# GTurbo - Token-option for gas turbine production

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# Brief Description of Project

GTurbo is a unique project since it is the first token option for gas turbine production. The project is based on a real machine-building facility specialized in repair of gas turbines for nitric acid production. By taking part in the GTurbo option investors will contribute to expansion of an well-established business which is in operation since 1964.

The project combines profound experience and up-to-date technologies. At the same time, it employs blockchain technology for the needs of ICO to ensure an easier and more reliable investment.

The key features of this project are as follows:

1. Profitability, as the core manufacturing process is a high-margin one (building and repair of gas turbine plants cost a lot);
2. GTR tokens will not be affected by inflation and volatility, and it makes them a reliable tool for capital saving and multiplying;
3. Stable income source: continuous flow of orders will guarantee the investors profit up to 300% if they invest at the early stages of the project.
4. Full transparency at all stages of investment, that allows to check that the investments were put into the real production process;
5. Annual buyout of the GTurbo tokens after scaling the manufacture, according to the specified procedure.

The GTurbo project combines advanced technologies in the field of finance and industrial production of GTT-3PN gas turbine units.

Gas turbines GTT-3 (M) and GTT-3PN are used in UKL-7 units for the production of non-concentrated nitric acid. It is the basis for production of nitrate nitrogen fertilizers (ammonium nitrate and its modifications),

as well as complex fertilizers (containing nitrogen, phosphorus and potassium). The industry of nitric acid in the countries of the former USSR still remains the largest in the world. Gas turbines are designed and produced by 5 countries in the world including Russia.

Compared with GTT-3M, the new turbine GTT-3PN allows to produce 24,000 more tons of nitric acid per year (22% of the total production of one turbine per year), which is equivalent to a gain of $ 3.5 million per year. Decentralized direct investment in the project will be implemented through the purchase of the GTurbo option. The GTurbo financial instrument will be launched on the Ethereum blockchain platform.

# Definitions

Prior to the detailed description of the project, it is necessary to make the basic definitions clear.

The underlying *asset* is the asset on which the financial derivative (option) is based. It is a product, in our case, GTT-3PN gas turbine unit and GTurbo derivative. The gas turbine unit GTT-3PN is used for the production of fertilizers (ammonium nitrate), which are used for agricultural needs.

*Derivative or derivative financial instrument* is a contract under which parties obtain the right and / or take the obligation to perform certain actions with respect to the underlying asset.

This *contract* is an agreement between two parties under which they assume an obligation or acquire the right to transfer the underlying asset within the prescribed period at the agreed price.

The *GTurbo derivative* is an optional contract for the sale of the GTT-3PN gas turbine in the form of GTurbo intangible asset (see below), which includes an option (put option) for the token buy-back at the agreed time at the agreed price.

Cryptoeconomy is a socio-economic relationship in the digital society that focuses on interactions using network protocols. The main areas that are part of the study of crypto-economics are: cryptographic tokens (crypto-currencies), digital assets; decentralized social security and crowdfunding systems; decentralized management systems; self-fulfilling "smart" contracts; commerce markets for computing resources; online trust systems and reputation systems; consensus algorithms, etc.

*Option* is one of the derivative types; the contract for the sale of the underlying asset (in our case, GTurbo), whereby the option buyer acquires the right to sell the asset at a predetermined price at a specified future time.

Primary capital formation, or *ICO, Initial Coin Offerings*, is a way to attract capital through the use of crypto investments in the project at its initial stage (including using crypto currency). The text of the document will use the "ICO" abbreviation.

# Current Industry Issues

As in any other industry, among the main issues there are how to increase output and cut costs in order to increase the overall effectiveness and profitability.

If we speak about the nitric acid production, costs are composed of expenses for buying raw materials (ammonia) and catalysts (platinum-rhodium-palladium alloys) in addition to cost of man labor, equipment and other resources.

At the moment, the states of the former USSR produce about half of the total world output of weak nitric acid. All the nitric acid plants in use utilise equipment provided by Russian and Ukrainian enterprises. Over 70% of the total nitric acid amount is produced with the use of modern large-scale UKL-7 and AK-72 plants. They are designed to produce 355 and 1150 tonnes of nitric acid per day, respectively. The temperatures at the catalytic gauzes in the ammonia oxidation reactors in UKL-7 and AK-72 are 900 and 840°C, and the pressures are 0.7 and 0.4 MPa. Within this process, consumption of both ammonia and of the platinum-rhodium-palladium catalyst per tonne of the final product is determined at the ammonia conversion stage. The approximate losses of metal per tonne of acid produced in UKL-7 and AK-72 are 0.135 and 0.12 g, respectively. About 85% of the cost of manufacturing of nitric acid is the cost of the ammonia and platinum metals catalysts.

It is hard to deal with these costs, and they can be cut by increase of the total output. The key point here is upgrade of the equipment in use.

In our case, upgrade of plants UKL-7 can be performed by replacement of old-fashioned and worn-out turbine units GTT-3M with new ones with improved design and performance parameters. It is so because a turbine is the most loaded element of a plant for nitric acid production.

There are competitive Russian pilot products, machines with total-head (single-step) air compression in an axial compressor. One of such designs (GTT-3PN) with higher performance has been developed.

Extensive use of new machines will prolongate the service life of plants UKL-7 and increase the performance by 10 - 15%. On the basis of machines with total-head air compression and modified drive, next generation of medium power units can be developed. Such units will have higher performance (40% higher in comparison with UKL-7), and they can work with another fuel (not natural gas).

# Detailed Project Description

Let’s begin from the very ground. Today, nitric acid is one of the most large-capacity and much-in-demand products in the chemical industry. It is produced from ammonia and is the main component of fertilizers. By far the principal use of nitric acid (80%) is in the manufacture of fertilizers.  Of this 96% is used to produce ammonium nitrate and calcium ammonium nitrate. A relatively small amount of ammonium nitrate is also used to make explosives.

More than 50 percent of the total volume of nitric acid in the CIS countries is produced by large-tonnage UKL-7 units, the operated quantity of which on the territory of Russia, Ukraine, the Republic of Lithuania and Uzbekistan is about 100 units, including conjugate production of sodium nitrite-nitrate, concentrated nitric acid, etc.

Energy-efficient UKL-7 units with GTT-3 gas turbine drive were developed and started to be put into operation more than 30 years ago. UKL-7 units operate in a mode of almost complete closed energy balance, since a gas turbine is used as an air compressor drive with the recovery of the energy of compression and heat of the off-gas in it. As a closing drive, an electric motor with a phase rotor is adopted, which can work in both the motor and generator modes. In terms of intensity of technology, structure, power, flexibility, autonomy and environmental friendliness these units are still among the competitive ones. However, a long period of operation necessitated the stylistic and physical modernization of their engine parts and energy technology in general.

The equipment limiting the service life of the UKL-7 units is GTT-3 (GTT-3M) gas turbine units, the warranty resource of which in the industry is in 1.5-2 excess, which requires significant costs for capital repairs with replacement of basic units (using expensive repair kits), purchasing components and spare parts. According to statistics, the failure of the main equipment and downtime due to GTT-3 fault account for 23.9% of the total amount of UKL-7 lost time.

We propose to reconstruct the energy-technological scheme of UKL-7 units by introducing a new development - GTT-3PN gas turbine unit with full-axial compressor, created on the basis of the reconstructed existing GTT-3M unit. This solution will allow to obtain a significant economic effect due to changes in the configuration of the machine, physical and stylistic updating of the main element of the gas turbine unit, which determines its productivity and reliability, the turbocharger unit, with relatively low capital costs, using the existing base of the GTT-3M machine.

To achieve this goal, we have the relevant experience. Here is a short historical journey showing you the way which is already behind us.
In 1964, an experimental-industrial station was established on the basis of the Novgorod line operation section for main gas lines of Lentransgaz Production Association (now within PJSC Gazprom).
The station was designed to test and refine main gas compressor units to be installed at compressor plants of main gas lines.
Over the 1964 to 1995 period, the following units were tested at the station:
- GT 750-6;
- GTK 10;
- GTK 10-2;
- GTK 10-4;
- GT 6-750 (produced by the Urals Turbine Engine Plant in Sverdlovsk);
- GTN-25 (2 options);
- Gas Engine (Diesel).

Full-scale tests of gas pumping units with integrated or station-based systems for fuel conditioning, regulation and control were performed at the experimental-industrial station.
In 1992, on the ground of JSC Research and Engineering Institute of Turbine and Compressor Building of the Nevsky Plant (Saint Petersburg) employees of the departments of gas, steam turbines and axial compressors organized CJSC Nevturbotest as an engineering company, and OJSC Novturbo as a production company.

New control systems by CCC (USA) were tested at the station. Later, they were installed in the most of compressor plants of PJSC Gazprom .

To keep its manufacturing facilities in operation CJSC Nevturbotest developed and launched manufacturing complex air-cleaning systems with heating and noise suppression units. The units were provided for gas pumping units of compressor plants of PJSC Gazprom , as well as for axial compressors of steel mills.

In the end of 1990's, CJSC Nevturbotest started development of design documents for reengineering of weak nitric acid units of GTT-12, KMA-2 GTT-3M types.

In 1999, the companies were restructured to form two firms: CJSC Nevturbotest or NTT (engineering) and CJSC Rigel (production).

Now, there are 15 employees in the engineering group and about 50 persons engaged in production.

NTT works closely with design companies. For example, combustion chambers for units UKL-7 for JSC Azot (located in Berezniki and Dorogobuzh) were designed in cooperation with GIAP (Moscow); feasibility study for reengineering of units UKL-7 based on upgraded turbine unit GTT-3P was performed jointly with UkrGIAP.

NTT cooperates with OJSC Chudovo Energy Machine Building Plant (Chudovo, Novgorod Region); OJSC Uralturbo (Yekaterinburg); Izhorskiye zavody OMZ (Saint Petersburg), JSC Kirovsky Zavod (Saint Petersburg) and other machine building enterprises.

Within recent years, CJSC Nevturbotest manufactured units KMA-4 and KMA-5, repaired and supplied parts for turbo-compressors and turbines of units GTT-3M, GTT-12, KMA-2.

Due to its scientific and technological potential, experience in pre-commissioning activities and operation in enterprises of Gazprom and Minudobreniya, the company can solve complex engineering tasks on reengineering and repair of turbo-compressor equipment.

Modernization of GTT-12 (KMA-5) was developed and implemented in order to increase production of weak nitric acid by 10-15% from the design value. The unit's runlife was increased up to 2 years.

Design documents for modernization of units UKL with the use of total head turbo-compressor GTT-3PN and increase of the acid production up to 3 t/hour were developed.

To implement the abovementioned projects, the company started acquisition of up-to-date metal-machining equipment to repair and manufacture turbine rotors and internal body assemblies and parts (among the newly-bought machines there are a multi-purpose lathe balancing machine). Also, new assembly stands were designed and produced, as well as a main sample of turbo-compressor GTT-3PN.

# Market of Gas Turbines for Plants UKL-7

Currently, more than 50 percent of the total volume of nitric acid in the CIS countries is produced by large-capacity UKL-7 units, the operated quantity of which on the territory of Russia, Ukraine, the Republics of Lithuania and Uzbekistan is about 100 units including conjugate production of sodium nitrite-nitrates, concentrated nitric acid, etc. At the moment, in addition to our production in Russia, few companies produce turbochargers for nitric acid production, but there is no large-scale produced engines with the performance higher than that of GTT-3PN.

The members of the project team have the experience of business cooperation with the largest enterprises of Russia: OJSC AKRON (Veliky Novgorod), KOAO Azot (Kemerovo), JSC Minudobrenia (Rossosh), Fergana Azot (Fergana), JSC Azot , JSC Azot (Kemerovo), ZMU KChKK (Kirovo-Chepetsk), Gazprom, and others.

## List of Customers with Units GTT-3

In this section, all the company customers who have units GTT-3 to be reengineered, are listed:

- OJSC AZOT (Berezniki) - 10 units;
- JSC Dorogobuzh - 3 units;
- JSC Uralchem - 3 units;
- JSC Meleuzov Mineral Fertilizers - 5 units;
- OJSC Nevinnomyssk Azot - 8 units;
- JSC Acron - 5 units;
- OJSC Azot (Novomoskovsk) - 9 units;
- OJSC FosAgro-Cherepovets - 10 units;
- JSC NAVOIAZOT - 2 units;
- JSC Aktau - 2 units;
- JSC DNEPRAZOT - 6 units;
- JSC Severodonetsk Corporation “Azot” - 2 units;
- JSC Rivneazot - 6 units;
- OJSC Azot (Cherkassy)- 10 units.

It is obvious that GTurbo has enough orders for the next 10 years. In such company position, investments are secure and made in the real production.

## Competitors

Dalenergomash announced production of GTT-9, but not a single unit was built or supplied to existing production facilities. And it is a disputable matter if this enterprise can produce turbines of the same level as those offered by our plant. At the moment, we have no competitors in Russia. Usage of gas turbines made by foreign manufacturers requires change of the entire process cycle. And it incurs additional costs for production.

## GTurbo Main Advantages

- Experience. The company is in operation since 1964. It has provided repair and reengineering of gas turbines for the major nitric acid production enterprises.
- Networking. GTurbo has established tight cooperation with many customers (see above).
- Uniqueness. There are no competitors of the company in the regional market. The case is that the GTurbo solution is genuine and advanced.
- Robustness. Quality of the work performance is high, and the solution itself is well-developed and reliable.

## Objectives

The project team has set the following objectives:

1. Expanding production from 3 to 10 turbines per year;
2. Exploring new markets for the turbine units;
3. Accumulating experience in machine building, metal machining and design work;
4. Gradual modernization of the production department by acquisition of new machines;
5. Further promotion of the project using different channels;
6. Expanding customer network.

These objectives are planned to be achieved after the ICO, since the ICO is the main tool to attract and secure investments.

Speaking about the current production prospects, it shall be mentioned that we already have a list of orders for 10 years ahead from the companies that need our gas turbines to produce ammonium nitrate.

# Production Facility and Equipment

Production is based on the company's own site with utilities and advanced technologies like plasma-arc cutting. Total area of the production site is 2.5 ha.

The shops have an overhead crane with a lifting capacity of 15 tons, as well as machines for sheet metal cutting (up to 20 mm thick) and bending (up to 50 mm thick).

The welding section is equipped with semi-automatic welding sets.

Using a bed-type miller with digital control, our specialists can machine parts up to 6 meters long simultaneously in 4 planes.

To machine parts of a stationary element, a vertical turning and boring machine is used.

To machine horizontal splits of parts and to counterbore holes, a horizontal boring machine with digital control is applied.

Screw-cutting lathes are used to manufacture and repair turbine runners up to 5000 mm in length and 8 tons in weight.

Worn parts are recovered by gas-flame built-up welding.

Turbine runners up to 10 tons in weight are balanced by a special machine.

After taking logbook measurements and balancingб an assembled gas turbine runner. The company repairs equipment with installation of digital control and recovery of initial precision.

## Stages of Production Scaling

The investment project under consideration provides for scaling production in two stages:
1. outsourcing the manufacture of components for the GTT-3PN gas turbine. Appropriate arrangements with third parties have already been made. Assembling of plants is carried out in our own production facilities.
2. expansion of our own production to increase the production capacity of components.

## Expansion of Production

Considering today's production capacity for output of 2-3 turbines per year, the main challenge is restructuring and expansion of the existing production in accordance with the renovation project to be ordered in a specialized design research institute. In line with the project, the annual output can be increased to 8-10 gas turbines per year.

The production renovation project shall include the following main stages:
- production expansion on the basis of the existing production site (general construction work);
- construction of 2 new assembly stands;
- construction of 1 new test stand;
- acquisition and installation of 3 new CNC stands;
- acquisition and installation of new blanking and auxiliary equipment;
- acquisition and installation of new instrumentation;
- hiring new direct and auxiliary workers.

Total costs of restructuring and expansion of the production is 8-10 mln US dollars.

# Financials

## Tokens to be Used

In our case it is predetermined that the tokens for sale are security tokens. Let’s make clear what does it mean.

Security tokens are used for an investment contract where the main application, and the reason for the investors to buy the tokens is anticipation of profits in future as dividends, revenue share or (as a rule) price appreciation.

Exactly the price appreciation matters in this case (it will be described later, in the buy-back table).

## Project Roadmap

This project assumes crowdfunding investment in the GTurbo derivative (see the definition above), which is implemented as a financial instrument on the Ethereum blockchain platform and is ensured with gas turbine unit GTT-3PN industrial product.

The main stages of the project are: "Fundraising (pre-ICO)", "Fundraising (ICO)", "Production" and "Buy-back". The road map of the project is as follows:

**Stage 1 "Fundraising (pre-ICO)"** June,1 - June,15, 2018. Pre-ICO for the acquisition of GTurbo options using Ethereum blockchain. The cost of the token will be $ 0.05, with a total of 26,000,000 tokens put out for sale (a total of 452,173,913.04 GTurbo tokens will be issued). On the

first day of pre-ICO, a "bonus" of 30% of the purchased number of tokens will be available. Pre-ICO collected funds will generate a marketing budget for the ICO. Note: additional information will be posted on the project website.

**Stage 2 "Fundraising (ICO)"** July, 15 - August, 15, 2018. Running ICO for acquisition of GTurbo options using Ethereum. The cost of the token will be $ 0.1, only 390,000,000 tokens will be put up for sale. On the first day of ICO, a "bonus" of 30% of the purchased number of tokens will be available. ICO collected funds will form investment budget to upscale the capacity of gas turbines. Note: additional information will be posted on the project website.
We have the following milestones: the softcap is 5,000,000 US dollars, and the hardcap is 30,000,000 US dollars.

**Stage 3 "Production"**. September - December 2018 - modernization of business processes to increase capacity and start production of turbines with new business logic. December 2018 - December 2019 - the first cycle of production of turbines.

**Stage 4 "Buy-back"** December 2019.

GTurbo options buy-back will be as follows:

| Buy-back Period | The percentage of tokens for buy-back from the total number of tokens sold | The buy-back price of one token | Profit in comparison with ICO price |
|---|---|---|---|
| September 2018 | 0.64% | $0.15 | 50% |
| December 2019 | 36.06% | $0.2 | 100% |
| December 2020 | 28.85% | $0.25 | 150% |
| December 2021 | 24.04% | $0.3 | 200% |

| | | | |
|---|---|---|---|
| December 2022 | 10.42% | $0.4 | 300% |

Note: the price of the token on the pre-ICO is $ 0.05, on the ICO - $ 0.1.

The main purpose of crowd investments in the GTurbo commodity option for investors is to acquire an option with a profit of 62% (the estimated average amount of future revenue per year); the acquired GTurbo derivative is ensured with a real commodity, which in the case of currency fluctuations is "protected" by the value of this constantly high-demand asset.

## Token Distribution

In general, all the GTurbo tokens will be distributed as follows:

| | **%** | **Amount of Tokens** |
|---|---|---|
| **Airdrop** | 1.00% | 4,521,739.13 |
| **Bounty** | 2.00% | 9,043,478.26 |
| **Partners** | 5.00% | 22,608,695.65 |
| **Pre-ICO** | 5.75% | 26,000,000.00 |
| **ICO** | 86.25% | 390,000,000.00 |
| Total | | **452,173,913.04** |

# GTurbo Project Expenses

Upon receipt of the first investments, it is necessary to place orders to manufacture blanks for the first 2-3 turbines:

- gated patterns for bodies;
- body mouldings;
- shaft forgings;
- rotating blades of turbines and compressors;
- stationary blades of turbines and compressors;
- forgings for vane carriers and other parts;
- metal to cut required blanks.

The expenses will amount up to 400 - 450 mln rubles. It will allow to launch the complete process cycle of turbine production and to make contracts with customers under more favourable terms.

Simultaneously, the existing production will be reconstructed in accordance with the renovation project.

Such an approach will yield the first income from sales of the manufactured turbines within 2-3 years. The income will be used for both production expansion and dividend payment.

Upon receipt of the greater amount of investment, expenses for annual procurement of blanks shall be increased up to 1.2-1.5 billion rubles (for 10 turbine unit sets). Mainly, at that stage, the most funds, 8-10 million US dollars shall be used for production renovation.

Fixed annual expenses for the project implementation will amount up to 80-100 million rubles.

# GTurbo Project Revenues

Current revenues associated with the daily operation of the plant are presented in the table:

| Indicator name | Value |
|---|---|
| The volume of production of GTT-3PN gas turbine unit (units) | 3 |
| Average cost of production of 1 turbine | $4,166,667 |
| Average sale price of 1 turbine | $8,333,333 |
| Total turnover per year | $25,000,000 |

Note: the billing period is defined as 1 year. Note: the exchange rate RUB/USD is taken 60

Planned revenues from the plant's activities for the year should be $25 million. With large volumes of production, it is possible to scale up to 10 gas turbines a year.

# Project Team

The GTurbo project team consists of developers of innovative technologies, technologists, scientists-experts, managers, economists with experience in industry and finance.

**Vitaly Filipov, CEO.** Economist, manager, developer of financial technologies in banking, state, investment spheres. Vitaly was involved in investment campaigns to attract investments in the industrial sector, in particular, with the support of the state.

**Arkhip Agafonov, CTO.** In the team since 2014. Arkhip has devoted more than 20 years to the power engineering. He has been working in the development of gas turbine engines for small aircrafts, design of auxiliary gas turbine engine systems. He is concentrated in increase of production efficiency by introducing new machinery and production technologies.

**Evgeny Bukovshin, CPC.** Specialist in design of gas turbine engines and installations. He has over 3-year experience as a designer in the CIAM department of air-jet engines. Over 1 year experience in processing results of air-jet engine testing.

**Grigory Tret'yak, CRO.** Candidate of technical sciences. He defended his thesis in the Moscow Power Engineering Institute in 2003, majoring in "Electrotechnical Complexes and Systems".
Grigory has more than 13 years experience in the field of turbine unit operation in power and mechanical drive systems.

**Ivan Andrysiak, CLO.** Applicant of the Candidate's Degree in Pedagogical Sciences "National State University of Physical Culture, Sports and Health named after P.F. Lesgaft", St. Petersburg.

**Oleg Prokura, COO.** Academician of the International Academy of Social Technologies, Oleg's qualification is a teacher-specialist in adult education and educational activities.

**Sergey Vladimirov, Advisor.** Phd of Economics, Professor, Academician of the Russian Academy of Natural Sciences (RAE). Leningrad Military Space Academy named after AF Mojajsky, qualification - the engineer-inspector of technical supervision of especially important ground and underground constructions.

The organizers of the project have publications, scientific articles, author's certificates and patents, corresponding to specialization in industry.

The experts of the team have experience of cooperation with industrial, construction, design, manufacturing companies in attracting financing from banking, private and foreign organizations.

# Conclusion

The participation of investors in the project involves the purchase of the GTurbo derivative, which is implemented as a financial instrument on the Ethereum blockchain platform;2 in its turn, GTurbo is secured by an industrial product - GTT-3PN gas turbine unit.The sale of GTurbo options will occur within the ICO (at the 1st and 2nd stages of the project - in June - August 2018). The acquisition of GTurbo options can be carried out with the help of the Ethereum blockchain.

In the early days, the option will be offered to investors "with a bonus" from the base cost of the GTurbo asset. A more detailed description of the terms of investment in the GTurbo option is available on the project website.1 The presented technology for the production of the GTT-3PN gas turbine unit is an existing production facility with an annual turnover of more than $16 million. The GTT-3PN gas turbine has a specific advantage over its "predecessor" GTT-3M, as well as higher service characteristics. This technology is in demand by the market, as the whole world uses ammonium nitrate in agriculture - fertilizer that can not be produced without our gas turbine units!

# References

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