

## **Environmental issues of Karelia**

*The Republic of Karelia is a federal subject of Russia. It is a part of North-west Federal district. Its capital is the city of Petrozavodsk. It is the biggest city, 263540 people live there.*

*Population of Karelia: 643548. Total area of Karelia is 180 520 km<sup>2</sup>.*

### **Borders:**

- *Murmanskaya oblast, Archangelskaya oblast, Leningradskaya oblast, Vologodskaya oblast.*
- *Finland – length of borders is 723 km.*

**Time zone** – Moscow Time (UTC+4)

**The main relief** of the republic is a hilly plain, passing into the Western Karelian Hill.

**The climate** is mild with abundant rainfall. It changes among the Karelian area from marine to continental. Winter is snowy, cool, usually without great frosts. Summer is short and warm, with plenty of rainfall. Even in June there can be some freezing weather. To hot weather is quite rare, it can come in Southern Districts, and lasts 2-3 years even not every year. This year the beginning of winter was abnormally warm. The average temperature in November was more than 3<sup>0</sup>C higher the average monthly rate. In December – it was 8 degrees exceeded normal. But after that in February and even the beginning of March there was quite cold.

*The Republic of Karelia is rich of minerals, there are 175 deposits of 24 different minerals^ mica, quartz, feldspar, granite, diabase, marble. Also there are gold, silver, diamonds, iron ore, titanium, uranium.*

*There are about 27,000 **rivers** in Karelia, the longest one is Suna (280 km) with the waterfall Kivach and with a nature reserve. By the way it is one of the famous showplace in Karelia is the most frequently visited. Also in Karelia here are about 60000 lakes. Ladoga and Onega lakes are the biggest in Europe. In Karelia we have there national parks:*

- *Vodlozero National Park*
- *Kalevala National Park*
- *Paanajärvi National Park*

*Also there are two famous around the world national parks-museums – Kizhi and Valaam. They quite popular for foreign visitors.*

*85% of Karelian area is composed of state forest stock. The total growing stock of timber recourses is 807 million m<sup>3</sup>.*

*Kostomuksha and 4 northern districts are related to **extreme North**, and 11 districts of republic are equated to Extreme North. Thate statues give some benefits to people living and working in those areas.*

*A leading manufacture and producer of **electric and thermal energy** is TGK-1.*

*Petrozavodsk thermoelectrical plants the biggest one- provides 85% heat in Petrozavodsk.*

*17 hydroelectrical plants with total capacity of 634 MWatt. They produce about 70% of all electricity produced in Republic. Also there are 4 thermoelectrical plants of paper manufactures with total capacity of 204 Mwatt.*

*Transmission of electrical energy engaged in “Karelergo” – it is a branch of “Irregional Distribution Grid Company of the North-West”. The length of electrical transmission line networks is 10256 km.*

*In housing major energy are refined petroleum products (fuel oil, diesel fuel, coal and natural gas) which are supplied to district companies from outside the republic.*

*Since the beginning of Stockman gas field we plan to complete gasification of Karelia. (it is one of the world largest natural gas fields.) It lies in the central part of Russia sector of the Barents sea). For example, in the beginning of 2012 after agreement between Gasprom company and Karelian government – one of Petrozavodsk city district was connected to natural gas. This will reduce payment for heating and as well reduce harmful pollution and improve the reliability and quality of heat supply in the district!*

## **Industry**

*The republic as well **developed industrial base**, there are steel, wood and paper industry are dominated. In Petrozavodsk there are 83 different plants, main directions are energetic, chemical equipment, paper mill’s equipment, timber products, including windows and doors, bread, meat, liquer, milk production and so on.*

*With local resources there are timber, paper, ferrous metallurgy and building material industries.*

*The biggest factories are:*

### **1) Onega Shipyard. Petrozavodsk**

*Every year shipyard delivers there made vessels to the owner. It is aimed at opening up new projects and new technologies. It cooperates steadily with customers and designers towards to development of operating characteristics of the vessels:*

*Shipbuilding;*

*Modernization of ships and ship repair;*

*Equipment for ships;*

*Customers are Ukraine, Turkey, Estonia, Russia.*

### **2) Wartsila Hardware Plant. Wartsila**

*They produce steel ware, wire nails metal mesh. Customers: Russia, Lithuania, England, finland, france, Sweden, Germany, hungary, Portugal, Austria, Estonia*

### **3) Karelian Pellet KARElsky okatysh**

*Produces iron ore pellets with an iron concentration of 64-66%.*

*It complies with international quality standards.*

*Customers: Vologda, England, USA, China, Netherlands.....*

#### 4) OAO "Kondopoga"

Cellulose and paper production 80% - export , germany -41%, usa – 11,5%, turkey – 10%, 10%-karelia, 8%- s.petersburg.

#### 5) Lyaskelsky Paper Mill

Paper from pulp, width 3100-3300 mm, print paper, wallpapers.

#### 6) Petrozavodsk Mash

This Holding is the largest machine-building, standard equipment for the pulp and paper industry, ..., details , cases for nuclear reactors. It is a part of Russian federal corporation "Rosatom"

#### 7) Onezhsky Tractor Plant

It is one of the oldest plants in Russia. It was founded in 1703 and the city of Petrozavodsk started to grow there.

They make 20 types of machines for timber and other industries.

Export: to Siberia, East, Leningradskaya oblast and Belarus.

#### 8) Segezha Pulp and Paper Mill

The largest producer of craft paper and paper sucks in Russia

Export: Australia, Europe, India, UAE, Korea, USA, Tunis

#### 9) Suoyarvsky cardboard Factory

A manufacture paper products.

#### 10) Pulp mill "Pitkyaranta"

They produce capacitor, electrical and market pulp. They pay great attention to the environmental situation in the zone of influence on the environment, nature and introduces new energy-saving technologies and equipment, seeks to ensure environmental safety.

#### 11) Nadvoitsky aluminum plant

Is situated in central part of Karelia. They start to implement the project of modern gas treatment that will help to reduce emissions. Also they start a system of water circulation.

But still citizens of Nadvoitcy suffer with teeth and bone fluorosis because of harmful emissions. The reason is that the plant doesn't have filters.

#### 12) ZAO "Varyag" and Verf "Polar Odissey"

They build timber ships, including copies of historical ships, yachts and boats.

#### 13) Dairy plant "Slavmo"

*Different types of milk production, yougurts and ice-creams*

14) Karelian meat plant - a leading meat processing company of the Republic of Karelia.

The product range of the Karelian meat-processing plant includes the following groups: meats, and deli meats, prepared food, the meat of broiler chickens.

## Transport

*Transport in the Republic of Karelia is presented with intercity and urban transport systems. Intercity bus transportation is carried out (in Petrozavodsk, Karelia, and regional centers), as well as the trolley in Petrozavodsk. Long-distance transport by road, rail, air and water transport, international - by bus and by air (from Finland) By 1940 the length of roads paved in Karelia was 448 km. After the war, construction of roads of national importance was continued .In the Republic of Karelia is the main section of the federal highway"Kola", the length of it in Karelia is 969 kilometers*

### **Car roads:**

*The distance between Petrozavodsk and Moscow (the capital of Russia) is 1010 km, between Petrozavodsk and Saint-Petersburg – 412 KM. to get Finnish boarder it is 350 km.*

*The length of public roads is 7822 km. (as of 2006) [8]. Ministry ofConstruction of the Republic of Karelia developed a regional targetprogram "Development of Roads of the Republic of Karelia in 2015" . But the quality of the roads is still quite bad, they always repair it, but it doesn't help.*

**Bus city network** connection consists of 29 directions. The price of the ticket for one trip costs 15 rubles. Also there lots of suburban and intercity directions.

### **Trolleybus network**

*One of the most northern of trolleybus systems in the world and consists of 8 different directions. The price of the ticket for one trip costs 12 rubles*

*And of course there is taxi services available 24 hours.*

### **Air connection**

*12 km far from the city here is airport Besovec. It gives regular plane flights to Moscow and Helsinki.*

## **Water connection**

*It is one of the oldest transport in Karelia.*

*There regular sightseeing voyages Petrozavodsk - Kizhi and social voyages Petrozavodsk -Petrozavodsk and Shala – Velikaya Guba through the Sennaya Guba – Kizhi*

**Railway transport in the Karelia** - a major component of the infrastructure of the economy. It's 2,800 kilometers of railway tracks, about 15,000 highly skilled workers, 4 branch of the October Railway (Murmansk, Petrozavodsk, Volhovstroevskoe, St. Petersburg) and Arkhangelsk branch of the Northern Railway. The operational length of electrified railways is increasing every year. At the end of 2005 was fully completed the electrification of the section "Svir - Idel" line "of St. Petersburg - Murmansk." The electrification of the northern course of the October Railway has provided us the industrial centers of North-West - Murmansk, Karelia, Arkhangelsk and Komi republic - with other regions of Russia. Now turn on the electrification of the line "Kochkoma - Kostomuksha - Lyttä" and then commissioning of passenger and freight traffic.

## **Agriculture**

In general, in Karelia unfavorable climatic conditions for agricultural production. Agroresursny potential of the country is relatively small: the share of arable land accounts for only 1.2% of the total area.

Agricultural area is 219,000 hectares, about 60% of arable land is located on podzolic pochvahrzlichnogo composition. [35]

Agriculture is represented by such industries as livestock (mainly dairy and beef cattle), pig, trout, poultry, fur farming, crop production. Fodder crops are grown.

Travel company specializing in Karelia in the summer and winter forms of leisure, one way or another connected with nature.

In the summer of Karelia popular with boating enthusiasts, travelers, bicycles and cars, the fishermen and hunters. In Ladoga and Onega lakes cruise ships ply the various companies. In the winter time in Karelia have the opportunity to engage in all kinds of skiing, to participate in a safari on the dog or reindeer sledding, snowmobiling to travel. Travel agencies offer a variety of sightseeing tours, historical and cultural monuments. In January 2012 hosted an international sled dog race "on the ground Sampo." Develop horse riding - Horseback riders can enjoy the nature of Karelia on horseback in the winter and summer.

Operate year-round resort village Marcial Waters - the first resort in Russia, founded in 1719 by decree of Peter the Great.

Tourists visiting the western part of the republic, declared the border area should be in possession of proof of identity (national passport, children - birth certificate) for a possible passport control.

## **State of the Environment**

*In general, except the high-water pollution in the city, the state of the environment in Petrozavodsk is satisfactory.*

*The main source of water for Petrozavodsk is Bay of Lake Onega. The main sources of pollution are not treated sewage and waste water enterprise of the city, full of natural*

organic water of the river Shuya and precipitation.

During the 2000s the level of air pollution in the city of Petrozavodsk is assessed as satisfactory. Emissions of air pollutants from stationary sources in comparison with 1991 decreased by 8 times. The important factors in reducing the amount of progress indicators of industrial emissions were equipped with gas cleaning equipment of enterprises and the implementation of the transfer of some enterprises from boilers to natural gas. However, due to the growth of the individual and the transport route significantly it increased their contribution to total emissions of air pollution in the city, on a busy road urban routes **occupational exposure limit** is exceeded in several times. Petrozavodsk acutes problem of negative influence of municipal solid waste. As a result, the 25-year operation of the city dump around the town Orzega does not meet sanitary requirements. In the city there is no system of separate collection of household waste, recycling and disposal.

Within the city limits of soil contamination by pesticides in excess of the maximum level was observed. Contamination of land occurs in the oil industry and territories along the railway. Contamination with lead and zinc in excess of maximum permissible concentrations observed in the upper layers of the soil along the road and rail routes.

### **Ecological problems of the Lake Ladoga**

After World War II on the island Heynyasenmaa there experiments were conducted with combat radioactive substances, which served as a repository of captured destroyer, renamed the "Whale." Similar experiments were conducted on the island Konevets, where the end of the war of 1996 was the experimental station, which developed new types of weapons and explosives, has been tested on animals the action of organophosphorus agents.

Researchings showed that in Lake Ladoga more heavily contaminated sites. Nearly 600 industrial enterprises (Volkhov Aluminum Plant, power plants, boilers, petrochemical and asfaltobitumnye production, pyrolysis, and motor vehicles, burning landfill), including pulp and paper mills (Sias pulp and paper mill, and Svetogorsk Priozersky (closed in 1986 ) paper mills) and several hundred agricultural plants emit industrial waste into Lake Ladoga and its tributaries. Units of all those have modern wastewater treatment plants.

In the 1970s, the water of Lake Ladoga was on the existing standards is considered pure and were characterized by the class I quality. Today Ladoga is considered moderately polluted body of water, she assigned the class III. On some islands of the lake there was endicated the contamination.

According to the 2000 concentration of nickel, copper, zinc, lead, cadmium and cobalt in the bottom waters of the southern coastal part of Lake Ladoga and the rivers flowing into it are close to the mean concentrations in the rivers of the world. The iron content higher than the world average values for lake water 3 times, for the river - 13 times. Are two areas with abnormally high for the basin of Lake Ladoga content of heavy metals in dissolved form: estuarine zone of the river Maurier, where the concentration of nickel, cadmium and copper exceed the background values of 20, 10 and 3 times respectively, and the western part of the bay Petrokrepost, where the copper and zinc above background, respectively, 20 and 10. Particularly strong microbial contamination, different parts of the Volkhov Bay, east coast (estuaries Olonka, Tuloksy, Tulemayoki) and a number of areas of the northern coast (Priozersk, Pitkäranta, Lahdenpohja). Strong microbial

and toxic contamination is observed in the Svir Bay and parts of east coast (estuaries and Obzhanki Vidlitsa).

### Onego environmental problems

Whereas the area of the lake used to be virgin, the pollution level is gradually increasing, especially in the northwestern and northern parts which contain industrial facilities of Petrozavodsk, Kondopoga and Medvezhyegorsk. About 80% of the population and more than 90% of industry of the basin are concentrated in these areas. The pollution from these three cities amount to about 190 million m<sup>3</sup> of sewage and drainage water and 150 tonnes of emissions per year. Human activity results in about 315 million m<sup>3</sup> of drain water per year, of which 46% are industrial and household water, 25% is stormwater runoff and 16% is *melioration*-related drainage. This drainage contains 810 tonnes of *phosphorus* and 17,000 tonnes of *nitrogen*; 280 and 11,800 tonnes of these elements are removed through the River Svir whereas the rest accumulates in the lake. Ships and motor boats (about 8000 units) bring oil pollution at the level of about 830 tonnes per navigation year, as well as *phenols* (0.5 tonnes), *lead* (0.1 tonnes) and *oxides* of *sulfur*, *nitrogen*, and *carbon*.