and weather instability, demand considerable costs of creation of receivers, converters, accumulators, regulators, etc [2].

Renewabl forces to create the big areas of power installations "intercepting" a stream of used energy . It leads reception surfaces of solar installations, the area to a big material capacity of similar devices, therefore, to increase in specific capital investments in comparison with traditional power installations. However, increased investment subsequently recouped by lower operating costs, but in the initial stage they beat sensitive afford those who want to use renewable energy.

As for "free of charge" the majority of types of Renewabl, this factor is leveled by considerable expenses on acquisition of the corresponding equipment. Some paradox, consisting that the rich countries though more developing countries need it are capable to use free energy, mainly, renewablults, but owing to the poverty have no funds for acquisition of the necessary equipment. The rich countries as Russia, don't show power hunger and show interenewablt to alternative power engineering for reasons of ecology, energy saving and diversification of power sources[3].

Therefore large-scale application of renewabl is a problem which demands system approach which is shown in many countries, and substantially – through legislative base.

References:

1. International Energy Agency. Energy Use in the New Millennium. 2008. 3-4.
2. Malik L. C. Nonconventional ecology. 2011. URL: http://www.ng.ru/energy/ (date of treatment:22.05.2014).
4. Resources and the efficient use of renewable energy in Russia / under. Ed. PP Bezrukikh Science, 2002. P. 214-213.

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Solar power towers

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The solar power tower, also known as 'central tower' power plants or 'heliostat' power plants or power towers, is a type of solar furnace using a tower to receive the focused sunlight. It uses an array of flat, movable mirrors (called heliostats) to focus the sun rays upon a collector tower (the target). Concentrated solar thermal is seen as one viable solution for renewable, pollution-free energy.[1].

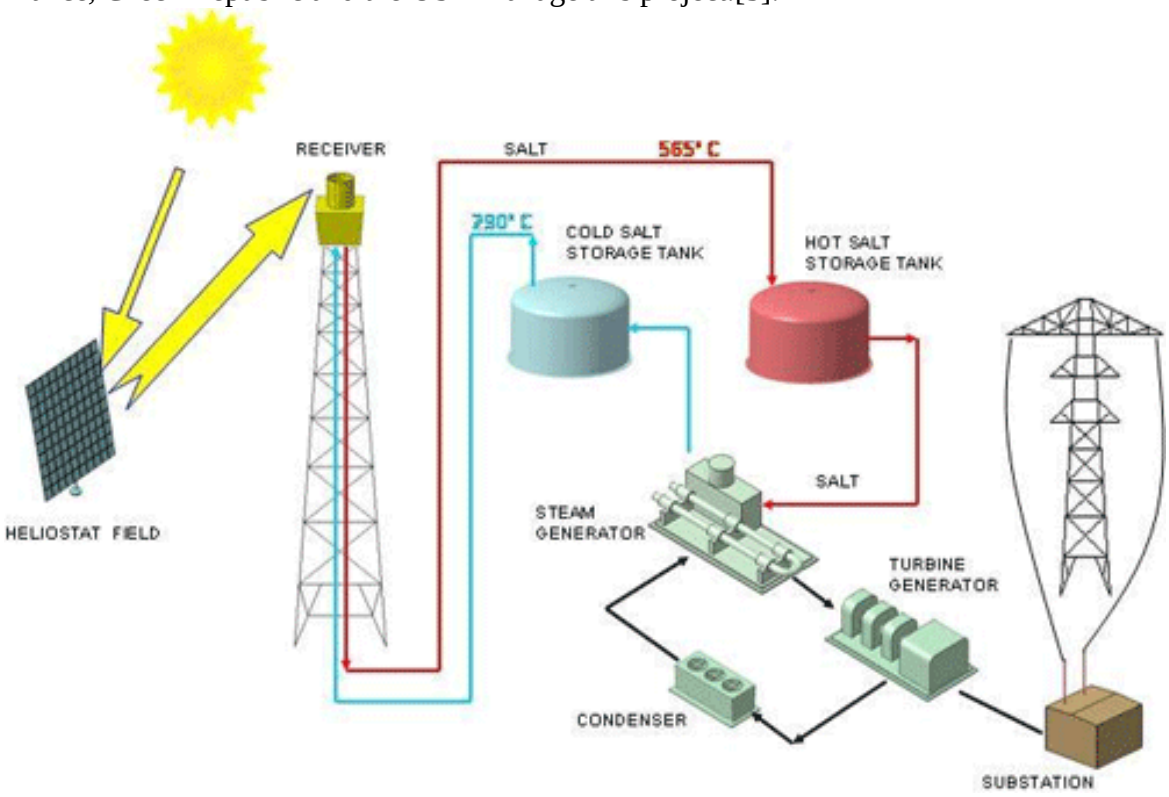
Picture 1, The 11MW PS10.

One of the most known towers is The 11MW PS10 near Seville in Spain. Because of strong bright light dust and moisture glow in the air, and we can see rays. On the field there are 624 mirrors, each is 120 square meters and the height of the tower is 115 meters. To build this station costs 33 million euros and it occupies several square kilometers. But the output energy can provide electricity to 6000 houses.

Sun rays turn water to steam.Steam is heated to 500 °C to drive turbines that are coupled to generators which produce electricity. Such towers use direct high temperature chemical reaction such as liquid salt. Thus, we can make the transformation of water. This method allows to accumulate energy in big tanks with hot salt and a plant can work in cloudy weather. It can provide steam generator's working for 16 hours without sun and it also can work all night long.[2].

There are other solar power towers, for example, in the USA, Turkey, Spain, Germany. There was a project of building SolarTres for 15 MW in Spain too. The project aims at building a tower with 2493 mirrors, each of which is 96 square meters.

In the second picture we can see the structure of this plant. Pink –is a storage of hot salt, blue – is a storage cold salt, red – is a steam generator which is connected with the turbine and the condenser. The European Commission has allocated 5 million euros for this construction. The International organization SolarPACES with the companies from Spain, France, Czech Republic and the USA manage this project.[3].



Picture 2.

Different solar power towers have differences in their structure, because everyone wants to make the production of energy more effective and cheaper. For example, Solucar in Sanlúcar la Mayor try to use various technologies such as parabolic concentrators with Stirling engines and parabolic cylindrical mirror with pipes for heating the coolant.

The price for erection of these plants is high and its energy is expensive, but due to the development and improvements in this sphere it will be cheaper. Also such manufactures

have positive influence on the environment. In the nearest future they will prevent the emission of near 600,000 tons of carbon dioxide per year.[2].

References:

1. Солнечная башня [website]. URL: http://aenergy.ru/21/.
2. Solar thermal collector [website]. URL: http://en.wikipedia.org/wiki/Solar_thermal_collector/.
3. Solar thermal or coal for regional Australia? // Yes 2 Renewables [website]. URL: http://yes2renewables.org/2011/09/19/solar-thermal-or-coal-fo-regional-australia/.

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EUROSTAG: power system dynamic simulation for transient, mid and long term stability

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EUROSTAG® is a software developed by Tractebel Engineering GDF SUEZ and RTE for accurate and reliable simulations of power systems dynamics.

It is dedicated to the dynamic simulation of the power systems, and fulfils the following three basic requirements. First, a single software program to simulate fast and slow phenomena in a continuous way. Second, for any phenomenon, a performance at least equal to those of the specialized software programs. Third, faster and easier studies.

EUROSTAG is based upon a unique algorithm using a continuously and automatically varying integration step size, featuring:

– A unique program using unique modelling of processes for a whole range of applications,
– A continuous display for both fast and slow phenomena.

EUROSTAG integrates all power system components and actions necessary to produce an accurate and faithful dynamic simulation: Generators – Motors – Controllers – Protection devices – Control equipment.

The advanced dynamic functions of EUROSTAG allow for the full range of transient, mid and long-term stability to be covered thanks to a robust algorithm using an auto-adaptative integration stepsize. The differential and algebraic equations are solved simultaneously with a variable integration time step. The stepsize varies automatically according to the actual behavior of the system (typically from 1 ms to 100 s) in order to secure a constant accuracy of the calculation process. In fact, the truncation error is calculated at each step for the determination of the exact step length to be used.

Open to import and export data in various international formats, the software is also renowned for its flexibility. Indeed, the user can directly access a vast library of power system models or modify them using a flexible graphical modelling language.

Various manoeuvres and operations can be initiated at predetermined momenta or during the simulation by user intervention. This is made possible by the graphic monitoring of the changes of the system's main quantities.

EUROSTAG can read the data in international formats and can recover models and parameters used in older programs, allowing knowledge acquired with other tools to be saved. It goes further in result exploitation through export to specialized programs (Microsoft Office, Matlab).

The following operations can be carried out: