

**PROJECT OF CREATION OF SCIENTIFIC AND TECHNICAL PRODUCTION
OF GRAPHENE AND LAMPS WITH FULL SOLAR RADIATION SPECTRUM**

2020

**PROJECT OF CREATION OF THE PLANT FOR
THE PRODUCTION OF INNOVATIVE LED
FIXTURES**



Brief summary of the Project.

The result of this project will be the organization of business in the design, serial production and marketing of innovative LED lamps designed to illuminate individual and public areas, fishery reservoirs, premises and territories of livestock farms, greenhouses and poultry farms (hereinafter all LED lamps will be combined under the name " **Sol Light**").

The product is a luminaire, it is a lighting device, in which the light emitter is a polymer coated LED that, when passing through it, emits light in a range close to the light of the sun.

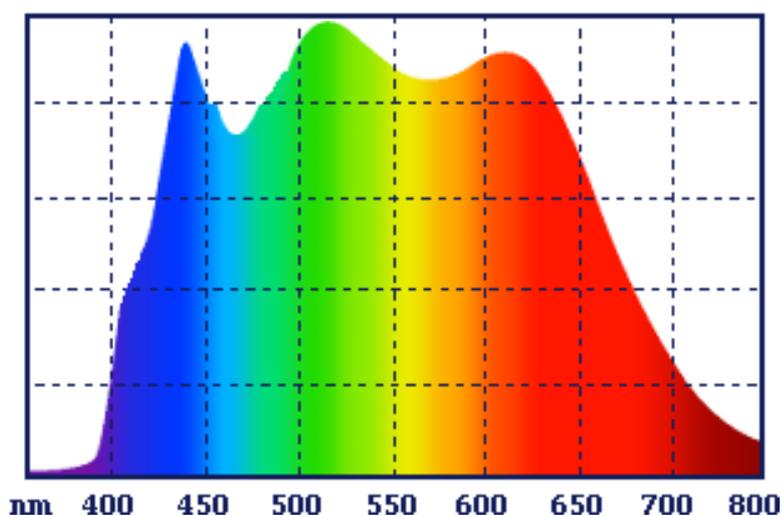


Figure 1 Spectrogram of the radiation of the Sol Light

Lamps that emit sunlight are very important in human life. allow to create ideal conditions for his life and open great prospects in all branches of agriculture. with their help you can get more agricultural products with minimal energy costs in the same area.

1. Advantages of using Sol Light:

The relatively low cost of the polymer makes it possible to produce a competitive product with high consumer qualities, such as perfect sunlight, energy efficiency and durability. Such lamps are in great demand in many spheres of human activity, namely:

1. Perfect lighting for people living in northern regions, polar territories and working without access to natural lighting. Full working shifts (underground, mines, production workshops, schools and kindergartens).

2. When illuminated with such luminaires on farms for growing cattle, in calves, by 6 months of age, the living weight will be higher by 8%, and the average daily gain - by 11%. This mode of illumination helps to reduce morbidity and improve the safety of calves at a 15- 20%. Irradiation of animals with sunlight not only increases the growth of live weight, meat production of bull-calves, but also the biological value of meat. The high efficiency of sunlight during the cultivation and fattening of young cattle is associated with the mechanism of the energy effect of light on bioobjects. The average daily increase in meat is increased by 8.8%. The weight of the carcass of the bulls is 12.2% higher, and the slaughter mass is 14.2% higher. With an

increase in the mass of the paired carcass and internal fat, the slaughter yield is 58.2%. In lactating cows, an increase in the growth of live weight and milk yield occurs without additional consumption of feed.

3. Fish with illumination are associated with many important behavioral responses, such as avoiding a predator and capturing prey, daily rhythm of feeding, spawning. Using our lighting technology, embryonic mortality is only 6%, and the growth of juvenile fish is accelerated by 20-40% compared to traditional methods of illumination. At the same time, diurnal rations are reduced by 3-5% and the conversion of consumed food is improved by 25-30%. At the same time, the improvement of the physiological state is guaranteed and the resistance to lack of oxygen and the hydro-ionoresistance of juveniles increase. At the same time, the taste is improving.

4. The length of the daylight affects the development and performance of the bird. The complex effect of all elements of the lighting regime on the bird's body can enhance metabolism and oxidative processes in tissues, stimulate the functions of endocrine glands, increase the body's resistance to various harmful environmental factors, reproductive ability and productivity of birds and activate the growth and development of young animals. The beneficial effect of lighting systems was found: its use contributed to a decrease in fission, an increase in live weight and, consequently, slaughter weight, improved feed conversion.

5. New lighting fixtures allow to increase the growth of production in hothouse facilities for a shorter time, by 30%, and also to ensure better quality of products. The wavelengths of the radiation from the luminaire, the density of the photosynthetic photon flux, are selected in the optimum ratio for plants.

3. Results Achieved

3.1. Unique composite thermally conductive materials have been created, which make it possible to remove heat from the heated surface of the LEDs as much as possible, which has a positive effect on its durability. The service life of LEDs, without the degradation of crystals, can be increased from 100,000 hours to 200,000 hours, which corresponds to 22 years of continuous operation.

3.2. Synthetic polymers have been created that allow the luminous spectrum of a luminaire to be as close as possible to sunlight, and to shift the spectrum to different areas.

3.3. Tests.

3.3.1. Since we are researching and selecting the ideal polymer coating composition, LED tests are conducted in our own laboratory. Made more than 20 different compositions that allow to create in the future a rise or lower in this or that region of the emitted spectrum.

3.3.1. Measurements were conducted in our own laboratory in total darkness. The device is a spectrophotometer, model Aurora4000. The purpose of the measurements is to search for the optimal mixture composition and test it for durability, degradation, temperature stability. All LEDs are taken from the same lot, the LED chips have the same BIN code.

3.3.5. The measuring sensor is located at a distance of 1 meter from the radiating surface.

3.3.6. Spectrograms are compared with a control sample.

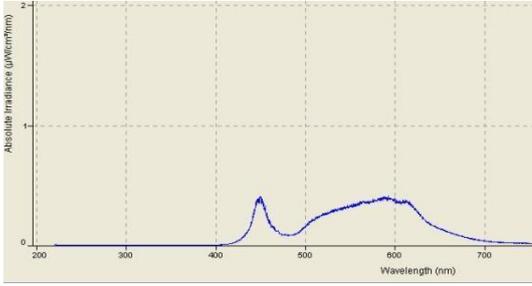
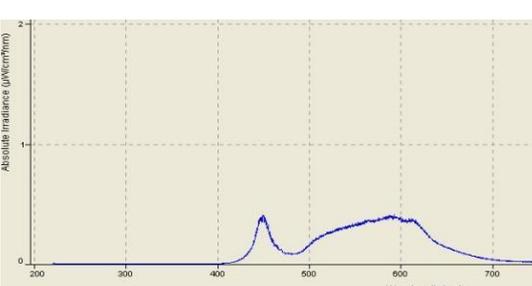
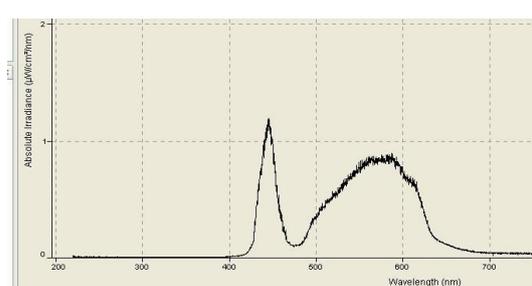
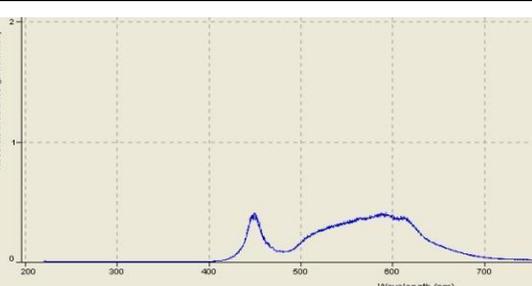
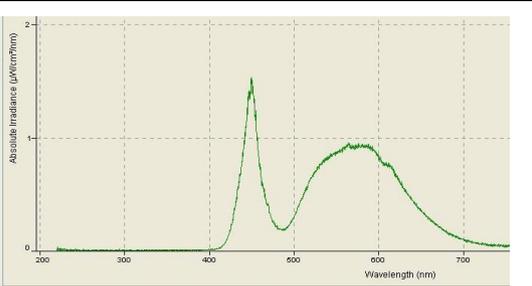
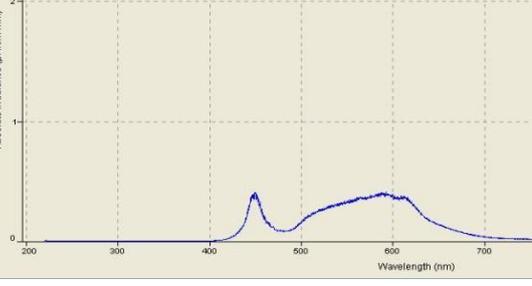
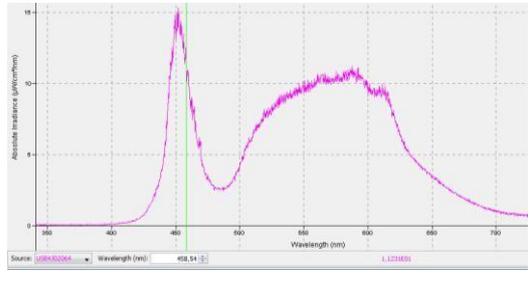
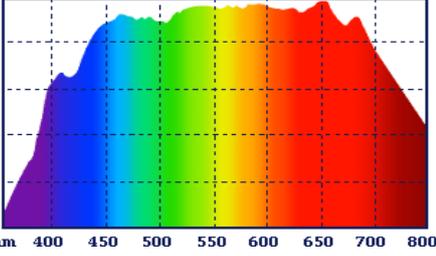
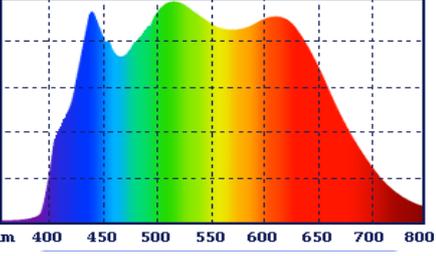
- Power consumption of lamps - 40 W. The emitted light flux is 4800 lm.

- Illumination of the surface by a control sample from a distance of 1 meter 5440 Lx,

The illumination of the surface by the polymer sample from a distance of 1 meter 5160 Lx,

- Falling illumination at a distance of 1 meter was, at 280 Lx, which at the moment is not significant.

3.3.5. Table of key indicators of measurements.

n/ n	ate d	Control sample	Spectrogram of light-emitting diodes with a polymer coating
1.	0.02.201 7 ¹		
2.	1.05.201 7 ⁰		
3.	0.10.201 7 ²		
4.	2.02.201 8 ⁰		
5.	3.05.201 8 ²	 <p data-bbox="448 2059 762 2091" style="text-align: center;">The solar spectrogram</p>	 <p data-bbox="954 2059 1305 2091" style="text-align: center;">Spectrogram of our lamp</p>

3.4. Drawings and technologies for manufacturing and application of LED lamps for various purposes - industrial, office, agricultural (greenhouse complexes, fisheries, poultry houses, farms for growing livestock) have been developed.

3.5. Technologies for manufacturing and applying synthetic polymers to LEDs have been developed.

The next stage is to solve the following tasks:

- to create luminaire production and research laboratory on the territory of the European Union;
- bring the polymers to perfection, achieving their maximum viability comparable to LEDs;
- Obtain certificates of the European Union CE, TUV, ISO 9001 and ISO 50001;
- to create and expand the marketing system in the European Union and around the world reaching by 2020 sales of at least 40,000 units. in year.

3.1. Graphene production.

The second direction of the Project will be the production of graphene

3.1.1. The essence of the project.

The result of the implementation of this Project will be the creation of a Plant for the production of an innovative method for obtaining pure graphene (95% purity) from waste from the woodworking and agricultural industries (lignin sludge, bark, sawdust, straw, etc.) lignin containing waste, using SHS (exothermic chemical process) of the type of combustion, proceeding in an autonomous mode and leading to the formation of useful condensed products and products.

Advantages:

Low cost (the prime cost of graphene is 100 Euro per 1 kg.) And high purity of the product.

High productivity (limited only by the size of the reactor and allows you to get GnP / GnS up to a ton per month.

It runs in autowave mode, in any environment.

3.1.2. Expected demand for products

Main consumers, sales directions.

The world graphene market is estimated at more than 100 billion USD

Application

- cryocoolers for 5G base stations
- graphene diaphragms in audio engineering
- textiles - Clothing with special properties
- aviation - lightweight and super durable materials
- cars
- ultra-fast battery charging.
- body armor
- heat-conducting and heat-insulating materials and much more.

Our technologies and developments are designed to solve a very wide range of problems.

They can be divided into 3 main groups:

Disposal of waste from the woodworking and agricultural industries (lignin sludge, bark, sawdust, straw, etc. lignin containing waste).

Pure graphene production of major grades (GnP / GnS).

Sale of produced raw materials (graphene) in the domestic and international market.

Organization of our own production of graphene-based heat-conducting materials (heat-conducting pastes, adhesives, compounds and sealants).

3.1.3. Reference:

A technological race for leadership in the field of two-dimensional materials has begun in the world. The first of these, graphene, has already found applications in real products, and graphene centers are opening all over the world. In March 2015, the Chancellor of the British Treasury, George Osborne, officially opened the National Graphene Institute in Manchester, called The Home of Graphene. Six months later, during an official visit to the UK, this institute was visited by Chinese President Xi Jinping - Chinese companies have invested tens of millions of pounds in Manchester research laboratories. A year later, Prince William and Kate Middleton also visited it.

The center has earned such popularity not only among high-ranking politicians and royalty. The world famous British billionaire businessman and philanthropist Richard Branson, after visiting the institute, actually made a policy statement about the need for a graphene revolution in aircraft construction. If in the Victorian era Manchester was one of the centers of the Industrial Revolution and was named the "Cotton Capital", now, in the 21st century, the city wants to see itself as the center of the "Graphene Revolution" - it is already called Graphene City.

The Battle for Graphene: A Global Competition for Leadership in Future Technologies

Great Britain, where three large research centers for working with graphene are concentrated at once, is far from the only country in which they went along the path of creating specialized centers. The first was the city-state of Singapore, whose authorities, on the recommendation of our Nobel laureates Andrei Geim and Konstantin Novoselov, opened a specialized center for research and development in the field of graphene. Total investments in it have long exceeded \$ 300 million, and Singapore has become one of the leaders in the graphene race. Similar graphene centers or national research laboratories have been opened in almost all leading industrial countries.

The moment of commercialization.

The main feature of such centers is the combination of advanced fundamental research with applied developments with the active participation of businesses: small, medium and large. Typically, the time from the discovery of a new material to its large-scale commercialization takes 20 to 30 years. And in the case of graphene, which began to be actively explored only since 2005, and the first technologies for its large-scale synthesis were developed only seven years ago, all countries still have time and chances to contribute to graphene technologies.

At the same time, graphene is only the first of two-dimensional materials in a family of more than a hundred species. Not to mention that they can be combined with each other, getting more and more new properties. Serious investments in other 2D materials began only in 2014. For example, the discovery of the first two-dimensional magnetic material took place literally this year.

Commercial use.

This two-dimensional world holds such a promising technological future that no one wants to miss the moment when laboratory research turns into commercial products.

Business interests.

The business ecosystem in the case of graphene is showing phenomenal results. There are already products on the market that use graphene. In Asian countries, you can buy smartphones where graphene is used as transparent electrodes in touch screens and there are expectations that in the near future graphene will become one of the components of highly sensitive cameras, transparent screens and fast-charging batteries in all our electronic devices. Prototypes of smart graphene contact lenses and many miniature sensor devices have been created. The possibilities of graphene to reduce the weight of unmanned aerial vehicles and space technology are demonstrated. Scientists' advances in the development of technologies for the synthesis of graphene and other two-dimensional materials and demonstration of prototypes of devices based on them are pushing the industry to increase investment in these new materials.

Large private companies such as Samsung (Korea), IBM (USA), SanDisk (USA), Foxconn (Taiwan), Fujitsu (Japan), Lockheed Martin (USA), as well as numerous startups are showing great interest in research in the field of graphene. The motivation of companies can be very different - this is the consolidation of leadership in their field of activity, and the diversification of risks and the search for new products to compensate for losses in connection with new opportunities that two-dimensional materials open up, for example, in the energy, aviation and space industries.

Absolutely all materials, with the inclusion of graphene in their base, acquire unique consumer properties.

Social effect of the project:

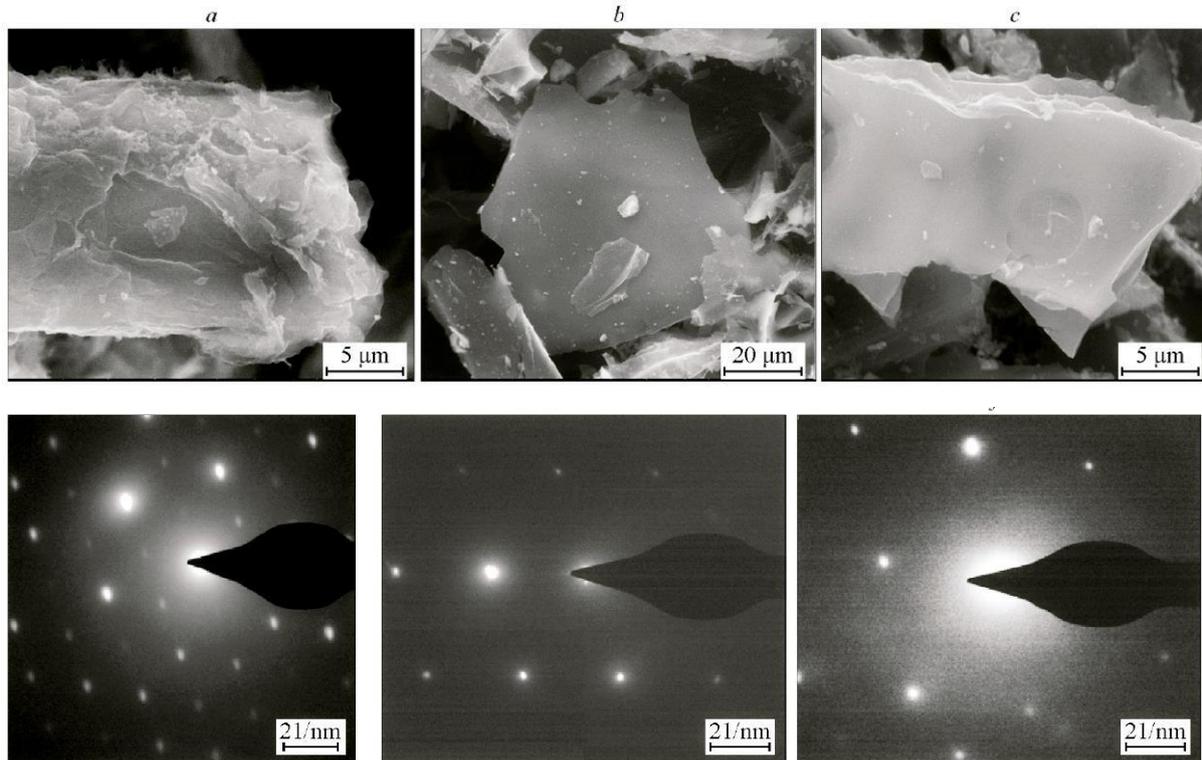
- the number of jobs under the project created at the first stage - 26 people.

Environmental effect of the project:

- disposal of hazardous waste from the woodworking and cellulose industry – lignin.

The main parameters of the production plan

- main nomenclature items of manufactured products - Graphene major grades (GnP / GnS)



-all samples have a distinct low - layer, hexagonal structure typical of GnP and other graphene materials;

-interplanar distances are 3.85Å, 3.74Å, 3.75Å, respectively;

-the number of layers in structures does not exceed 5;

-specific surface are a GnP-Cellulose 620M²/g, -Glucose 436M²/g, -Lignin 525M²/g

Planned production volumes (capacity) in physical and value terms, including taking into account seasonality (in the context of products);

After reaching the planned production capacity, the plant will be able to produce up to 12,000 kilograms of graphene per year. Average market value € 24 million.

If necessary, production can be easily scaled up within a short period of time. The increase in production takes place by 12,000 kg per year. The cost of increasing such production is 550,000 Euro.

Production

The new Enterprise is planning full-cycle technologies for the production of graphene.

For the production of graphene, at the Enterprise, synthesis reactors will be manufactured, assembled and installed. The plant will create its own research and testing laboratory and pilot sites for the development of various application technologies.

characteristics and composition of the main equipment:

- synthesis reactor;

- cleaning lines (raw material preparation lines);

- equipment for cleaning and aspiration of air;
- wastewater treatment line;
- disposal of residual components;
- laboratory equipment
- loading and storage equipment;
- packing area;
- raw material storage area.

Manufacturing of main equipment and reactors - Russia.

The rest of the equipment and equipment is from the European Union.

4. Description of the project

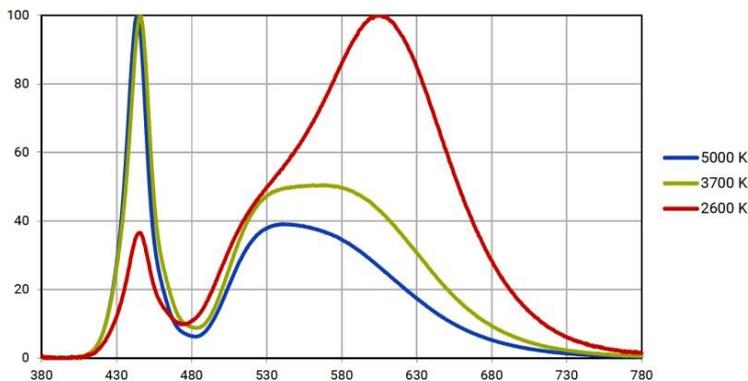


Figure 2. Spectrogram radiation of some of the best LEDs in the world

Luminescent fixtures have an even worse spectral characteristic. Analyzing the data, we realized that the existence of man in climatic conditions of high latitudes is characterized by certain features. The most severe inhibitory effect on the growth of children has a severe climate in the first year after birth. As a rule, this is due to a lack of vitamin D3 growth, as well as other vitamins of group C and D, P, B2 and PP, necessary for the functioning of metabolic redox processes. The vitamin and immune-biological deficiency associated with it naturally affects the general resistance of the organism and is a predisposing factor to the emergence or deterioration of the course of the most diverse, including infectious diseases. Polar explorers have a "polar stress syndrome" that includes anxiety, nervousness, the effects of a kind of hypoxia (oxygen starvation) followed by dyspnea, with elements of polar night insomnia or polar daytime drowsiness, as a consequence of the combined effect of the "infinity" of the polar day or night, geomagnetic and meteorological factors. Developed and nervous disorders, which are manifested by a bad mood, periods of unreasonable longing, unwillingness to get out of bed, reduced efficiency, noticeably reduced concentration of attention.

The absence of natural light causes various disorders in plants. Plants need sunlight for growth in a quantitative and qualitative sense. It is not so much in the northern latitudes, and traditional lamps in hothouse farms can not replace it.

- The limited spectrum of light radiation does not allow to grow high-grade plants with their rich content of useful substances, organoleptic and chemical indices are worse than those grown under the Sun.
- with the time of operation, the spectrum of the radiated light is shifted to the red side and the plants do not receive a sufficient spectrum of radiation.

-High power consumption.

As a result of traditional methods of growing plants in greenhouses, we have a high production cost and low organoleptic and chemical indices of production.

Vision is the leading sensory system for most vertebrates. With illumination, many important behavioral reactions are associated, such as avoiding a predator and capturing prey, the diurnal rhythm of feeding, spawning. As research has shown, the reaction to light of various species of fish is one of the first, which indicates the great importance of this factor in their lives. Light plays the role of a signal factor when air is filled with a swimming bubble of larvae, determining the direction of movement to the water surface. When growing various species of fish, one of the important factors affecting the growth and development of fish is light. The reaction of many fish to light varies depending on the intensity of illumination, photoperiodism, its spectral composition, and also their type and age.

The same problems can be observed in all species of animals.

Trying to create a light close to sunlight, we have come a long way. Initially, they began experiments with their own two-spectral luminaires (blue and red), but their application did not give the desired result, because, contrary to the existing opinion, plants need the average component of the spectrum, too. It is the yellow-green part that activates the photoreceptors in the plant, allowing more complete use of the extreme spectral components. Therefore, we began to conduct experiments on the creation of a full spectrum of RGB LEDs, later, a spectrum of luminaires, was created due to 12 groups of monochrome LEDs. The latter option produced more or less acceptable results, but the power consumption began to approach the consumption of electricity by lamps of sodium and mercury lamps, and the cost of such luminaires was quite high, which made their application not cost-effective.

Therefore, we have come a long way towards creating polymers that allowed us to lift the middle part of the spectrum without large losses of light flux.

4.2. Consumer problem and proposed solution

For the qualitative existence of man, at the present time, there are many problems, one of the main ones:

1. Lack and high cost of energy resources. The energy crisis has affected everyone. The high and constantly rising cost of electricity forces us to look for ways to reduce costs in all areas of human activity. One way to save energy resources are LED lights. With their introduction into any sphere of life, we can help to save electric energy by 2-10 times, and the correct light radiation will help to save health.

2. Getting enough quality and inexpensive food. In 2018, according to statistics, about 100 million children in the world under the age of 5 can not develop normally due to lack of proper nutrition. Statistics of the hungry shows that every year, from a shortage of food, about 2.5 million babies die.

3. Areas that are suitable for growing foods are reduced. According to the world's leading scientists, in the coming decades, humanity will face global problems related to food security, environmental protection and conservation of natural resources. The need to provide the population with food today is becoming an urgent problem. It is the need for food for the growing world population that threatens its natural resources - soil, water and climate. One of the reasons for the depletion of the resources of the planet is modern agriculture - man seeks to get even more from the land, and so under severe influence. In this case, the intensification of agriculture will be a necessary means to cover the food needs of the world's population, and the most

catastrophic in its consequences for all life on Earth. The damage from these actions will be enormous and it can really be compared with the consequences of a global catastrophe: we are facing water shortages, loss of acreage due to soil erosion, degradation, salinization and desertification of lands, forest loss, threats to species biodiversity and the existence of humankind itself. In addition, this situation will worsen due to the potential impact of global warming and climate change on a global scale.

4. Disappearance of commercial fish species. Industrial fishing cleared the World Ocean from a giant blue marlin to a large bluefin tuna, and from tropical sea bass to cod of Antarctica. Now there is not a single virgin area of the planet's water spaces. According to scientists, over the past decades, 38% of commercial marine fauna have been on the verge of total depletion. By 2048, this figure can increase to 90%, making fishing unprofitable. The problem of reducing world fish stocks becomes even more urgent in the light of the fact that the disappearance of fish and shellfish inevitably leads to the death of larger marine animals and, as a result, the destruction of the ocean ecosystem.

In such a difficult time, we want to make our own contribution - to introduce our technologies in an attempt to conserve natural resources and feed humanity.

4.3. Business model

4.3.1. Target Consumers

Our technologies are designed to solve a very wide range of problems.

" Human" Group *5

Climatic extremality for the living conditions of the population in extreme cold conditions creates a number of factors, one of which is the lack or complete absence (polar night) of sunlight in winter. The period of ultraviolet twilight lasts most of the year. Due to the constant strong wind and snowstorms, in the winter period, air ionization reaches anomalously high values. In this climate, cosmic radiation is slightly increased, magnetic storms, auroras often occur, which introduces a special distinction in the effects of acclimatization. Full ultraviolet night lasts 3-4 months. Therefore, adults in the arctic and subarctic zone suffer from ultraviolet insufficiency, except in cases when, in a very short time, in a very short time, a sufficient dose of direct and diffuse ultraviolet irradiation is obtained in a very short time.

The existence of man in climatic conditions of high latitudes is characterized by certain features. The most severe inhibitory effect on the growth of children has a severe climate in the first year after birth. As a rule, this is due to a lack of vitamin D3 growth, as well as other vitamins of group C and D, P, B2 and PP, necessary for the functioning of metabolic redox processes. The vitamin and immune-biological deficiency associated with it naturally affects the general resistance of the organism and is a predisposing factor to the emergence or deterioration of the course of the most diverse, including infectious diseases.

But not only this category of people is subject to problems associated with lack of sunlight. These include people who work for a long time in the metro, mines, production workshops, military facilities, schools, kindergartens and the entire population in high latitudes. In the production process, such lighting reduces the attention of the personnel to various important details, causes fatigue and drowsiness, worsens orientation and leads to occupational injuries and accidents, and productivity and quality of products decrease. Also, the visual adaptation affects performance, when the eyes from the constant transition of bright and faint light then narrows, then expand, this leads to rapid eye fatigue. Uneven lighting in working conditions leads to occupational diseases.

Group "Livestock" *2

One of the important directions of scientific provision of agricultural development is the development of effective production methods, which allow ensuring maximum productivity with minimum energy costs.

The growth and development of young animals are in a certain dependence on the level of natural and artificial illumination, the duration of its exposure to the body, the spectral composition of visible radiation. In livestock premises of specialized farms and complexes, in order to achieve maximum biological effect, it is necessary to correctly normalize the lighting, both in intensity and duration, especially when growing young animals.

Studies conducted in the United States have shown that the health, fertility, metabolism and productivity of animals have a multifaceted impact that can not be underestimated. Thus, according to American scientists, increasing the duration of daylight hours in the autumn-winter period led to an 8% increase in the milk productivity of lactating cows, an increase in feed intake by 6-8% due to greater animal activity. The increase in milk productivity is associated with an increased release of the autologous growth factor-1 (AFP-1) from the liver and a decrease in the melatonin concentration in the light period. Studies have shown a positive effect of different lighting regimes on milk yield of cows. Thus, the consideration of the interaction of stochastic and coherent light radiation and the biological system at all levels of the organization as a photobiological and thermodynamic process shows the significance of the radiation of the optical range in regulating the vital processes of the animal organism.

Group "Fishery" *1

With illumination, in fish, many important behavioral reactions are associated, such as avoiding the predator and capturing prey, the daily rhythm of feeding, spawning. As research has shown, the reaction to light of various species of fish is one of the first, which indicates the great importance of this factor in their lives. When growing various species of fish, one of the important factors affecting the growth and development of fish is light. The reaction of many fish varies depending on the intensity of illumination, photoperiodism, and its spectral composition.

Light acts on the central nervous system through the organ of vision, and then the central nervous system affects the function of the pituitary gland, which in turn affects the function of the sex glands. The sexual periodicity of fishes is regulated by one of the external factors - light, and also internal - by the action of the pituitary gland, which is a "transformer" of light.

It is established that the conditions of illumination are one of the important factors affecting the efficiency of fish larval growth, as well as their further development.

Group "Poultry farming" *3

To the conditions necessary for increasing the productivity of poultry, specific measures for their implementation are being developed. These measures are aimed primarily at creating favorable environmental factors that ensure the optimization of conditions, and, consequently, improving the productive qualities of the poultry. It is established that the duration of illumination has a very tangible effect on the nature of the biological processes of increasing the live weight of broiler chickens and their further productivity.

Group "Greenhouses" *4

The absence of natural light causes various disorders in humans and animals, the same happens in plants. Plants need light for growth in a quantitative and qualitative sense. Due to the global energy crisis, production of products in greenhouses using traditional lighting sources (fluorescent lamps, DNaT, DRL) becomes very expensive, and the quality of the produced products differs significantly from plants grown in under the sun.

To lacks of illumination by sodium lamps it is possible to carry

- high power consumption.

- strong heating of working lamps

- the filler for these lamps is a mixture of sodium and mercury. Having smashed the lamp by carelessness, it is necessary to say goodbye to the whole harvest. Requires recycling costs.

- The parameters of the luminaires depend on the supply voltage, they are not recommended to operate if the voltage fluctuations in the network differ from the rated voltage by more than 10%.
- The limited spectrum of light radiation does not allow to grow high-grade plants with their rich content of useful substances, organoleptic and chemical indices are worse than those grown under the Sun.
- with the time of operation, the spectrum of the emitted light is shifted to the red side and the plants do not receive the desired emission spectrum.
- High power consumption.

As a result of traditional methods of growing plants in greenhouses, we have a high production cost and low organoleptic and chemical indices of production.

4.3.2. Problems

Human.

According to the latest data, around 300 million people suffer from visual impairment worldwide, of which 19 million are children! Another 40 million do not see at all. Separately in Russia, statistics are even more terrible: a drop in sight is observed in every second inhabitant of our country, including children. So, with myopia in the first class comes already 5% of children, by the eleventh class they are 25-30%, and by the end of the institute, already 50-70%.

The tendency to deterioration of vision is associated with a sharp increase in the visual load in recent years. According to experts, the reason lies in the large-scale development of modern technologies and old lighting technologies. The person is constantly in the room. Of course, this leads to constant overstrain and fatigue in the eyes.

Livestock and poultry farming

Animal husbandry is an integral part of the economy in the world. To date, this industry is incredibly promising, subject to gradual modernization, the introduction of fully or partially mechanized equipment, and hence - to reduce the unit cost of production. The most serious problem of animal husbandry is the ecological safety of the products. This applies, first of all, to food production. As already mentioned above, food products should be safe for humans, and for this the manufacturer must comply with all the environmental conditions for their animals.

First of all, this applies to feed, which must be grown without the use of aggressive chemistry. Also, animals should not be exposed to antibiotics and hormones that are prescribed for the prevention of viral diseases and growth stimulation. The cultivation process should be natural, and the amount of antibiotics should not exceed the permitted level.

Pisciculture

The main problem of the growth in the production of fish farming products is mainly due not to the increase in the efficiency of the hatcheries, but to the increase in the volume of fish production.

Today we can emphasize the following problems that occur in the fish-breeding industry:

- Reduction of the volume of natural reproduction of fish, which is caused by a decrease in spawning areas, the expansion of uncontrolled and irrational fishing, and environmental pollution;
- Lack of financial resources. Large companies refuse to invest in the industry due to the fact that fish farming requires large financial investments with long-term payback (more than 5 years);

Greenhouses

For a person's full life, the realization of his physical and mental abilities, first of all, high-quality food, clean air and water, i.e., a favorable ecological situation, are needed. Problems of environmental safety affect everyone, regardless of wealth and poverty. The struggle for the purity of the environment stands on the same level as the struggle for a world free of nuclear weapons on the planet. American scientists have calculated that only a 50% reduction in air pollution in industrial cities in the US will extend the average life expectancy of people by 3-5 years, and the death rate for villages will decrease by 4-5%. Growing organic food under the open sky is becoming impossible. Only greenhouses can partially give us relatively safe products and not only one crop a year, and throughout the year.

4.3.3. Consumer value

The consumer value of using LED light lies in the fact that they will allow a person to maintain their health, improve the quality of life, get rid of depression. The correct lighting system is a tonic effect, it has a beneficial effect on the human physiological system and its performance. In work, correct light will reduce the number of accidents at work, reduce the number of poor-quality and defective products, improve overall working conditions and productivity. In pre-school institutions, schools and institutes will allow to increase attention, focus on learning and actively participate in the educational process.

Livestock raising - to increase milk yields, meat count, to accelerate the growth of young cattle, to double the shelf life of chilled meat.

Pisciculture – accelerate the growth of fish, and improve its consumer qualities. To solve the problems of qualitative increase in the level of productivity of fish farms, stabilization of environmental conditions.

Poultry farming – increase poultry slaughter weight and egg quality in egg-laying breeds.

Greenhouses – reduce energy consumption and accelerate plant growth.

There are many other applications of luminaires with a full solar spectrum and they consist in the possibility of manipulating the composition of polymers and lighting control systems to simulate the spectra of the Sun at any time, time of year and even the time of the Earth's development.

The sun shines always the same, including in winter and summer, except for activity and recessions. Depending on the thickness and composition of the atmosphere, the intensity of the radiation changes in a short range, so in the morning and in the evening the sun's ray travels a longer path in which the shortwave band (ultraviolet and blue part of the visible spectrum) is scattered. Therefore, the sun at sunrise and sunset is more red, and in the daytime, closer to the equator, white. Knowing the composition of the atmosphere, its thickness and the processes taking place on Earth millions of years ago, it is possible to calculate, fabricate and simulate the light that our planet was illuminated at that time. It is possible to simulate light by stimulating the growth of various plants, helping them to acquire certain substances in their composition.

4.3.4. Re-equipment costs and average economic effect

The cost of equipping the premises occupied by a person is higher by 10% of the currently installed LED lamps and lamps, but the economic and health-improving effect is incommensurably higher.

The costs for re-equipment of farms on average are from 60 to 150 euros per 1 m2 of re-equipped area.

Type of farm	Average costs per 1 m2 Eur	Guarantee period of service of fixtures years	Average energy savings%	Average increase in production %
Livestock raising	60	5	75	20
Pisciculture	85	5	65	25
Poultry farming	40	5	50	20
Greenhouses	90	5	80	30

Table 1. Costs for re-equipment and average economic effect

4.3.5. Chain of creation of the final product

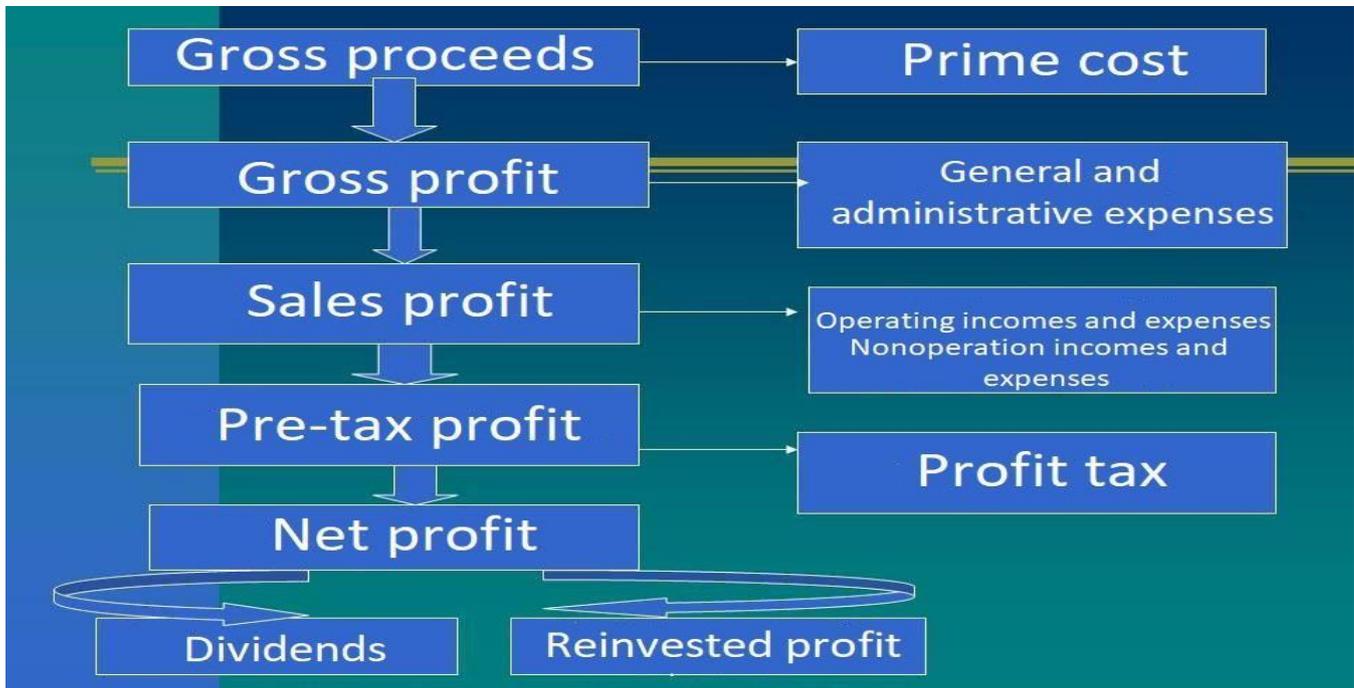
At this point in time, the end product chain is dispersed between the LT groups and the component suppliers in such a way that the production of high technology products and technologies remains within the Company. All operations for the production and application of heat conducting materials, light-converting polymers, machining and complete assembly are carried out on the territory and by the forces of our Company. Thus, with a minimum capital intensity, maximum flexibility is provided in the design and manufacture of lighting equipment and control systems.

Figure 3. Production chain

4.3.6. Profit-generating model

At the stage of entering the EU market, the profit model is based on low production costs, allowing it to set a maximum price of 50% higher than the material cost. This level of prices will make it possible to recoup investment and access to the market. In the future, the business profit model can be built on the growth of sales volumes (at the same production capacity), combined with a reduction in the cost of sales.

Profit distribution model



4.3.7. Competitive strategy

With regard to our Product, we propose to combine 2 types of competitive strategy - "Leadership in costs" and "Product differentiation". "Leadership in costs" provides the company with access to cheap raw materials, uses unique equipment and advanced technologies. All these factors allow to reduce the cost price. The focus is on reducing costs. "Product differentiation" is aimed at the production of special products for consumers, who make specific demands and are willing to pay for uniqueness. In this case, the cost price rises, and the price, respectively, too. It is this strategy that will determine the rapid and non-competitive advantage of promotion in the market.

4.3.8. Growth strategy

We offer three types of strategy for development:

- Strategy of intensive growth,

It is aimed at expanding operations, increasing market share, increasing sales, and increasing profits.

The objectives of this strategy concern such indicators as sales volumes, market share, profit and firm sizes.

- Development of primary demand

Effects on global demand are being made to increase the size of the market. This is achieved by: attracting new users to the product; motivating buyers to more frequent use of the goods; motivating consumers to consume more one-time consumption; detection of new uses.

- Territorial expansion.

Implemented in other regions of the country by: supplying goods to other markets through local agents and trading firms; creation of a distribution network from exclusive distributors

4.3.9. Intellectual property

The main object of commercialization of the project is heat-conducting and polymeric materials for heat removal and conversion of light radiation. This object of commercialization is in the stage of final research and testing. Compositions of polymers, their production technologies, methods of applying and bringing them to the working state are protected, decorated and protected in a know-how mode. In the future, it is planned to protect only general parameters by the patent.

The main methods of protection of trade secrets established in the Company are:

- a list of know-how is defined;
- established the procedure for handling know-how and monitoring its compliance;
- Employees who have access to know-how are considered;
- Agreements were concluded on the preservation of trade secrets with all employees who have access to the production and application of polymers;
- the stamp "Commercial secret" is indicated with indication of the holder of such information;
- the purchase of reagents, for the manufacture of polymer, is carried out on unrelated factories to a legal entity that is not affiliated with our Company;
- Polymers are manufactured outside the Company's location in separately leased areas. At the work site, the polymer comes in the form of a ready-made substance with a lifetime of no more than a day;
- Key information on the formulations and technologies is stored in the banking cell;
- The company does not intend to issue a license for the production and use of polymer.

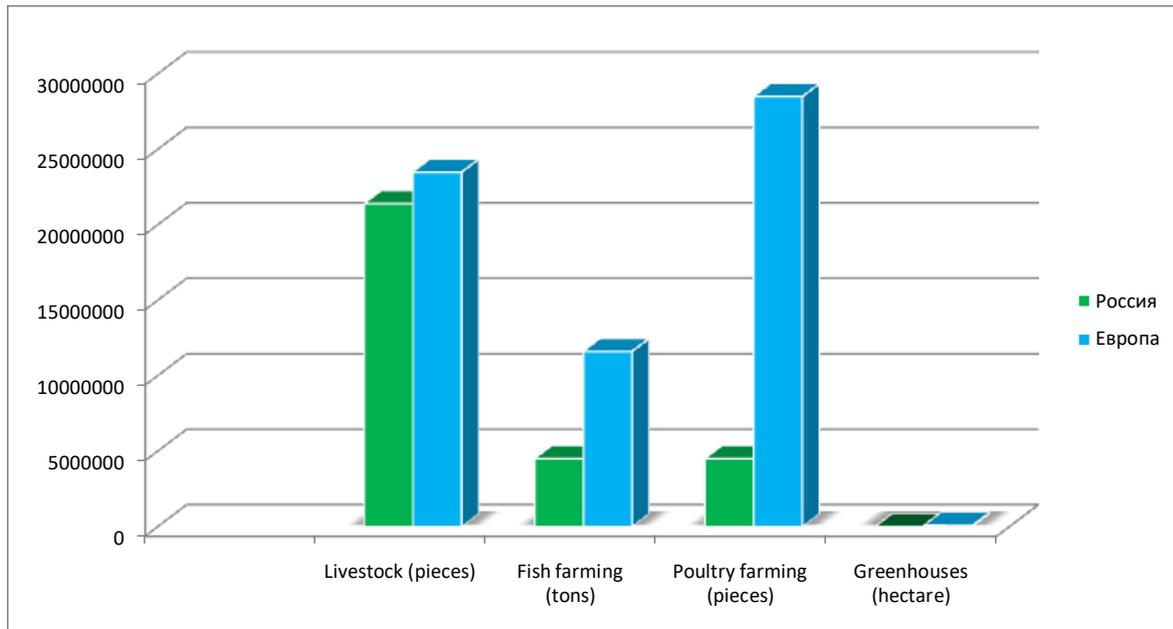
5. Analysis of the sales market of the countries of the European Union and Russia

The market was analyzed for five target categories of application of LED light fixtures

Table 2. Volumes of commodity markets by categories

	Categories	Europe	Russia
	Population, (people)	675 520 040	146 100 000
	Livestock (livestock)	23 500 000	21 400 000
	Fish farming (volume of fish production) tons.	11 614 000	4 500 000
	Bird (pieces)	28 500 000	4 500 000
	Greenhouses, hectares of land	94 000	2 600

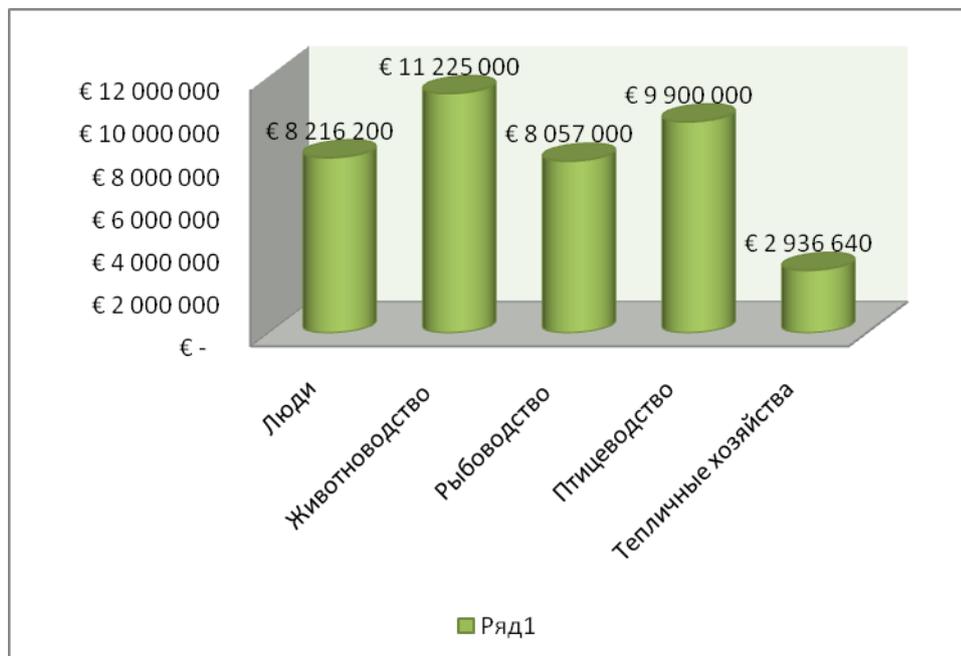
Figure 4. Diagrams of agricultural indicators by sales markets



5.1. Available market capacity

Potential capacity of the market of the European Union and Russia

Calculations Market capacity was estimated at 0.1% of potential buyers of the total volume per year.



6 Tendencies of the world market for research and creation of similar materials

For a long time already work has been done to find and create similar solutions for creating lamps that repeat sunlight. Many Companies are moving along the way of mixing the colors of several LEDs, but we have passed this way and it has been recognized as a dead-end. In 2016, Toshiba tried to create a phosphor for LEDs, but this attempt was unsuccessful. The luminous flux decreased 3 times and in order to achieve an acceptable level of illumination it was necessary to increase the energy consumption of the LED by 3 times, which made it not profitable.

7. Competition

7.1. Phyto of the LNaT lamp

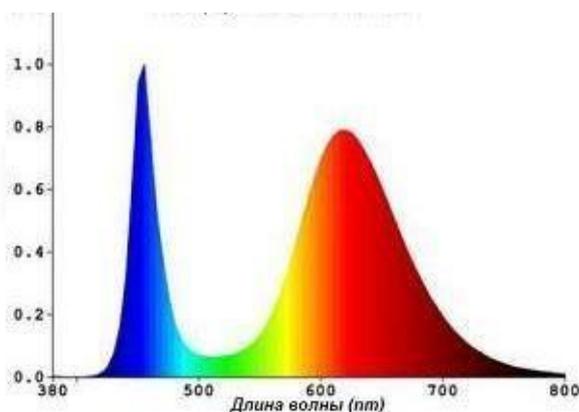
Problems and disadvantages of traditional sources of artificial light

- high power consumption.
- strong heating of working lamps
- the filler for these lamps is a mixture of sodium and mercury. If moisture gets on the operating lamp, they are destroyed, which leads to mercury entering the illuminated surface. Having smashed the lamp by carelessness, it is necessary to say goodbye to the whole harvest. Requires recycling costs.
- the parameters of the luminaires depend on the supply voltage, they are not recommended to operate if the voltage fluctuations in the network differ from the rated voltage by more than 10%.
- The limited spectrum of light radiation does not allow to grow high-grade plants with their rich content of useful substances, organoleptic and chemical indices are worse than those grown under the Sun.
- with the time of operation, the spectrum of the emitted light is shifted to the red side and the plants do not receive the desired emission spectrum.
- High power consumption.
- are sensitive to vibration;

As a result of traditional methods of growing plants in greenhouses, we have a high production cost and low organoleptic and chemical indices of production.

7.2. Two-spectral lamps

In the market of LED lighting, luminaires for greenhouses are used with two spectra (red and blue), emitting light in two bands with peaks at 460 and 660 nm.



They do not meet the requirements of agronomists for a number of reasons. One of the main ones is a very narrow radiation spectrum. Therefore, such phytoscultors can only be used for plant illumination.

Plants grow, bloom and bear fruit through the process of photosynthesis. In this process, two main components are involved - chlorophyll of group A and B and carotenoids. They perceive the colors of the full spectrum, and not the cut-off area. Such radiation is easy to obtain by mixing light of 2 LEDs, but this is not enough.

7.3. Potential competitors in the future

In the near future, until 2025, the appearance of competitors in this direction is possible, but unlikely. In 2015, Toshiba announced full-spectrum LEDs, but according to the results of their work they showed a low efficiency, that the released batches remained prototypes, and so far nothing of the kind appeared on the market.

7.4. Access to markets

Access of light-emitting products to the market of any country (including Russia) is carried out in several stages: the stage of development and production, the stage of testing and certification of products. Then the product gets the right to appeal and gets to the market, where it competes for the budgets of customers. Already at the certification stage, the manufacturing company begins to actively fight for the inclusion of technology in the lists that open the possibility of public procurement and recommended for use.

8. Production plan

8.1. General Provisions

In paragraph 4.3.5. The integrated chain of creation of an end-product of manufacture of unique light-emitting diode fixtures is presented. At the first stage, a similar production infrastructure will be created with the maximum possibility of localization of suppliers of component parts from the EU countries. The very production of science-intensive products will remain within the Company. All operations for the production and application of heat conducting materials, light-converting polymers, machining and complete assembly were carried out on the territory and by the forces of our Company. Thus, with minimal capital intensity, maximum flexibility will be provided in the design and manufacture of lighting equipment and control systems.

The production is designed in accordance with the standard ISO 9001. In accordance with the requirements of the standard, a staff member is responsible for the quality of the products in the company's staff. Documented procedures of the quality management system.

8.2. Time of passing the production lot and maximum production capacity

According to our experience, 30 calendar days are required for the delivery of components.

Machining, plumbing, and assembly require 1 day per lot of fixtures from 100 to 300 pieces. Thus, a working staff of 7 people, for a month, can collect 6000 fixtures on an area of 600 m². In the presence of the necessary quantity of warehouse balances of the component parts, it is possible to arrange rhythmic deliveries under the Agreements within a period of up to 14 days.

8.3. Production infrastructure and production personnel

To organize the serial production of LED # 3 with a capacity of 6 thousand units. a month is planned to create in the EU a plant for manufacturing polymers and heat conducting materials, machining casings and radiators and finishing assembly of fixtures.

Table 3. Production infrastructure

	Plots and rooms	Equipment
	The area of input and output inspection	Working tables 3000 * 1000 PC Measuring tool Measuring instruments Printer
	Warehouse of components and finished products	Shelvings Desktop
	Blank plot	Tables of length 3000 * 1000
	Machining section	Band Saw Machine Radial Drilling Machine Bench drilling machine Desktop lathe CNC milling machine with table size 1500 * 1500 Grinding machine Emery Workbenches PC Measuring and working tools Adaptations Chairs
	Locksmith site	Workbenches Bench tools Adaptations Chairs
	Assembly site	Assembly radio assembly tables Assembly tool Bench tools Tables for assembling 3000 * 1000 Mobile tables (on wheels) Chairs
	Packing section	Packing Tables Transporting mechanisms Adaptations and tools for packaging
	Laboratory	Testing tables Monitoring and measuring devices Equipment for the preparation and application of heat conducting materials and polymers PC Printer
	Administrative premises	Tables Chairs PC Office equipment
0	domestic premises	Household equipment Tables Cabinets

Table 4. Technological partners

Name	Components	Country
Josef Dressehufus GmbH & Co.Kg	Screws	Germany
Herford Germany		
Ferreteria Chamartin	Bolts, washers, nuts	Spain
Reka cables	Cable and wire	Finland
Ledil OY	Secondary optics	Finland
Osram	Power supplies	Germany
MeanWell	Power supplies	Taiwan
CREE	LED chips	USA
Innovative polymers	LT group	Russia
Heat conducting materials		
Case		
Heat sink		
Machining and bench work		
Assembly and packaging		

Table 5. Production and technical staff units

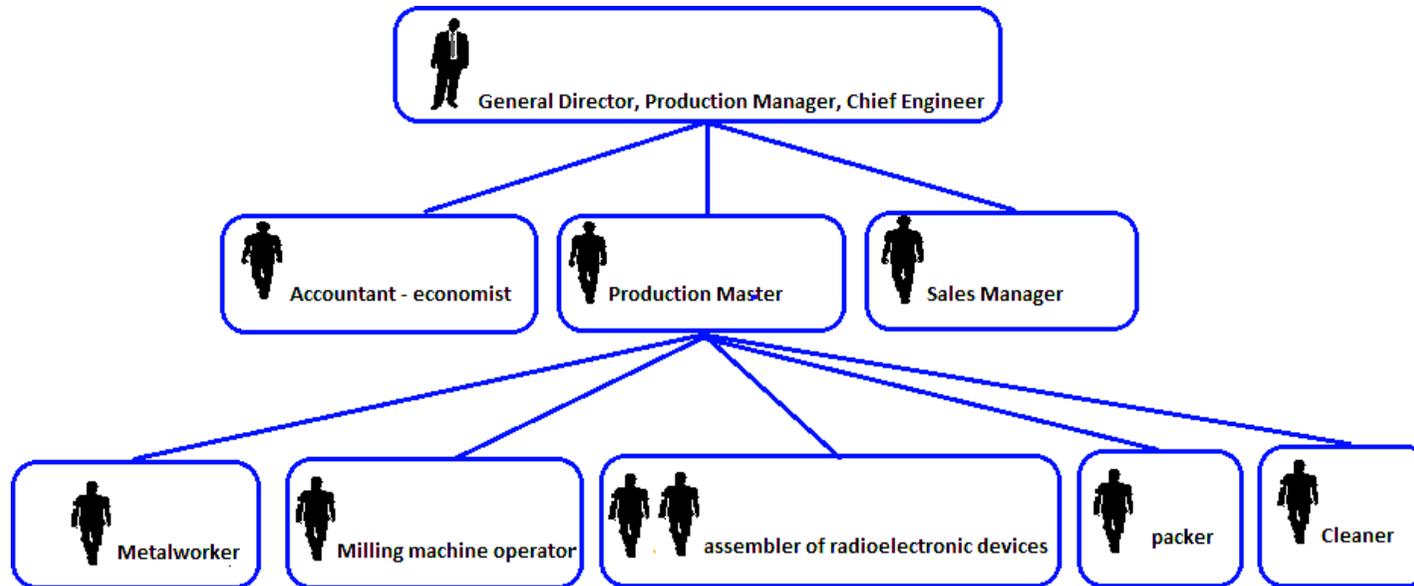
№	Established unit	Responsibilities
1	General Director, Production Manager, Chief Engineer	<ul style="list-style-type: none"> • Manages the Company; • Acting as Chief Technologist; responsible for the conformity of the technological process with the requirements of internal and external regulatory documentation; • provides training and certification of workers involved in the production process; • selects and manages relations with technology partners. • Responsible for the compliance of the infrastructure and the production environment with the requirements of internal and external regulatory documents (labor protection, fire safety, electrical safety, ecology, technical supervision); • Interacts with supervisory and inspection bodies of the relevant field; • Accepts, distributes and is responsible for the implementation of the annual production plan and compliance with the production budget • Responsible person for safety in the workplace
2	Accountant-economist	<ul style="list-style-type: none"> • Carries out accounting and makes economic calculations
3	Sales Manager	<ul style="list-style-type: none"> • Carries out activity on sales of production, creation and functioning of a dealer network
4	Change Master	<ul style="list-style-type: none"> • Coordinates the work of all employees involved in manufacturing the lot; • Forms a batch (on the basis of the production task, calculates the composition and size of batches, schedules their launch into production, draws out routing sheets); • Material and responsible person in WIP warehouses; • Carries out delivery of finished goods for acceptance tests • Carries out support and control of technology execution in the production process; • Provides input control of components and final inspection of finished products
5	Metalworker	<ul style="list-style-type: none"> • Carries out adjustment of the process equipment;

		<ul style="list-style-type: none"> • Produces mechanical and metalworking of products;
6	Assembler of radioelectronic devices	<ul style="list-style-type: none"> • Build the luminaires and check
7	Packer	<ul style="list-style-type: none"> • Marking and packaging of products
8	Cleaner	<ul style="list-style-type: none"> • Clean rooms, keep cleanliness at work; • Helps label and pack finished products

All of the above workers' work units must be interchangeable and will be combined.

8.4. Structure of the unit.

That is how the structure in the "LT groups" is now built.



To increase the volume of products will need to organize work on the second shift. This will give 70% increase in output in the same occupied areas.

9. Financial parameters of the Project

Capital requirement:

1. Division for the production of luminaires with a full solar spectrum - 7,200,000 Euro.
 2. Division for the production of graphene and innovative materials containing graphene – 8,500,000 Euro.
- Total investment funds required – 15,700,000 Euro.

Distribution of shares in the Company: 30% to investor, 70% to the initiator of the Project.

- rentability on investment -49%,
- internal rate of rentability, IRR, 699%,
- Pay-Back Period: PBP = 32month
- The average projected profit for 5 years -22 360 000 Euros.

Payback of the project is 36 months.

Investments are placed for 5 years.

We offer the investor 2% per annum for the use of investments, 30% participation in the profit of the Company and after exiting the Project - an investment premium.

10. Sensitivity of the Project

The maximum deviation of the parameters is 50%

This table shows the sensitivity of the Project, which shows the degree of risk, depending on the changes in parameters and the financial strength of the Project. The maximum deviations of the parameters are taken as 50% in increments of 5%. Financial risks come at a 50% reduction in product prices.

Dependence of NPV on deviation of parameters	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%
Decrease in sales volume	1 140 353	1 018 681	914 595	810 396	706 169	601 919	497 668	393 107	287 188	181 167
Reduction of the price of products / services	1 128 533	993 676	876 826	757 766	637 210	513 823	385 187	243 325	99 935	-43 455
Increase in direct costs	1 207 028	1 159 882	1 106 850	1 053 090	998 490	942 919	885 313	826 419	767 168	706 048
Increase in fixed costs	1 245 025	1 244 810	1 244 596	1 244 381	1 244 166	1 243 952	1 243 737	1 243 523	1 243 308	1 243 093
Increase in capital expenditures	1 212 557	1 161 364	1 129 224	1 097 083	1 064 943	1 032 802	1 000 662	968 522	936 381	904 241
Increase in interest rate	1 240 910	1 236 579	1 232 249	1 227 919	1 223 589	1 219 259	1 214 686	1 210 074	1 205 462	1 200 850

Minimum account balances	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%
Decrease in sales volume	1 945 067	1 926 276	1 842 683	1 758 920	1 675 156	1 591 392	1 507 628	1 423 414	1 337 065	1 250 619
Reduction of the price of products / services	1 945 768	1 923 744	1 838 452	1 749 398	1 657 753	1 560 665	1 452 424	1 336 858	1 221 292	1 105 726
Increase in direct costs	1 948 804	1 949 303	1 949 303	1 949 303	1 949 303	1 949 303	1 949 303	1 949 303	1 949 303	1 949 303
Increase in fixed costs	1 947 970	1 947 954	1 947 939	1 947 924	1 947 909	1 947 894	1 947 879	1 947 864	1 947 849	1 947 834
Increase in capital expenditures	1 916 600	1 885 093	1 853 054	1 821 015	1 788 977	1 756 938	1 724 899	1 692 860	1 660 822	1 628 783
Increase in interest rate	1 947 406	1 946 827	1 946 249	1 945 670	1 945 091	1 944 513	1 943 747	1 942 953	1 942 159	1 941 365

18. Project risks

18.1 Identification and risk assessment

Risk factors	Probability	Seriousness	Risk	
Uncontrolled risks				
Changes in legislation (ИЗ)	• Legislative ban on the sale of LED lighting fixtures	1	3	ИЗ 1
Currency risks	• Significant growth of exchange rates (BP)	2	2	BP 1
Deteriorating economic environment (EE) • A significant drop in effective demand	• Stopping the activity of technological partners	2	3	ЭО 1
		2	2	ЭО 2
The worsening of the political situation (ПО)	• The deterioration of relations with all countries where it is planned to sell products	2	3	ПО 1
Controlled risks				
Production (ПП)	• High percentage of marriage	2	2	ПП 1
	• Lagging performance of technology partners from the planned level	2	3	ПП 2
	• Failure of technological equipment.			
Financial (ФП)	• Shortage of current assets	3	3	ФП 1

Marketing (MP)	• Slow flow of customers;	3	3	MP 1
	• Low labor productivity;	3	2	MP 2
	• Discrediting the reputation of competitors;	3	3	MP 3
	• Customer dissatisfaction.	2	3	MP 4
Personnel risks (KP)	• Lack of qualified personnel;	3	2	KP 1
	• Dismissal of key employees	2	2	KP 2
Operational risks (OP)	• Leak of confidential information;	1	3	OP 1
	• Violations in the performance of business processes	2	2	OP 2

18.2. Scale for assessing the likelihood of a dangerous situation

Scale for assessing the likelihood of a dangerous situation		
	Name	Description
	Almost unbelievable	Less 1%
	Unlikely	~ 25%
	Enough is enough	~ 50%
	Probably	~ 75%
	Very likely	от 95%

18.3. Scale for assessing the severity of a dangerous situation

The severity of the dangerous risk (the severity of the dangerous situation, the harm)		
<i>а.н.</i>	Heaviness	Description
	Negligible	Almost does not affect the profitability of the project
	Minor	Affects the need for investment, but keeps the profitability of the project within the allowed values
	Significant	Can worsen the profitability of investments on the planned horizon
	Critical	Significantly increases the payback period of investments
	Catastrophic	Excludes in principle the opportunity to recoup investment

Probability estimation \ Seriousness	Seriousness				
	1	2	3	4	5
1			ИЗ 1, OP1		
2		BP1 , ЭО2, ПП1, KP2, OP2	ЭО 1, ПО1, ПП2, MP4		
3		MP 2, KP1	ФР 1, MP1, MP		
4					
5					

Risk matrix

The green zone is an acceptable insignificant risk; yellow zone - an acceptable risk, requiring increased attention; red zone - unacceptable risk (development of urgent measures for risk reduction).

The cells of the diagram are filled with the assignment of each dangerous situation to assess the likelihood of occurrence and possible harm. The identified hazards do not exceed the limits of the acceptable risk.

18.4. Risk Management Measures

Implemented preventive and corrective measures

Risk factors		Implemented preventive and corrective measures
Uncontrolled risks		
ИЗ 1	<ul style="list-style-type: none"> Legislative ban on the retail sale of implants; 	Since the risk is incredible, no measures are envisaged
BP 1	<ul style="list-style-type: none"> Significant growth in the exchange rate; 	<ul style="list-style-type: none"> Application of increased rates in financial planning; An increase in the selling price when the exchange rate is higher than the
ЭО 1 ЭО 2	<ul style="list-style-type: none"> Significant drop in effective demand; Stopping the activity of technology partners; 	<ul style="list-style-type: none"> Work on reducing the cost of production; Search of companies-doublers of suppliers of components; Search and selection of new potential contractors.
ПО 1	<ul style="list-style-type: none"> Deterioration of relations with all countries where products are planned to be sold; 	<ul style="list-style-type: none"> Search for new product markets Search for potential project buyers among individuals (brokers); Development of investment return scenarios without considering the possibility of selling the project to a strategic investor;
Controlled risks		
ПР 1 ПР 2 ПР 3	<ul style="list-style-type: none"> High percentage of marriage; Lagging performance of technology partners from the planned level; Failure of technological equipment. 	<ul style="list-style-type: none"> Implementation and maintenance of a QMS meeting the requirements of ISO 9001; Application of pessimistic norms of production planning; Search and selection of new potential contractors; Maintenance of preventive maintenance; Duplication of unique installations.
ФР 1	<ul style="list-style-type: none"> Shortage of working capital 	<ul style="list-style-type: none"> Work on attracting investments from all possible sources; Work on attracting grant funding;

MP 1	<ul style="list-style-type: none"> • Slow flow of customers; 	<ul style="list-style-type: none"> • Allocation of the preparatory phase in the development of the market, aimed at working out the main barriers when attracting customers; • Attraction of distributors;
MP 2	<ul style="list-style-type: none"> • Low labor productivity; 	<ul style="list-style-type: none"> • Training of workers in the courses of advanced training; • Introduction of mentoring;
MP 3	<ul style="list-style-type: none"> • Discrediting the reputation of competitors; 	<ul style="list-style-type: none"> • Support for further research, scientific publications;
MP 4	<ul style="list-style-type: none"> • Customer dissatisfaction. 	<ul style="list-style-type: none"> • Development of measures aimed at identifying possible problems and their elimination at the production stage
KP 1	<ul style="list-style-type: none"> • Lack of qualified personnel; • Dismissal of key employees 	<ul style="list-style-type: none"> • Organization of training and professional development of personnel; • Development of employee interchangeability; • Development and documentation of business processes at all stages, control over document management
OP 1	<ul style="list-style-type: none"> • Leak of confidential information; 	<ul style="list-style-type: none"> • Maintenance of the regime of commercial secrecy;
OP 2	<ul style="list-style-type: none"> • Violations in the performance of business-processes 	<ul style="list-style-type: none"> • Maintaining the QMS in working condition <p>13485</p>