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Meet the catalytic technology

- **up to 4 times cost savings over competition**
- **the Rate of weight gain of farm animals > 7%**

Catalytic Heating and Air purification

1st place at the All-Russian competition "Up Great 2020"

"Air purification from Coronavirus" <https://upgreat.one/safemode/#docs>

Invention of the Institute of Catalysis of the Russian Academy of Sciences

<https://en.catalysis.ru>, the founder of the company



Any burning of fuel - always harmful substances CO , NO , N_xO_y

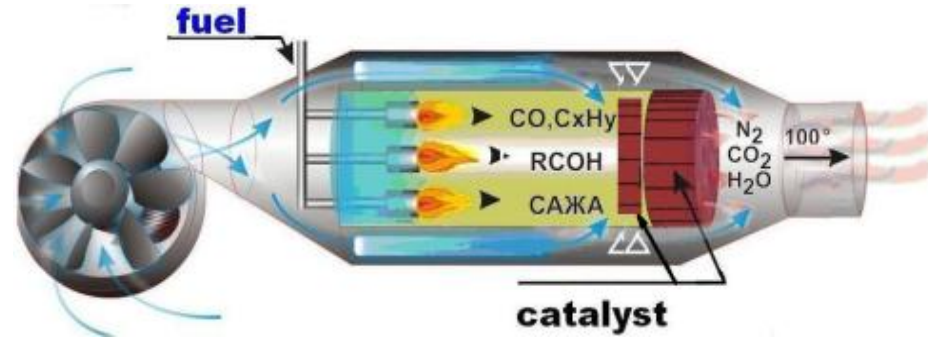
Traditional Heating: water heating



Heating 1.0 - "Boiler"

- heat Exchanger (boiler)
- heat Carrier (water) – to Room,
- **Smoke + Heat – to Atmosphere**
- **heat losses > 67 - 75 %**
- efficiency ~ 25 – 33 %
- greenhouse gas emissions

Key technology - Catalytic Heating

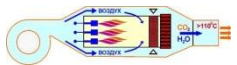


- **All generated heat remains in the room - 2 % Loss**

Reducing greenhouse gas emissions:

- reduction of fuel combustion
- There is no harmful substances - ammonia, methane, nitrogen oxides, etc

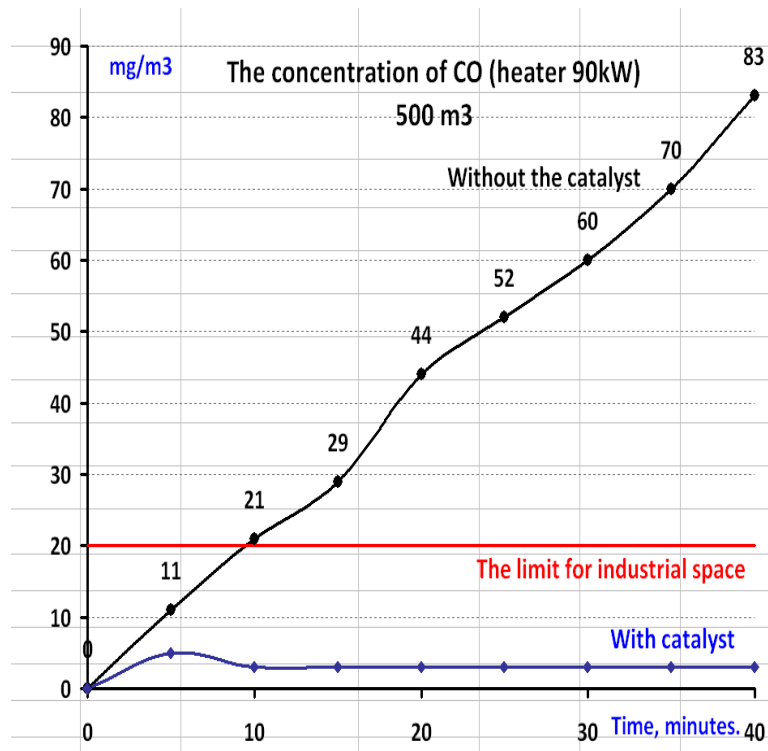
Complete decomposition of Coronavirus (Viruses, organic matter)
on the surface of the Catalyst to **H2O** (water) and **CO2** (carbon dioxide)



Harmful substances can't be removed by mechanical or thermal processing **without catalysts**

Eco catalysts vs. conventional Heaters

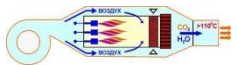
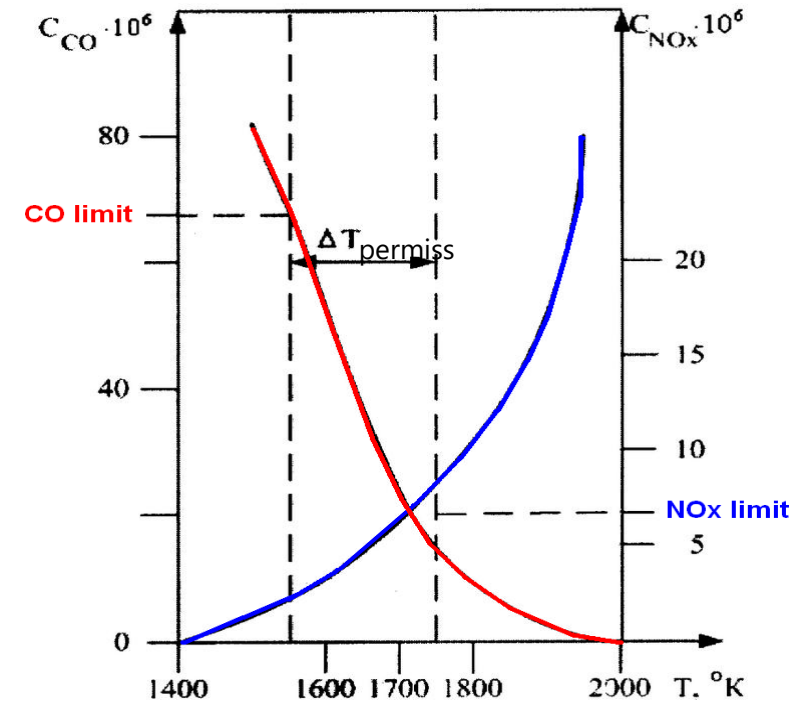
- without catalyst
- with the catalyst
- limits for industry



Two opposite processes of formation

- Oxides of nitrogen (NO_x)
- Carbon monoxide (CO)

for conventional heaters



Target markets and customers

- **Farms**
- Shops
- Warehouses
- **Green houses**
- Disinfection
- Air purification



The results of independent measurements

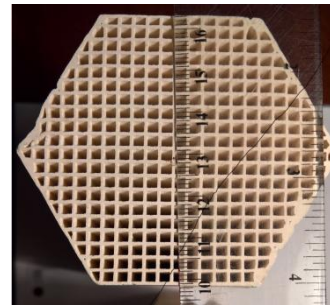
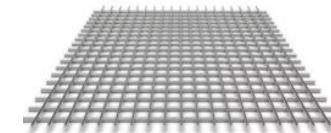
N°	Name	CO	NO	C _x H _y
	Max. Permis. Concentration. ppm	20	5	300
1	Novosibirsk	1	1	0
2	Ijevsk	2	1	0
3	Chelyabinsk	1	1	0

Conservative market size:

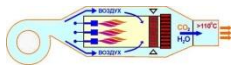
\$ 500 million in Russia,
\$ 10 billion overseas ²

Forecast: similar to the catalytic converters for vehicles, all combustion installations will be equipped with catalytic filter in 10-20 years: boilers, power plants, heating equipment that uses fossil fuels

- **Competitors - flat metal catalytic structure** (1 mm) - small interaction time:
Power <2 kW
- **EcoCat volumetric Catalyst** (length 150 mm) - a long time of interaction of gases with the catalyst. **the Power up to 10 MW**



Competitive equipment with power more then 2 kW are **not available** in Russia and abroad.



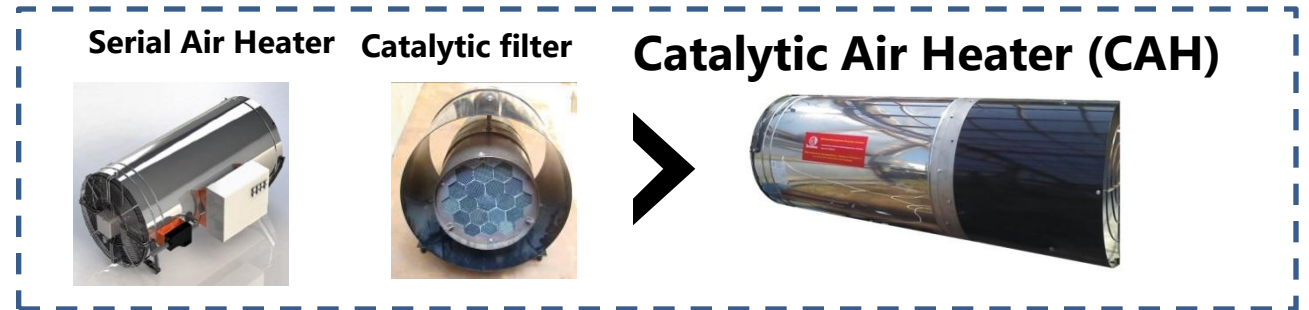
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² – market research by www.siora.ru – conservative estimate for green houses, not taking into account farms

Product and structure

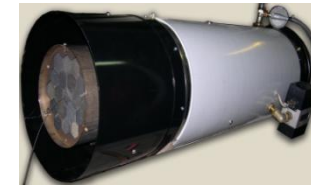
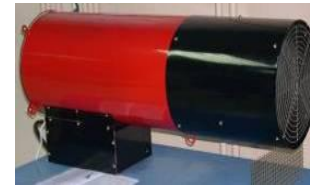
Product structure

- **burner**
by independent supplier
- **catalytic filter**
passive nozzle, no changes in burner required
- diesel fuel & natural gas



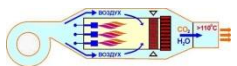
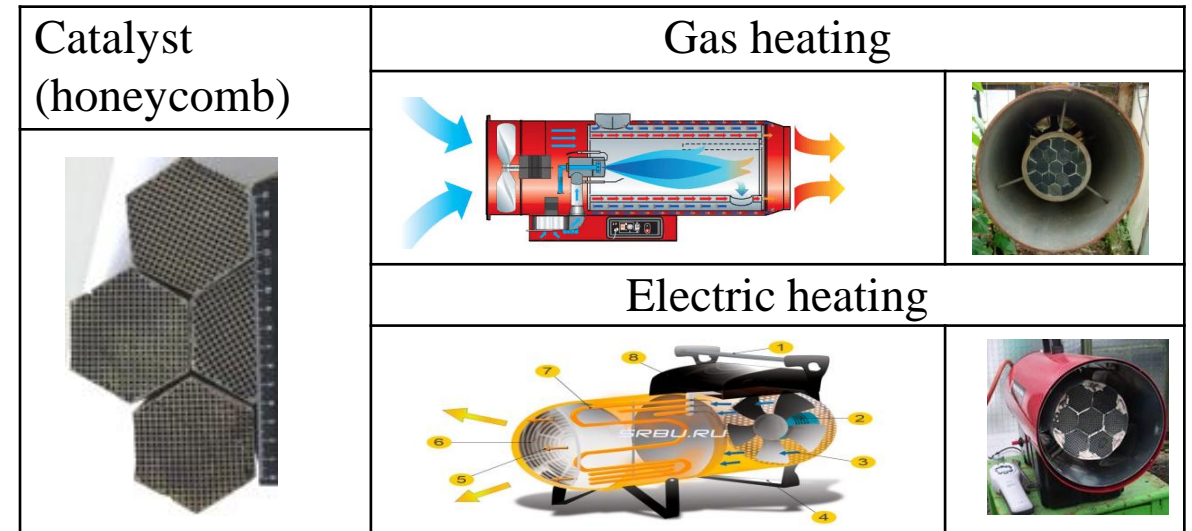
Product line- 30 kW (China), 90 kW (Holland)

Product line Russia – 2, 30, 90 kW, 360 kW (diesel & gas)



2nd stage of “EcoCat” - serial production

- The sales volume (Plan) - \$ 20 000 000
- Profit after taxes (Plan) - \$15 000 000
- NPV - \$ 88 million.
- IRR - 108%
- ROI – 10
- Discounted Payback Period - 2 years



Current state: **research is completed**

Development of technology (catalysts) is completed.

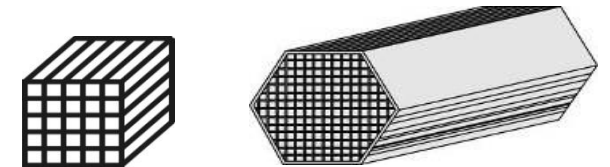
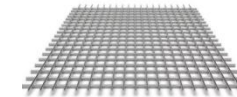
- a technological "know-how" (two-stage catalyst)
- the catalysts production is inexpensive (<50\$)
- Catalytic Air Heater (CAH) requires burners from independent producers
- The equipment has been used by industry consumers **for over 12 years**.



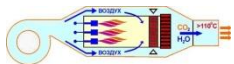
The results of independent measurements of parameters of air heated space

Nº	Name	O ₂	CO	NO	C _x H _y	unit mg / m ³	
0	Maximum permissible concentration	20,8	20	5	300	Room, cbm.	analyzer
1	Novosibirsk		0	1	0	2 500	POLAR
2	Chelyabinsk	20,5	2	1		100	Testo 330

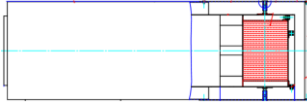








- **Competitors** - (<2 kW) used a flat structure (1 mm) with a small interaction time:
metal mesh (Pt, Pd) or catalytic fiber
- **CAH EcoCat** - ceramic catalyst (length 150 mm)
with a long time of interaction of gases with the catalyst.
It allows to increase the capacity up to 10 MW



Competitive equipment with power more then 2 kW are **not available** in Russia and abroad.



China market

Catalysts are installed in air heaters			
Air heaters are not produced in Russia - European-made catalysts are used . There is necessary Interaction with the EU	 www.hollandheater.nl	 https://homecomfort.resideo.com	 www.thermobile.com
China produces 200,000 air heaters <ul style="list-style-type: none"> •NINGBO BAOGONG ELECTRICAL APPLIANCE CO., LTD. •Ningbo Cixi Aolipu Electronics Co., Ltd, Cixi , •Cixi City Hengjin Electron Co.,Ltd, Ningbo •ZOBO TECHNOLOGY CO., LTD, ZHEJIANG 			

Access to related markets: Southeast Asia, Japan, Korea India, Mid East

No	Global market	Catalytic equipment, \$
1	Poultry farming	4 000 000 000
2	Pig farming	3 000 000 000
3	Greenhouses	20 000 000 000
		\$27 000 000 000

Greenhouses. China - 2 million hectares, Russia-2 000 hectares

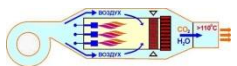
Pork China - 50 million tons, more than 50% of world production

Poultry China - 40% of world Production equipment

Greenhouses = Kingpeng www.chinakingpeng.com

Pork - Muyuan Food Co www.muyuanfoods.com

Poultry - Huanan Poultry Equipment www.hnxmsb.com



EcoCat + China

EcoCat – move to China (Joint venture) :

- Production of catalysts from Chinese raw materials and on Chinese equipment
- Production of Air Heaters (optional) with catalysts

EcoCat will receive from China for Russia and the CIS:

- Catalysts & Catalytic equipment
- Work with Chinese engineering companies in Greenhouses, Pig farming, Poultry farming

Road map (Joint venture) :

- Signing of the "Protocol of Intent"
- Verification of documentation with "Production of 50 kg of catalysts" on Russian equipment from Russian raw materials with the participation of Chinese specialists
- Instrumental verification of catalyst parameters by installation in catalytic equipment
- Establishment of a joint venture in China and production of catalysts
- Support of Chinese production by Russian specialists up to a volume of 1,000 kg
- Testing of catalytic equipment in a pig farm (RusAgro www.rusagrogroup.ru/cn)

The technology has a huge margin of profitability:

- The technology of "Catalytic honeycomb production" is identical to the "Brick production technology"
- The equipment for the production of "catalysts " is identical to the "Equipment for the production of bricks"

Brick slotted. price – 0.15 \$/kg



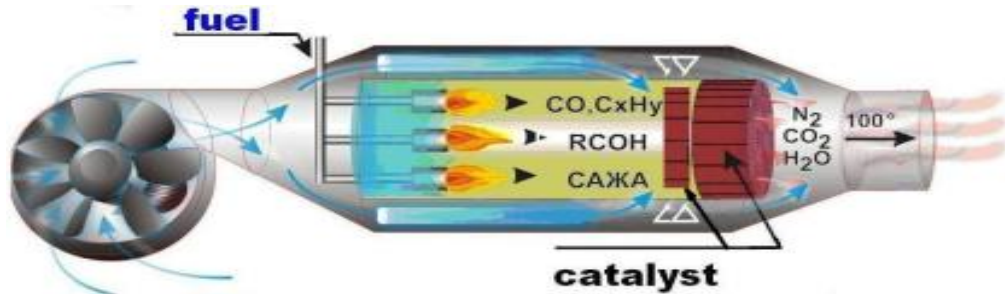
Cell Catalyst. price – 3.0 \$/kg



Petrochemistry Catalyst. price – 3.0 \$/kg



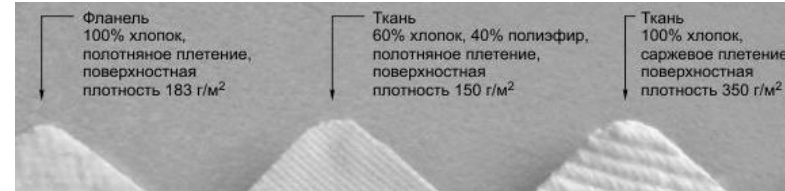
Catalytic air purification



The equipment is ready for serial production - tested, documentation is available

installation **"Valve & ultraviolet LED"** in existing masks /

- we have laboratory tests, design work is required for serial production



- **Activation** – Fuel combustion, Electric heating, Ultraviolet activation
- Resource - more than 10 years

Use of Catalysts for complete combustion (decomposition):

- Coronavirus, Bacteria, microbes, viruses, toxic substances, Harmful Gases and Persistent Organic Pollutants (Pops), Animal Husbandry, Chemistry, Pharmaceuticals
- Volatile products in the air of workshops

Advantages over other cleaning methods - Total decomposition (99.9999%) of gases (oxidation) to:

- CO₂-carbon dioxide
- H₂O-Water

EcoCat – 1st place at the All-Russian competition "Indoor **Air Purification from Coronavirus**"

<https://upgreat.one/safemode/#docs>

Ecological impact of the technology

88% of all energy by burning fossil fuels (BP Statistical Review of World Energy 2016)

- Greenhouse gases are formed in any combustion of fuel - CO, NO, N_xO_y , ... "United Nations Framework Convention on Climate Change"
- Persistent organic pollutant (POP)

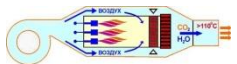
tests in the Poultry and Pig Farm Rusagro www.rusagrogroup.ru/cn

Purpose - **Increase the weight of farm animals due to a comfortable microclimate of more than 5%:**

- Complete removal of combustion products - Carbon monoxide (CO), Nitrogen oxides (NOx)
- Complete removal of waste products - Ammonia (NH₃) and Methane (CH₄)
- Reducing greenhouse gas emissions by up to 3 times
- Removal of odors in the vicinity of farms - impact on nearby Cities

Catalyst systems:


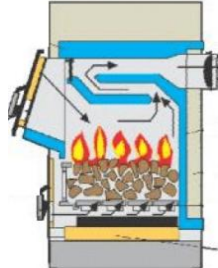
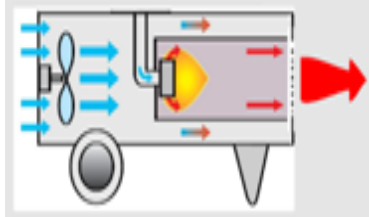
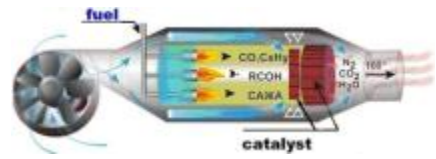
- Reduce greenhouse gas emissions (CO₂) up to 4 times by reducing energy consumption
- Complete decomposition of methane (18% of greenhouse gases), ammonia, nitrogen oxides (N_xO_y)
- Destruction of Swine Flu and Avian Influenza
- Deodorization and disinfection of indoor air
- Full extinction of the "Persistent organic pollution", and toxic substances



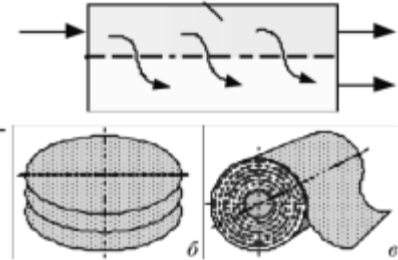
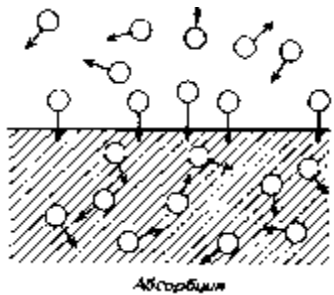
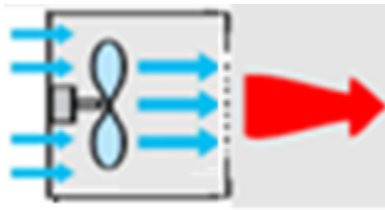
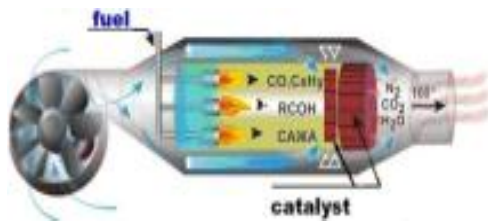
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Catalytic systems - the Industrial revolution

In Heating

Bonfire	Boiler	Direct heating	Catalytic heating
			
Energy conversion efficiency (η) ~ 5%	Energy conversion efficiency (η) 25% < 51%	Energy conversion efficiency (η) 25%	Energy conversion efficiency (η) > 98%
heat loss	use	use	use

Air purification

Mechanical separation not for gases	Absorption small volume	Dilution small efficiency	Catalytic cleaning > 500 cubic meters per hour
			

Team management and summary

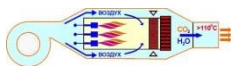
Domain	Name	University	Degree & Specialization	Progress
CEO	Sergey Sunchugashev	Moscow Institute of Physics and Technology	M.S. (superconductivity)	Metalloinvest RUSAL
CTO	Marencev Alex	Moscow Institute of Physics and Technology	Radar systems	Metalloinvest
Chief Innovation Officer (CINO)	Sergey Hairullin	Novosibirsk State University	Ph.D. (chemistry)	30 patents, introduction TatNeft NorNikel
International Markets Expert	Mike Sh	Princeton University	D.Sc. Ph.D. (phys&math)	3 patents, 300 articles introduction Boeing

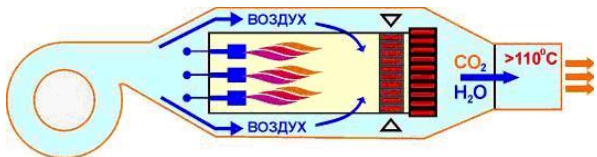
Catalytic air heating technology

- Allow reducing heating costs up to 4 times
- Inexpensive
- Simple, but complicated for reverse engineering
- Approved by industrial customers experience

Business in China:

- 1-st stage - 100% copying of Russ production - success guarantee first stage
- 2-st stage - increasing the number of products by 1000 times
- The Chinese company operates independently. The participation of Russian employees is not required



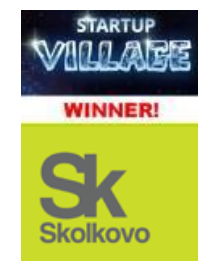
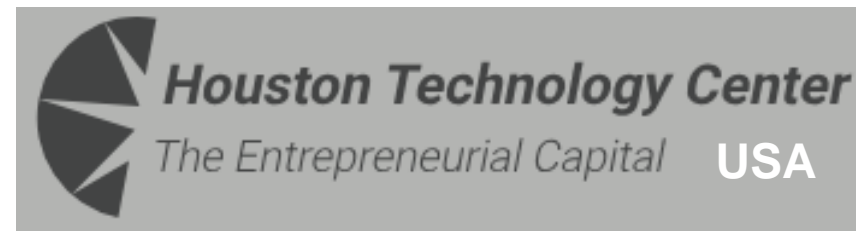


EcoCat

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Thank you for being with us!



Top-50 of RBTH Russian Startup Rating 2016
young tech companies for the international arena

Video:

Heating of greenhouses, Novosibirsk -

<https://cloud.mail.ru/public/BebM/TQwAfJvVo>

Heating of poultry farms, Lipetsk -

<https://cloud.mail.ru/public/k832/CAUuQ8c7o>

Heating of workshops, Gubkin - <https://cloud.mail.ru/public/359g/oy6vt9kpr>

The composition of the catalytic air heater -

http://www.ecocat.biz/ecocat_videoPhoto:

Greenhouse farm Novosibirsk - <http://www.ecocat.biz/photo/2>