



Solar Panel Provision

5 to 9 Pirton Road SG5 2AZ

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Commercial in Confidence

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Introduction

Following on from our previous proposal we note that you have said that you are “We are looking to ensure that the solar panels generates enough energy to suit our needs for now and the future, without being excessive”.

We should say at the outset that to cover your electricity needs from solar only would require a very large number of panels. This is because the time of year when your electricity demand is highest, in the winter, the solar panels are producing the least. If you were able to install more panels so as to cover the winter demand then you would be hugely over producing in the summer with a very large export. The capital costs involved would mean that this would be uneconomic. As we have discussed, our approach is to model your consumption and match this in the most financially attractive way to your solar system.

The use of an ASHP makes a big difference. You have also said that you prefer to keep your house quite warm. This means that the ASHP would need to run for longer than the average household and would use correspondingly more electricity. It's therefore likely that your electricity demand would actually be higher in practice than the average. This in turn puts a potentially higher demand on the solar PV system to deliver as much as possible. Your new home will be built to modern standards of insulation and we have already mentioned that we recommend that you invest as much as needed to ensure that the insulation in the property is as good as you possibly can make it. The return on this investment will be worthwhile.

You have kindly sent us an alternative quote you have received. There are three different technology types. Tesla, which is a string inverter with high battery capacity and good controls. Enphase which uses micro inverters on each panel and which therefore has an optimised generation on each panel. The Enphase battery has good controls but in the proposal has a lower battery capacity, and SolarEdge which uses micro-optimisers plus a central inverter and has battery capacity in between the Enphase system and the Tesla system.

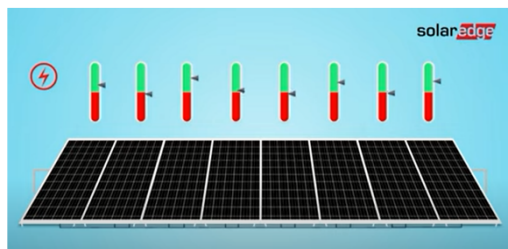
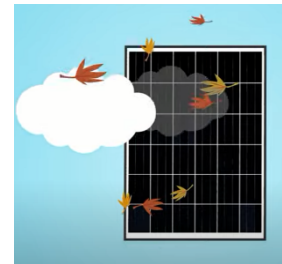
All three are excellent high-quality solutions. We have included a discussion and compared the merits of each technology later.

Tariffs are fortunately and unfortunately developing in the market. Fortunately, because meaningful export tariffs are finally coming to market, unfortunately because they introduce a level of complexity that is difficult to understand and evaluate. We have included a discussion later.

In order to determine the optimal solution for you we have examined a number of different designs. Using on roof mounting a larger 440W panel can be deployed. Also because of the mounting system more panels can be fitted onto the three roofs. We have looked at an 18 panel system a 22 panel system and a 23 panel system (the most we can fit) each of these were examined with and without a battery. We also looked at a 23 panel system with two 10kW batteries.

SolarEdge

Earthpoints will provide a premium SolarEdge design because this manufacturer offers the best solution when it comes to potential shading. SolarEdge technology enables us to handle varying electricity generation by panel more effectively, providing you with more efficient electricity generation and therefore greater savings (generation can be as much as 12% higher with an optimised system). The advantage over a string inverter system is that when one panel is shaded, or part-shaded, it is only the generation level for that particular panel that is affected. In a string inverter system, the maximum generation level is determined by the lowest generating panel, in effect, the lowest common denominator. Clouds, leaves, snow or birds can all be a temporary inhibitor to electricity generation.



Even without an obvious obstruction, at a micro-level the amount of light reaching one panel can be slightly different to the light reaching an adjacent panel.

Whilst more expensive, for these reasons we have specified SolarEdge for optimal generation performance.

Enphase

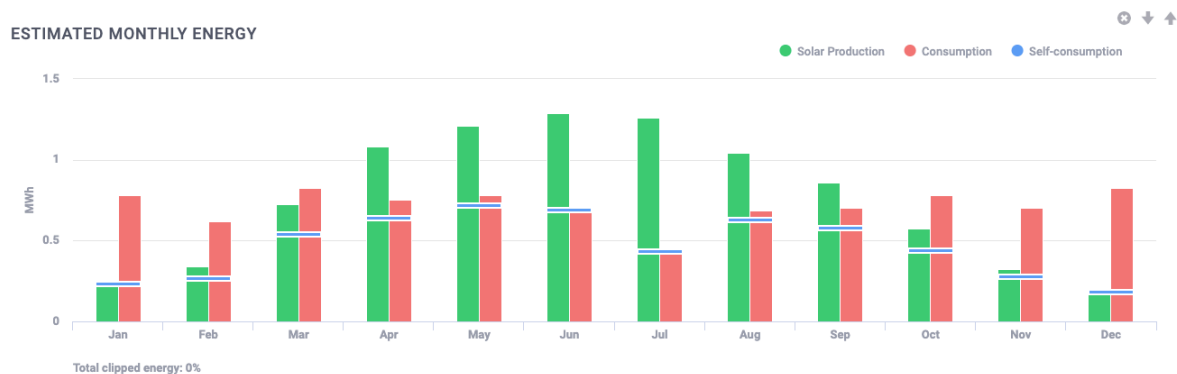
This technology approach essentially makes each panel a single electrical system. Consequently, you achieve all of the benefits of a micro-optimised system such as SolarEdge. This means more efficient generation than a string inverter – the same as SolarEdge. The panels can be in any orientation (important for your house). The drawback is that because there is more technology per panel they tend to be more expensive than a SolarEdge system whilst only able to deliver the same performance benefits as a micro optimised solution. The Enphase solution has excellent battery controls and will allow a third party such as Octopus to control the battery remotely. This provides access to the Octopus Intelligent Flux tariff currently the highest paying export tariff available. SolarEdge does not provide this at the moment.

Tesla

Tesla uses a central string inverter to power its battery. This is normally the cheapest technology but Tesla carries a premium due to its brand name. The system does allow different “zones” so the usual drawback to string inverters when deploying panels with different orientations is somewhat handled but it won’t handle temporary inhibitors to electricity generation such as clouds, leaves, snow or birds. This can be observed in the proposal as the Tesla solution is reporting lower total generation. On the other hand its battery is excellent has the highest capacity when compared to SolarEdge and particularly Enphase and its battery controls allow access to the Octopus Intelligent Flux tariff. Tesla should be the cheapest technology but is priced at a premium, so much so that whilst it has the best battery capacity it is the most expensive. The question is, is this worth it? A comparison of financial returns is made later.

Proposal Summary 23 x 440W panels with a 10 kW battery

10.12 kWp Installed Capacity	9.14 MWh Annual production	1.77 t CO ₂ saved	5.64 MWh Self Consumption
£14,164.20 Capital cost	£2,335.60 Savings in first year	16.49% in first year*	6.5 years Payback



The ASHP will add a significant electricity load. This is likely to be higher than the average. The key is to attempt to balance winter requirements against the additional capital needed for a larger array. This design provides the best financial return of the six considered. Including a battery enables better utilisation of the system in February to May and from September to November and will help meet the extra demands of the ASHP. Adding an additional battery to improve the amount of power that could be stored is not justified. Only a marginal amount of extra electricity is stored. As electricity use increases so does self consumption. The additional demand of an electric car will increase self consumption although with this size of array and this battery size the effect will be marginal. Adding an electric car is similar in terms of efficiencies as adding an extra battery although you of course get to drive the car around!

Information you provided us with

Electricity use:	Estimated Annual usage 4600 kWh (we added the estimated electricity required to run an ASHP (4000 kWh/year) making the 8600 kWh used in this proposal)
Electricity price:	29p/kWh (including VAT) Used in this proposal to ensure a meaningful comparison to the JPS proposal
Export tariff:	20p/kWh Used in this proposal to ensure a meaningful comparison to the JPS proposal

Use an on-roof mounting system

Use all black panels

Roof material: Assumed to be tile

Consumption profile, Family of four, working from home on different days 1-2 days a week

No electric car at present, plans to have one or more in the future

Underfloor heating on ground floor and installation of an ASHP

Enphase system (20 panels) 7227kW in the first year. 5.0 kWh Battery, Estimated Savings £1,920 Price £14,314

Tesla system (20 panels) 7,097kW in the first year. 13.5kWh Battery, Estimated Savings £2,132 Price £15,494

Proposed Deployment

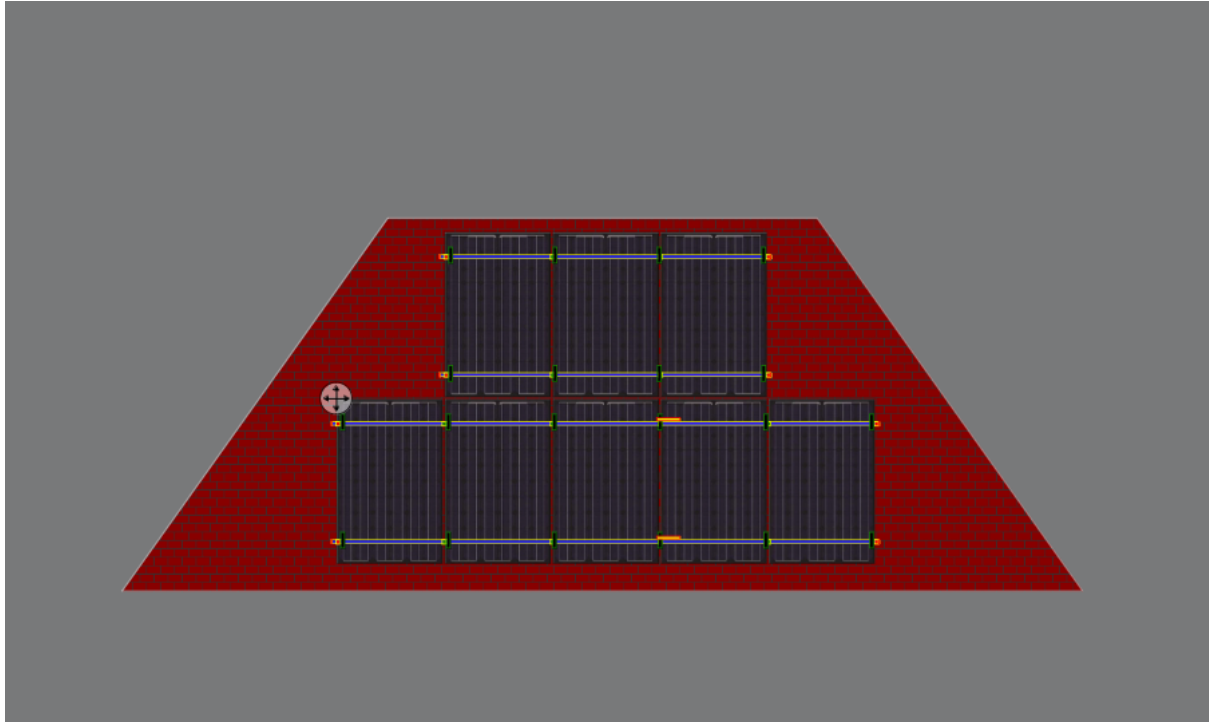
23 panels in total.

8 on south facing roof

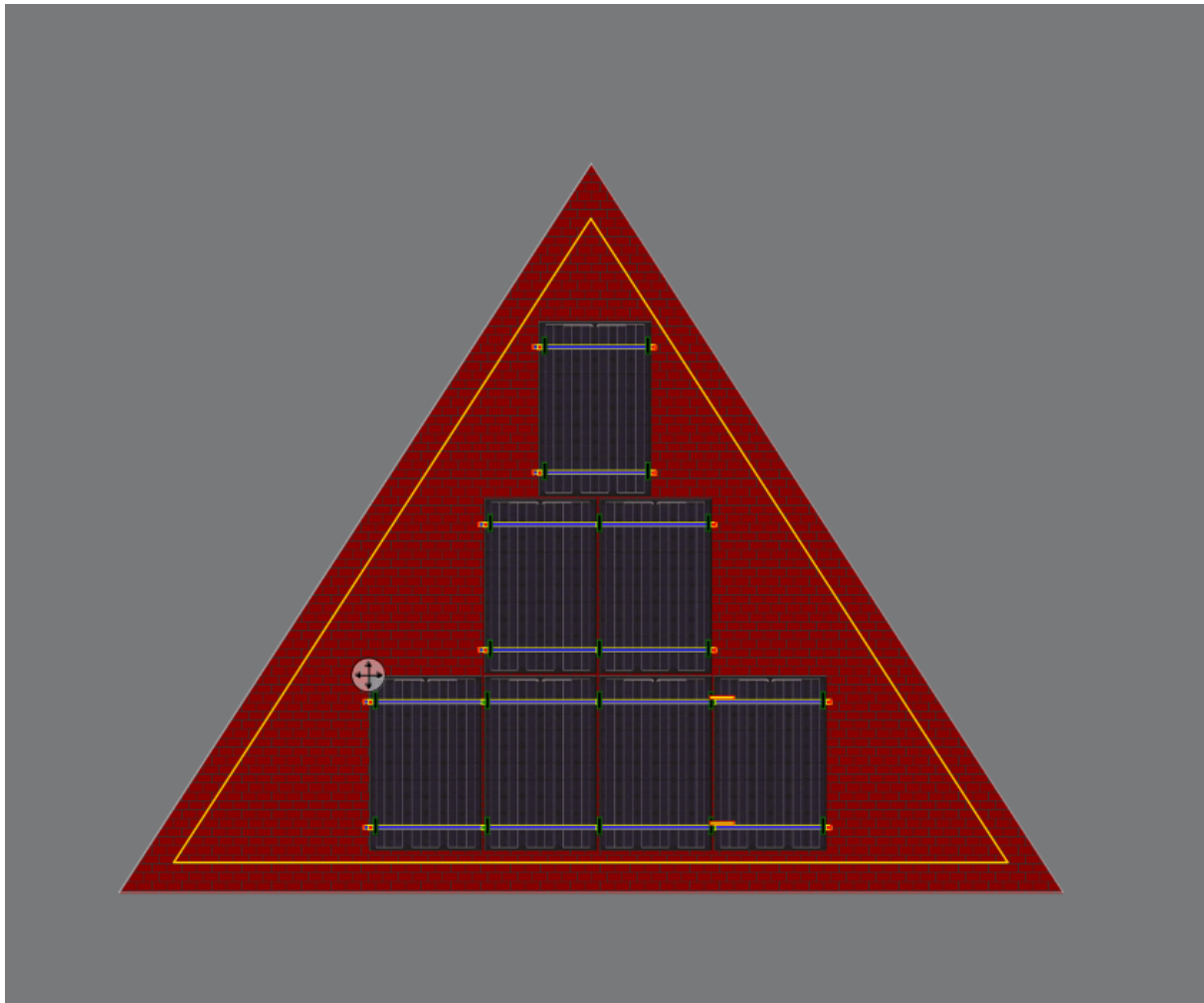
8 on west facing roof

7 on east facing roof

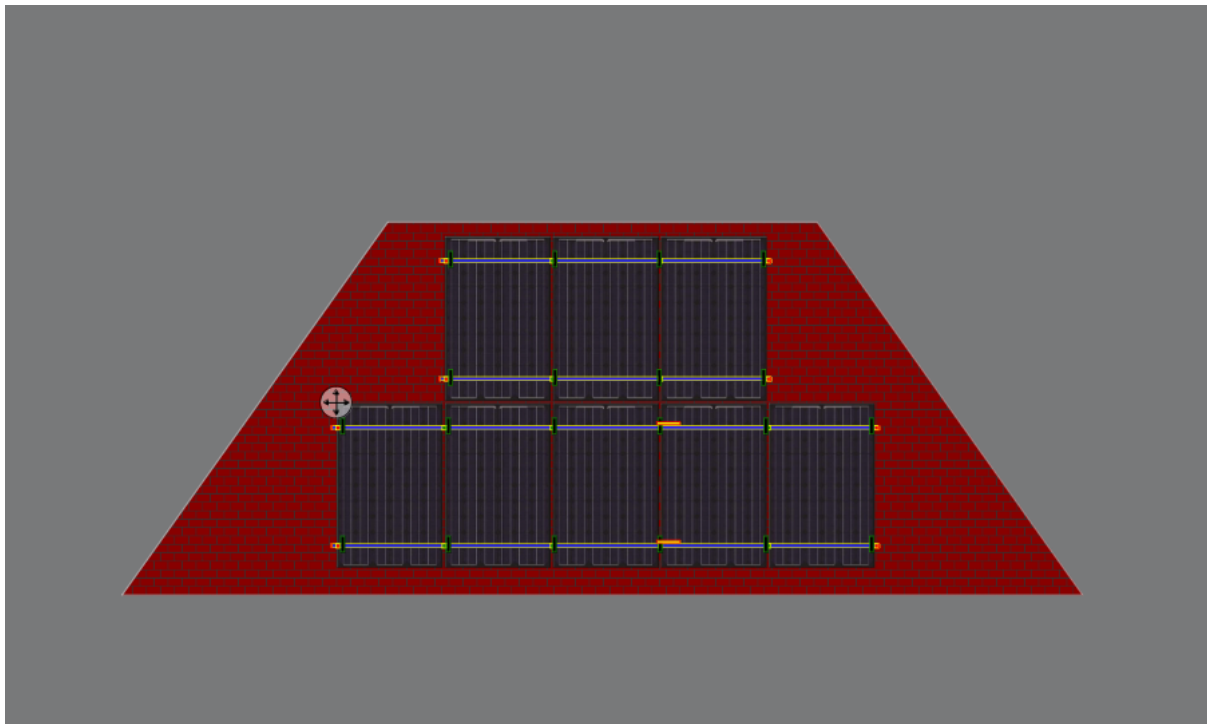
West Facing Roof



East Facing Roof



South Facing Roof



High Level System Specification

QTY		Description
23	x	Jinko Solar Tiger Neo N type JKM-440N-54KL4R (all black)
1	x	SolarEdge SE8000H Home Wave
All		Electrical connections, Meters and isolators
All		Mountings

We have included the installation of a Zappi car charging unit and bird protection in our revised offer.

Our Offer

Outright Purchase

Total System Purchase Price including installation **£14,164.20**

Estimated electricity bill savings

(The total amount of electricity you are billed for will be lower than if you did not have the system, unfortunately at this time, the electricity bill savings will not be itemised on your bill).

First year:

Self consumption is 5640 kWh displacing grid electricity at 29p/kWh = £1,635.60

Export paid at 20p/kWh = £700.00

Total = £2,335.60

Estimated rate of return in year 1 is 16.49%

Estimated payback period 6.5 years

The solar PV system is expected to operate for at least 25-30 years or more and so after the payback period all the savings from your bills are your reward.

As this is a long time, some components of your system may need replacement. The main one to be aware of are the inverters which currently have an expected life of 12-15 years. Batteries are expected to perform well for 10 years and performance and storage capacity will decline over time

Comparisons

Financial:

Both the Enphase and Tesla systems are marginally more expensive. This is unsurprising. The Enphase system has more technology per panel than the Solar Edge system. Tesla system carry a premium and the battery has a larger capacity.

SolarEdge: £14,162.20

Enphase: £14,314.00

Tesla: £15,494.00

However, it's important to consider the financial returns in order to determine which represents the best value for money.

We examined the detailed figures in the Detailed Savings table and used the overall savings figures quoted to compare the overall performance of each system

SolarEdge: 16.49% in the first year

Enphase: 13.41% in the first year

Tesla: 13.76% in the first year

Why? The SolarEdge system is larger and generates more electricity it also has a lower initial capital outlay. This is very small when compared to the Enphase system but because the Enphase system has a smaller battery more of the electricity generated from the SolarEdge system can be used to substitute for grid power at 29p/kW

The Tesla system will capture more of the generated power from its panels because it has a larger battery than the SolarEdge system but the additional cost of this system is not justified by the additional amount stored.

You will have noticed that the 20p export rate from Good Energy is only available if the system is installed by JPS. Therefore, once a comparison of the overall performance of the systems are compared by adopting the same assumptions for each this should be checked against what is likely to be achieved if the SolarEdge system was actually deployed and you only had access to a lower export tariff. This would be an Octopus tariff (please see the discussion of tariffs below) and the lowest they will pay from 1st July is 15.51p/kWh. When we use this rate for the SolarEdge system and the same 20p rate for Enphase and Tesla the first year rate of returns are as follows.

SolarEdge: 15.38% in the first year

Enphase: 13.41% in the first year

Tesla: 13.76% in the first year

Technology

The Enphase system and the SolarEdge system will perform similarly due to the localised efficiencies at each panel. With the SolarEdge system this is achieved using a micro-optimiser and with Enphase though micro-inverters. There is more kit on each panel with the Enphase system and so this results in a more expensive system. However, both Enphase and Tesla will give you access to both Intelligent Flux from Octopus – the highest rates

available on the market at this time and the Solar Savings Exclusive tariff from Good Energy. The discussion on tariffs is an important consideration here so please see below.

The Tesla system will be less efficient because it is a string inverter. It has been reported that micro optimisers can be fitted to the panels connected to the Tesla central inverter to address this. However, if this were done so that the system was more efficient there is likely to be an additional cost for this extra kit and so the rates of return would be lower than both Enphase and SolarEdge.

Similarly, you could add more battery capacity to the Enphase system (two batteries instead of one) Again there would be more cost to this and so even though the utilisation of the generated electricity would be improved the capital cost would increase and the rate of return would not reach the SolarEdge system.

JPS could also adjust their layout to add more panels but again this would increase the overall cost. The increase would be marginal but in this case both the Enphase and Tesla systems would be more expensive and generate the same as the SolarEdge system and so the return from the SolarEdge system would still be higher.

Installation

The Earthpoints team is definitely smaller than JPS (who are an excellent company). JPS would not have been taken over by Good Energy if they were not. They have a track record of successful installations. Earthpoints although smaller is a specialist in solar. We have been operating in the market for 13 years as well. We additionally operate and maintain solar systems across the country so understand both the processes before installation, installation itself and post installation support and care. Our focus is to help customers install solar to help the planet. As part of this we also plant trees for every system that we install and for those we manage. Last year we planted over 4000.

Overall

The differences between the systems are relatively small. All three systems will perform well and all will payback between 6 and 8 years. They all are high quality premium systems that will deliver. Whichever system you decide to go with you will benefit both from the financial returns and help the planet.

Tariffs

The price you pay for electricity and that you can obtain for your export makes a material difference to the absolute returns from your solar system.

Whilst a number of new tariffs have appeared on the market recently Good Energy being one of the latest to offer a more meaningful export tariff they were not the first and are not (at the moment) the best.

We expect that more tariffs will continue to be introduced and the ones that are out there will be subject to change – as often as every three months.

As JPS is part of Good Energy have access to a special export tariff from them. However, there are a number of alternatives. One issue is that the complexity of the tariff structures and their variability makes it difficult to take a long term view. Whilst this not our area of expertise we are familiar with the market as it directly affects the financial viability of solar. Essentially higher electricity prices make solar more attractive financially. So, whilst we would like to encourage everyone to install solar because it is good for the planet we acknowledge that it needs to pay.

Here are some of the latest offers all per kWh

From your proposal

Good Energy Solar Savings Exclusive (only available if you install through JPS)

Import 29p you pay this

Export 20p you get paid this rate for your exported electricity

9p night 12 to 5am

Octopus Intelligent Flux

Off peak import 22.73p

Off peak export 22.73p - the same!

Peak rate import 30.31p

Peak rate export 30.31p

This sounds really good but to get access you need to allow Octopus to have access to your battery. Happily Enphase and Tesla are enabled technologies. SolarEdge is not as yet (possibly to come but it's impossible to say for certain or when)

Octopus Flux

Import Day rate 25.25p

Export Day rate 15.51p

Import Flux rate 02.00 – 05.00 15.51p

Export Flux rate 02.00 – 05.00 5.64p (not really relevant as its night time!)

Peak rate 16.00 – 19.00 35.36p

Export peak rate 25.85p

With this one anyone can get it if you have solar and a smart meter. You might be able to export and run down the battery during the summer (the SolarEdge battery can be set to not charge and run down but then you might have an empty battery for the evening. It depends on the profile of your use in the summer. It's not relevant in the winter where you won't

export but will charge up overnight from the grid on cheap power and use it during the morning, saving money and using your battery better.

These are all dependent on your use patterns and so it's very hard to tell if one would be better for you than another.

However, Intelligent Flux is likely to result in more cycles from your battery and these are out of your control. Also and more critically when you have high electricity use – which you will have you are likely to be better off with a different tariff altogether.

Cosy Octopus if you have an ASHP

It has multiple time periods and so is very difficult to model

Cosy rate 04:00 – 07:00 and 13:00 – 16:00 12.73p import

Peak rate 16:00 – 19:00 36.62p

Day rate – all the other times 25.25p

You can still get 15.15p for export

Octopus Go for EV's

Night rate 9p (so you can charge your EV and your battery at a very low rate)

Day rate (04:30 – 0030) 27.93p so most of the time

Again, you can get 15.15p export.

So, as things stand *Intelligent Flux* is the best headline rate for export but you have to give control of your battery to Octopus and it's probably not going to be good if you have an ASHP. It is better than *Good Energy Solar Savings Exclusive*.

Cosy Octopus is likely to be good for you as you will have an ASHP and the costs of running it particularly as you want to run it harder than the average are likely to be reduced so this one makes good sense for you

To date many of our customers have gone for *Octopus Go* because of the low overnight rate and the rest is pretty fixed so you know what you are getting and it's the simplest one of all.

How does this affect your choices about solar?

You probably shouldn't base your decision on what solar technology to invest in based on a tariff which may be short lived or variable and which may not suit your needs. Rather get the best tariff for your consumption profile because import prices will be more important for your overall bills than export – particularly as you will have high use.

As we saw above variations in the export tariff make only a marginal difference to the overall returns from your solar system.

And yes this is all very complex and difficult to untangle.

Assumptions & Considerations

General Assumptions & Considerations

- If for any reason, you should alter the requirements in relation to this proposal, Earthpoints reserves the right to re-assess its offer
- System Specification provided is subject to availability. Similar specification components of equivalent quality may be substituted.
- There are no access issues in order to reach the installation site.
- **Our solar PV projections are based on the Microgeneration Certification Scheme approved methodology which uses data on historical UK sunlight. The actual performance of your system will depend on how much sun falls on the panels and so in any period may be higher or lower than described here. The information presented provides you with an indication of expected performance and is not a guarantee.**

Specific Assumptions & Considerations for 5-9 Pirton Road

- In roof mounting (a higher power panel could be used if surface mounted)
- All black panels Jinko 440W total Black mono
- Tiled roof
- Installation takes place during the building works as in roof and scaffolding will be in place
- An ASHP is installed

Installation

All our systems are installed by professional fitters with the appropriate qualifications to ensure MCS and NICEIC compliance. Scaffolding/access equipment as required is included.

If purchasing outright and once installation is complete you will be supplied with a handover pack consisting of:

- All relevant test documents
- User instructions
- Circuit diagrams
- Warranty paperwork

Warranties

The solar panels have a Product Warranty of 12 years and a Performance Warranty of 25 years. The inverter comes with a 12 year warranty which can be extended directly with the manufacturer. Our installations are covered by our 2-year workmanship warranty.

Maintenance

The system should require little maintenance. Earthpoints can provide costs for periodic checks to ensure that the system is working optimally.

Planning Consent

Most roof based systems outside conservation areas can be considered as permitted development subject to standard requirements and our system design and installation adheres to these.

District Network Operator (DNO)

The local District Network Operator (DNO) will need to be informed that we wish to install a system at your site. We will need to obtain permission from the DNO before installation.

Structural Stability

Most roofs are more than adequate to cope with the installation of a solar array. Earthpoints recommend that you check for integrity and the ability to support the weight of the solar array if you have any concerns.

Buildings Insurance

We advise you to inform your insurance company that you have solar panels installed.

Mains Power Failure

If there is a mains power failure or the supply to the property is switched off, the solar PV system will be automatically disconnected from the mains supply. This is to ensure that anyone working on the local mains grid will not be in danger. The system will reconnect automatically when the power supply is switched back on.

Health, Safety & the Environment

A full health and safety assessment and installation method statement will be carried out prior to the commencement of works

We recycle as much of any packaging or waste material as possible and limit the amount of travelling our install teams do, to minimise the amount of carbon emissions due to the installation process. We also plant three trees for every system installed.

Payment Terms

For Outright Purchases:

- 10% of the total on order (a refundable deposit in the event the system installation does not go ahead).
- 80% of the total purchase price before installation commences.
- 10% of the total on completion of the works.

ALL PRICING IS VALID FOR 30 DAYS.

Contact details

If you have any questions, please contact me

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