

CLEANTECH INDUSTRIES IN RUSSIA

Шевцова А.А. Трушкова Т.В.,

Научный руководитель доцент Трушкова Т.В.

Сибирский федеральный университет

The term “cleantech” according to our definition breaks down into five groups of technologies:

- alternative energy and renewables: wind power, photovoltaics, solar hot water and CSP, biofuel, biomass, biogas, mini hydro power plant, tidal and wave power, hydrogen power;
- energy management systems: smart power systems, advanced batteries, power efficiency;
- green transport: electric vehicles and hybrid electric vehicles, alternative fuel;
- waste and emission management, water and air resources: waste collection and transportation, recycling, disposal; water treatment, air treatment; environment recovery;
- innovative technologies and materials: nanotechnologies, bio technologies, eco-friendly materials.

Alternative energy and renewables

Comparing to the USA and EU the proportion of renewables used for energy generation in Russia is much lower. The main reasons are high availability of traditional fossil fuels and little attention to environmental problems paid by the government, business and households. One of the main obstructions to building large power plants working on renewables is the lack of regulations on the feed-in tariff, according to which the government would purchase electrical power produced from renewables.

Wind Energy

In the beginning of 2010 the gross installed capacity of wind turbines in Russia amounted to 18 MW. In the last four years this exponent has grown only by 4MW. Wind turbines account only for 0.008% of all energy generating objects in Russia (220 GW). Russian park of turbines consists of more than 1 600 small turbines with a capacity of 0.1–30 kW and 10 large wind farms delivering up to 90% of total capacity. Among the largest wind farms are Koulikovskiy station (Kaliningrad Oblast, 5.4 MW), Chukotskaya station (the Chukotka Autonomous District, 2.5 MW), Tyupkildy wind power station (the Republic of Bashkortostan, 2.2 MW). The use of installed power at these stations is equal or less 12.5%. Today private initiators have presented several investment projects with installed power of 100 MW and more per each. There are about 20 wind turbine producers in Russia, but they all work with small and medium turbines producing less than 500 kW of power.

Photovoltaics

On the photovoltaics market Russia plays a role of raw materials and products exporter. Absence of home consumption can be explained by the fact that favorable levels of solar radiation fall within relatively low-income regions: South-West, Southern Siberia, Far East. Consequently, in the beginning of 2010 the total capacity of installed photovoltaic power plants amounted to less than 1MW. Despite the absence of inner market and bleak perspectives of its development Russian photovoltaic industry has grown rapidly being oriented towards the European market. During the period of polysilicon shortage on the global market the silicon waste and crushed slabs were imported to Russia from Europe. Using these raw materials many Russian companies

grew monosilicon ingots, cut slabs and produced solar cells. One of these products was exported back to Europe. The annual turnover of this business reached 400 tonnes, but it is decreasing every year. The gross installed capacity of enterprises of the further chain (modules, batteries) accounts to less than 50 MW.

With the assistance of Rusnano the Nitel polysilicon factory was built in Irkutsk Oblast (3 800 tons a year) and three large factories of solar cells and modules with the total capacity of 300 MW are being built.

Biofuel

As of 2010 bioethanol and biodiesel are not produced in Russia due to the lack of government support. Producers are not sponsored, there are no standards for biofuel, gasoline and diesel compounds or any consumption targets.

In Russia bioethanol is officially equated with food-grade alcohol with excise duty more than RUB 30.5 (\$1.02) per liter. It is higher than the price for gasoline at a fuel station. There are too few oil-bearing crops (rape and sunflowers) grown in Russia for developing biodiesel production, which has competitive price.

Biomass

Thanks to large timber reserves wood pellets industry is well developed in Russia. Nowadays there are approximately 100 manufacturers of wood pellets in the country. Larger and higher capacity factories (up to 300 thousand tons per year) have recently been built.

In 2009 the production of pellets amounted to 700 mt, 619 mt of which were exported. The major trade areas for Russian exporters are European countries, where pellets are used for power generation: Sweden, Denmark, Belgium, The Netherlands.

Other renewables

Among other types of renewables it's worth mentioning OAO Rusgidro's projects carried out in the field of mini-hydro power plants. OAO Rusgidro involves Russian water-power stations with total capacity of 25GW. The company also realizes the program in the area of wind energy. Russia has a great potential in the field of tidal power. The total power of Russian tidal stations in projection stage amounts to 100 GW. Meanwhile there are only two projects with total power of 5MW being at the stage of approximate commercialization. Projects in the sphere of solar power and wave power are still disparate. In spite of vast theoretical background hydrogen power isn't still commercialized either.

Ecofriendly Transport

The largest Russian automotive manufacturing plant OAO AvtoVaz has been working on electromobility since 1974. For more than five years it had developed several prototypes, which unfortunately haven't been put to serial production because of the absence of infrastructure. The probability of producing electromobility at Russian plants in the nearest two years is very low because of the lack of domestic demand, climate and non-competitiveness of Russian automobiles on foreign markets.

Waste management, emissions, air and water treatment

The annual volume of domestic waste production in Russia exceeds 40 mln ton, 35% of which are appropriate for recycling. The absence of separate collection of waste is a serious problem in the field of domestic waste in Russia. That is why among the basic methods of waste management are household waste combustion, distribution into special sites, and expensive

sorting on specialized lines of waste processing plants and waste sorting plants. Wastepaper (40%) and glass waste (35%) have the highest converting rates among all types of household waste. Stock utilization of worn-out tyres and plastic waste amount to 8% and 5% respectively. Separate recyclable materials' markets in Russia have the following characteristics: paper waste – \$260 mln (40% stock utilization); plastic waste – \$110 mln (5% stock utilization), glass waste – \$26 mln (35% stock utilization), worn-out tyres – \$19 mln (8% stock utilization).

In the beginning of 2001 there were 4 waste incinerators, 5 waste processing plants, 39 waste sorting plants in Russia. Initiators are planning to build several large waste processing plants in various regions of the country. Programs in the sphere of water resource management refer to initiatives of regional and municipal officials, industrial enterprises, which clean, recycle and reduce the volume of sewage.

Innovative technologies and materials

Research in the field of nanotechnologies in Russia is carried out by more than 150 organizations with nearly 20 000 analysts in total and about 80 specialized enterprises. 80% of market players are state-owned companies or quasi-state-owned companies. The nanotechnology based products sales revenue of Russian companies in 2009 is estimated at RUB 9-10 bn, 176 mln of which is the revenue of 176 mln of which is the revenue of the primary project organizations with the participation of Rusnano. This exponent falls behind the target value amounting to RUB 900 bn (\$30 mln) by 2015. The major areas of interest of Russian nanomaterial producers are nanocomposites, nanopowders, carbon-based nanomaterials (nanodiamonds, CNT, fullerene), nanoparticles, and nanomembranes. The volume of production and consumption of nanomaterials in Russia are still low. For instance, at the end of 2009 the volume of carbon-based nanomaterials market was estimated at 400 kg, 90% of which are detonation nanodiamonds.

Conclusion

Russian clean technology industry is still at the early stage of commercialization of the accumulated scientific potential. Thanks to the government support, which is connected to nanotechnology and energy efficiency programs Russian and foreign initiators get significant opportunities for realizing their projects. The low level of personal income and the lack of steady development tradition is a serious deterrent both in business and in households. The former condition leads to low potential of domestic market, which Russian initiators orientate on.