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Power Engineering in Agriculture

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Nowadays, requiring large expanses of land, farms are invariably located far from highly populated urban areas. Due to their geographic isolation and possibly a lingering sentimentality for the horse and plough days of old, agriculture is often neglected in discussions of energy consumption and energy efficiency. But modern agriculture, is a very energy intensive industry.

Hard to find a branch of agriculture in which electricity cannot be employed to advantage. Moreover, it immensely adds to the amenities of country life and should therefore help to stem the flow of population from the country to the town. In these days of dear labour and falling prices, mechanical aids are imperatively necessary to the farmer.

Agriculture requires energy as an important input to production. Agriculture uses energy directly as fuel or electricity to operate machinery and equipment, to heat or cool buildings, and for lighting on the farm, and indirectly in the fertilizers and chemicals produced off the farm. At the level of farm, energy use is classified as either direct or indirect. Direct energy use in agriculture is primarily petroleum-based fuels to operate cars, trucks and pickups, also machinery for preparing fields, planting and harvesting crops, applying chemicals, and transporting inputs and outputs to and from market. Liquid propane, natural gas, and electricity also are used to power crop dryers and irrigation equipment. Indirect energy is consumed off the farm for manufacturing fertilizers and pesticides.

Because of measurement difficulties, energy used to produce other inputs for agriculture, such as farm machinery and equipment, is not included in USDA's definition of indirect energy.

Some years ago, agriculture was our chief industry. From the time electricity became a science, much research has been made to determine its effect, if any, upon plant growth. The earlier investigations gave in many cases contradictory results. Such men as Nollet, Jolabert, Mainbray and other eminent physicists affirmed that electricity favored the germination of seeds and accelerated the plants growth; while, on the other hand Sylvestre and other savants denied the existence of this electric influence. The heated polemic and animated discussions attending the opposing theories stimulated more careful and thorough investigations, which establish beyond a doubt that electricity has a beneficial effect on vegetation. Experiments showed that electricity increased the return from root crops, while grass perished near the electrodes, and plants developed without the use of electricity were inferior to those grown under its influence.

Grandeau found by experiment that the electrical tension always existing between the upper air and soil stimulated growth. He found plants protected from the influence were less vigorous than those subject to it. It has been proved that the slow discharge of static electricity facilitates the assimilation of nitrogen by plants. Faraday showed that plants grown in metallic cages, around which circulated electric currents, contained 50 per cent less organic matter than plants grown in the open air. Thus, this research topic is still relevant, and it is considered by many scientists [1].

Nowadays, new trends are emerging in the global agrarian economy and demography. Integrative processes are developing actively. Global climate changes are occurring. The population of the world grows. The structure of consumption is

shifting towards higher-quality products. The role of agriculture in the country's food supply, employment, and economic development is increasing.

The preferred energy sources for agriculture are animal traction, manual effort and gravity. Solar power and windmills are attractive alternatives because there are no energy costs, but they require greater capital investment, greater organization and a higher level of technical capacity than traditional power sources. Wind power may be a good option if there is wind throughout the year, with average monthly speeds exceeding 2.5 m/sec. Windmills Technology Windmills can provide the energy to move a pump. The most common models have a rotor fixed to a horizontal axis that is mounted on a steel tower.

For a normal windmill-driven pump at 3 m/s wind speed, the yield at a 10 m head is typically 0.12 liters/sec per m² of rotor area. Some windmills may be designed for torque, while others are designed for tip speed ratio. A vertical axis windmill and a horizontal axis windmill are very different and are used for different things. A vertical axis is mainly use for torque, and a horizontal is used for speed.

Solar energy is one of the best renewable energy options; level is in line with the air condition demand. Solar energy technologies have a long history. One of the periods: from 1860 to the first World war. The cost of electrifying the farm is very high, so you can use solar energy to reduce costs. Problems of cooking and heating water heaters are solved with the help of solar stoves.

Agriculture has always been based on solar energy. The relationship that has formed between agriculture and sunlight has changed due to disruptive innovations. Used a Solar Photovoltaic for irrigation, aeration for aquacultures, but also for electric fencing, refrigeration of agricultural products, poultry lighting and pest control.

The main goal of rural electric power engineering is to improve the efficiency of production in the agrarian sector of the economy, and create the social conditions in rural areas, which are necessary for life. In order predict the development of rural power engineering. These measures are designed not to allow them or prevent problems [2].

The role and significance of agricultural electrification increase considerably due to the task of improvement of its effectiveness. Nowadays, some reason exists to transform agriculture into a highly effective industry. Mechanization and electrification of agriculture good effect on the need for energy resources, increase it. The development of rural electric power engineering is a prerequisite for the maintenance of the optimal level of national and economic security of the region.

When making decisions regarding the use of renewable energy sources to supply power to territories, remote industrial and nonindustrial facilities, as well as for electricity supply to farms and agricultural complexes separately, it is necessary to take into consideration not only its effect for the interested parties, but also the effect for society, which includes the abandonment of technologies, which that have a negative impact on the environment.

References:

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