept raw materials at a rather high cost, but also to form a rather impressive revenue.

A rigid contractual corporate system of relations between the balance holder of MA Enterprise “0” and other enterprises closed exclusively for the supply of raw materials from ENTERPRISE “0”:

1) allows you to have no doubt in the guaranteed sale of raw materials at a guaranteed cost in guaranteed volumes;

2) the price of raw materials does not depend on external factors and remains stable in any conditions.

These 2 factors provide the basis for reliable, reliable long-term lending.


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# MARKET BUYING TACTICS

**7.5 billion tons** - the accepted limitation of the 20-year-old market of phosphogypsum.

**3 627.62** (column 3 of the table “Purchase of phosphogypsum market” - the difference between the planned market volume of 7.5 billion tons and the purchased volume in the 4th turnover.

Waste is purchased at € 1, per ton of waste (column 3), separated from fixed assets, put on a balance sheet at € 0.81 (column 5) and revalued to raw materials with a 200-fold increase in value (column 6).

**Raw materials** for processing are sold at a price of € 162 per ton.

For further market development as a result of the conversion of waste into raw materials and its capitalization on the balance sheet of the enterprise, credit funds are used in the amount of 25% of their book value, which is provided by contacts for the purchase of raw materials of enterprises.

This is an internal issue of the Company - owners of enterprises and has no external influence.

**Credit funds are distributed:**

12% - for the purchase of the next batch of waste;

13% - for the development of production using new technology.


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# MARKET RISKS

The reaction of the Market to the purchase of industrial waste will be reflected in an increase in its cost, but the availability of our patents for its processing will deter sellers from raising the price, **given the understanding that it is impossible to use our own waste and the stable unjustified costs of its maintenance that fall on the cost of production.**

The total market income will consist of 2 components:

1. Conversion of industrial waste 7.5 billion tons at € 162, tons into secondary raw materials - € 1,215 billion.
2. The production of marketable products of 7.5 billion at a price of € 400 / ton € 3,000 billion.

When the Market is saturated with our product, its unit cost will certainly decrease, but with absolute knowledge of the direction of the rates moving in the Market, the losses in the reduction in the cost of the product can not only be compensated, but also multiplied.

The availability of own production facilities and the possibility of lending in the amount of at least **€ 145,800 million will allow not only to expand the processing of purchased phosphogypsum everywhere, but also to start our own production of potassium chloride, securing supplies for the main production.**


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# MARKET RISKS

Since liabilities to crowd investors are limited to ROI5 = 4000, which occurs in the middle of the 5th year (4th turn), the investor has the right to withdraw his share in the proportion of 1 * 4000 and leave the company. The phase of mastering the global production volume of phosphogypsum processing - the “long money” phase of the Company’s 7-20 years of operation, remains outside the risk zone of crowdinvestors.

By the middle of the 5th year of operation, after confirmation of ROI5 = 4000, investors will also be able to make a choice: to stay in business or to leave on the eve of the most interesting thing - cooperation of phosphogypsum processing with other industries.

There is no doubt that at a certain stage of the purchase of the raw material market, the question of the Company's monopoly position and a ban on the further purchase of raw materials will arise. We have a large list of new technologies that can compete with the technology of phosphogypsum processing, both in terms of the ecology of the planet and the potential for incomes of strategic importance.

Therefore, we will gladly and without loss provide licenses for the processing of phosphogypsum to those companies that, in exchange, will provide technical documentation for technological conversions to our new technologies.

Thus, we will create a market for phosphogypsum processing and diversify our company to develop new markets for processing other industrial waste, such as: brines; "Red mud"; natural and technogenic deposits are depleted of manganese; sulfuric acid industrial waste; Further ...


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# TOTAL PROFITABILITY OF THE COMPANY

**€ 1 215 billion - profitability of the conversion production € 3,000 billion - profitability of the production itself with a specific yield of € 400 per ton of waste material**

**€ 4,125 billion - TOTAL REVENUE**

Purchase of the global waste market by a forward for a 20-year licensing period of 7.5 billion tons can be made in less than 6 years into a 5-fold conversion turnover.

For a 5 year waste conversion in raw materials, $ROI_5$ = 24,300,

**For crowdfunding investors, $ROI_5$ is limited to 4000 with a minimum deposit of € 1.**

The 20-year production income for processing 7.5 billion tons with a yield of € 400 per ton will be € 3,000 billion for production **$ROI_{20}$ = 60,000.**

The total ratio of income to invested capital will be **$ROI_{\Sigma}$ = 84,300.**

**For a strategic partner - investor - buyer, from € 25 million or more shares of the Project, there are no restrictions on ROI.**


sbi315000@gmail.com, +38-067-4073537

# ICO COMPANY

- Pre-ICO
- ICO Issue
- Project Costs
- Project ICO Revenues

# Pre-ICO

| Stages | NAME OF STAGES | Costs, thousand € | Note, conditions, validity period, implementation ... |
|---|---|---|---|
| 1 | **Pre-ICO, including:** | | Fundraising for the preparation and conduct of ICO - presale |
| 1.1 | **Website creation** | **2,00** | Section of the site http://ecoprofit.mozello.ru/proekty/fosfogips-problemy-jekologii/ |
| 1.2 | **presentation** | **1,00** | Presentation of Microsoft PowerPoint "PHOSPHOGIPS_PRESENTATION" |
| 1.3 | **Video presentations** | **30,00** | Crowdinvesting for tokens. € 1 = 1 token |
| 1.4 | **Writing white paper** | **5,00** | It is carried out independently |
| 1.5 | **Translation of materials** | **1,00** | Presentations, website, white paper, ICO in English |
| 1.6 | **Advertising and PR** | **4,00** | Competition for "FREELANCEHUNT" |
| 1.7 | **Targeted advertising** | **3,00** | Facebook, Linkedin, Viber, Telegram, WhatsApp, Messenger, WeChat, YouTube .. Conversations on "FREELANCEHUNT" |
| 1.8 | **Pre-ICO Token Issue** | **4,00** | Their introduction to the market of 50 million units, including 50 thousand pcs Pre-ICO |
| | | **50,00** | Crowdfunding |

* Payment for work performed by tokens

** Volume of own works (items 1.1, 1.2, 1.4) - € 8 thousand

*** Crowdinvesting for tokens. € 1 = 1 token (items 1.3, 1,5, 1.6, 1.7, 1.8) - € 42 thousand


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# ICO ISSUE

| Stages | NAME OF STAGES | Issue, mln. € | Note, conditions, validity period, fulfillment ... |
|---|---|---|---|
| 2 | **Размещение токенов ICO, в т.ч.: Placement of ICO tokens, including:** | 50.0 | Market launch of tokens: 50 million pcs. - 50 thousand pcs. Pre-ico |
| 2.1 | **ИНВЕСТИЦИИ INVESTMENTS** | 25.0 | Batch sale of 2.5 million tokens with no profit limit |
| 2.2 | **КРАУДИНВЕСТИНГ CRAUDINVESTING** | 20.0 | Free sale of 20 million units. tokens at face value € 1 = 1 token<br>INCOME IS LIMITED ROI = 4000: 1 |
| 2.3 | **PERSONAL INVESTMENT** | 5.0 | Intangible Asset (NMA) of the authors of the Project and technology 10% (goodwill, technical know-how) |

Issues placement of tokens will be made on the most popular platforms: Ethereum, BitShares and Waves.

IP technologies are developing rapidly and on BitShares and Waves platforms, tokens can already be issued directly in the browser, in a simple visual interface.


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# PROJECT COSTS

| Stages | NAME OF STAGES | Costs, thousand € | Note, conditions, validity period, implementation ... |
|---|---|---|---|
| 1 | **ENTERPRISE "0" *** | **2,5** | **Conversion of technogenic waste** |
| 2 | **ENTERPRISE 1, including:** | **22,50** | **Implementation of technology, development of technical solutions at Site 1 in Ukraine** |
| 2.1 | Purchase of Object and raw materials | 0,50 | |
| 2.2 | Project Management Costs | 1,50 | |
| 2.3 | Design | 5,00 | |
| 2.4 | Licensing obligations | 1,00 | |
| 2.5 | Technological equipment | 10,50 | |
| 2.6 | Building | 3,40 | |
| 2.7 | Commissioning works | 0,60 | |
| 3 | **ENTERPRISE 2 **** | **25,00** | **GTC at Site 2 abroad** |

* Financing Pre-ICO is part of the financing of ENTERPRISE “0”

* * The difference in costs of the ENTERPRISE 1 and the ENTERPRISE 2 in € 2.5 million is the cost of the accommodation facility. Savings on the design of about € 3.5 million will also be spent on the acquisition of the Object, including phosphogypsum.


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# PROJECT ICO REVENUES

| Name | Years | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1, 2 | 3 | 4 | 5 | 6 | Amount | 7-20 |
| € ENTERPRISE "0", stock growth, million € | 81 | 1 575 | 30 612 | 595 088 | 587 645 | 1 215 000 | |
| 12% - purchase of waste | 9,72 | 189 | 3 6733 | 71 411 | 70 517 | 145 800 | |
| 13% - production introduction | 10,53 | 205 | 3 980 | 77 361 | 76 394 | 157 950 | |
| Construction of new facilities, million tons per year (at € / t) | 0,25 (1000) | | 8 (500) | 155 (500) | 155 (500) | 316 | 284* |
| Yield potential in € million per year at € 400 per ton | 100 | | 3 200 | 62 000 | 62 000 | 127 300 | 113 600 |

* The construction of new capacities is planned up to a total production capacity of 600 million tons per year; therefore, the planned volume of commissioning of capacities of 7-20 years should be 284 million tons per year with a planned profit of € 113,600 million.


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