ORGANIC INVESMENT

In cooperation with Environmental
ECO - Management

Silicon Dioxide Production Project from Rice Husk

Let's Turn Waste into Wealth

This is an innovative project of modern Russian scientific thought. The project is aimed at solving problems of production of silicon dioxide from waste, and solving problems of small renewable energy in South-East Asia.

Challenge

Utilization of rice husk

About 600 million tons of rice husk are formed in the world each year, as a result of threshing. For the most part, it is burned in kilns or buried, requiring the use of large land areas. But most importantly, the husk does not disintegrate in the ground due to the presence of silicon dioxide in it. And when burning husk, substances are released that can adversely affect the nature and human health.

Rice husk utilization is a pressing problem worldwide, especially in countries where rice is the main cereal product (China, India, Egypt, Brazil, partly the United States and Colombia)

High cost of SiO_2 production

The lack of introduction of new technologies in the production of CuO2 increases the cost and makes the production of such products as varnishes, paints, sealants, food additives, medical preparations, car tires, cosmetics, toothpastes dependent on imports.

The problem of the lack of low-cost technologies for the production of silicon dioxide does not allow for the rapid development of the production of silicon microelectronics, the production of solar cells, the production of photovoltaic cells, heat insulation materials based on airgel.

120M tons of husk in the world each year

2M tons of husk in the USA

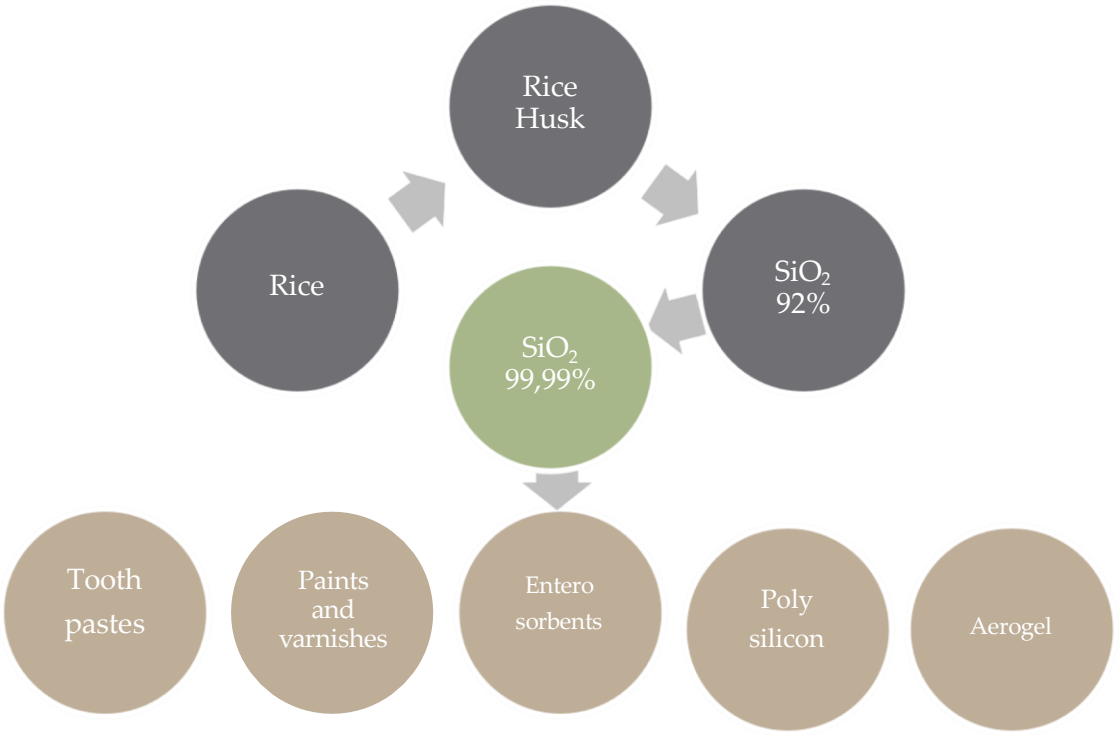
$2
SiO_2
90%

$8-12
SiO2
99,99%

Solution

The unique technology of rice husk processing

Derivatives of rice husk ash



Disposal 9K tones of husk per year

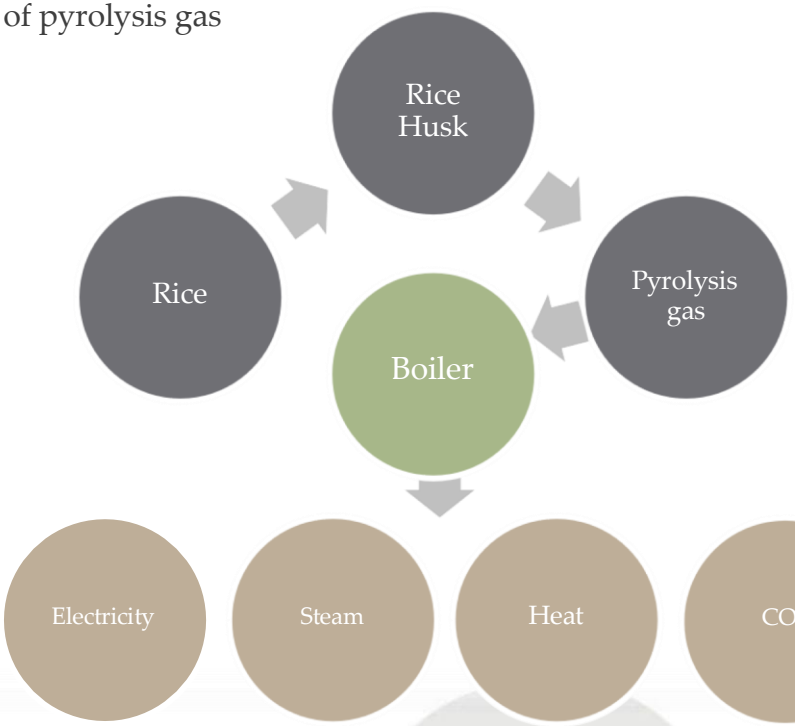
1000 tons of SiO_2 per year

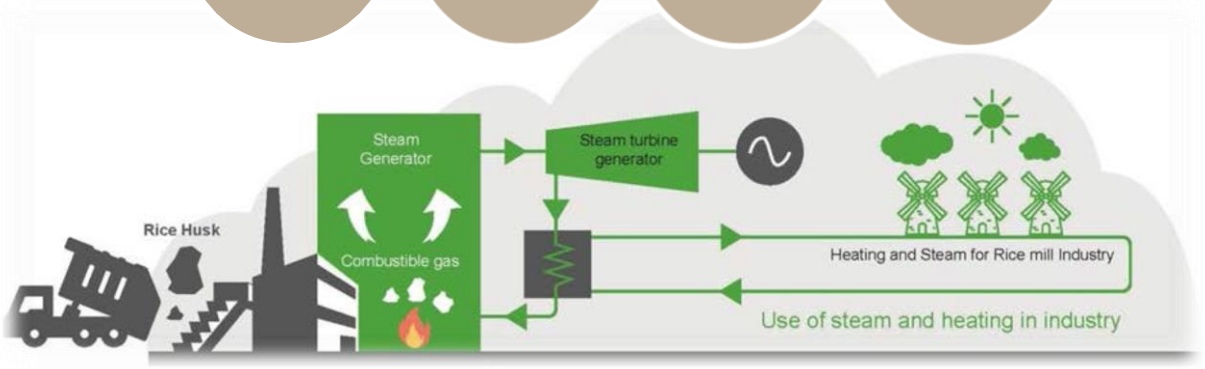
2.1K tons of NaCl per year

Solution

The unique technology of rice husk processing

Derivatives of pyrolysis gas





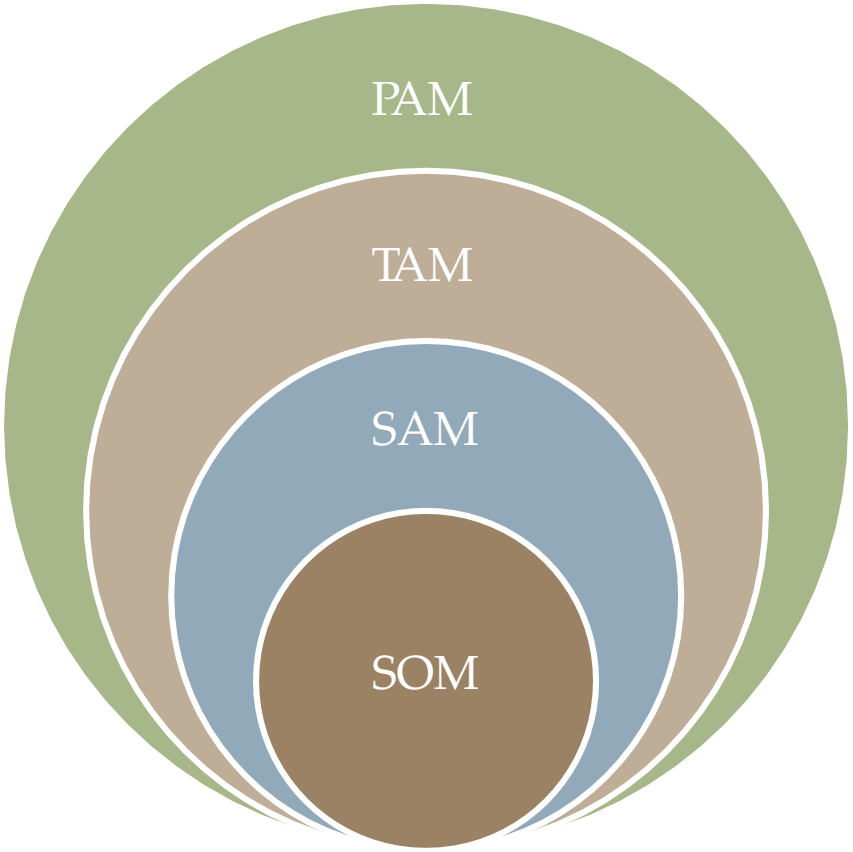
6 GW E/E per year

26K tons of steam

1.9M m^3 CO_2

Silicon dioxide market

Market size



Chemical and physical properties of the product complies with peers global manufacturer Evonik - as confirmed by the Faculty of Chemistry, Moscow State University.

PAM (Potential Available Market) – According to Transparency Market Research, by 2024 the market for silicon dioxide will be US$ 7,323.3M (5,185 thousand tons);

TAM (Total Addressable Market) – According to Transparency Market Research, Sales of specialty silica across all applications were valued at US$ 815.8M in 2015 and are expected to reach US$ 1354.9M by 2024 (1,071 thousand tons);

SAM (Served/Serviceable Available Market) – The U.S. is one of the leading consumers of specialty silica across the globe. Sales of specialty silica across all applications were valued at US$ 815.8M in 2015 and are expected to reach US$ 1354.9M by 2024;

SOM (Serviceable & Obtainable Market) – The specialty silica market in North America is primarily driven by expansion in the rubber industry. Sales of specialty silica across rubber industry were valued at US$ 468.3M in 2015 and are expected to reach US$ 804.8M by 2024.

The specialty silica market in Canada is anticipated to create an incremental opportunity of US$ 184.6M from 2016 to 2024, thereby offering lucrative opportunities for existing manufacturers as well as new entrants.

North America Specialty Silica Market

Key Findings

Application Perspective

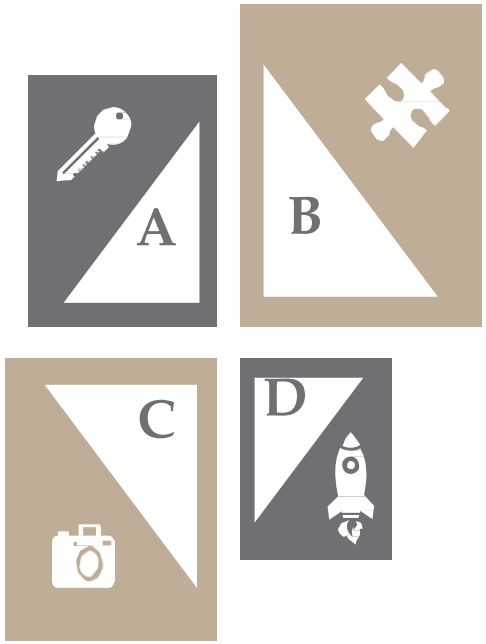
Usage of specialty silica in the tire sector is rising at a rapid pace in North America, led by its ability to partially replace carbon black

Implementation of stringent norms regarding carbon emissions in the U.S. and increase in usage of lightweight plastics and rubber tires in the automotive industry are driving the specialty silica market in the region. This is ascribed to specialty silica's ability to lower the rolling resistance of tires.

Focus Segments

Fumed silica is a major segment of the specialty silica market due to the growth in cosmetics and personal care industries. Fumed silica is primarily used in the cosmetic industry.

Wacker Chemie AG, Evonik Industries AG, and Cabot Corporation have increased their production facilities for fumed silica and precipitated silica to cater to the demand from various end-use industries



New Entrants

Demand for specialty silica is rising significantly in the U.S. There exists high possibility of new players entering the specialty silica market owing to the low capital investment for manufacturing precipitated silica

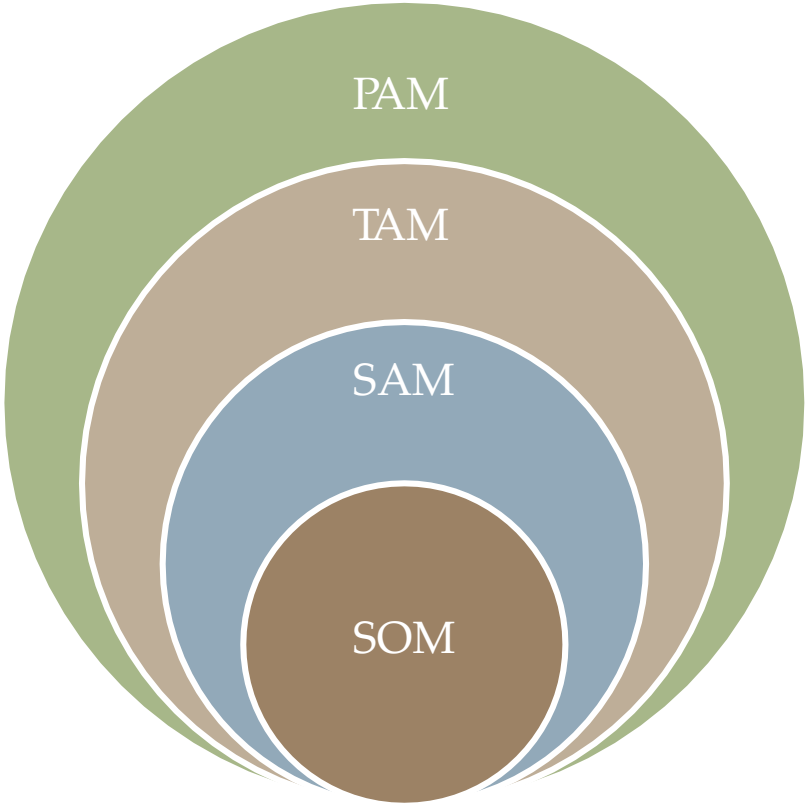
Country Perspective

The U.S. dominates the specialty silica market in North America

Major capacity expansions for various specialty silica grades have been carried out in the U.S. in the last few years. This trend is expected to continue during the forecast period.

Small renewable energy market

Market size



In the United States, more than 10M tons of rice is grown per year, which allows for the construction of 222 plants with a capacity of 1 MWh. The total power of electricity that can give the processing of rice husk is 222 MWh or 1322 GW per year

PAM (Potential Available Market) – 672M tons of rice is grown in the world per year and 544K tons of husk are produced, It provides a feedstock for generating electricity with 14.9K plants with 1 MWh;

TAM (Total Addressable Market) – The target market for this direction is the country with an undeveloped power supply system: India - 2971 plants, Vietnam - 864 plants, Thailand - 699 plants, Iran - 50 plants;

SAM (Served/Serviceable Available Market) – Negotiations were held with the Ministry of Energy of India about the start of a large-scale program for the introduction of small renewable energy - 1000 plants with a capacity of 100 kW, after launching the pilot in India;

SOM (Serviceable & Obtainable Market) –

Negotiations were held with Michelin about working together to produce silicon dioxide in the amount of up to 300 tons per month for the needs of the tire industry and the use of electricity in the tire production process.
The beginning of the project was postponed at the time of launching the industrial plant and receiving the first production samples.

Global Market

Exports of silicon dioxide and rice husk processing equipment

Growing markets

The growth forecast for silicon dioxide markets by Asia in 2024 is $ 1405 million; in Europe $ 605 million

India

133.7 million tons of rice are grown annually and 26.7 million tons of husk are produced.

Vietnam

38.8 million tons of rice are grown annually and 7.7 million tons of husk are produced.

Tailand

Every year, 31.4 million tons of rice are grown and 6.2 million tons of husk are produced.

The need for electricity - generating equipment operating on rice husk

Electrification only one in India will allow to create a market of more than 1000 sales of small renewable energy plants, with service contracts.

To operate 1 plant with a capacity of 1 mWh, 9,000 tons of rice husk per year are needed.

Business model

Silicon dioxide production and electricity generation

Cost SiO_2 92%

$0,42

for 1 kg

Price of low quality SiO_2 from China is:

US$ 1-2

Cost SiO_2 99,99%

$2,08

for 1 kg

Price of high quality SiO_2 from Europe is:

US$ 8-12

Cost of electricity

$0,02

for 1 kWh

The average cost of electrical energy in the USA is:

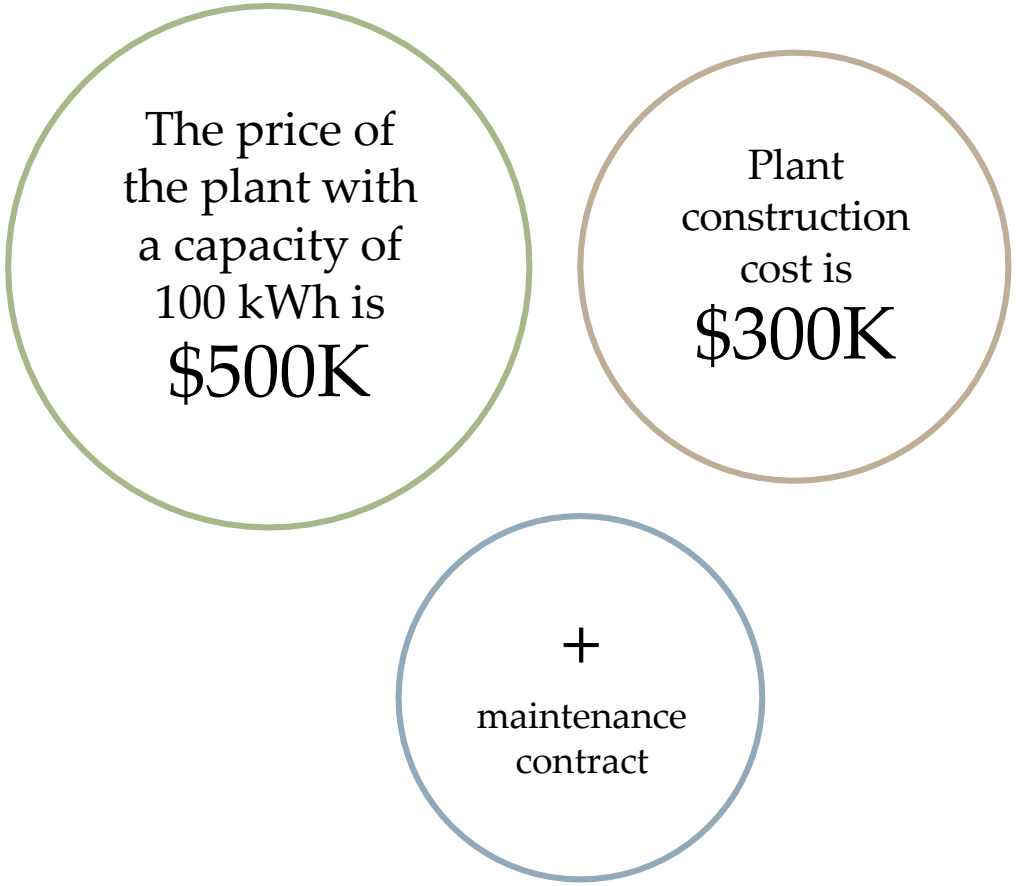
US$ 0,12

Business model

Sales of small renewable energy plants

Key factors

1. Low degree of energy supply of remote rural areas in Southeast Asia;
2. Large reserves of renewable raw materials - rice husk;
3. The transformation of waste - rice husk into a valuable product - silicon dioxide;
4. Project support at the level of the Ministry of Energy of India, Iran;
5. The possibility of government subsidies for projects, both capital expenditures and operating expenses for programs supporting the development of renewable energy (India, Iran, Thailand);
6. Through the commissioning of factories - the creation of its own raw material base for the production of high quality silica pure 99.99%.



Technological trends and competitors

The traditional method of producing high purity silica from silica sand is very expensive. The first step in the traditional technology for precipitated silica is sintering quartz sand (SiO_2) with sodium carbonate at 1700 °C. Such a temperature requires extremely high energy costs, expensive furnaces and fixed costs for refractory layer renewal. High temperature is necessary for the destruction of the crystal lattice of quartz sand and the transfer of a substance into an amorphous state.

Currently, anyone can find a lot of publications on the topic of research using rice husk to produce high-value materials. Delicate grains of rice grow with tough husks that keep insects and bacteria out yet still circulate air and moisture. The husks accomplish this feat thanks to nanoporous layers of silica that are strong yet breathable.

Various sources speak of research conducted in South Korea, India, Russia, and China. But no one has yet built industrially operating silicon dioxide production plants from rice husk. This is due to imperfect technology, which increases the cost of the final product and makes the whole production process meaningless.

However, the team of scientists from Russia fulfilled this task and was able to come up with an industrial technology for the production of high-quality silicon dioxide from rice husk.

Waste from one of the most popular crops, rice husks, can be a resource that helps meet the ever-increasing demand for SiO_2.

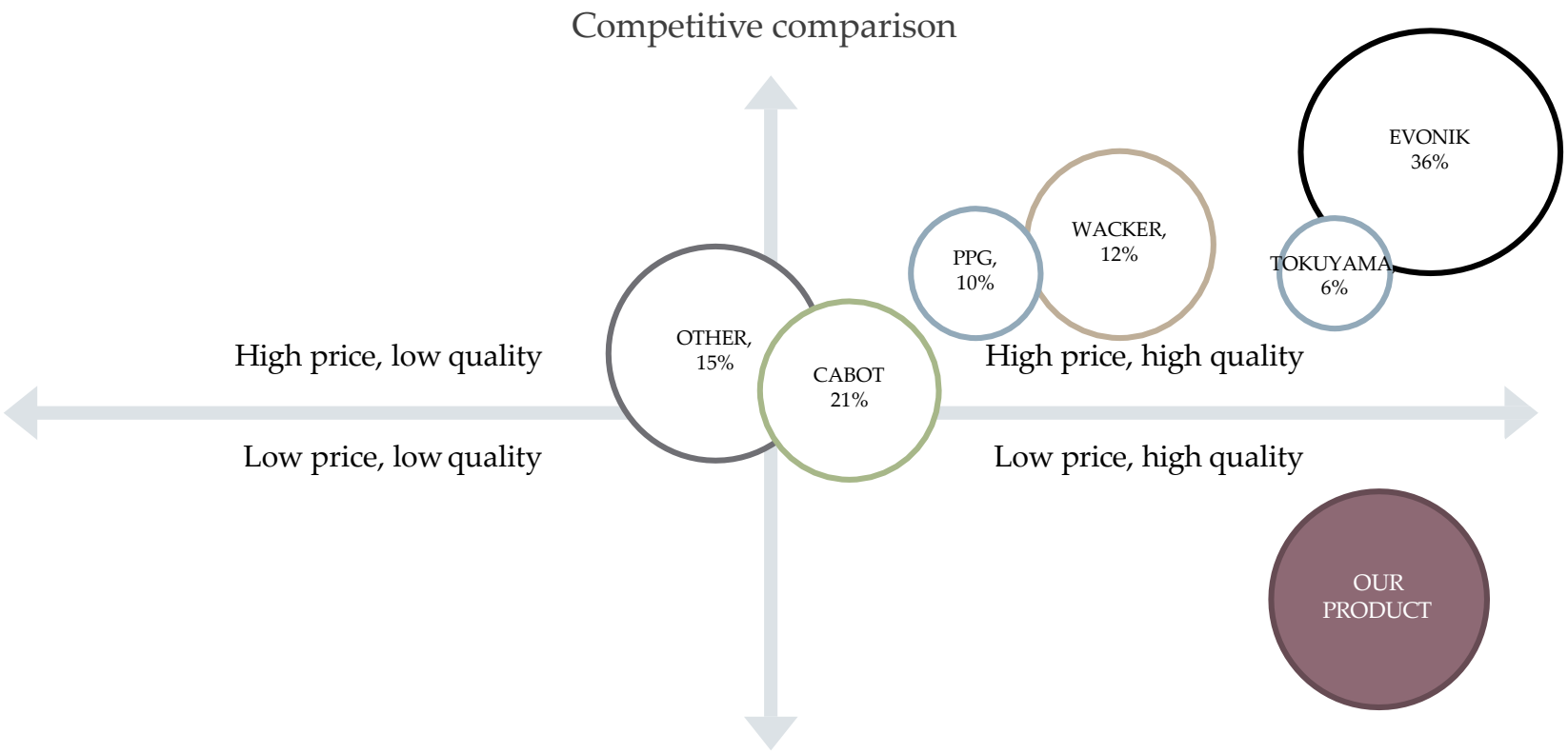
Our scientific partners

Academician of RAS Lunin V.V.- https://istina.msu.ru/profile/LuninVV/

Doctor Savilov S.V.-https://istina.msu.ru/profile/savilov/

KHN Novotortsev R.Yu. - https://istina.msu.ru/profile/Novotortsev/

Competitors



High quality

Competitive performance

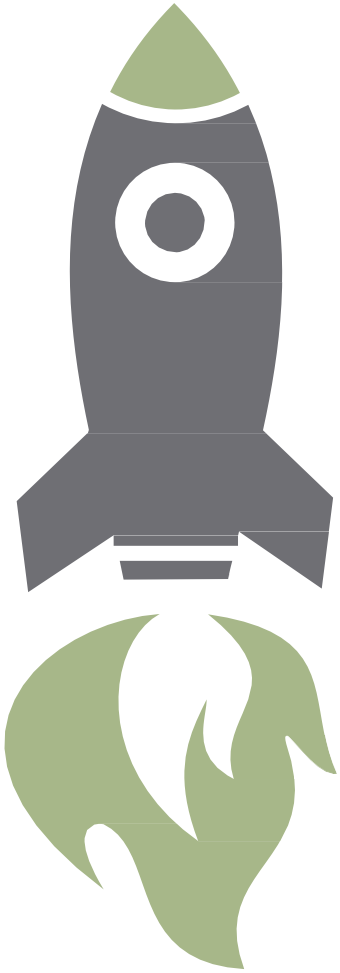
The main factors influencing the choice of the buyer are Price and Quality. In such industries as cosmetic and food lack of impurities and the color of the powder are fundamental. In coatings are the main properties of matting, in the tire industry price.

Our final product is White, without impurities, as it has an organic origin, with huge matting properties and a very low production cost.

Low price

Competitive advantages

Why do customers choose us?



01

Organic origin

It is the world's first environmentally friendly silicon dioxide of organic origin, without impurities of heavy metals.

02

Low price

The production technology allows you to produce the final product with a cost price several times lower than that of competitors

03

Deep customization, production flexibility

Thanks to partnerships with the Faculty of Chemistry of Moscow State University, production will be able to quickly adapt to customer requests, changing the properties of the product.

04

Scaling volumes

Renewable and readily available source of raw materials makes it possible to quickly scale production, with the possibility of placing the plant on the customer's premises, using additional products and resources of technology.

Current status

From History to Future History

2016

Commissioning pilot plant for processing rice husk, electricity generation and production of silicon dioxide 92% in Krasnodar, Russia

2018

Commissioning pilot plant for processing rice husk, electricity generation and production of silicon dioxide 99.99% Vietnam

2019

Construction of an industrial plant for the production of SiO2 99.99% in the United States with a capacity of 1000 tons per year

2021

Construction of a pilot plant for generating electricity in India with a capacity of 100 kWh

2023

Scale American plants to 10,000 tons per year; Entry into the Indian market, - sales of 1000 plants with a capacity of 100 kWh

To Investors

Opportunities for taking part in our business

We are looking for funding for the development of the project:
$ 1.75M for capital costs;
$ 0.5M for working capital replenishment.
Financing is provided by a 50% stake in the company's authorized capital.
After 3 years, it is possible to repurchase shares by the management of the company.

50%
Share in equity

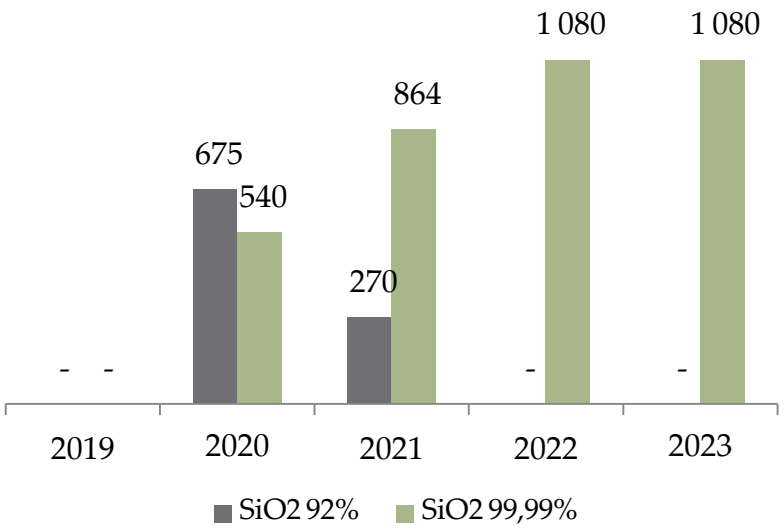
It is necessary for:
$1.75M CapEx
$0.5M NWC

$2.25M
Amount needed

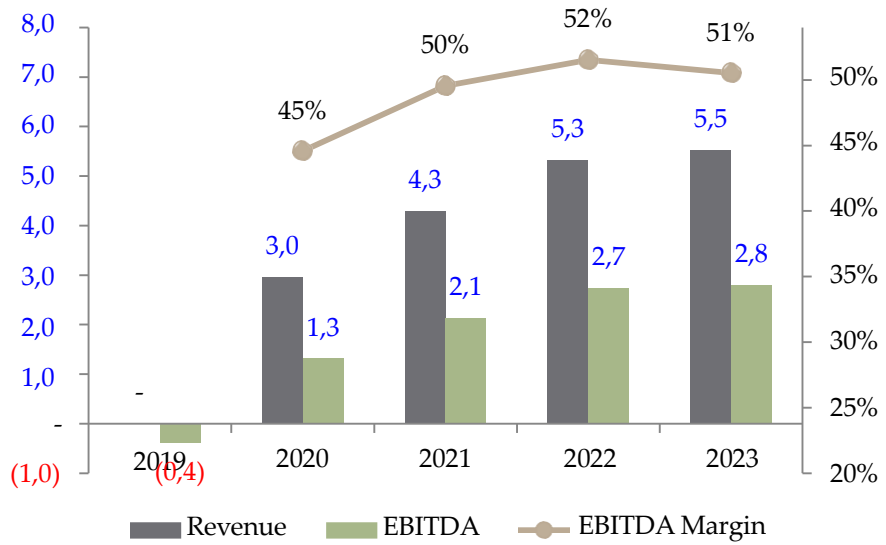
Financial model

Key project indicators

Silicon dioxide production, tons



Revenue and EBITDA, million US dollars



NVP $16M

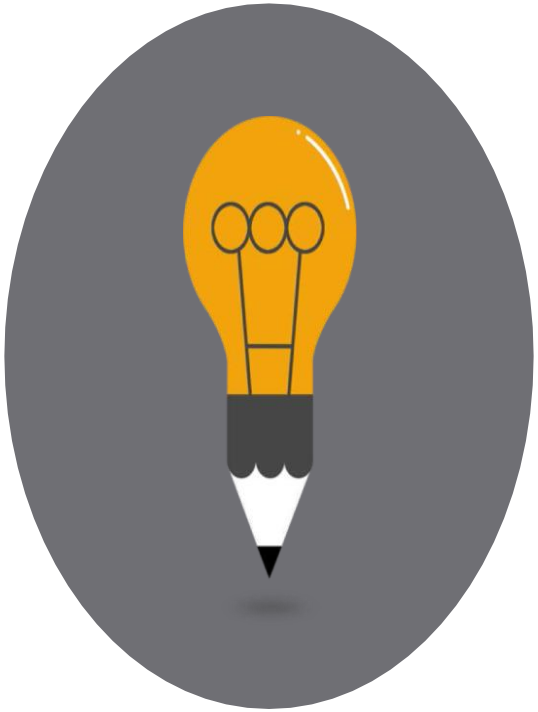
Project Indicators

NVP $ 16M; IRR 47%; PI (profitability index) 7.2; DPP (payback period) 3 years; discount rate of 12%.

Resources, which necessary to implement the project

The project budget is $ 2.25 million:
CapEx: $ 1.75 million; NWC: $ 0.5 million

IRR 47%



Thank you