WEAM4i
Water & Energy Advanced Management For Irrigation

Solar and Hydraulic Pivot

Summary

Agriculture sector is accountable for 30% of the total water consumption in Europe, but reaches up to 70% of total water consumption in several European southern countries. In recent years, most of the efforts have been focused on water efficiency, but without taking care of energy aspects, resulting - in some cases - on a significant increase in energy consumption, combined with a scenario of increasing energy costs throughout Europe.

The **WEAM4i** project has addressed these challenges by developing an on-line crop water demand projection ICT tool that combines crop water demand (quantified by satellite observation) with a weather forecast to project future crop water needs to determine the optimal irrigation time balancing crop water needs and energy costs.

WEAM4i project has covered many case studies at the local irrigation level during the development of the **WEAM4i Smart Irrigation tool** including the use of **Solar and Hydraulic Pivots.**

Description of the case study:

In many regions in Germany, including the region of Lower Saxony, farmers use hose reel machines with high pressure (8 – 10 bar) systems for irrigation. When such a system is included in an existing high-pressure system, the field is equipped with the infrastructure needed for irrigation with hose-reel machines.

To simplify the integration of low-pressure systems in existing high-pressure systems, two alternative power supplies for low-pressure irrigation were developed and installed:

- Solar power system
- Hydraulic power system

Description of the Solution

The development and installation of a **solar power system** which produces electricity is needed to power small pivot or linear irrigation systems for small and irregular structured fields. These filed are usually equipped with high-pressure irrigation systems.

The development and installation of a **hydraulic power system** which uses the excessive water pressure of the given high pressure water supply infrastructure to produce the electricity is needed to power small pivot or linear irrigation systems as needed on small, irregularly structured fields already equipped with high-pressure irrigation systems.

Results

- Regarding the local market, it becomes clear that the irrigation systems can more easily integrate the turbine system due to the existing energy loss.
- The use of a renewable energy is omnipresent.
- The picture of the agriculture is positively changed with regard to a resource-conserving agriculture.
- The solar pivot is interesting for the individual user, if a pump installation or an own line network already exists.

Learned lessons and market perspectives

- The low efficiency is one of the weaknesses of both systems.
- The energy storage with regard to the costs of the battery packs, the lack of experience of the durance of the batteries, which go beyond the manufacturer data are the points which can be considered when discussing about the weaknesses of the both systems.
- The maintenance and the costs in the coming years cannot be evaluated seriously.
- Irrigation period have to be coordinate with the testing period.
- Time period for the research is not easy to be calculated

Key messages:

- Water turbine can be easily integrated almost in any irrigation filed.
- It is user-optimized.
- Both systems lead for sustainable irrigation and are ecologically friendly

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