

FOOD BANK PROJECT

UNIVERSAL MULTI INTEGRATED CLUSTERED
COMPLEXES "BIOSPHERE" FOR COST-
EFFECTIVE ECO-PURITY FOOD PRODUCTION
IN ALL CLIMATE ZONES

We offer a comprehensive solutions for launching joint venture production

The main advantages of this project:

1. Financially profitable:

Investments in this project give a fast and high income for a long time.

2. Social significance of the project:

Implementation of the project provides food security and saving energy resources in any climatic conditions. Solves the problem of greening hot and desert regions. The project develops jobs for the population of the region.

3. Innovative Technology:

The application of project technology, allows for rapid and efficient scaling of the project and production. Technology allows fast and efficient cultivation of necessary vegetation and animals in difficult climatic conditions.

Massive integration of agricultural technologies for food production and quality control

Unique integrated solutions to the food, environmental, pandemic and climate security of States and territories

The origins of scientific development:

Initial developments began on the initiative of the heads of Gov departments of fundamental research and strategic R&D of the Russian Federation back in early 1991.

As a result of many years of work, interrelated targeted large-scale projects were developed, technological and economic mechanisms for their implementation were worked out, industrial cooperation was formed, and new structural construction materials were prepared for mass production.

In total, about 2.5 thousand cross-industry specialists are working on the project.

The project has an integrating character and allows to multiply the profitability of agriculture.

Unique integrated solutions to the food, environmental, pandemic and climate security of States and territories

The origins of scientific development:

The scientific and technical basis of the "Biosphere" project is based on many years of fundamental research conducted at "Nature" laboratory of Kurchatov Institute, Institute of Medico-Biological Problems of RAS and ANO "State System Research Center". The following key deliverables were taken for the project:

- closed biosphere systems,
- glass packets with vacuum heat insulation,
- new materials from glass-crystalline granules,
- functional basalt-plastic insulators and basalt power elements.
- technology of volumetric-polarized light for increasing the photosynthetic efficiency of plants.

Unique integrated solutions to the food, environmental, pandemic and climate security of States and territories

The main goals:

Establishment of a multi-purpose infrastructure that provides food, demographic, energy, environmental, communications, social and financial security of the country:

- Integrated multipurpose agro-technoparks provide increasing the overall profitability of agricultural production by 6-8 times.
- Innovative facilities for long-term storage, sorting, packing of food.
- Reserve funds of food, and creation of a complete infrastructure of life-support systems for the population.
- Sustainable, self-sufficient, environmentally clean, energy-independent areas.

Food, demographic, energy, environmental, communication, social and financial security of the citizens

Approach for achieving the goals:

The project execution consist of following stages:

- Launching R&D laboratories - core supporting element of the project development;
- Launching production of clustered components such as construction materials, energy generation, food storages, disposal of waste products - core innovative components of the project execution;
- Building the scalable range of eco-food production modules as the master-prototypes - main project deliverables;
- Accelerated replication of self-supporting infrastructures for fast launching eco-food production on the other territories.

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Product lines of the typical industrial cluster:

The industrial cluster of the project consists of its own production of environmentally friendly backbone building materials of a new generation:

- Basalt roving and functional basalt plastics;
- Double-glazed windows with vacuum insulation;
- Basalt super-composite;
- Silica granite.

The use of these system-forming building materials makes it possible to achieve the specified indicators of strength, durability and quality of resource saving.

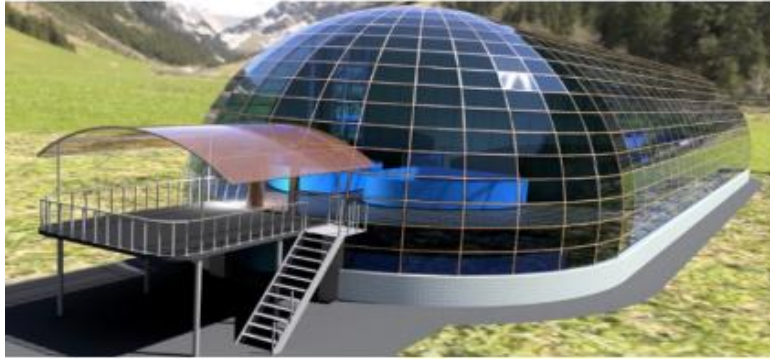
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Typical plants in industrial zone for production of:

- Continuous basalt fiber (BNV) with a modular capacity of 15 thousand tons per year for using in the following finish products:
 - wide range of composite products from basalt fiber;
 - thermal insulation materials from ultrathin basalt fiber.
- Double-glazed windows with vacuum insulation with a capacity of 240 thousand square meters per year.
- Glass-crystal foamed silica granules from perlite and zeolite with a capacity of up to 200,000 m³ of material per year with a density of 180 kg/m³;
- Components and equipment of "Biosphere" complexes for various purposes:
 - noosphere houses of various projects (30 pcs. per month),
 - "winter gardens" of various projects (30 pcs. per month),
 - aeroponic modules and hydroponic modules.

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Typical plants constructions in industrial zone:



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“Biosphere” – unique and advantages:

Realization of biospheric processes of the circulation of matter and energy flows and ensuring a continuous year-round process of reproduction of a wide range of biological resources:

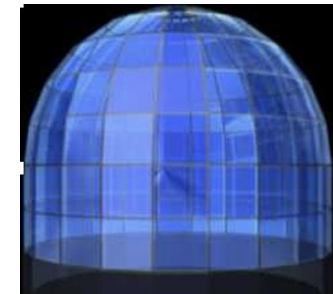
- forests,
- orchards,
- vineyards,
- animals,
- birds,
- fry,
- crustaceans,
- greens,
- valuable fish species,
- caviar,
- vegetable crops,
- flowers,
- genetically pure planting material,
- high-protein vitamin biomass and algae in closed biological and technical systems.

at the lowest possible cost of nutrients, energy and water.

modules and hydroponic modules

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Solution “**Biosphere - B**” (visualization):



Individual complexes "Biosphere" of basalt plastics and vacuum glass packs for growing higher plants give 6 to 12 crops per year

Production complex 1 - “Biosphere - B”:

“Biosphere – B” is intended for year-round aeroponic cultivation of fruits, vegetables, spicy herbs, plants

- **vegetables** (tomatoes, peppers, cucumbers, eggplant, greens, onion, etc.) - up to 9 harvests per year;
- **berries** (strawberries, raspberries, honeysuckle, etc.) - up to 6 harvests per year;
- **melons** (watermelons, melons, pumpkins (including biomass) - up to 3 harvests per year;
- **grapes** of all varieties - up to 3 harvests per year;

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Production complex 1 - “Biosphere - B”:



Food, demographic, energy, environmental, communication, social and financial security of the citizens

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- **medicinal plants** (zhen-shen, jinura, tea, essential oil crops, other medicinal plants up to tropical, tobacco) - up to 3 harvests per year;
- **garden crops**, year-round mass replication of planting material (peach, apple, plum, etc.) - up to 3 harvests per year;
- **cedars** (Lebanese, Manchurian, Siberian), **paulownia**, **linden**, **walnut**, **ash**, **beech**, **larch**, **velvet**, **sequoia**, etc. to restore the habitat; planting material of these crops grows at least 2 times faster;

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Production complex 1 - “Biosphere - B”:



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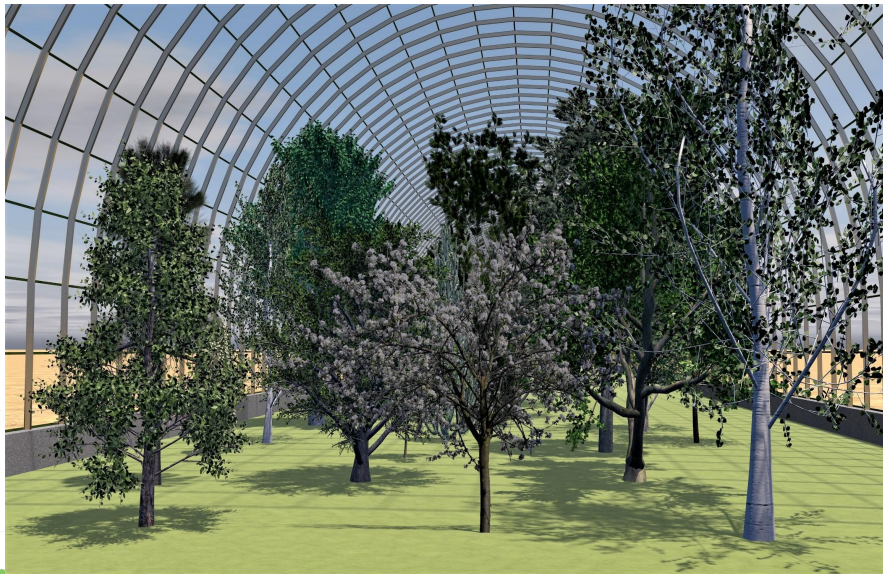
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- **oaks** (Belovezhsky, Chinese, etc.) for habitat restoration;
- **flower crops** (roses, lilies, asters, etc.) - up to 5 harvests per year;
- **olive, tropical** (mango, papaya, etc.), and exotic trees for growing under vacuum glass domes. These tree species grow 2-3 times faster before the fruit ripens and the yield is 3 times greater than these crops.

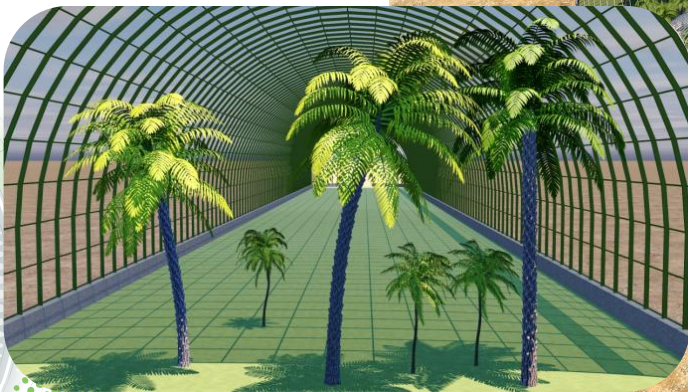
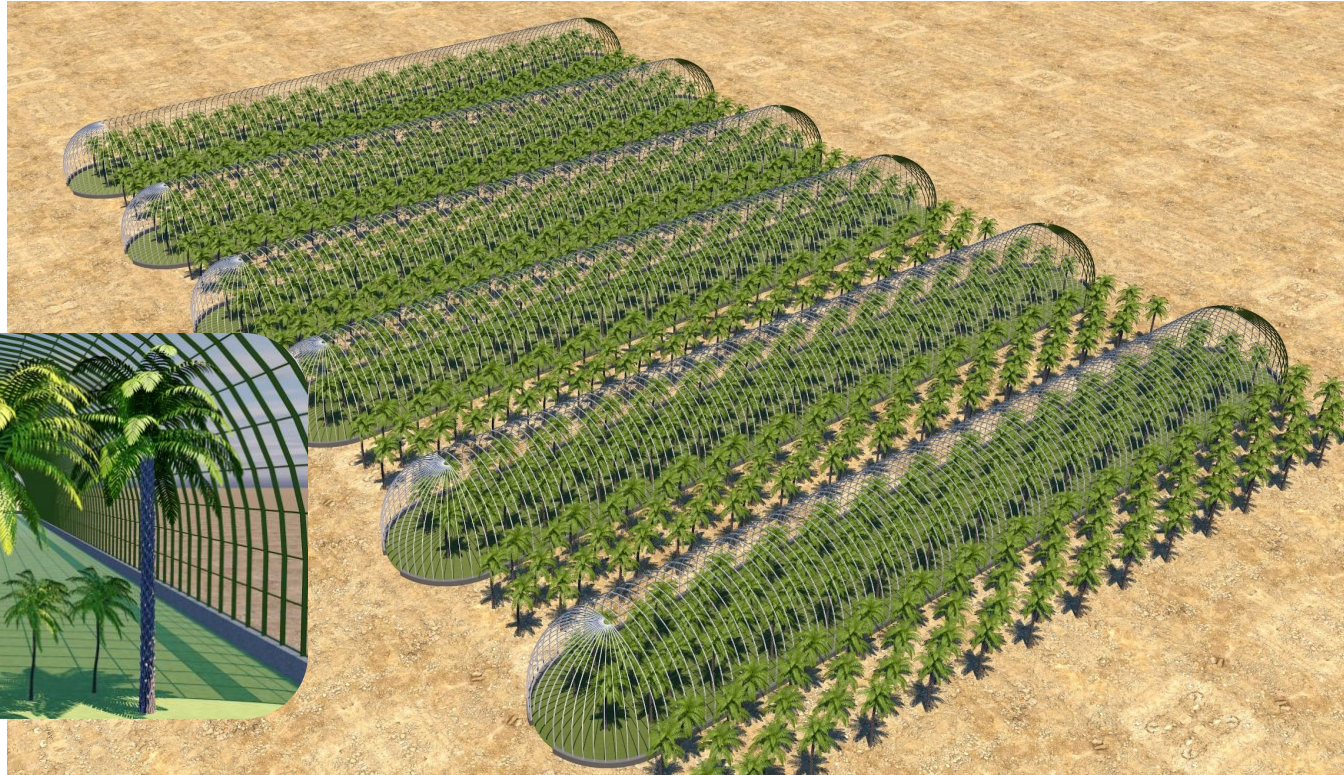
Food, demographic, energy, environmental, communication, social and financial security of the citizens

Production complex 1 - “Biosphere - B”:



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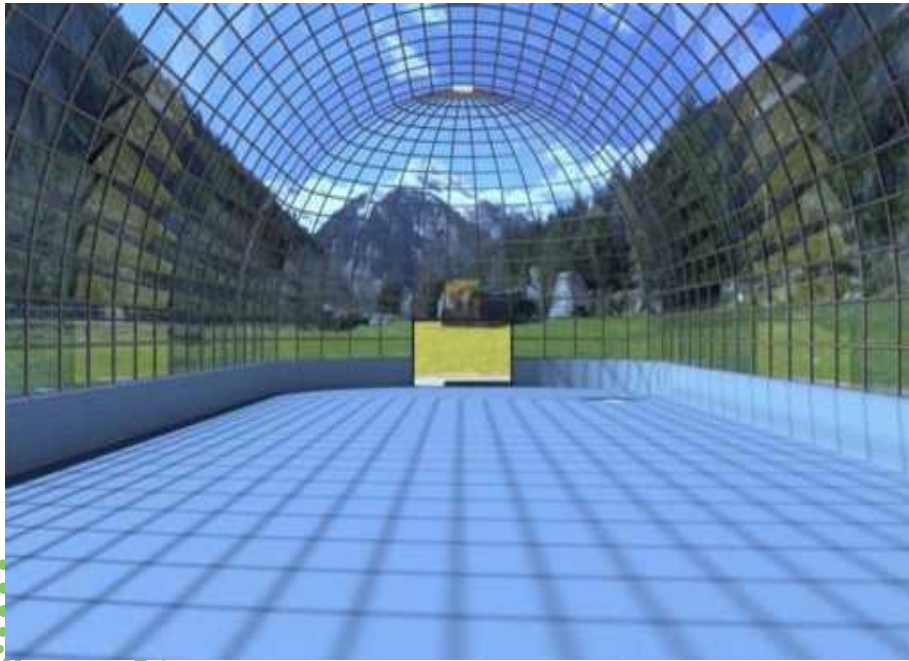
“Biosphere – B” is intended for year-round aeroponic cultivation of fruits, vegetables, spicy herbs, plants

- Seeds of vegetables, potato, flower, melon and grain seed production. One complex replaces 300 hectares of fertile land;
- Vitamin green feed from cereals for livestock, poultry, wild animals and other purposes - up to 9 harvests per year;
- Alfalfa, animal feed - 6 harvests all year round;
- Wheat crops - 3 harvests per year.

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Aeroponic modules "**Horizon**":

Visualization of Aeroponic module "Horizon" for year-round cultivation of plants:



Harvest from day 47 to 60 from seed

Project efficiency Aeroponic modules "Horizon":

1. The glazing area of a greenhouse of 50 meters by 18 meters and a height of 8 meters, with walls of aeroponics structures from 2 meters to 6 meters under the roof will be 1.800 m².
Such a greenhouse in 1 year will give 150 tons of any ecologically clean greens or vegetables without the use of pesticides and chemicals.
2. The water requirement for 1 year for this size of spherical greenhouse would be 1 rail tanker: 63 tons per year.
This is very small for growing 150 tons of eco-products.
3. For comparison, the project in Abu-Dhabi (<https://www.madarfarms.co/>) organized in 2017 plans to grow 30 tons of greenery on 1.500 m², which corresponds to 20kg of production per 1m² per year, using electric lights and high electricity consumption. The amount of water consumed by this project is not known.

Our project will grow 150 tons of finished product on 1.800 m², which corresponds to 83 kg green of product per 1m² per year. The difference is 4 times.

When growing low-growing tomatoes the yield depending on the variety is 10-12 crops the year, which gives **1m² of 250 to 300 kg.** products during the year.

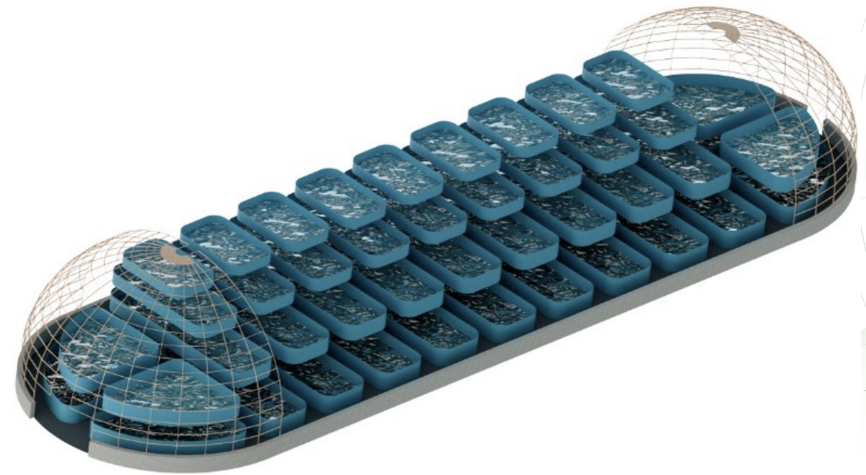
Harvest from day 47 to 60 from seed

Production complex "Fish" - "Biosphere - F":

"Biosphere – F" complex for year-round cultivation of valuable fish species

Complex in the version of recreating and rearing from the eggs of:

- Beluga,
- Kaluga,
- Lena Sturgeon,
- Baikal Sturgeon,
- Muksun,
- Omul,
- Valuable Salmonids,
- Trout, as well as crustaceans and shrimps.



Cultivation of fish in all climatic conditions

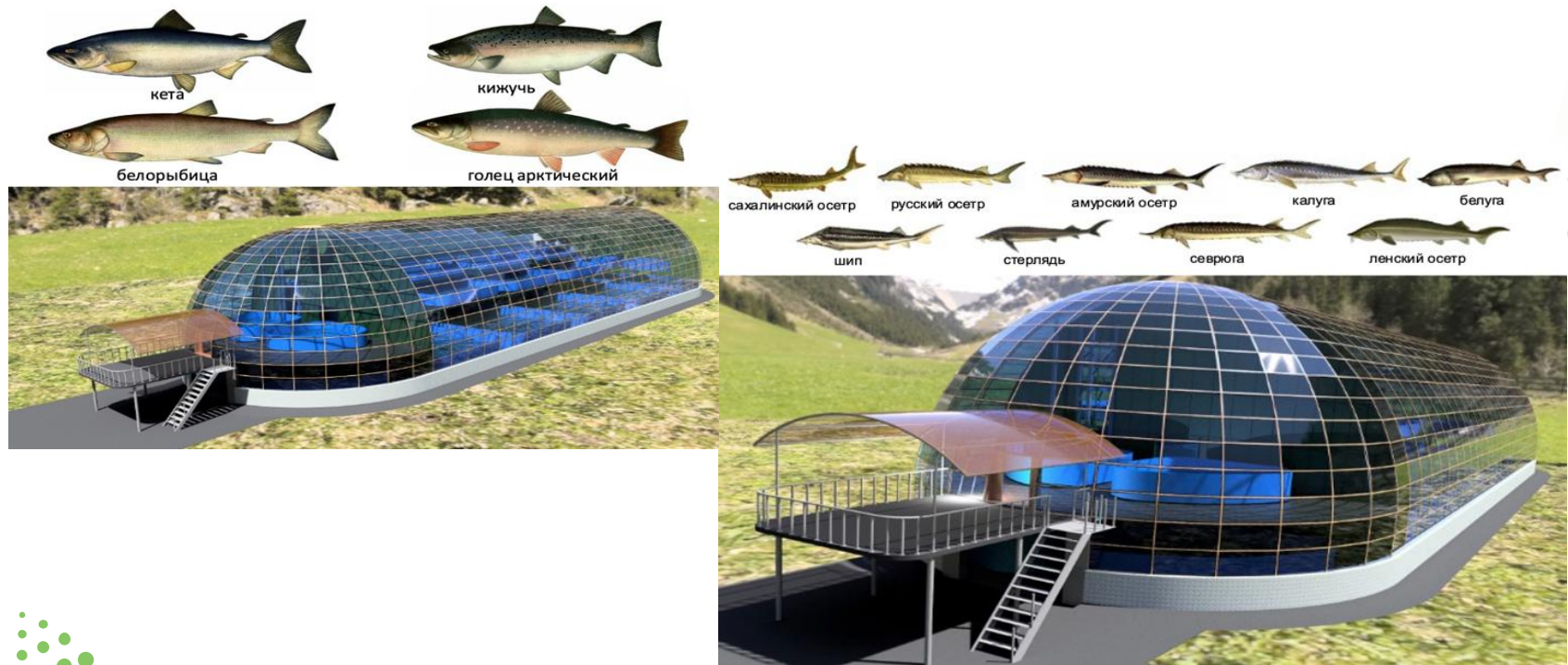
Production complex "Fish" - "Biosphere - F":

1. Hydro-botanical phytodromes for growing valuable species of fish and water hyacinth "Eichornia".
2. The technology uses the principle of forage biocenosis in growing products, water purification, oxygenation. Water temperature is maintained without much energy by accumulating the heat component of the solar flux in the water. Hydrobotanical biotechnology of recycled water treatment and oxygenation based on the use of water hyacinth "Eichornia" has an efficiency of 95%. The complex yields up to 250 tons of high-protein biomass for cattle and fish feed in the form of by-products, up to 70 tons of portioned sturgeon, up to 10 tons of black caviar.
3. Sturgeon planting density will be 40 kg/m² of the central cascade mirror.
4. $1800 \text{ m}^2 \cdot 40 \text{ kg} = 72 \text{ tons}$ of sturgeon meat, of which 2 tons will be allotted to the mother stock.
5. The planting density of African catfish will be 450 kg per m³ of pond, which at a depth of 2 meters will give for the year: $400 \text{ m}^2 \cdot 2 \cdot 450 = 360 \text{ tons}$ of catfish of which 60 tons will go to feed the sturgeon.

Cultivation of fish in all climatic conditions

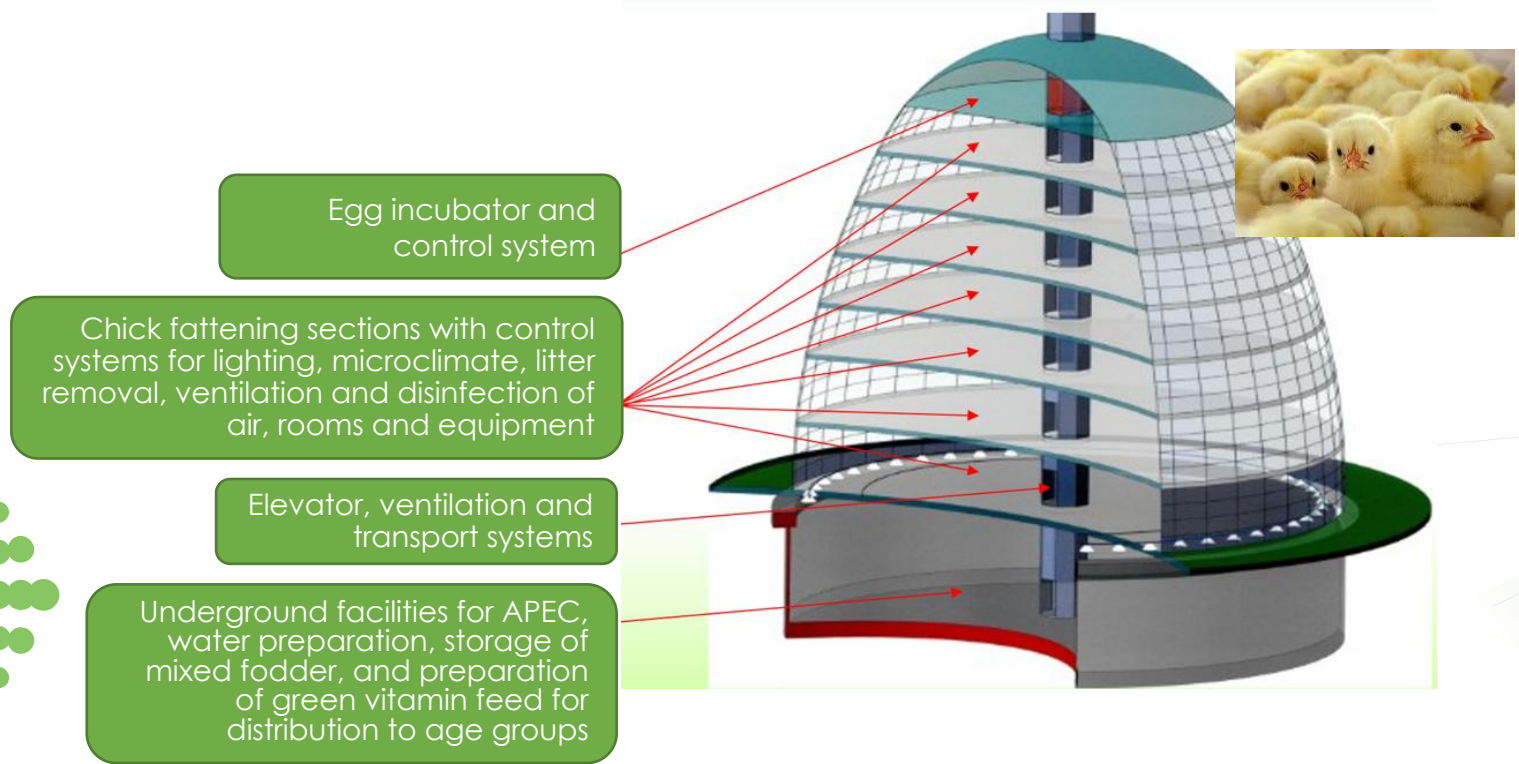
Production complex "Fish" - "Biosphere - F":

Visualization of Fish modules "F" for year-round cultivation of fish:



Cultivation of fish in all climatic conditions

Production complex 2 - “Biosphere - P”:



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Production complex 2 - “Biosphere - P”:

“Biosphere – P” is intended for Vertical technologies of growing poultry.

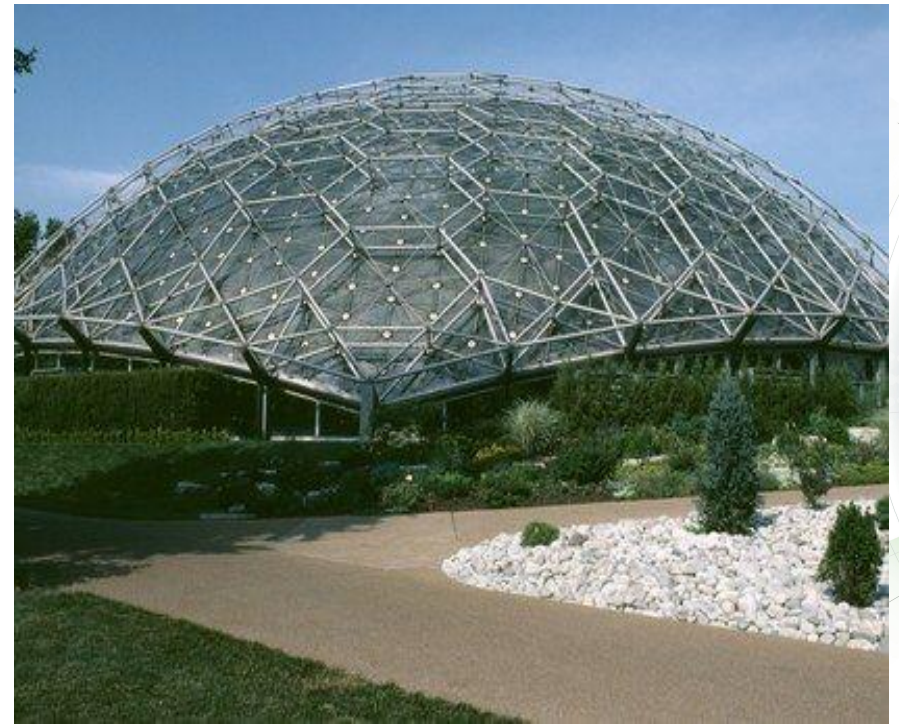
Production building has 7 levels of poultry rearing of corresponding ages.

Manure is removed stage by stage through the radial pneumatic conveying pipe systems and is loaded into external hoppers.

Total saving of heat and electric energy as well as perfect illumination of sections thanks to vacuum glass, clean disinfected air is provided by new technologies of ecologically clean biocidal mists formation.

Food, demographic, energy, environmental, communication, social and financial security of the citizens

Production complex 2 - “Biosphere - P”:



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Production complex 2 - “Biosphere - P”:

“Biosphere – P” is intended for Vertical technologies of growing poultry.

A new way of poultry production is implemented - 7 poultry houses in one housing. Total saving of heat and electric energy as well as perfect illumination of sections thanks to vacuum glass, clean disinfected air is provided by new technologies of ecologically clean biocidal mists formation.

After incubation, day-old chicks are placed on the seventh floor of the complex, where the appropriate feeding and watering support equipment is installed and set up for them.

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Production complex 2 - “Biosphere - P”:

“Biosphere – P” is intended for Vertical technologies of growing poultry.

After nine days hardened chicks are transferred through special sluices to the sixth floor and vacated area is fully cleaned, sanitized and disinfected in one day from droppings and waste products with environmentally friendly water solutions and mists from them.

Then the 7th floor receives day-old chicks again and the cycle repeats.

Chicks from the 6th floor are transferred to the 5th floor after 9 days, then to the 4th, 3rd, 2nd and the last 1st floor.

Food, demographic, energy, environmental, communication, social and financial security of the citizens

Production complex 2 - “Biosphere - P”:

“Biosphere – P” is intended for Vertical technologies of growing poultry.

“Biosphere – P” provides 7 times the production of premises and change of bedding, as well as to provide 7 times the disinfection.

In addition, a 7-fold reduction in exposure of the birds to their excrement is ensured.

**In 63 days after the launch of the “Biosphere-P” platform,
11,000 poultry are released every 10 days.
Poultry density is 15 birds/m².**

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Production complex 3 - "Biosphere - O":

"Biosphere - O" is intended for ecologically clean production of lamb

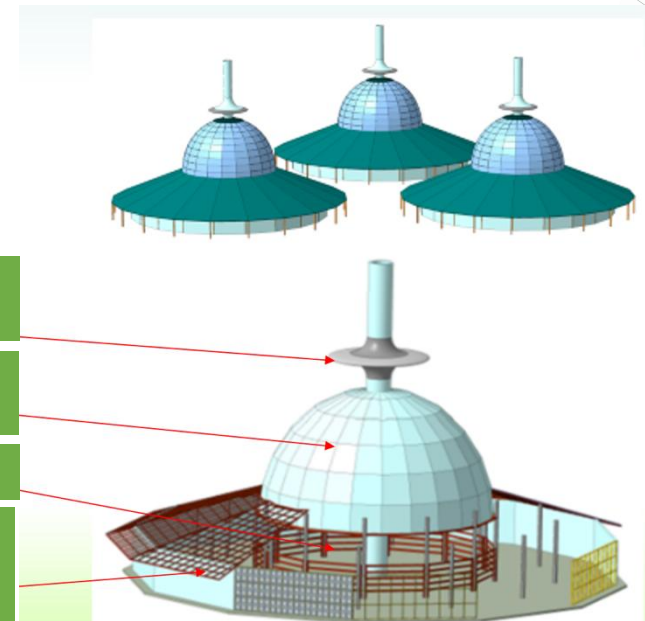


Energy installation and ventilation

Vacuum glass dome and basalt-plastic structures

Neonatal and maternity ward

New-born seeps area \varnothing 30 m made of basalt plastic, basalt reinforcement, mesh, roll insulation made of ultrafine basalt fiber, covered with polyurea on top



Food, demographic, energy, environmental, communication, social and financial security of the citizens

Production complex 3 - “Biosphere - O”:

“Biosphere – O” is intended for ecologically clean production of lamb

“Biosphere-O” is fitted for staying 300 heads and allows to produce ecologically pure lamb meat, cheese, milk, sheepskin, fleece, ecologically clean biohumus, as well as raw materials for methane CH₄ gas production.

They are equipped with modern mechanisms for mobile milking, maternity, watering and feeding.

The main products of the project are ecologically pure lamb meat of high diabetic nutritional and gustatory qualities, additional products are breeding groups of sheepfolds, as well as wool, sheepskin and biohumus.

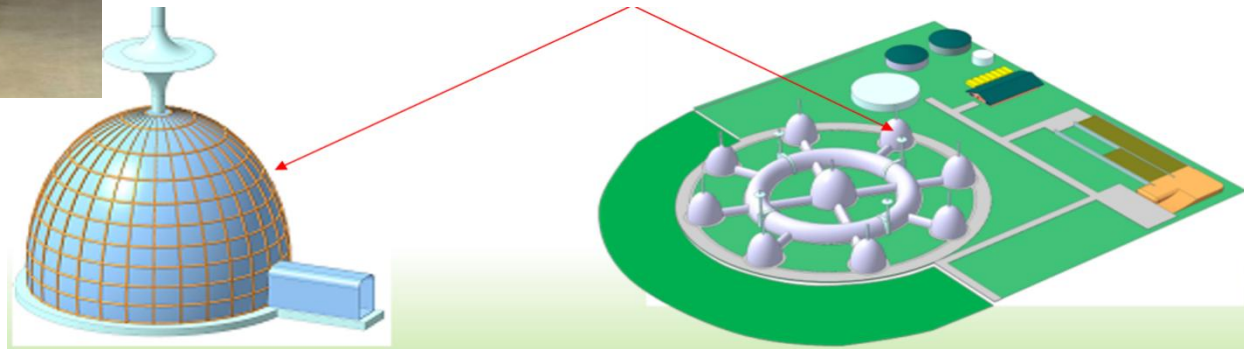
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Production complex 4 - "Biosphere - K":

"Biosphere - K" is a new generation of housing for 160 dairy cows without a leash on deep bedding



Animal farm complex "Biosphere-K" with animal life support systems, germination of green vitamin feed and disposal of waste products with the production of Vermicompost and methane gas CH₄



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Production complex 4 - “Biosphere - K”:

“Biosphere – K” is a new generation of housing for 160 dairy cows without a leash on deep bedding

Keeping of all groups of animals is loose-fitting with active programmed diets (it is expedient to use pastures in summertime in places where it is conditioned by surplus of grounds or other economically and ecologically justified reasons).

To prevent hypodynamic in cows and young cattle, an indoor manage is provided. For the exercise of fresh cows, calves and young cattle there are outdoor walking areas with canopies.

Food, demographic, energy, environmental, communication, social and financial security of the citizens

Production complex 4 - “Biosphere - K”:

“Biosphere – K” is a new generation of housing for 160 dairy cows without a leash on deep bedding

The manage is a place where one of the main provisions about keeping animals in conditions of natural family is realized.

Cows, bulls, young calves and calves are in visual and, if desired, physical contact in the manage, because there are areas for their rut, partitions between which allow the cows to sniff and lick their calves, indicate their interest in the bull and even enter the enclosure through the remotely controlled gate.

Food, demographic, energy, environmental, communication, social and financial security of the citizens

Production complex 4 - “Biosphere - K”:

“Biosphere – K” is a new generation of housing for 160 dairy cows without a leash on deep bedding

Balanced year-round maintenance and nutrition is provided through the use of:

- new technologies for watering the herd with ecologically clean biologically full-fledged water;
- disinfection of feed, industrial premises and technological equipment with an environmentally friendly aqueous preparation;

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Production complex 4 - “Biosphere - K”:

“Biosphere – K” is a new generation of housing for 160 dairy cows without a leash on deep bedding

- technologies for the preparation of disinfected and activated compound feeds for various age groups of animals,
- technologies of year-round production of decontaminated vitamin green feed from sprouted barley of a seven-day period with grafted organically bound trace elements,
- as well as technologies for the production of high-protein feed "Eichornia" allow for balanced year-round nutrition of animals.

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Production complex 5 - "Protein biomass":

Vitamin green food (VGF) and protein biomass "Eichornia"

Vitamin green fodder and protein biomass "Eichornia" are produced year-round at aeroponic installations and phytodromes of "Biosphere" complexes.

Comparative chemical composition of Grain and VGF:

Index	Grain	VGF	Effect, times
Protein, %	8,80	16,90	1,9
BEV, %	3,76	4,41	1,17
Minerals, %	2,87	3,31	1,15
Calcium, %	0,056	0,40	7,14
Phosphorus, %	0,32	0,43	1,94
Carotene, ppm	1,01	33,136	33
Vitamin E, ppm	1,60	414,00	259
Vitamin B2, ppm	175,00	1981,00	11,3
Thiamine, ppm	280,00	1091,00	3,9
Nicotinic acid, ppm	640,00	8818,00	13,8
Vitamin C, ppm	10,00	4500,00	450

