smart skills
smart sustainable agriculture

Course 2: Smart Irrigation and Fertilisation

M5: Renewable Energy-Powered Irrigation Systems

Co-funded by the European Union

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What will you learn?

This module aims to introduce to the world of irrigation systems powered by renewable energy, with a focus on solar technologies. You will learn how solar installations for pumping and distributing water work and what their main advantages are. You will also learn about the challenges and limitations of using renewable energy sources in agriculture. This module will show you how to combine agriculture with the green energy of the future.

Understand…

…the basics of irrigation technology using renewable energy sources.

Identify…

… benefits and limitations of renewable energy in agriculture .

Explain…

…opportunities for combining photovoltaics with other areas of agriculture.

contents

This module explores how renewable energy—especially solar power—can drive irrigation systems in agriculture. Learners examine the components, benefits, and limitations of solar pumping, alongside concepts like agrivoltaics, highlighting how green energy supports sustainable farming and boosts resilience in off-grid or rural areas

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01

SOLAR-POWERED IRRIGATION TECHNOLOGIES

Using solar energy in agriculture

Solar energy allows for a revolution in water use in agriculture by providing a modern and sustainable way to irrigate crops. Solar-powered water pumps are used to pump small amounts of water. For rural areas, where the installation of solar panels is not a problem, the use of such a solution brings a number of benefits.

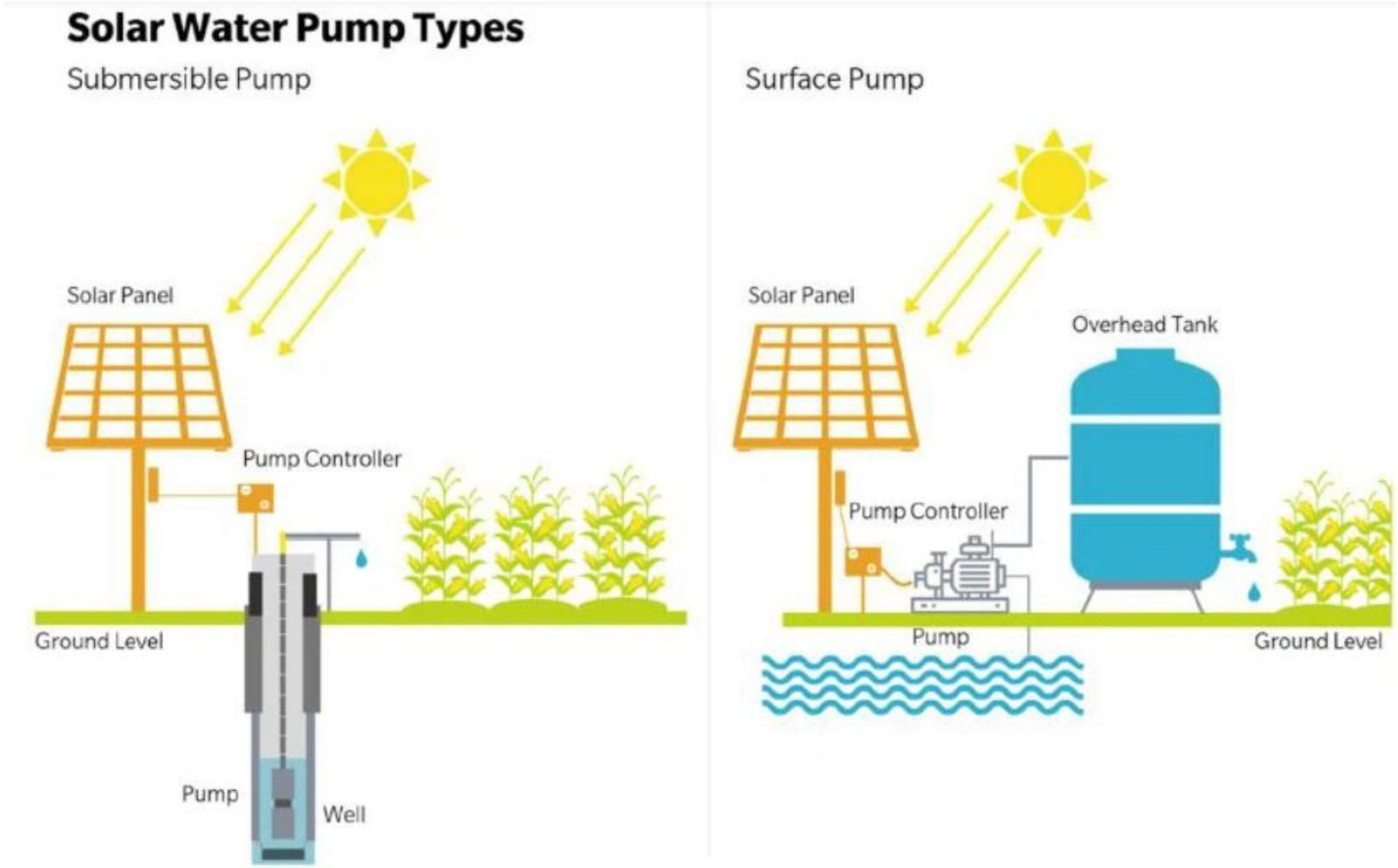
Solar Water Pump

It is a clean, simple and energy-efficient alternative to traditional electric and fuel-powered pump sets. They foster an environmentally friendly approach by reducing the negative impact of agricultural activities. The advantage is that solar energy can be used or exploited in any region, whether developed or poor.

The use of solar energy in water pumping systems can significantly help and accelerate the development of agriculture

Solar Pumping System Components

- photovoltaic (PV) system,
- Electric Motor Pump:
- submersible
- surface



02

BENEFITS & LIMITATIONS OF RENEWABLE ENERGY IN AGRICULTURE

Benefits of renewable energy in agriculture

Reduce energy costs

- independence from electricity prices
- reduction of fossil fuel purchase costs
- free electricity in windy regions

Increasing energy independence

- own energy
- reduced dependence on the power grid
- avoid power cuts

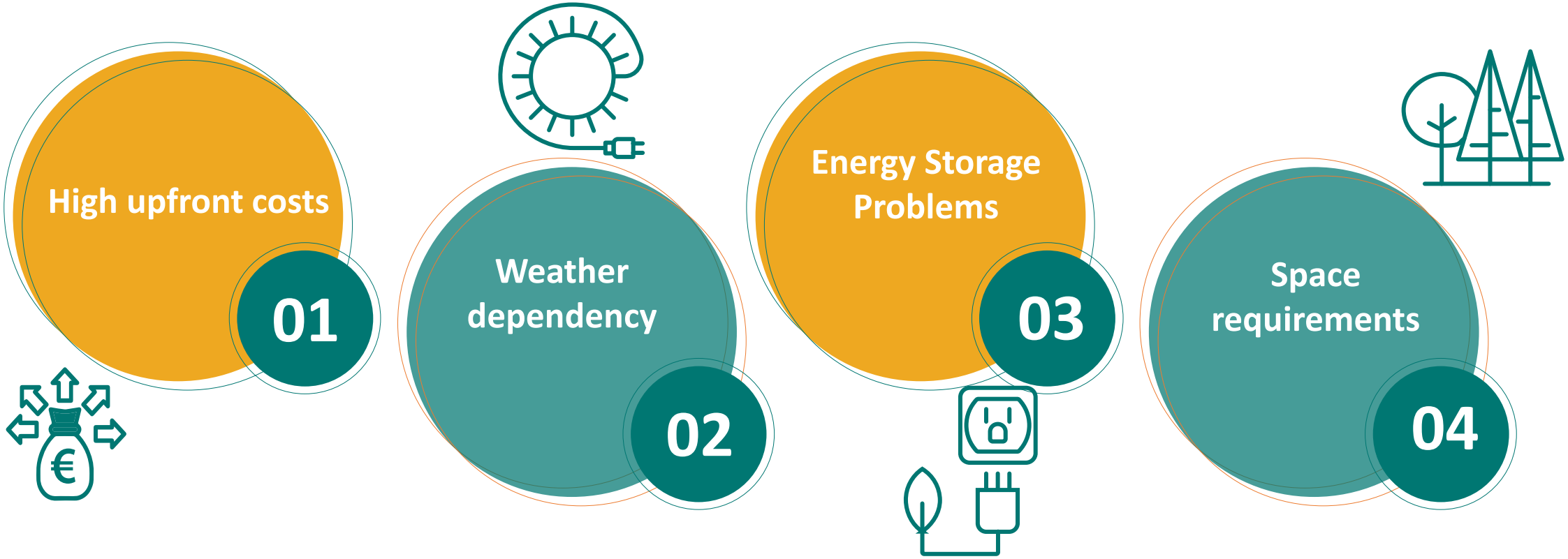
Ecological production

- reduce CO_2 emissions
- reduced use of fossil fuels
- use of agricultural waste

Source of income financial support

- sale of surplus energy
- land rental for wind and photovoltaic farms
- subsidies (e.g. the EU supports RES in agriculture)

Restrictions on the use of renewable energy in agriculture



Agrovoltaics

The goal is to combine agricultural crops and livestock production with electricity production. It differs from large-scale photovoltaics in that agricultural production remains the priority, and the photovoltaic installation utilizes available space, further supporting production.

[How Agri-Voltaics are Changing Agriculture | The Power of Solar Panels | EyeTech]

Advantages of agriphotovoltaics

- **Better use of agricultural space –** growing crops and producing energy at the same time, rather than competing for land, especially in areas with limited agricultural space (e.g. the Netherlands)
- **Protection against extreme weather conditions -** panels reduce heat stress for plants in hot weather, protect against hail, strong wind
- **Reduce evaporation and save water –** reduce irrigation requirements
- **Increased yield of shade crops**

03

SUCCESSFUL IMPLEMENTATIONS OF SOLAR SYSTEMS

Benefits of using solar pumps in specific farms

- No receipts
- Yields during drought periods
- Ease of Use
- Equipment Mobility

Check out the entire set that makes up solar pumps and in which farms they have been used

[Solar Water Pump for Smallholder Farmers - The Futurepump SF2]

04

Let’s Practice

Learner Exercise: Scenario

You have a field where you have established a tomato crop under cover. The location of the crop is quite far from power lines. Cultivation requires constant watering. **Choose the best strategy.**

Answer A

Every day I bring water and water the plants with a watering can.

Answer B

Install a water tank with an irrigation system and solar panels to provide energy

Answer C

Installs a water tank with an irrigation system and a power generator

Feedback on answers

Option A

The chosen method is time-consuming and not very profitable. Choose another option and the time you would spend on this watering variant can be spent on other activities or relaxation

Option B

The perfect choice! The plants will receive the right amount of water, and the panels will provide clean electricity. You care about your crop and the environment!

Option C

Not a bad choice. You will provide your plants with the right level of hydration. Maybe you will also think about caring for the environment and becoming independent of fossil fuels?

GREAT JOB!

Now you know that you can combine many different activities to get the maximum benefit for your farm and the environment. If you've completed all the modules, it's time for the quiz! If not, go back to the module you skipped.

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