

WHAT ANGLE SHOULD SOLAR PANELS BE INSTALLED AT IN ORDER TO GENERATE THE MOST ENERGY THROUGHOUT A YEAR?

Introduction

For our project, we investigated what angle solar panels should be tilted at to be able to generate the most energy throughout a year. This is very important for the development of renewable energy in the future, as our results will be able to help people generate energy for their homes using solar panels more efficiently, making the change to renewable energy happen faster. During our experiments, we encountered several problems, such as not making the test fair, and doing an incorrect test. For example, we neglected to raise the light as we did the panel, so they always maintain the same distance, making our test unfair, as the light would get more concentrated and have less time to spread out when the solar panel is closer. As well as this, we did the angles of light for the equator, meaning our results were incorrect, as that was not we had set out to investigate. However, through working as an entire team, we managed to do the correct experiment which matched our research.

Method

For our experiment, we researched the largest angle the sun reaches on average in the UK. We found out that this is 20 degrees in the winter, 40 degrees in spring and autumn and 60 degrees in the summer, assuming the solar panel is facing south - the most optimal direction for a solar panel. We then conducted three tests according to these three angles. First, we set the light to one of the three angles, and attached a solar panel onto a tilting wooden board with a protractor. We then wired the solar panel to a voltmeter to measure the energy produced by the solar panel. We then tilted the board in increments of 10 degrees, and measured the energy produced. Finally, we repeated with the light at a different angle. Throughout the experiment, we also made sure that we obeyed all safety rules. We made sure we didn't shine the light in other's eyes and also that we didn't electrify or hurt ourselves through the circuit by making sure we were careful when conducting the experiments.

Summer

	Summer				
Angle (°)	0.00	10	20	30	40
Voltage (V)	0.22	0.23	0.23	0.23	0.23

Spring/Autumn

	Autumn/Spring				
Angle (°)	0.00	10	20	30	40
Voltage (V)	0.18	0.19	0.19	0.22	0.22

Winter

	Winter				
Angle (°)	0.00	10	20	30	40
Voltage (V)	0.15	0.18	0.19	0.20	0.20

Our Experiment

For our experiment, we researched the largest angle the sun reaches on average in the UK. We found out that this is 20 degrees in the winter, 40 degrees in spring and autumn and 60 degrees in the summer, assuming the solar panel is facing south - the most optimal direction for a solar panel. We then conducted three tests according to these three angles. First, we set the light to one of the three angles, and attached a solar panel onto a tilting wooden board with a protractor. We then wired the solar panel to a voltmeter to measure the energy produced by the solar panel. We then tilted the board in increments of 10 degrees, and measured the energy produced. Finally, we repeated with the light at a different angle. Throughout the experiment, we also made sure that we obeyed all safety rules. We made sure we didn't shine the light in other's eyes and also that we didn't electrify or hurt ourselves through the circuit by making sure we were careful when conducting the experiments.

Conclusion

We found out that that the angle to install solar panels in order for them to be able to generate the most energy throughout a year is 30-40 degrees, when the solar panel is facing south. Solar panels facing south are most efficient, as south-facing panels are in the sunlight, at least partially, throughout the day. At 30-40 degrees, more energy is generated throughout a day as the energy produced slightly changes throughout a day. Solar panels work best when the sun is perpendicular to them. This means that when the panel is at 30-40 degrees, it works best in the middle of the morning and afternoon, but still also works relatively well in at other times of day. At 0 or 90 degrees, however, it will work really well at one point in the day, but very badly in others.