BIG SOLAR CO-OP

Case Study
Kerry Taste & Nutrition

Chris Rigby (Big Solar Co-op), Martin Heath (Basingstoke Energy Services), Joe Bentley (Sharenergy)

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Lets begin at the beginning

- Site submitted by volunteer member Gordon Coppock
- Had already spoken to site and had an expression of interest
- Big Solar Co-op produced an initial design
  - 298.53kWp
  - 252,457kWh

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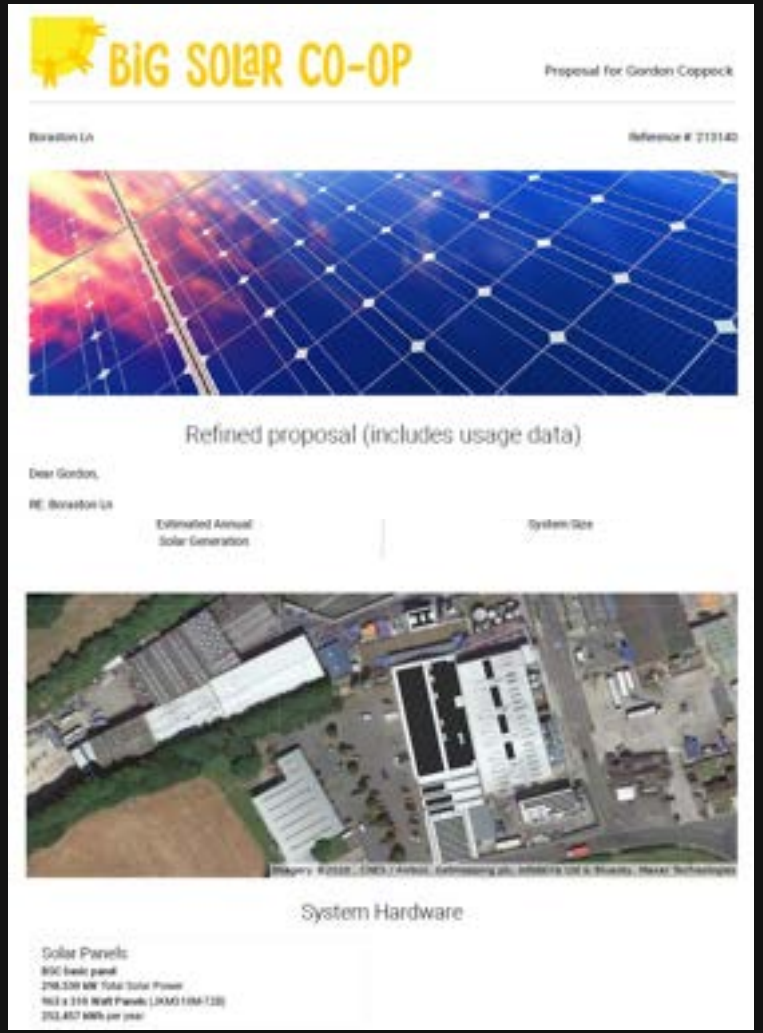
First Proposal

- Sent on 7th December 2020
- Design would provide 8% of total energy usage on site
- Followed by meeting on 9th December 2020
- Meeting discussed refining energy data (half hourly) additional roof space availability and history of site
- Host site confirmed interest in Big Solar Co-op installing



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Design Refinement

- Ongoing process
- Additional roof areas assessed separately and proposals issued showing these additions.
- Final proposal issued direct from Open Solar 15th March 2021

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Revising Proposals

- First recognisably ‘current’ Big Solar Co-op proposal issued 18th May 2021
  - 537kWp
  - 450,000kWh
  - Provides 16% on site energy
- Design accepted by Kerry and exclusivity agreement signed

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More Design Refinement & G99

- Refining design in Helioscope (alternate software)
- Specifying inverters and stringing design
- Production of all documents for G99 application i.e. schematic diagram
- Completion of G99 forms and submission to National Grid (Western Power Distribution as known then)

Part 3 Section 2 - Generating Unit data (please complete a separate sheet for each different Generating Unit)

Generating Unit Active Power capability

Generating Unit descriptor / reference

Fronius Symo 20-3-M

Rated terminal voltage (Generating Unit)	400 / 230	V
Rated terminal current (Generating Unit)	28.9	A
Generating Unit registered capacity	0.02	MW
Generating Unit apparent power rating (to be used as base for generator parameters)	0.02	MVA
Generating Unit rated Active Power (gross at generator terminals)	0.02	MW
Generating Unit minimum Active Power (minimum generation)	0	MW

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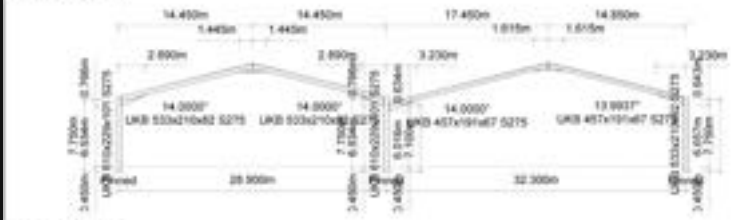
Site visits and Structural Surveys

- Kerry engaged structural surveys
- Big Solar Co-op visits site to determine inverter locations, visually inspect electrical connection points, generally liaise with host site
- Structural survey returns issues, only the outer slope of the building can be used

Following my recent site visits and our subsequent conversations regarding the above scheme, I would like to summarise our finding as set out below.
From the outset we were dealing with two buildings, building 1 constructed in the early 1970's and building 2 constructed in 2012. There was no structural information available for building 1 so we have assumed that, typically from this era, the steel coil for the purlins would be a 2275 grade and the steel for the main frame would be of a 5275 grade.
The information for building 2 is available, in part, but neither the steel grades nor the purlin sizes can be confirmed by the manufacture. There is some anecdotal evidence which gives suggestion on steel sizes and grades but none of this information can be substantiated.
The lack of verified information left us in the position of having to run the frame checks using the lesser grade of steel for both purlins and main portal frame. The outcome of the frame checks resulted in the failure of building 2 to support any additional loading for solar panels and the outside slope only, of building 1 being able to support any additional load.

REFERENCE: Portal Frame with Panels

Frame Diagram



Frame Details

No. Spans	2
Effective Frame Centres	6.700 m

Span Geometry

Span	Type	Axis	Lh Eaves [m]	Lh Apex [m]	Apex [m]	Rh Apex [m]	Rh Eaves [m]
Span 1	Standard	X	0.0	-	14.450	-	28.900
		Z	7.300	-	10.903	-	7.300
Span 2	Asymmetric	X	28.900	-	46.350	-	61.200
		Z	6.650	-	11.001	-	7.300

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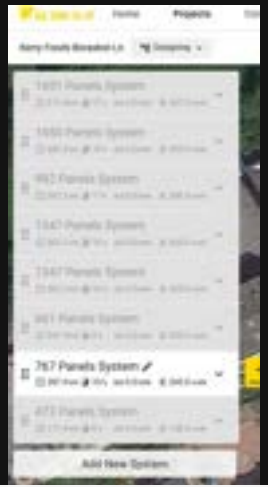
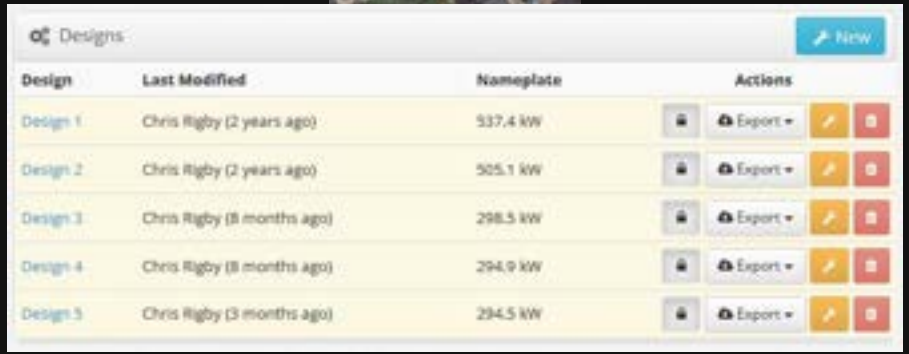
Back to the Drawing Board

- Designs, designs, designs
- Lots of back and forth with host site
- G99 for accepted design is accepted
- New design significantly smaller is accepted which meets structural requirements.





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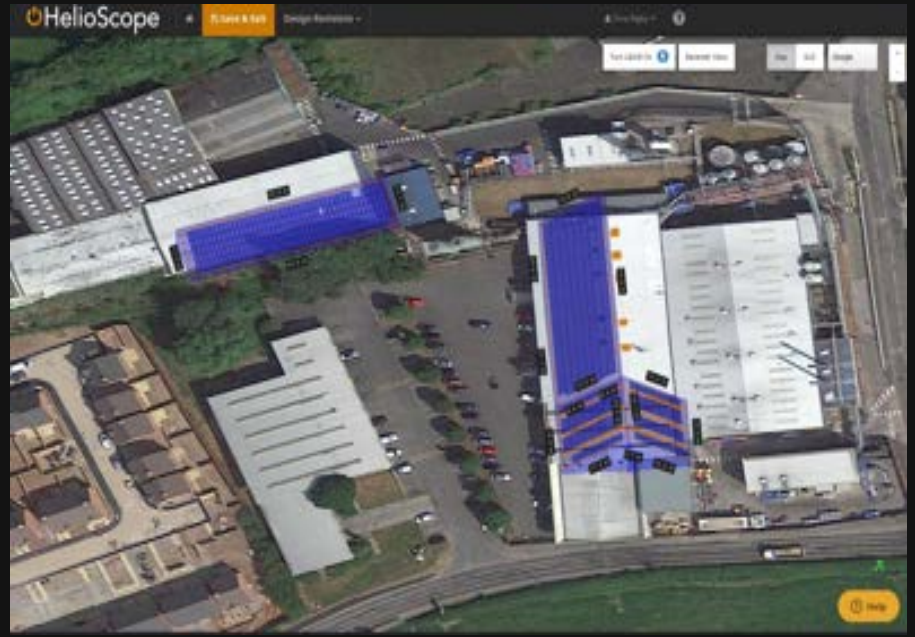
Finalising Designs & Tendering for Installers

- Revised design opens up new roof space by agreement of structural engineers
- May 2022 wrote a tender and invited contractors to submit quotations based on our criteria; panels, ethics, quality
- Received back limited expressions of interest
- Reviewed 3 submissions awarded contract to Basingstoke Energy Services Co-op



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Who are we? We have worked with many schools and community energy groups

HAMPSHIRE RENEWABLE ENERGY CO-OPERATIVE

MaidEnergy CLEAN ENERGY LOCALLY OWNED

TPS

LFB

Basingstoke Energy Services Co-op

For the benefit of our community

BCoT

ACAN

RIDING SUNBEAMS

CUCKMERE COMMUNITY SOLAR COMPANY

Wight Community Energy

WinACC

CHAMPION BUILD

16 42 Eggar's School

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What we are and what we do

- Founded in 2012
- A co-operative with co-operative values
- A worker's co-operative
- Designed and installed MWs of solar PV
- Ground and roof mount
- Small domestic to large scale commercial
- Batteries and EV chargers
- Business Plans
- Feasibility Studies
- Maintenance
- Pre-finance due diligence

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Who we are

- Iain – ex aeronautical and car industry engineer. 25 years experience. Runs finance and operations
- Jon – Mechanical Engineer. Heads up installation and design.
- Steve – Green Party Councilor. Ex RAF technician. Sales and marketing
- Martin – Veteran of the renewables industry – co-founder of Bes Co-op.
-
- Ben – Automotive Engineering background. 15 years in solar. CEO Ecogen.
- Jazz – Ecogen Project manager. Used to build ships.
-
- Jim – 25 years as an electrician.
- Mechanical and Production Engineer Co-runs JPH Electricals
- Sam – Ten years as an electrical engineer

Basingstoke Energy Services Co-op

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JPH ELECTRICALS GROUP LIMITED

ecogen energy

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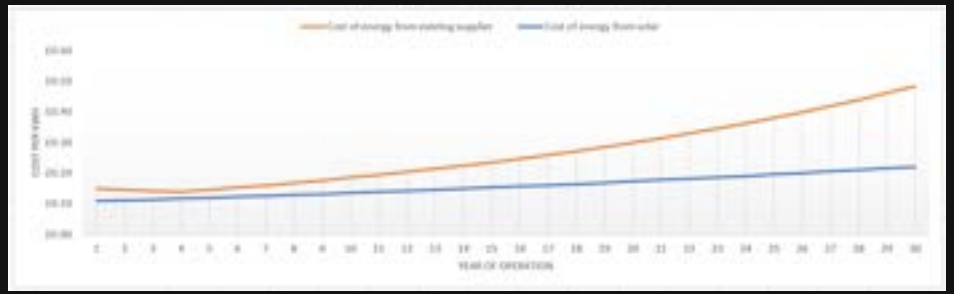
Financial Modelling

- Throughout all stages internal financial model has been running using estimated costs
- Now able to input actual costs
- The project works at the proposed costs

	A	B	C	D	E	F
1						
2	Inflation		100.0%	106.8%	114.3%	122.2%
3	Inflation (electricity export price)		100.0%	95.8%	91.8%	87.7%
4	Year		1	2	3	4
5	Energy produced (kWh)		246,834	245,847	244,859	243,872
6						
7	**Income**		£	£	£	£
8	Income from electricity exported		987	943	899	855
9	Income from electricity used on site		25,592	27,248	29,011	30,888
10	Total Income		26,579	28,191	29,910	31,743
11						
12	**Costs**					
13	Operational costs	3,889	3,889	4,168	4,466	4,784
14	Income reduction due to risk	3,268	3,268	3,495	3,736	3,993
15	Core costs		1,019	1,089	1,165	1,245



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Contracting stage

- Site visits
- Redesign to suit contractors stringing
- Gantt charts, scheduling, safety, storage
- Meeting host site requirements
- Meeting Big Solar Co-op requirements

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Legals Stage

- Running concurrently with contracting stage
- First PPA and lease agreement which will be signed
- Lots of work with solicitors drafting the PPA and lease documents followed by lots of negotiation refining them with host site solicitors

THIS AGREEMENT is dated 6 April 2023

PART A - KEY TERMS

Purchaser	**Kerry Ingredients (UK) Ltd** incorporated and registered in England and Wales with company number 329695 whose registered office is at Kerry Ingredients, Bradley Road, Royal Portbury Dock, BS20 7NZ
Generator	**BIG SOLAR CO-OPERATIVE LIMITED** a society registered in England and Wales with registration number RS004877 whose registered office is at The Pump House, Coton Hill, Shrewsbury, SY1 2DP
Term:	30 years and 0 months starting on and including the date of this agreement subject to the terms of this agreement.
Agreement:	Part A - Key Terms, Part B - Supply Terms, Part C - General Terms, the Schedules and the Plan shall form the agreement by the parties
Electricity Supply:	In accordance with the provisions of this agreement, the Generator shall use all commercially reasonable endeavours to supply electricity generated by the Equipment to the Purchaser and the Purchaser shall take delivery of and purchase such electricity
Building:	The buildings shown outlined in blue as shown on the plan attached to the lease dated [06/04/23] and made between (1) Big Solar Co-operative Limited and (2) Kerry Ingredients (a copy of which is annexed to this agreement)

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Insurance - (aka Big Trouble in Little Tenbury)

- Host site insurers provided us with an installation guide Sept 2022
- Had additional requirements above and beyond current MCS and BS:7679 requirements
- Current designs would not meet these requirements
- Insurers not open to negotiating or listening to our design reasoning
- Discussions ongoing until July 2023 including various design revisions and re-engaging structural engineers

RSA

Design and Installation Considerations

There are important factors to consider during the design and installation of the PV panel system, which affect both the system performance and the control of risks. A fire on the roof is difficult to control using manual firefighting. The PV panels are plastic make-up and some roofs are combustible. So, a fire spreading throughout the installation and involving the roof materials can be devastating.

The main considerations are:

Construction

1. Do not install PV systems on expanded polystyrene sandwich panel roofs.
2. Other combustible roofs (unapproved sandwich panels or felted steel/concrete deck roofs with no full-scale fire test certification) or roofs with combustible coverings should have the following installed where roofing materials cannot be removed:
   - Apply a fire-resistant roof covering (these should be reviewed by RSA on a case-by-case basis) as:
     - Gypsum or calcium silicate barriers (this is ideal and should be used for combustible roofs with combustible insulation)
     - Fire protection blankets (these can be used for combustible roof membranes).

   OR

   - Class 0/Class A PV panels throughout.
   - Strictly apply a spacing between banks of PV panels of 1.2m every 45m in each direction.

Layout

3. Do not install PV panels over or within 1.2m of skylights. Any skylights to be covered by PV installations should be covered with a fire resistive or non-combustible cover as agreed with RSA.
4. Do not install PV panels over roof or ground drains.
5. Provide a spacing of 1.2m every 45m in each direction and short of the roof edges for fire brigade access, access for gutter clearing and for inspection of roof drains & bolt fastenings.

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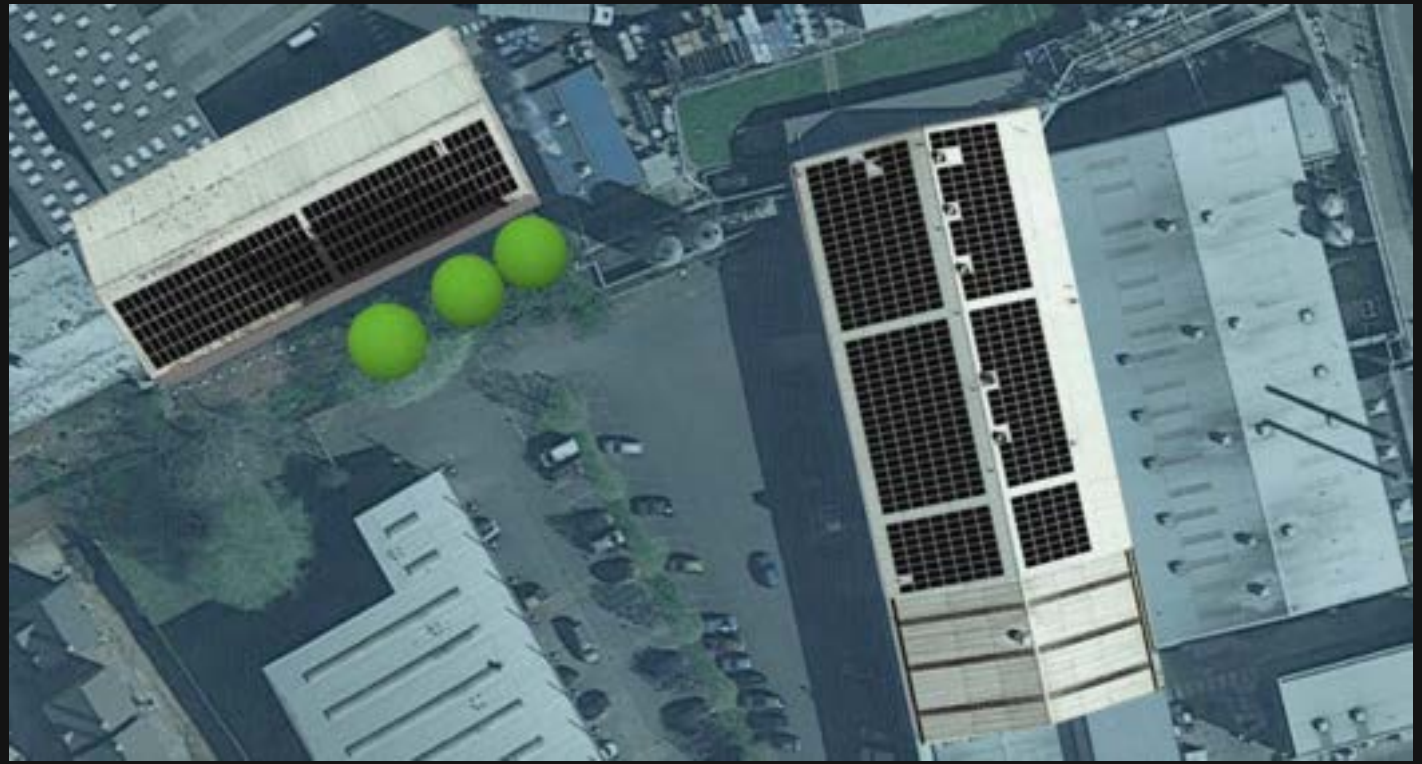
Final Final Design Approved



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Installation Begins 24th July 2023

- 2 Years 8 Months from initial proposal.
- Straightforward from this point?

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Site Visit 3rd August 2023

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Site Visit 3rd August 2023

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Site Visit 3rd August 2023

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Site Visit 3rd August 2023

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Site Visit 3rd August 2023

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Insurance - (aka Big Trouble the Sequel)

- 6th August - Insurers not happy with inverter location internal to the main building behind racking (fire risk)
- Our solution, move the inverters external - agreed
- 30th August - Insurers not happy with DC isolation only being inside the building on bottle store
- Agreed solution installation of firefighters switch external to bottle store

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Results

- Increased costs
- Delays
- Completion scheduled next week
- Many lessons learned
- System installed
  - 761 x 385Wp panels
  - 292.985 kWp
  - 254,600kWh
  - 53,466kgCO_2 saving in year 1
  -

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Sharenergy Operations Team


Joe


Liz


Rachel


Andy


Kinga

Starting Nov 2023!

Vicki

Sharenergy's Operations Team is a dedicated full-time team specialising in providing professional finance, accounting, administrative and membership support to the community energy sector.

Sharenergy provide ongoing services under contract to nearly 40 different organisations, with around a dozen more regular 'ad hoc' clients.

Sharenergy have also administered 60+ share offers for community energy schemes across all the main renewable technologies: wind, hydro, renewable heat and solar.

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Data Handshake with Sharenergy

- Sharenergy are under contract to manage the ongoing relationship between the Big Solar Co-op and the host sites - including insurance, performance, maintenance, billing, and liaison.
- All the necessary information is captured in a Data Handshake with the Big Solar Co-op project team.
- The Data Handshake includes the establishment of all necessary contracts for MOPs, DA/DC arrangements, exported energy agreements and flows of metering and performance data.

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Operations and maintenance

- Performance is monitored and opportunities to optimise are identified
- Maintenance schedule and insurance is arranged, and issues are identified and resolved, as per Big Solar Co-op's legal agreements with the host sites
- Data is collected and used to create accurate bills for the energy used on site
- Sharenergy are first point of contact for host sites and liaise with Big Solar Co-op
- Sharenergy also provide ongoing membership services: interest payments, share register, etc.

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Questions?

Thank You!