



AgriTech Solutions: Innovating VET for Sustainable Agriculture
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FIELD VISITS

Renewable energy sources

Experts/organizations: ZZ "STUBA", TD DZP KLECHOVCE DOOEL, ADUT GVN, AG FUTURA Technologies, „KAV KOMERC AND AGRO KAV KOMERC", COMPANY „STOJCHEVI and WINERY ARBESKA", INDIVIDUAL FARMER MARJAN TANCHEV, LISA – KOM KAVADARCI, INDIVIDUAL FARMER STEFAN STOJCHEV, AGRIJA DOOEL, Individual farmers groups and individuals, IZ Branko Atanasov, Livestock farm

Engaged teachers: Stefanovski Saso, Milosheva Zaklina, Jovanova Kristina, Doncheva Milica, Nikolov Efremcho, Slavkovic Sonja

Location: Kumanovo, Sveti Nikole, Skopje, Strumica, Kavadarci, Valandovo, Veles

Short description

ZZ "STUBA" is located in the village of Studena Bara near Kumanovo. In order to meet the energy needs of the agricultural enterprise itself for the production of vegetables, primarily for the production of tomatoes and peppers, it uses part of the planned renewable energy sources in its production facilities.

Solar energy, primarily as an option for greenhouses and irrigation systems. Currently, the economy uses solar collectors to heat water to heat the greenhouses. Biomass, too, but currently as an option for heating fuel, during periods of the year with fewer hours of sunshine.

Regarding geothermal energy, a study is currently being conducted to examine potential sources of geothermal water, which in the near future would be used to heat the new greenhouses and conservatories that will be built on the farm.

Renewable energy sources are increasingly used in agriculture, especially in sustainable production, cost reduction and environmental protection. Solar panels are used on greenhouses, both for heating the greenhouses and for powering the pumps, thus saving energy costs. In the context of vocational education, their representation is increasingly important for preparing young personnel for ecologically and technologically compliant agricultural production.

from Kavadarci, is the owner of 2 agricultural companies Kav Komerc and Agro Kav **Petre Temov** Komerc which have been export-import oriented for more than 30 years.



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in the country and abroad in the Republic of Serbia (Belgrade on the Kvanataški Pazar), the Czech Republic, Croatia, Poland and Greece. Renewable energy sources in their companies. The company has its own panels for its own energy production that it uses for its own needs, the most modern new vineyards of Odrina construction, covered with anti-hail nets, Italian inox steel construction and digital peronospora service, automatic for measuring all parameters of soil moisture, relative air humidity, temperature and other parameters. The same, through the company Agro Kav Komerc, have installed a drip system on all new modern plantations and the most modern technology with a fertigation process or incorporation of mineral, crystal fertilizers into the vineyards through the drip. They expect an annual production of grapes of over 1 million kg.

This agricultural enterprise is engaged in the purchase, storage, sulfurization, storage in large cold stores and transport and sale of agricultural products throughout the year: table grape varieties, mostly domestic and from its own plantations, citrus fruits, early garden products, etc. The company also has over 15 of its own refrigerated trucks. It has applied renewable energy sources against the grids of the Gardobi, which protect against natural weather conditions due to climate change, such as hail, and provide shading from the sun against the harmful effects of UV radiation.

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Conclusion

The use of solar energy and biomass as renewable energy sources in a small agricultural holding, such as the "STUBA" Agricultural Farm, represents an efficient, economical and environmentally sustainable solution.

Solar energy provides a stable supply of electrical and thermal energy for irrigation, heating and lighting needs, especially in greenhouses.



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Biomass, through the utilization of plant residues and organic waste, provides an additional source of energy, reduces waste and lowers fuel costs. Combining these two sources increases the energy independence of the economy, reduces the impact on the environment and contributes to the sustainable development of agricultural production.

The increasing cost of energy is leading producers to implement measures to save and reduce the cost of heat and electricity. However, the lack of information and education among producers about how they can make biogas themselves, using animal waste, which could be used for heating, generating electricity and producing organic fertilizer, is an obstacle that many producers face.

There is a large amount of literature and materials that can be integrated into curricula, through which new generations can be educated and prepared for energy sources and ecological agriculture.

With these renowned and long-established two large agricultural companies that are positioned both on the domestic and international markets for the purchase of agricultural products and their sale, we have also concluded a Memorandum of Cooperation between our students, i.e. the school and the company Kav and Agro Kav Commerce, for the implementation of Work-Based Learning with an employer, where students acquire many practical trades and practical skills. This provides them with the opportunity for employment in the company after completing secondary vocational education, the opportunity to earn money, learn and practice, and the opportunity to have their own business in the agricultural sector.

