"CONSTRUCTION OF A HYBRID ELECTRIC STATION WITH THE USE OF BIOGAS AND SOLAR TECHNOLOGIES, TOTAL CAPACITY OF 9.5 MW, IN ALMATY REGION OF THE REPUBLIC OF KAZAKHSTAN".
LEGISLATIVE STANDARDS FOR RENEWABLE ENERGY SOURCES (RES)

According to the Resolution of the Government of the Republic of Kazakhstan dated June 12, 2014 №645, the fixed electricity tariff of RES:

- FOR BIOGAS - 32.23 Tg. per kW/h.
- FOR SOLAR TECHNOLOGIES - 34.61 Tg per kW/h  
- FOR SOLAR TECHNOLOGIES in case of using of solar panels made by local company “Astana Solar” - 70 Tg. per kWh/h

TARIFF GROWTH AFFIXED TO ANNUAL INDEXATION FOR INFLATION.

In accordance with the Law on RES, Validity of fixed tariffs - 15 years.

The energy transmission organizations are obliged to provide the Suppliers with unimpeded access to the transmission networks of electric energy, the Suppliers are exempted from paying for energy transmission services to energy supplying enterprises.
STRUCTURE AND STAGES OF CONSTRUCTION

ON THE TERRITORY OF 14 HECTARE WILL BE PLACED:

- **SOLAR POWER PLANT** - 4,57 MW
- **BIOGAS POWER PLANT** - 4.8 MW + 0.1 MW (Solar panels)
- **INFRASTRUCTURE** (transmission line, transformer substation, distribution point, TECHNICAL WATER)
- **PLANT OF ORGANIC FERTILIZERS**

**STAGE I:**
- SOLAR POWER PLANT - 4,57 MW
- BIOGAS PV - 2,4 MW. + (Solar panels on the technological objects of the Biogas PV) - 0.1 MW
- INFRASTRUCTURE for 10 MW (transmission line, transformer substation, distribution point, TECHNICAL WATER) 10 MW

**STAGE II:**
- EXPANSION OF THE BIOGAS PV BY 2.4 MW
- Construction of a plant of organic fertilizers. The raw material for the Plant will be biomass made of Biogas Plant. The capacity up to 30 tons per day.
SCHEDULE OF CONSTRUCTION

- **2019 IV**: Start of the construction of the transmission line
- **2019 VI**: Start of the construction of the BGS
- **2019 VII**: Start of the construction of solar PV
- **2020 III**: Start of the stage I
- **2020 V**: Start of the stage II

- **2020**: Start of construction of the organic fertilizers plant
Why Almaty Region?

Almaty Region Fact Sheet:

Population 2 million
Area – 224 000 km2
Ranked first in Kazakhstan for the of gross products in agriculture - 15.7%.

More than 54 thousands of agricultural units.
Cultivates about 30 different types of crops.
Breeds 45 species of agricultural animals.
Produces more than 35 kinds of processed food products.
Ranked first in Kazakhstan by the number of livestock, horses and poultry, second - sheep and goats.

AVERAGE DURATION OF SUNNY DAYS > 2500 HOURS IN YEAR
THE AVERAGE PEAK POWER IS UP TO 1200 W / m² PER YEAR
Location of the Power Plant

The Power Plant will be located in Ili region Almaty city.

The Plot will be used for the construction of an electric station and solar panels.

The land area for Biogas Plant & Plant of Organic Fertilizers – 6 hectares.

The land area for Solar PV - 8 hectares.
SITE PLAN

Biogas station - 4.8 MW

Solar PV – 4.57 MW

Distribution point, transformer substation, transmission line

Organic Fertilizers Plant
ADVANTAGES OF THE HYBRID PROJECT

• SURPLUS OF BIOGAS WILL BE ACCUMULATED AND DIRECTED TO THE ADDITIONAL COGENERATION ENGINE OF THE SOLAR PV, INSTEAD OF COMBUSTION IN THE TORCH.

• THE COGENERATION ENGINE (1,2 MW), ON THE TERRITORY OF THE SOLAR PV, WILL BE USED FOR ENERGY BALANCING, THAT WILL ALLOW TO INCREASE EFFICIENCY OF THE SOLAR PV FROM 24% TO 38%.

BIOGAS AND SOLAR POWER PLANTS USE THE GENERAL INFRASTRUCTURE (TRANSMISSION LINE, DISTRIBUTION POINT) FOR THE TRANSFER OF ELECTRICITY.
TECHNOLOGIES

SOLAR PV

- The installed capacity of 8 hectares is 4.57 MW.
- The power of one panel is 320W.
- Total - 14,292 panels, combined by 18 panels in a string.
- 4 inverters type SG500MX capacity of 500 kVA.
- 4 inverters type SG630MX capacity of 630 kVA.
- The angle of inclination of the supporting structure under the photovoltaic panels is 35 degrees.
- Cogenerator (Jenbacher) 1.2 MW.

BIOGAS POWER PLANT

- Technology - "dry" and "liquid" fermentation.
- Dry method - 2.4 MW, liquid method - 2.4 MW.
- The Biogas PV will be work with all types of organic waste.
- Up to 300 tons of organic waste per day.
- 4 cogenerations (Jenbacher) at 1.2 MW.
THE MAIN ELEMENTS OF HYBRID PLANT

BIOREACTORS (DRY AND LIQUID METHOD OF FERMENTATION)

COGENERATOR (JENBACHER)

PHOTO ELEMENTS

LOADERS
Usage of the Heat from Cogenerators

• Exhaust gas heated to the temperature 450°C flows from cogeneration units through the special pipeline into a drying chamber for organic fertilizers.

• Usage of the Heat from Cogenerators

  - Performance of the drying chamber 50 tons of biomass with 65-67% of moisture per day.

  - Uses heat from co-generators up to 4 MW/h

The Line of drying chamber, granulation, and packaging of organic fertilizers.
Production of Organic Fertilizers

Equipment of the drying shop uses heat generated by the co-generator.

Drying, granulation and packing line of organic fertilizers. Capacity up to 50 tons per day.
Drying system uses organic materials from bioreactors in Biogas Power Plant.
Organic Fertilizers

- Humus is 15-20 times more efficient than chemical fertilizers.
- Specific micro flora and enzymes contained in humus are able to revive "dead soil".
- Humus preserves high fertility for 3-4 years.
- Due to specific processing in Biogas Plant organic fertilizers are completely decontaminated from pathogenic micro flora.

- Bio-fertilizers are highly resistant to the washing off the soil of the nutrients.
- During one season about 80% of the nutrients are washed out, while only 15% of nutrients are washed out from the soil with bio-fertilizers.
- Organic fertilizers work 3-5 years longer than mineral fertilizers.
SUMMARY OF THE PROJECT

- Sources of investment - investment banks and private investors, European and other funds involved in the support of the "green economy".
- Total Investment in the project – €17.7 million.
- Project implementation period – 2 years.
- Up to 30 new job positions.
- Solution of environmental issues of the district – utilization of up to 15 million m³ of greenhouse gases per year.
- Processing of up to 170 thousand tons of organic waste per year.
- Production of 15 thousand tons of solid fertilizers per year.
- Electricity production – 9,4 MW/h.
- Payback period – 6 years.
Thank you for attention

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