

COMPLETE GUIDE TO SOLAR PUMP SUCCESS



Investing in a solar pump for your farm might feel daunting as there are many different options to consider.

But getting the right solar pump can both save and make you money, all whilst reducing your environmental impact.

Want to find out how solar can work for you...?

We'll walk you through some of the sums and tips and tricks for getting the most out of a solar pump

...lets jump straight in



IRRIGATION FOR SUCCESS



Do you find that the growing season hits you full on every year? No matter how well you plan and prepare, there is no shying away from the fact that peak growing season can feel like spinning hundreds of plates at once! You've got seedlings to plant out, weeds to tame and crops that need an almost constant supply of water.

Many of the farmers we speak to are having to lug watering cans about to keep their plots watered or have experienced the high fuel costs and frequent breakdowns of petrol pumps.

All hope for a helping hand from the clouds to water their crops.

Irrigation allows you to control when and how much water you apply to your crops. And a solar pump means you can do this with **free power from the sun** and without huge physical effort.

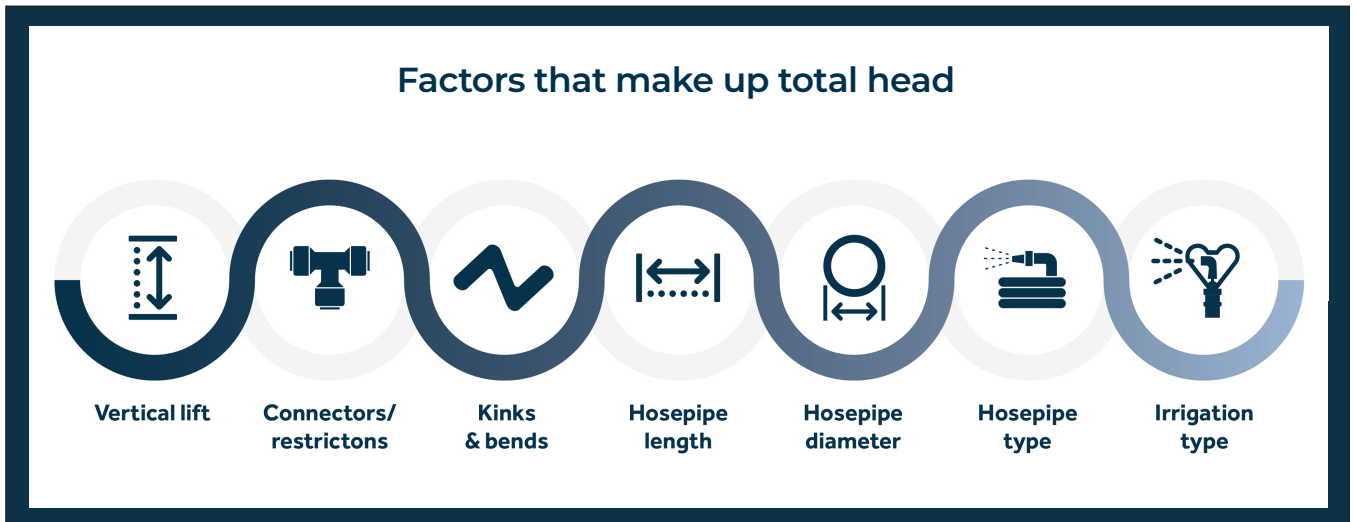
At Futurepump we have an expert team who have built and supplied over **17,000 solar pumps** to small-scale farms, homesteads and market gardens over the last decade.

Along the way we've learnt from the many different situations where our customers use pumps and have a huge library of tips and tricks for getting the best out of solar irrigation.

And we don't see a reason why we would keep any of that a secret...

1 GETTING YOUR HEAD AROUND TOTAL HEAD

A commonly used, extremely important, but sometimes confusing measurement...



In water pump brochures and datasheets you will often see the term 'total head' - usually shown as a figure in metres.

Although it is written as meters, that does not equate to something you can measure with a ruler.

Total head is the 'work' the pump must do to move a liquid. It is the sum of vertical, pressure and velocity head which are influenced by:

- **Vertical lift**
- **Hosepipe length, diameter and type**
- **Hosepipe restrictions (kinks, bends, connections)**
- **Irrigation type (i.e. adding sprinklers)**

Is this still feeling a bit technical? Don't worry! We'll explain more on the next few pages...

Note:

10 meters head = 1 bar pressure

Futurepump solar pumps have a total head of 15m = 1.5 bar pressure

The more pressure you put your pump under, the harder it will be working.

That means you'll either get less water and low radiation has a bigger impact. Depending on your need, it could be wise to invest in larger solar panels or a higher head pump.

Vertical lift

One of the easiest components of total head to visualise is vertical head in meters (suction and discharge depth). Lifting water up uses energy from the pump as it must move the weight of the water against gravity.

A surface pump has both suction and discharge lift, whereas a submersible pump only has discharge lift. This is because a surface pump sits on the ground out of the water and must suck water up, then push water out. A submersible pump sits in the water and only has to push water out of the discharge side.

Take a look at the site where you plan to irrigate and measure your suction and discharge lifts - you can note them here:

Suction lift: _____

Discharge lift: _____



Hosepipe length, diameter and material

As water travels down the length of hosepipe, it interacts with the pipe walls. This resultant friction is determined by pipe width and material. The longer your hosepipe, the further the water has to travel within the pipe, and the greater the friction the water experiences.

Friction = pressure on the pump

What hose(s) are you planning to use?

Note their specifications here:

Horizontal length of your pipe: _____

Hosepipe diameter: _____

Hosepipe type: _____

For more detailed information on how this translates into pump pressure, please see our technical note at <https://bit.ly/Total-Head-Technical-Note>

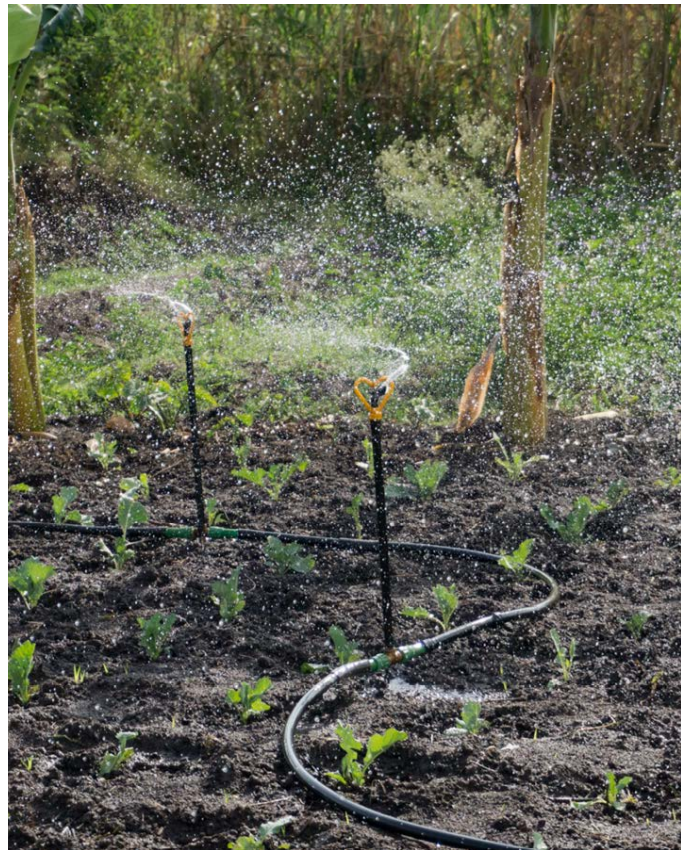


Hosepipe restrictions (kinks, bends, connections)

In a similar way to hosepipe type and width having an impact on friction and flow, restrictions within a hosepipe makes it harder for water to move through the pipe. Harder to move = more energy required to push the water through.

Where possible, avoid letting your hosepipe kink as you place it in the farm. If you do need to have your pipe zig-zag around the farm, try to have a wide bend in the pipe so it does not constrict the flow.

If you are connecting sections of pipe together, make sure you use the right size of connector so the diameter of the pipe is not dramatically reduced at these points.



Irrigation type

Adding sprinklers, drip or mist irrigation add significant back pressure on the pump as water is forced out of small holes and propelled over a distance - all of which requires energy.

When purchasing irrigation accessories, there will usually be information provided about the pressure requirement. For example, drip usually requires 0.2 bar of pressure.

The number of sprinklers appropriate to use with a pump is also a key point to research - with Futurepump pumps you should never use a single sprinkler as the back pressure is too much.

What irrigation type are you planning to use?

What pressure requirement does this irrigation type have? _____

2 HOW MUCH WATER DO YOU NEED?

Different crops have different water requirements and it's something helpful to estimate...

We know that looking at flowrates on a datasheet can sometimes feel meaningless. However, it's important to consider the water requirements of your farm when choosing a pump, as you could end up spending more than needed on an oversized pump or struggle to give your crops enough water.

We'll run through a really simple way to estimate your farm's water requirements and then how you can apply this to your farm.

Back of an envelope calculation - as simple as it gets

On average, vegetable crops have a water requirement of around 5mm per plant every few days (approx 25mm per week).

To see if a pump will provide you with enough water, first work out the area of your land, and then multiply by the assumed water requirement to get your cubic meters.

Tip!

The flow rate of water will be affected by the vertical pumping head, the power input from the solar panel, and the efficiency of the pump system.

Here's an example:

An acre of land = 4046m²

If all the plants need 5mm of water (0.005m) then the cubic meters of water required is:

$$4046 \times 0.005 = 20\text{m}^3$$

To get from m³ to litres, multiply by 1000.

$$20 \times 1000 = 20,000\text{L of water per day}$$

In our experience, it is rare to have your whole farm under crop at one time, or that all of your crops will require water every day.

Your turn:

Your area of land _____ m²

$$_____ \text{ m}^2 \times 0.005 = _____ \text{ m}^3$$

$$_____ \text{ m}^3 \times 1000 = _____ \text{ L}$$



Adjusting for your farm

Different crops have different water requirements - one acre of maize will require a lot less water than an acre of cucumbers...

Adjust your calculation depending on the crops you're growing.

If you have low water use plants, multiply by 0.3 or medium by 0.5 to get an estimate.



Low

Cacti, succulants,
yuccas



Medium

Ornamental perennials,
bushes, shrubs



High

Annual ornamental plants,
tropical plants, ferns,
vegetables, fruit

How do you compare this to a pump's flow rate?

Now that you roughly know how much water you need, it is time to look at the flow rates of different pumps to find the best match.

The Futurepump SE1 can pump up to 10,800 L per day which is enough for a 1 acre farm with intermittent irrigation.

The Futurepump SF2 can pump up to 21,600 L per day which is enough for a 2 acre farm with intermittent irrigation.

3 SOLAR IRRADIATION FOR IRRIGATION

Sunshine levels vary around the world, you can optimise your set up for your location

SOLAR RESOURCE MAP

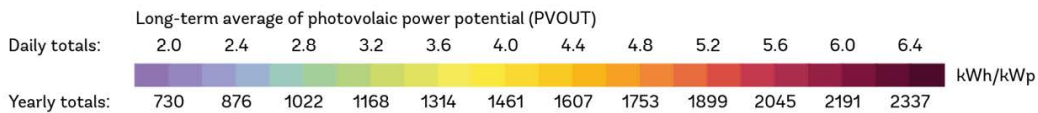
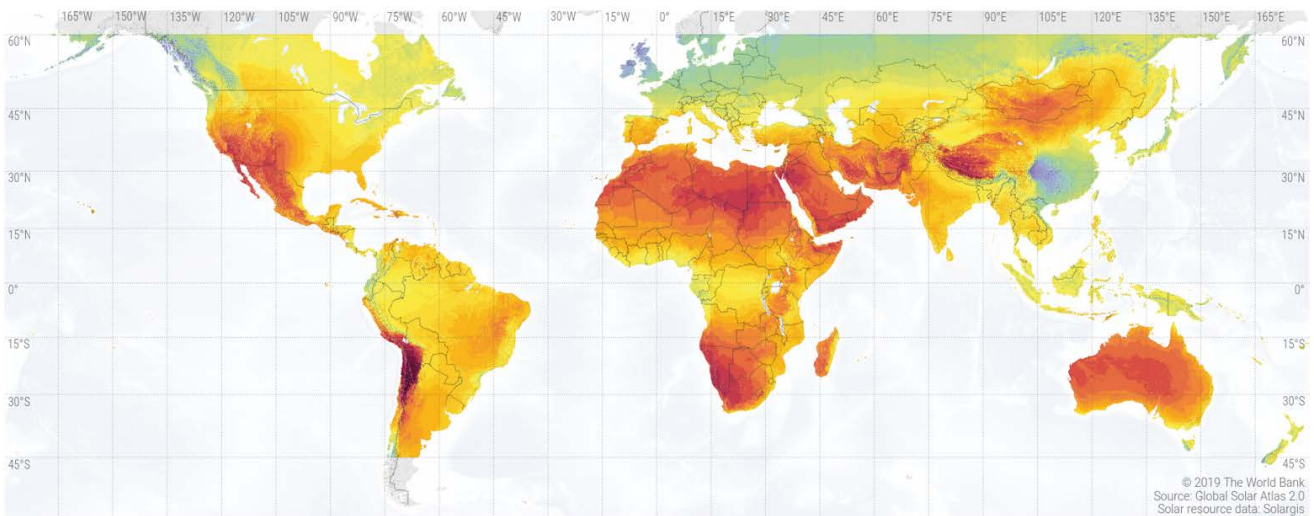
PHOTOVOLTAIC POWER POTENTIAL



WORLD BANK GROUP

ESMAP

SOLARGIS



Working out what the **solar irradiation levels** in your location are can be difficult. The problem is, because our eyes adjust, what might look like a bright day in one place, may not be as bright as another.

Luckily, there are some great online tools like the ['Global Solar Atlas'](#) which you can use to estimate the solar irradiation in your location.



globalsolaratlas.info/map

Note!

Solar irradiance is the power received from the sun for a given area...

e.g. Watts per m²

Why it is important to get an idea

Solar pump datasheets will have a lot of different variables covered in their flow rate assumptions. One of these will be the **watts per metre squared** (W/m^2) that the panel is 'seeing'.

The amount hitting the panel will change with weather conditions - $1000 W/m^2$ is pretty much the maximum on a very sunny day, $800 W/m^2$ is still quite sunny, $600 W/m^2$ is hazy sunshine and around $400W/m^2$ is quite cloudy.

So if you research your location and find out that the solar irradiation that you receive is on the lower side, you might want to look into oversizing your solar panel.

By oversizing your panel you are enlarging the solar collection area (m^2), so you can collect more W (energy).

Our video guides

Check out our YouTube channel for a video explaining how to correctly size your solar panel... scan the QR code below to go direct to the video.



<https://www.youtube.com/c/FuturepumpLtd>



4 TIPS AND TRICKS

How to introduce 'low-flow' solar pumps to your farm



If you are used to a high powered petrol or diesel pump and are swapping to a solar pump like the Futurepump you will experience a reduced flow rate - **but this can work in your favour.**

If you optimise the use of your solar pump, the benefits of its 'low flow' can be huge - you can use your water more efficiently and your plants can thrive.

Tip!

How to save water:

Avoid overwatering, mulch around plants, avoid 'hit and miss' watering to make sure water gets to roots

How you can optimise flowrate:

- Use your pump with compatible irrigation methods such as low flow sprinklers or drip
- Combine the pump with a raised tank - you can use the pump to fill the tank through the day and use gravity flow from the tank whenever you need
- Let irrigation run while you do other jobs
- Don't waste water - avoid things that can lead to extra evaporation before the water can be used by your crops.

5 HOW TO GET THE MOST OUT OF A SOLAR PUMP

There are some simple things you can do to make sure that you get the most out of your investment



Why choose a solar pump

A solar water pump is a great choice for a small farm because it has **low recurring costs** and is an **environmentally friendly** way to **reduce the labour required** to move water. They are also easy to set up and maintain, meaning you can use it year after year with little effort.

How to get the best out of your solar pump:

- Pick the right panel size
- Make sure your panels are facing the most direct sunlight - this will typically be south or southeast (in the Northern hemisphere)
- Avoid shading the solar panels - clean the panels regularly to remove dirt and cut back any plant growth that creeps over the panel
- Keep your panels clean
- Be careful about how much back pressure you add to the pump - avoid using a single sprinkler, constricting the hosepipes or trying to lift water too high
- Make sure you find out how easy the pump is to maintain and what type of warranty support is offered, and for how long. This can mean the difference between a few seasons use or decades of irrigation.

Find the right solar pump for you

Now that you know how you can use a solar pump for success, use the table below to help you compare pumps on the market. This will help you find the most suitable solar water pump for your farm.

We've filled it out for our range of pumps to help you get started!

Your farm:

Total lift required: _____

Water source: _____

Farm size: _____

Irrigation type: _____

Water requirement: _____

Solar requirement: _____



	Total head	Suction lift	Irrigation area	Compatible irrigation	Flowrate at 1m	Solar provided
SE1	15m	7m	Up to 1 acre	Sprinklers, drip, mist, hose	1,600 L/hour	60W
SF2	15m	7m	Up to 2 acres	Sprinklers, drip, mist, hose	3,600 L/hour	120W / 240W
SF2H	25m / 45m	7m	Up to 1 acre	Sprinklers, drip, mist, hose	1,500 L/hour	120W / 240W



AND FINALLY...

On behalf of the Futurepump team I hope that this information is useful. Our company mission is to help farmers earn more money through using our robust solar irrigation pumps.

Visit www.futurepump.com now to find out how a Futurepump solar pump can help grow your farming profits. Here's to your success!

Toby Hammond
Managing Director
Futurepump Ltd



 Future pump

www.futurepump.com

