

Modernization of plants' gas facilities: choice of delivery method and supplier

Objectives:

- suggest options for modernization of gas facilities
- define the best supplier
- calculate the payback of the project

Modernization of gas facilities of LLC "Osnova": basic data


LLC "Osnova" was founded in December 2004 and it is located in Lipetsk.

The main line of activity is the production of metal work (structures), including steel formwork/shuttering and its components for monolithic construction.


Types of activities that requires industrial gases and level of consumption:

1. Metal cutout using flame cutting.

Consumption: 200 cylinders / 40 litres*150 bar per month in accordance with GOST (national standard) 5583-78. Purity of O₂ is 99,5%.

<p>Oxygen cylinder 40l. GOST 949-73: small and medium-sized steel gas cylinders with operating pressure not more than 19,6 MPa</p> <p>Volume, l.....40 Weight of cylinder, kg.....60 Weight of gas, kg.....8,3 Operating pressure, MPa.....14,7 Diameter, mm.....219 Height, mm.....1430 Material.....steel 30ХГСА 45Д Type of locking devicevalve</p>	
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and 20 cylinders / 50 litres of propane per month as per GOST 20448.

<p>Propane cylinder 50l. GOST 15860-84: small and medium-sized steel cylinders for liquid hydrocarbon gases with the pressure up to 1,6 MPa</p> <p>Volume, l.....50 Weight of cylinder, kg.....22 Weight of gas, kg.....21 Operating pressure, MPa.....1,6 Diameter, mm.....299 Height, mm.....1015 Material.....steel B Cr.3 cn Type of locking device.....valve</p>	
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2. Metal products welding.

Consumption: 1500 cylinders / 40 litres*150 bar, welding mixture (80% argon+20%CO2) per month as per Technical Standard (TU) 2114-002-83807220-2010

Welding is done by robotic welding station or welding operators on stations. Number of stations – 80.

<p>Welding mixture cylinders 40l. GOST 949-73: small and medium-sized steel gas cylinders with operating pressure not more than 19,6 MPa</p> <p>Volume, l.....5</p> <p>Weight of cylinder, kg.....65</p> <p>Weight of gas, kg.....10.3</p> <p>Operating pressure, MPa.....14,7</p> <p>Diameter, mm.....219</p> <p>Height, mm.....1430</p> <p>Material.....steel 30XГСА 45Д</p> <p>Type of locking device.....valve</p>	
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At the moment, all gases are purchased from **GasTech** that deals with selling and filling-in of cylinders. Gas for filling the cylinders is purchased from gas producers in liquid form.

Purchase price of one cylinder for **LLC “Osnova”** is 200 RUR for an oxygen cylinder , 800 RUR for a propane cylinder and 500 RUR for a welding mixture cylinder.

All prices include VAT and delivery.

The company operates in 3 shifts and due to the large amount of orders the deadlines for the new products are postponed by 2 months from the planned ones. Wherefore the company can incur the penalty in the amount of 0,1% per day from the amount of the contract.

A proposal is required for modernization of gas facilities that will make them better/more efficient than the current ones.

Gas market description:

1. There are 2 more companies in the region of Lipetsk that delivers oxygen, propane and welding mixture in cylinders. They are situated at the same distance from **LLC “Osnova”** plant as the company **GasTech**:

- the **Cryogas** company: price for oxygen is 180 RUR/cylinder, for propane it is 700 RUR/cylinder, and for the welding mixture it is 520 RUR/cylinder.
 - the **Lider** company: price for oxygen is 210 RUR/cylinder, for propane is 800 RUR/cylinder, and for the welding mixture is 480 RUR/cylinder.
- All prices include VAT and delivery.

2. There's a metallurgical plant in Novolipetsk that has that has its own ASU (air separation unit) which produces liquid nitrogen, oxygen and argon for its own needs. Part of the produced gases is sold by the plant directly to the market. The distance from the plant to **LLS "Osnova"** is 15 km.

The price for 1 ton of oxygen is 6000 RUR, and for argon is 10000 RUR. The prices include VAT and based on customer pick up.

3. "**Air Liquide**" company has 7 plants in the central region, 3 of them (in Cherepovets, Kstovo and Balakovo) produce liquid nitrogen, oxygen and argon, another 4 (Zelenograd, Ryazan and Alabuga) produce only nitrogen and oxygen. Plants in Zelenograd and St.-Petersburg are also equipped with the filling stations.

Air Liquide offers the following prices with different delivery options:

a. Delivery of liquid product to Customer's bulk container.

Price for 1 ton of oxygen is 9000 RUR, for argon is 16000 RUR, for CO₂ is 18 000 RUR.

All process include VAT and delivery.

б. Leasing of gasifier and product delivery on a long-term basis (7 years). Price for 1 ton of oxygen is 15000 RUR, for argon is 21 000 RUR, for CO₂ is 33 000 RUR, all prices include rent of equipment and product delivery to Customer's site. Prices include VAT.

в. Delivery of cylinders 40 litre*150 bar, price for oxygen is 230 RUR/cylinder, for propane is 700 RUR/cylinder, for welding mixture is 555 RUR/cylinder. Delivery is done from Zelenograd. Cost of delivery is calculated by km and stands 50 RUR/km. Vehicle capacity is 180 cylinders. All prices include VAT.

г. Delivery of cylinders 50 litre*200bar, price for O₂ is 300 RUR/cylinder, for propane is 700 RUR/cylinder, for welding mixture is 694 RUR/cylinder. Delivery is done from Zelenograd. Cost of delivery is calculated by km and stands 50 RUR/km. Vehicle capacity is 180 cylinders. All prices include VAT.

д. Delivery of bundles of 16 cylinders *50 litre *200bar, price for oxygen is 6000 RUR/bundle, for welding mixture is 12 000 RUR/bundle. Delivery is done from Zelenograd. Cost of delivery is calculated by km and stands 50 RUR/km. Vehicle capacity is 12 bundles. All prices include VAT.

Properties of oxygen.

Presence in the world

Oxygen is the most widely spread element in the earth's crust, its share (in the composition of different compounds, mostly silicates) is about 47 % of the total mass of solid crust.

Physical properties

Gas without colour and odour, non-toxic.
Slightly heavier than air. Slightly soluble in water.

Application

For effective fuel combustion in metallurgy and rocket industry, for metal cutting, as therapy in healthcare, for food products packaging, as a reagent in the chemical industry, etc.

Key principles of application

Chemical properties

- Strong oxidizer, interacts with all elements except helium, neon, argon and fluorine by forming oxides.

Properties of argon.

Presence in the world

Argon is the third element of the air after nitrogen and oxygen.
The content of argon in the Earth's atmosphere is τ 0,934 % by volume and 1,288 % by mass.

Physical properties

Inert gas without colour and odour, non-toxic.
Heavier than air. Slightly soluble in water.

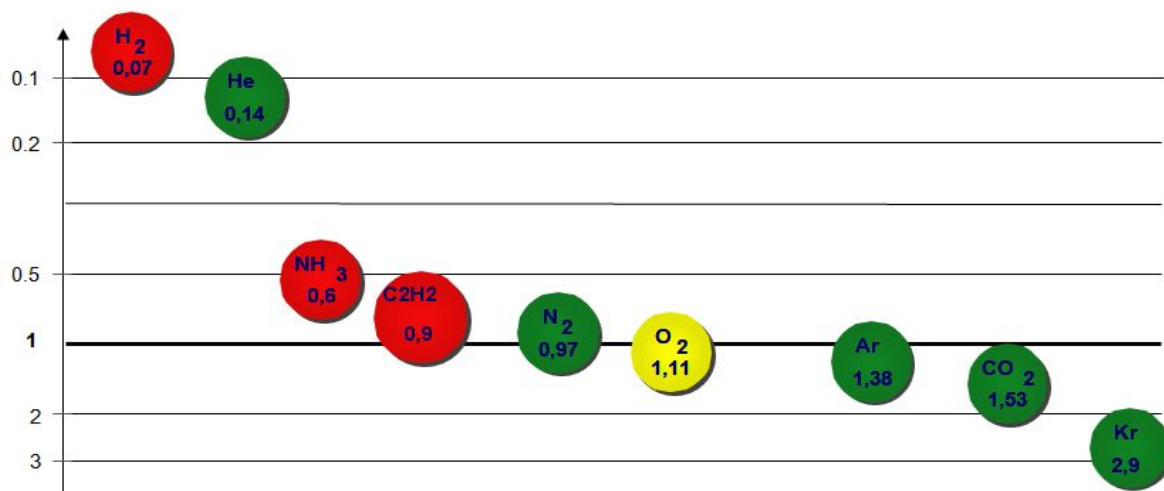
Application

As shielding gas in welding, for food products packaging, in incandescent lamps and in dual-pane windows. Metal alloys' cleaning.

Key principles of application

Chemical properties

- Inert gas



Air Liquide in the world

Air Liquide is the world leader in gases, technologies and services for Industry and Health. The company is present in 80 countries with approximately 80 000 employees and serves more than 2 million customers. Oxygen, nitrogen and hydrogen are essential small molecules for life, matter and energy. Production of industrial gases has been at the core of Air Liquide activities since its creation in 1902.

In Russia, Air Liquide produces and delivers to its customers a wide range of gas products, including industrial gases, special gases and gas mixtures.

At present the company operates 11 production sites in key regions of the Russian Federation. Liquid gases are produced in Moscow, Cherepovets, Ryazan, Kstovo, Alabuga and Balakovo.

Air Liquide has already committed to investing more than €450 million in Russia.

Our clients are companies from various branches of economy, such as: machine construction industry (engineering), including automotive, aviation and space, railway; metallurgy and metalworking industry, electronics, chemical industry, production of glass and home appliances, food industry.

Its own network of Air Liquide production sites located in different regions of the Russian Federation ensures proximity of production the end customer and availability of the required product in the right amount. That allows us to ensure reliability of gas supply to our customers.

Experience

- more than 100 years in industry

Expertise

- Technologies
- Production and logistics

Global infrastructure

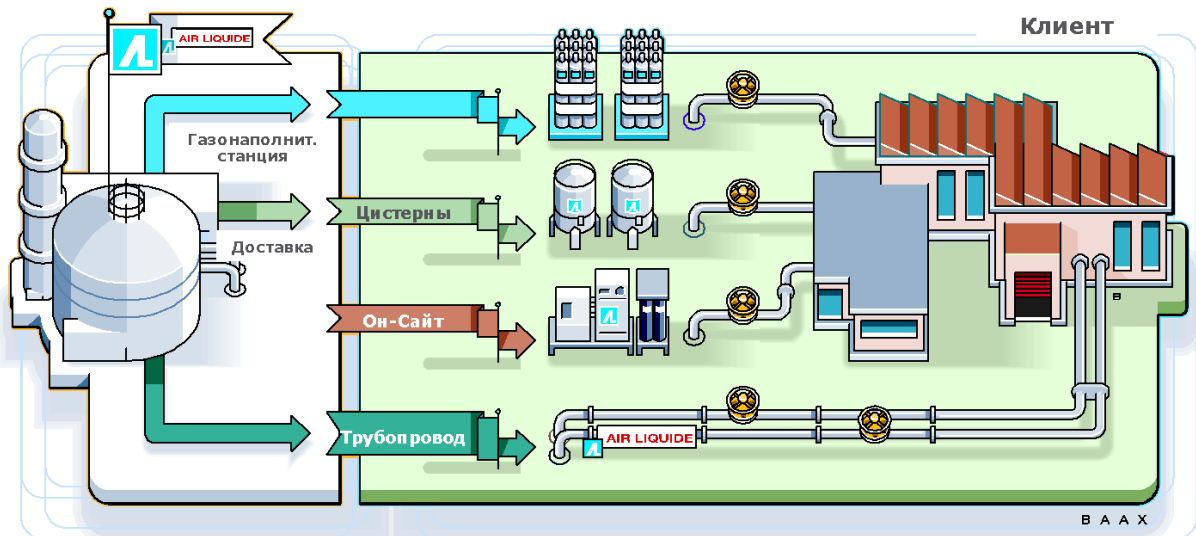
- present in 80 countries

Revenue

- 16,4 billion € in 2016

- 80 000 employees

Means of supply of industrial gases of Air Liquide



* gas filling station is a complex of the technological equipment designed for receiving, storage and filling of cylinders and bundles.

** on-site is a gas production facility at the territory of a client.

TASKS

Propose an efficient version of gas facility modernization

Provide a new variant of supply of the plant with industrial gases

- Show the main point of modernization
- Prove the choice by specifying the pros
- Indicate the risks of the proposed variant

Define the best supplier

Choose a supplier (from the existing at the market) and justify the choice coming from :

- Means of transportation
- Means of gas storage at the territory of the plant
- Additional equipment for delivery

Prove the economic effect of introducing modernization at LLC "Osnova"

- Investments/costs (description)
- Impact on production
- Calculation of economic effect (compare gas costs before and after modernization taking into account investments)

Criteria for assessment

<u>Technical solution</u>	30%
<ul style="list-style-type: none">• Description and advantages (choice rationale)• Innovation	
<u>Assessment of supplier:</u>	20%
<ul style="list-style-type: none">• Total costs for gas• Expenses for additional equipment• Construction costs	
<u>Business case (economic evaluation) and risks assessment</u>	30%
<u>Presentation skills</u>	20%