



Development of the renewable power generation projects in Russia in terms of “Nord Hydro” experience



# Profile of Joint-Stock Company “Nord Hydro”



Joint-Stock Company «Nord Hydro» is the management hydrogenerating and engineering company which is carrying out activity in the area of development of projects on input new hydroelectric power plants, reconstruction and modernization of existing objects of small hydropower within the territory of the Russian Federation.

Within 2007-2010 experts of the company made a survey of more than 200 hydraulic engineering installations located in 30 regions of the Russian Federation. There are 36 objects of small HPS In the company's property.



In 2009 the maintaining division was created which is engaged in service and maintenance of a current condition of redeemed and rented objects of small hydroelectric power plants, and also service of the customer was created which is carrying out control of building and construction works.

In 2010 the division which carrying out functions of engineering survey was created.



By this time the company has all necessary permissions and licenses for performance of engineering surveys, design and building and construction works.

There are more than 70 experts, designers and engineers which are working in the Company.

# Current condition

## Company assets:

At the moment there are 37 small hydroelectric power plants in the company property; 4 operating small plants total capacity of which 8,5 MW; and 10 objects in a design stage. CJSC “Nord Hydro” implements projects of new small hydroelectric power plants construction in zones of centralized power supply, in zones isolated from centralized power supply, in permafrost based on operating and destroyed hydraulic structures.



## «Delovaya Rossiya»:

The management of CJSC “Nord Hydro” is the management of Federal inter-industry branch – sectorial division of renewable energy sources of all-Russian Public Organization “Delovaya Rossiya”. The activity of executives of this division aims employer’s association of the real sector of the Russian economy for the assistance in development of competitive market, domestic production, fair and effective market social system in Russia, middle class make-up – the class of a new russian property owners; assistance in affirmative actions of businessmen from the administrative pressure and corruption and in upholding of the interests of the russian business on the foreign markets, development of joint business projects; assistance in networking and enhancing cooperation with national and international organizations of employers all over the world; assistance in formality among the employers , setting up of charity and benefactor activities.



## Participation of the Company in legal framework development in the field of renewable energy sources:

The experts of CJSC «Nord Hydro» are included into working groups at the Minenergo of Russia, the Market Council and other Departments carrying out the improvement of legal and regulatory framework with regard of development of Renewable energy sources in Russia. Besides, the experts of the company are included into the Russian-Finnish, Russian-Swedish and Russian-Czech working groups created at the Minenergo of Russia for cooperation in the area of renewable power generation.

In a number of districts and regions of Russia «Nord Hydro» projects of reconstruction and construction of objects based on Renewable energy sources are included in federal and regional Programs of perspective development of power and in the Programs of social and economic development of Russian regions.

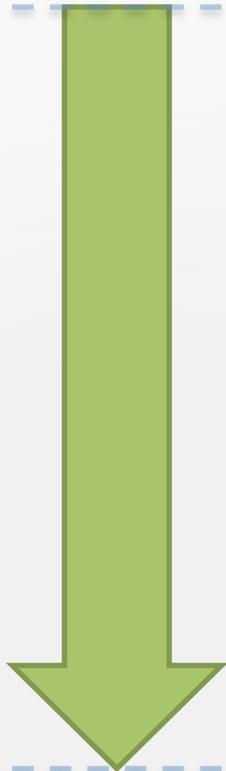
The “Nord Hydro” Project of development of small hydropower in Russia was included in the List of priority capital investment projects of Northwestern Federal District and was approved by the Ministry of Finance of the Russian Federation and the Minenergo of Russia.



# Implementation of instruments of development of small Hydropower on wholesale power market in Russia

Regulatory legal acts amendments under date of 28-th of May 2013 :

2012



2013

The Government decree of the Russian Federation № 449 under date of 28.05.2013 “Concerning the instruments of stimulating of using renewable energy power on wholesale electricity and power market”

1) The Government decree of the Russian Federation № 426 under date of 03.06.2008

- The qualification of the generating objects regulations
- The price formation for the renewable energy sources regulations
- Methodology for the admeasurement of expenditures which are being compensated at the expense of demand charge of renewable energy sources
- Methodology for the estimation of price component (capital expenditures and operation expenses returns)

2) Charter of the Ministry of Industry and Trade of the Russian Federation set by the Government edict of the Russian Federation N 438 under the date of 05.06.2008

- Determination order of the localization level of the objects based on renewable energy sources

**The Government edict of the Russian Federation № 861-p under date of 28.05.2013**

The tasks concerning the ratio increase of ecologically-green renewable energy sources in power balance of Russia were set by the Government edict of the Russian Federation № 1-p under date of 08.01.2009

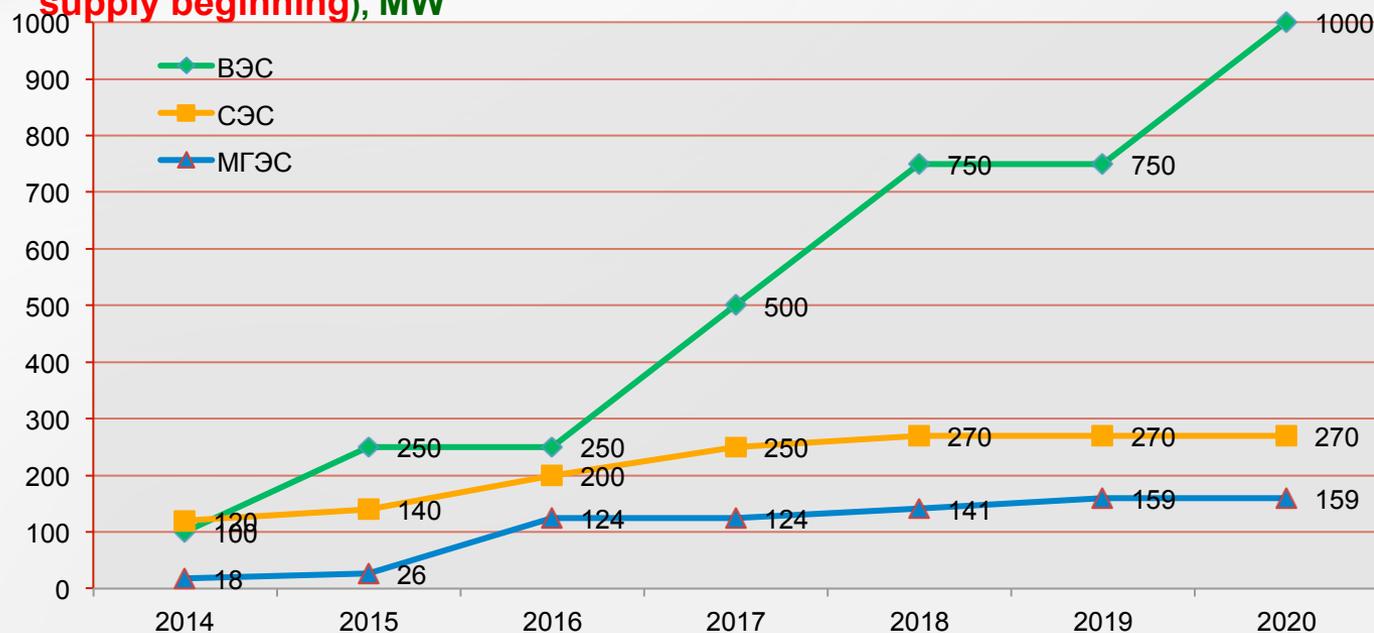
“Concerning the main course of the state policy with regard to the energy efficiency of power sector based on renewable energy sources until 2020”- Performance targets of the rate of total input of total capacity of generating object based on renewable energy source

- Performance targets of the localization level of production of the basic and (or) auxiliary generating facility for renewable energy sources within the territory of Russian
- Marginal measures of capital expenses for 1 kW of of total capacity of generating object based on renewable energy source

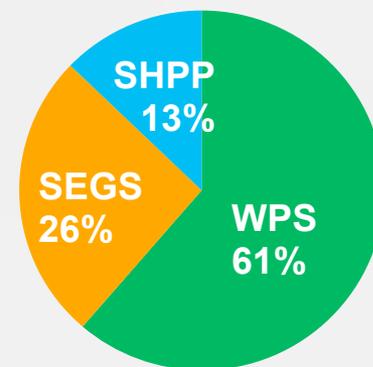
**10-th of September 2013** – the first competitive selection of investment projects in the field of renewable energy power for the year 2104 finished.

# Input amount, localization indices

Installed capacity of RES by the power competitive selection (for the year of the supply beginning), MW



RES structure for the year 2020



Localization level in terms of object type for 2014-2017

| Object type/ year | 2014 | 2015 | 2016 | 2017 |
|-------------------|------|------|------|------|
| WPS               | 35%  | 55%  | 65%  | 65%  |
| SEGS              | 50%  | 50%  | 70%  | 70%  |
| SHPP              | 20%  | 20%  | 45%  | 45%  |

# Main parameters of supporting of development of SHPP projects on wholesale power market in Russia put in regulatory legal acts

| Value   | Indicator name   |
|---|--|
| <p>SHPP &gt; 38%</p> <p>WPS &gt; 27%</p> <p>SEGS &gt; 14%</p>                         | <p><b>ICUF</b><br/>(limiting value of installed capacity utilization factor of the RES object – hydrogeneration)</p>         |
| <p>SHPP &lt; 3,4 K EURO</p> <p>WPS &lt; 2,7 K EURO</p> <p>SEGS &lt; 1,53 K EURO</p>   | <p><b>CAPEX</b><br/>(marginal amount of capital expenditures for 1 kW of RES object in 2014)</p>                             |
| <p>SHPP &lt; 3,95 K EURO</p> <p>WPS &lt; 2,33 K EURO</p> <p>SEGS &lt; 2,74 K EURO</p> | <p><b>OPEX – SHPP</b><br/>(marginal amount of operating expenditures for 1 MW of RES object per month in prices of 2012)</p> |
| <p>15 years</p>   | <p><b>Payback period of RES projects</b><br/>- from the time of the putting the object into operation;</p>                   |
| <p>14 / 12 %</p>  | <p><b>Annual return on investment</b><br/>(2014/ after 2014)</p>   |

# Prospects of development of the Company

## Objects of the company:

According to the company's plan by 2020 CJSC "Nord Hydro" will have occupied 20% overall total of new start-up capacity in the field of renewable power generation in particular water energy and will have localized up to 75% of production for small hydroelectric power plants within the territory of the Russian Federation.



## Sources of financing of the projects implemented by the company:

For the purposes of the project finance of construction of small hydroelectric power plants CJSC «Nord Hydro» signed investment contract with the state Bank for Development and Foreign Economic Affairs in 2011. The total sum of financing of the 1-st stage of the Program of CJSC «Nord Hydro» is 40 mln. euro. The Project of the company passed 3 bank examinations including: marketing, technical and insurance examinations with the participation of independent experts including the company Mott MacDonald (England).



## International cooperation:

On the 21-st of February 2013 CJSC "Nord Hydro" signed Cooperative Agreement with the Czech company «TES VSETIN s.r.o.» for the purposes of the implementation of attractive projects of development (reconstruction, modernization and construction) of objects of small hydropower and production location of parts of hydrogenerators in Russia. According to the Cooperative Agreement parties to the Agreement determined criteria that provide production of 56 hydrogenerators with the total capacity of 137,5 MW within the territory of the Russian Federation by 2020. This is the first case in Russia when technology transfer for the implementation of the renewable power generation project is realized by the private company.



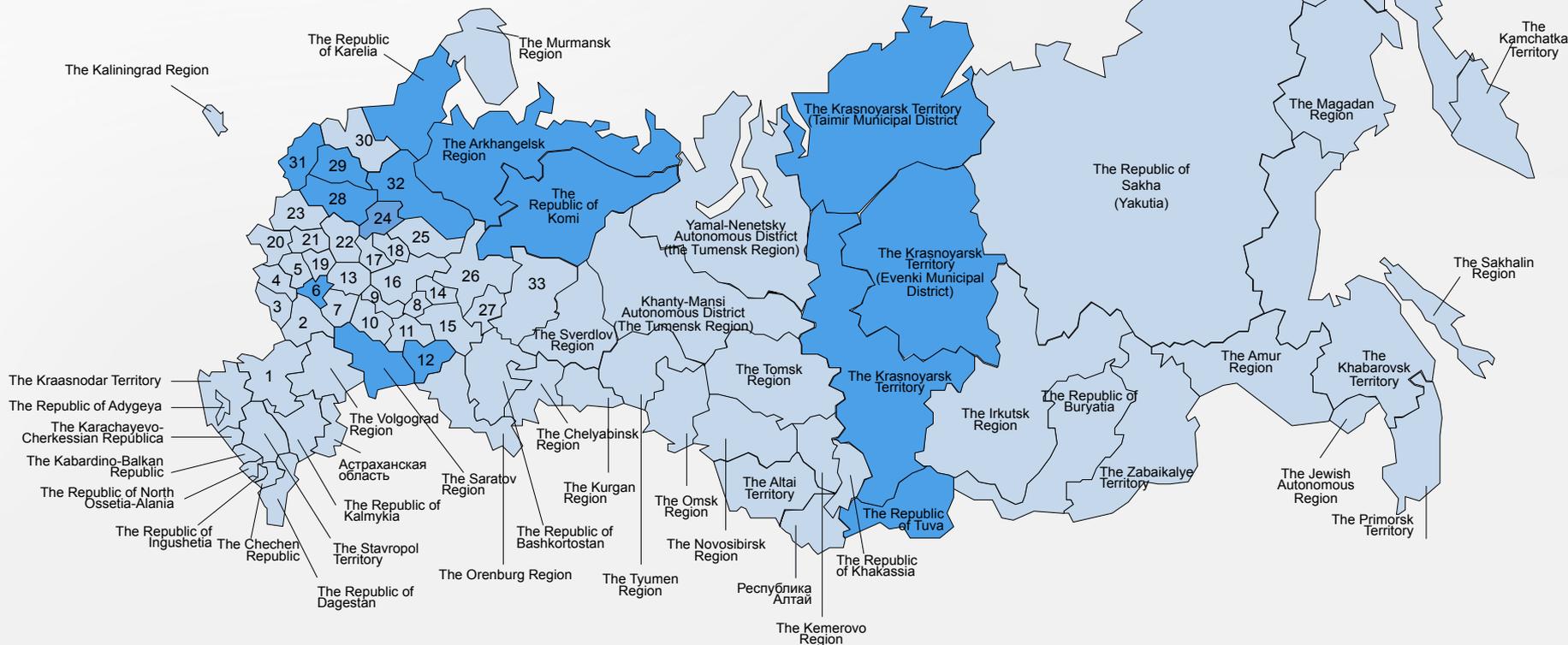
## Agreements with the Regions of the Russian Federation:

For the purposes of development of local electric power system the company signed Cooperative Agreements in the field of electric power industry with the Governments of 13 constituent entities (such as the Vologda Region, the Arkhangelsk Region, the Novgorod Region, the Pskov Region, the Samara Region, the Saratov Region, the Lipetsk Region, the Tver Region, the Yaroslavl Region, the Republic of Karelia, the Komi Republic, the Republic of Tuva, the Krasnoyarsk Territory). According to this Cooperative Agreements the activity of all parties is directed on development (reconstruction and modernization) of particular objects of small hydropower and supporting events for its start-up.



# Map indicating the Regions where “Nord Hydro” has the signed Cooperative Agreements in the field of electric power industry

- |                        |                         |                             |                                |
|------------------------|-------------------------|-----------------------------|--------------------------------|
| 1. The Rostov Region   | 5. The Oryol Region     | 9. The Republic of Mordovia | 13. The Ryazan Region          |
| 2. The Voronezh Region | 6. The Lipetsk Region   | 10. The Penza Region        | 14. The Republic of Marij El   |
| 3. The Belgorod Region | 7. The Tambov Region    | 13. The Ulyanovsk Region    | 15. The Republic of Tatarstan  |
| 4. The Kursk Region    | 8. The Chuvash Republic | 14. The Samara Region       | 16. The Nizhni Novgorod Region |



- |                         |                                       |                          |  |
|-------------------------|---------------------------------------|--------------------------|--|
| 17. The Vladimir Region | 21. The Kaluga Region                 | 25. The Kostroma Region  | 30. St-Petersburg and the Leningrad Region |
| 18. The Ivanovo Region  | 22. Moscow city and the Moscow Region | 29. The Udmurt Region    | 32. The Pskov Region                       |
| 21. The Tula Region     | 23. The Smolensk Region               | 30. The Tver Region      | 33. The Vologda Region                     |
| 22. The Bryansk Region  | 24. The Yaroslavl Region              | 31. Новгородская область | 34. The Perm Region                        |

## The first implemented project in Russia of construction of a "green" energy source

On September, 5th, 2011 in Karelia, in settlement Ljaskelja of Pitkjarantsky area the pilot project of Joint-Stock Company "Nord Hydro" on construction of small hydroelectric power plant - "Ljaskelja" was set going. The hydroelectric power plant capacity in 600 kw has stopped energy generation in 1989. It was reached a decision to redeem and reconstruct this plant in 2007. By means of this small plant it's possible to receive 4,8 MW of electric power.



**СОВЕТ РЫНКА**  
ПО ОРГАНИЗАЦИИ ЭФФЕКТИВНОЙ СИСТЕМЫ  
ОПТОВОЙ И РОЗНИЧНОЙ ТОРГОВЛИ  
ЭЛЕКТРИЧЕСКОЙ ЭНЕРГИЕЙ И МОЩНОСТЯМИ  
НЕКОММЕРЧЕСКОЕ ПАРТНЕРСТВО

On **January, 20th, 2012**, Supervisory board nonprofit partnership "Sovet Rinka» in accordance with the established procedure concluded to give the **qualification** of small hydroelectric power plant " Ljaskelja" as an object operating on the basis of the renewed energy source – energy of water.

At this rate "Nord Hydro" is the first company in Russia which put into practice the potentialities of imposing "green" tariffs for electric power which are in accordance to legislation in force.

# Condition of the plant before reconstruction

## General view inside (the old equipment):



## General view outside (the headrace channel, hydroelectric power plant building):



# Condition of the plant after reconstruction

**View on the headrace channel before (at the left) and after (on the right) reconstruction**



**General view on hydroelectric system constructions**



**View on hydraulic turbine inside the machine hall:**



# Main design parameters of SHPP "Ljaskelja" after reconstruction

## Design parameters of SHPP

4 800 kW

Installed capacity of SHPP

28 mln.kWh

Annual power output

13 meters

Design value of water head

40 M<sup>3</sup>/sec

Design value of water flow

~18,6 mln.EURO

Total investment value



# Examples of the Projects which has been launched by Joint-Stock Company “Nord Hydro” in Northwestern Federal District

The Vologda Region – Cherepovetskaya plants 1,2 – 4 MW  
(stage of initial permission documentation gathering)



The Komi Republic – Kazhim plant 450 kW  
(stage of design approval in state expert appraisal)



Karelia – Kalliokoski plant 950 kW  
(construction stage)



Karelia – Beloporozhskaya plants 1,2 – 50 MW  
(implementing of engineering surveys stage)





**HPP «Turinskaya» - Krasnoyarsk Region**



# Dam



Фотография расположения створа плотины (вид с нижнего бьефа)

# Example of the implementation of the projects of SHPP construction in the regions isolated from centralized power supply by JSC “Nord Hydro”

Project of construction of SHPP «Turinskaya» in the village Tura in the Krasnoyarsk Region:

## Information about the village:

The village is isolated from centralized power supply. At the moment the power supply of the village is 3 diesel power plants working on imported diesel. In 2012 power output was **28,14 mln.kWh** in the village. At the present moment tariff for the electricity in the village is **21,75 rub/kWh**. The population of the village is approximately 5 500 people.

Existing electric and heat demand for the territorial budget on subsidization of the difference in residential tariffs is **approximately 23,26 mln. Euro**.

## Information about the project:

Installed capacity of SHPP- **8500 kW**

Annual power output - **49,19 mln.kWh**

Total investment value (including VAT) – **90,77 mln. Euro**

Tariffs for the 5-7 years payback period- **26,44/20,59 rub/kWh**.

Tariffs reduction for the electricity for legal entities (for the payback period of the project) **>20 rub/kWh**.

Cost cutting for subsidization of tariffs for the residential tariffs for the budget of the Krasnoyarsk Region (for the payback period of the project) - **for 20 rub/kWh. or 7 mln.Euro/year**

Tax revenues in regional budget (for the payback period of the project) – **more than 23,26 mln. Euro/year**

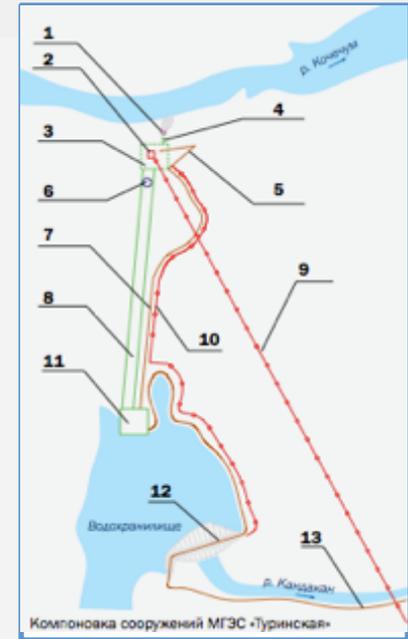
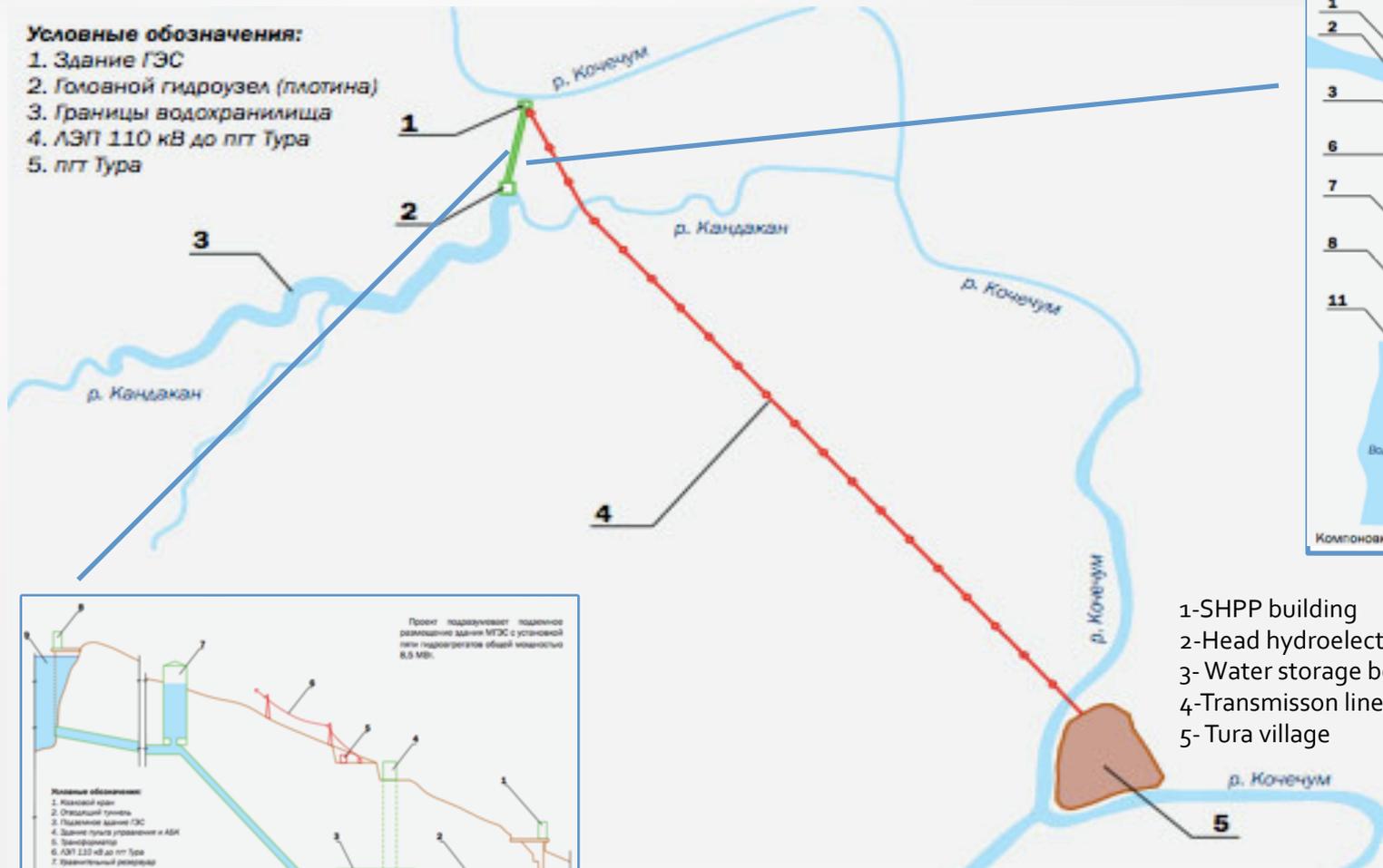
Reduction of the value of imported nonrenewable source (residual oil, diesel) - **for 20 thousands tonns/year**

# Example of the implementation of the projects of SHPP construction in the regions isolated from centralized power supply by JSC "Nord Hydro"

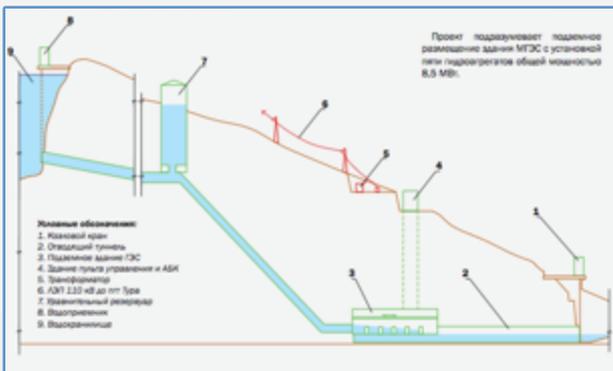
Sketch map of power supply of the village Tura from the SHPP "Turinskaya":

Условные обозначения:

1. Здание ГЭС
2. Головной гидроузел (плотина)
3. Границы водохранилища
4. ЛЭП 110 кВ до пгт Тура
5. пгт Тура



- 1-SHPP building
- 2-Head hydroelectric complex (dam)
- 3- Water storage borders
- 4-Transmission line 110 kV up to the village Tura
- 5- Tura village



**Thank you for your attention!**

**Joint-Stock Company  
“Nord Hydro”**

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