Assessment of solar PV and battery storage proposals for South Wonston Pavilion

Prepared for: South Wonston Parish Council

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Introduction and background

South Wonston Parish Council wishes to install solar PV panels and battery storage at South Wonston Pavilion, to reduce the energy consumption, running costs and carbon emissions associated with the building. The Council has obtained proposals/ quotes from four companies who were supplied with a tender document and outline system design.

The Council has requested an assessment of proposals from two companies, Cinergi Ltd (1 proposal), and C2 Renewables Ltd (2 proposals, options 3 & 4), with a focus on technical features, quality of equipment, the battery backup power supply, and the merits of on-roof and in-roof (integrated) designs.

The detailed assessment is set out in the tables below, and considers these and other factors for each proposal in its own right, in comparison to others where relevant, and against the brief provided in the tender document. Key points are highlighted, and these are brought forward and/ or summarised below with particular reference to the Council's main concerns.

The Council has not asked for a recommendation on which proposal it should accept, if any, and this has not been provided.

Summary

Quality of equipment

Cinergi and C2 Renewables have both specified Aiko solar panels and SigEnergy inverters and batteries. These are both well-known makes being very commonly installed in the UK at present, and may be thought of as upper mid-range to premium brands in terms of price and features.

Technical features.

The Aiko panels specified by both companies are recent models, which incorporate the company's latest features and coatings, and their efficiency is towards the upper end of the range possible at present.

The Sigenergy SigenStor energy controller will automatically switch to providing electricity from the PV and battery to the building in the event of a powercut. This should meet much of the building's demand, though possibly not when consumption is very high for short periods when PV generation is low and battery power is not enough to make up all of the difference. I suggest you discuss this with your chosen installer, as it may be possible to direct battery power to selected essential circuits instead of the whole building, to ensure these continue working and extend the period when the batteries can provide backup power. In normal use, the energy controller can also divert surplus PV generation to an immersion heater instead of exporting it.

The controller and batteries are modular and stackable, making adding additional capacity at a later date very straightforward. The batteries also have a thermal management/ heating system enabling them to continue working at high efficiency in very cold conditions so they could be installed outdoors if necessary.

Panel numbers and layout

Both companies propose PV systems of approximately the size requested by the Council. Cinergi's 36 panels on 3 roof faces might not require planning permission to install with minor adjustments to the position of the arrays.

The south-west facing array of 10 panels from C2's 35 panels will not fit into the space available as can be seen from the images below; only 9 panels can fit into this space and if the Council is minded to accept their proposal this should be clarified and confirmed, and the total output would be slightly lower as a result. The longer east facing array might require planning permission even if its position is adjusted, and the in-roof system might also require planning permission due to the additional space taken up by the trays and flashing system.

Cost

The companies have applied VAT differently: Cinergi have applied VAT at 20% to most of the cost with a small proportion at 0%, whereas C2 have applied VAT at 0%. Unless the Parish Council has charitable status I am not aware of, I feel that Cinergi's approach is probably correct, in which case the Parish would need to reclaim the VAT charged, but this is a specialist area and I recommend the Parish seek specific advice on this point. I have used VAT exclusive prices for comparison because of the different approach.

C2's on-roof system cost is £19,395, 20% less than Cinergi's £24,676, though both are significantly less expensive than the average of quotes received during phase 1 of the

WinACC Community Solar Support Scheme from October 2023 – March 2025. C2's in-roof system cost is £26,995.

Energy and financial savings

Based on the information provided in the proposals, although they are very similar in size, Cinergi's system has higher annual output than C2's on-roof option with 35 or 34 panels, but slightly lower self-consumption. This may be due to the use of different modelling systems.

Cinergi's system shows significantly better annual financial savings (£3475) than C2's, on-roof proposal (£2928), and the lack of a breakdown in C2's proposal between reduced import from the supplier and export income makes it very difficult to compare in detail and assess why this is the case.

C2's proposal suggests much higher lifetime savings, but this is primarily due to the use of higher assumed energy price rises than Cinergi (7% compared to 3%) and a higher export rate, neither of which can be forecast accurately. The effect of these variables can be removed by calculating simple ROI and payback figures using year 1 savings and system cost. On this basis, ROI and payback proposal are similar - 14.1%/ 7.1 years for Cinergi, and 15.1%/ 6.6 years for C2 option 3.

In-roof / integrated panels

In-roof/ integrated mounting is certainly worth consideration where aesthetics are important, given their lower profile and lower visual impact, and when re-roofing, as the area occupied by the panels does not have to be tiled / slated, helping to partly offset the higher cost of the integrated mounting. However, as well as the higher cost, it's generally accepted that there will be a slight loss of efficiency compared to on-roof, resulting in lower system output and less good financial savings, ROI and payback. If the building is not being re-roofed, unless the tiles removed are reused, the lost embedded carbon could be considered to be an emission to set against the carbon savings from the system.

In the case of the Pavilion, the cost of C2's option 4 for integrated panels is far higher than for on-roof, to the extent that ROI is around 33% lower and payback 50% longer. The Council will have to consider whether aesthetic considerations are sufficiently important to outweigh the much higher cost and its impact on other financial measures. It could also ask Cinergi or other installers to provide a quote for an equivalent in-roof system if it has not already done so.

Damage risk mitigation

Both companies have addressed the issue of potential damage by impact from footballs by specifying fully optimised systems using Tigo optimisers, and slightly different Aiko solar panels with thicker than standard glass or dual glass layers. These have the same impact and load ratings, and it's not known whether one has better impact resistance in

practice. They are the same size, so it should be possible for either company to fit either module if the Council has a preference.

Maintenance

Inverters and batteries do not generally require annual servicing in order to continue working properly; some makes require an inspection at certain intervals to maintain a warranty, but this may not be the case for SigenStor equipment.

The MCS has guidance on system inspection and testing, which the Council may wish to follow, and at least some of this could be carried out by staff, though may require work by an electrician or installer in some years. This being the case, if Cinergi carry out the installation they could be asked to provide prices to carry out inspections and checks to a schedule determined by the Parish Council when required, and C2 could be asked to provide details of what work would be included in their annual service each year to ensure that the MCS guidelines are met and decide if the annual cost is appropriate.

Panels are self-cleaning to a limited extent, but dirt will accumulate over time, and allowance should be made for maintenance cleaning when this becomes very noticeable before it becomes more difficult and expensive, but this may not be as often as every year. The £225 charge from C2 is not unreasonable, but I would advise obtaining other quotes from specialist companies who will be aware of particular issues involved in cleaning solar panels and could carry out physical checks as part of their service, rather than general window and building cleaners.

More information and advice on these points can be provided on request.

Quality of proposals

Both proposals include information about all the key issues requested by the Parish Council enabling them to be properly assessed. C2's proposal contains the error in panel layout design highlighted above; has less detail about export income making like-for-like assessment of savings more difficult, and no full list of materials and equipment for the in-roof system (option 4).

Cinergi Ltd	C2 Renewables Ltd (Option3)	C2 Renewables Ltd (Option 4)
a) Panel numbers, layout and output		
36 x AIKO A480 - MCE54MB 480W panels: 15 east (2 rows), 12 west (1 row), 9 south-west (1 row) = 17.28kWp. On-roof mounting.	35 x AIKO-A490-MCE54Db 490W panels: 13 east (1 row), 12 west (1 row); 10 south-west (1 row) =17.15kWp. On-roof mounting.	As for option 3, but in-roof/ integrated mounting.
		
Comments • Cinergi. It may be possible to install this layout without applying for planning permission; distances from the edges of each array to the external edges of the roof should be checked to confirm this. • C2 - option 3. As designed, the south-west facing array extends beyond the main roof and across the hip, and clearly 10 panels can't be fitted in this position, so the total number of panels which can be fitted is actually 34 = 10.67kWp. Subject to this reduction, it may be possible to install this layout without applying for planning permission if the arrays are positioned lower on each roof face. • C2 – option 4. In-roof mounting requires fitting trays which hold the panels and flashings for water-tightness, and on the east and south-west faces it may not be possible to fit these so the panels are > 1m from the edge of the roof, in which case planning permission would be required. Two in-roof mounting systems are in general use, but the proposal does not state which would be used or include a full listing of installation materials as for option 3. There is no information about retention or disposal of the tiles to be removed.		
b) Inverter		
Sigenstor 17kW 3 phase	Sigenstor 15kW 3 phase	Sigenstor 15kW 3 phase
Comments SigEnergy is a Chinese manufacturer whose products became available in the UK market in 2024, are now widely installed, and in terms of cost and functionality may be considered to be upper mid-range or premium products. They are thought to be the most commonly used make in Australia since their introduction there in 2022. All three systems use their 3-phase inverter; C2 propose the slightly lower output 15kW model, but the maximum output from the PV system is unlikely to exceed this in practice so generation is unlikely to be limited. The potential combined power from PV + battery is slightly		

lower than the 17kW proposed by Cinergi, but the amount of time/ occasions that the building will require > 15kw and so additional power would be pulled from the grid would be very low, so in practice this would make little difference to energy and financial savings.		
c) Batteries and backup system		
2 x Sigenstor BAT 10, 9.04kWh (8.76kWh useable) = 17.52kWh total, 4.6kW output. Sigenergy Gateway C60 60kW, 3 phase full backup	2 x Sigenstor BAT 10, 9.04kWh (8.76kWh useable) = 17.52kWh total, 4.6kW output. Sigenergy Gateway C60 60kW, 3 phase full backup.	2 x Sigenstor BAT 10, 9.04kWh (8.76kWh useable) = 17.52kWh total, 4.6kW output. Sigenergy Gateway C60 60kW, 3 phase full backup
Comments. All three systems use the same batteries which are within the capacity range specified by the Council. They are of a modular/ stackable design, so if it was felt that additional capacity was needed at a later date this could be added very easily. The backup system is also the same for all three systems, and in normal use can also direct excess PV generation to the immersion heater when a set amount of PV export is detected. It operates as on/off switch, so uses excess PV but if the threshold set lower than the power rating of the immersion (e.g. 1kW for a 3kW heater) then the difference would be met from battery then grid. This is less efficient than e.g. iBoost which only uses surplus, but incurs no additional cost, and 17kW PV will often generate a surplus, particularly from spring to autumn.		
d) Annual output, self-consumption and self-sufficiency		
Annual output = 15,736kWh Occupancy pattern = in half the day Self-consumption = 46% / 7174kWh Self-sufficiency = 81%	Annual output = 15,105kWh Occupancy pattern = in half the day Self-consumption = 48.7% / 7356kWh Self-sufficiency = 83%	Annual output = 14,476kWh Occupancy pattern = in half the day Self-consumption = 47.8% / 6919kWh Self-sufficiency = 77.7%
Comments: • Cinergi. Stated output is c4% higher than for C2 option 3 though the system sizes are almost identical, suggesting different modelling methods for estimating generation. • C2 – option 3. Annual output will be lower than stated as one less panel can be fitted (see above), estimated at 14,650kWh, hence self-consumption and self-sufficiency will also be slightly lower. • C2 – option 4. Annual output as stated is c4% lower than option 3, in line with expected slightly lower efficiency of integrated panels, and will be lower than stated as one less panel can be fitted (see above), estimated at 14,050kWh, hence self-consumption and self-sufficiency will also be slightly lower, probably close to the figures in the Cinergi proposal. • All systems. The figures for self-consumption and self-sufficiency are based on an occupancy archetype, not the actual consumption pattern of the building, which is strongly influenced by the ground-source heat pump in winter; the actual figures are likely to be higher in practice. This has no bearing on the size of the PV array, but a more detailed analysis based on half-hourly meter data might indicate that a larger battery capacity would be desirable. (See comments on adding battery capacity above.)		
Maintenance		
No servicing/ inspection required to maintain warranty; hydrophobic coating makes panels "self-	Annual service £180 ex VAT, no details provided Annual clean £225 ex VAT	Annual service £180 ex VAT, no details provided Annual clean £225 ex VAT

cleaning" during rain, though acknowledge possible need for cleaning.		
Comments: • If SigenStor equipment requires no mandatory servicing to maintain warranty as stated by Cinergi, this is useful in terms of cost, though the MCS has guidance on system inspection and testing, which the Council may wish to follow, and at least some could be carried out by staff, though may require work by an electrician or installer in some years. For this reason, it would be advisable to ask C2 to provide details about what work would be included each year within the chargeable service. • Cinergi's comment that panels are self-cleaning is true to a limited extent, but dirt will accumulate over time and allowance should be made for maintenance cleaning when this becomes very noticeable, but this may not be as often as every year. The £225 charge from C2 is not an unreasonable sum, but it would be advisable to obtain other quotes from specialist companies who will be aware of particular issues involved in cleaning solar panels and could carry out physical checks as part of their service.		
Mitigation of damage risk		
• Introduction states that panels are dual glass for greater impact resistance. • Full Tigo optimisation • Bird exclusion mesh included	• No reference to panel impact resistance • Full Tigo optimisation • Bird exclusion mesh included	• No reference to panel impact resistance • Full Tigo optimisation • Bird exclusion mesh not required
Comments • Panel impact resistance. The data sheet for the panels specified by Cinergi shows they are 3.2mm mono glass (on top of the silicon cells), not dual glass. The panels specified by C2 are 2 x 2.0mm dual glass (one sheet each side of the silicon cells), so may have slightly greater impact resistance, but both panels pass the same hail impact test and have the same load ratings, so perhaps little difference in practice. The panels are the same size, so it should be possible for either company to use either module if the Council has a preference. • Full Tigo optimisation and bird exclusion included in both proposals. Panel monitoring is probably via a phone app and/ or desktop app; ensure instruction in this is included in handover.		
Cost		
£18,814 for PV system + £5862 for battery storage = £24,676 exc. VAT	PV system + battery storage = £19,395 exc. VAT	PV system + battery storage = £26,995 exc. VAT
Comments • The companies have applied VAT differently: Cinergi have applied VAT at 20% to most of the cost with a small proportion at 0%, whereas C2 have applied VAT at 0%. Unless the Parish Council has charitable status I am not aware of, I feel that Cinergi's approach is correct, in which case the Parish would need to reclaim the VAT charged, but this is a specialist area and I recommend the Parish seek specific advice on this point. I have used VAT exclusive prices for comparison because of the different approach. • Cinergi. The combined system cost is approximately 10% lower than the average costs quoted during phase 1 of the WinACC Community Solar Support Scheme, made up of a higher price/kW for PV, and lower price/kWh for storage.		

- C2 – option 3. The system cost is c22% lower than the average costs quoted during phase 1 of the WinACC Community Solar Support Scheme; no breakdown between solar PV and storage elements was provided.
- C2 – option 4. The system cost is c8% higher than the average costs quoted during phase 1 of the WinACC Community Solar Support Scheme, and 40% higher than option 3; no breakdown between solar PV and storage elements was provided. A higher cost would be expected given the additional materials, and work in terms of roofing and removing tiles, though 40% seems a very high differential. The tiles removed would contain an amount of carbon embodied in their production, and if not reused this could be seen as an emission to offset the carbon savings the system would achieve.

Financial and carbon savings

Annual consumption saving = £2507 Annual export income = £968 Combined annual saving = £3475 Lifetime savings = £58,287 Annual carbon savings = 4.74t	Annual consumption saving = no breakdown provided Annual export income = no breakdown provided Combined annual saving = £2928 (this is presumed to be the combined figure, it is not clearly stated). Lifetime savings = £73,941 Annual carbon savings = 4t	Consumption saving = £? Export income = £? Combined saving = £2710 Lifetime savings = £57,993 Annual carbon savings = 4t

Comments

- Annual savings. C2 estimate a significantly lower annual saving than Cinergi, despite annual output being very similar and C2 estimating higher self-consumption, which should equate to a higher annual saving. It is possible that the figure of £2928 is for consumption savings only and that export income has been omitted for some reason, or the discrepancy may be due to using different financial models, but no breakdown is given, so the figure has been assumed to be correct.
- Lifetime savings. C2's estimate for option 3 is much higher than Cinergi even using a shorter system life of 20 years compared to 25 for Cinergi. This will be partly due to the lower system cost, slightly higher assumed electricity unit cost (C2 = 25p, Cinergi = 24p) and a higher price for energy exported (C2 = 15p, Cinergi = 12p), but mainly due to the cumulative effect of a much higher assumed figure for energy cost inflation – 7% compared to Cinergi's 3% - over the system life. The lower figure for C2 option 4 reflects the higher system cost and lower annual output and self-consumption.
- Simple return on investment (ROI) and payback. Use of different assumptions for energy price increases is common, and it is impossible to say which is more realistic. The effect of this variable can be removed by calculating simple ROI and payback figures using year 1 savings and system cost. On this basis, ROI and payback for the Cinergi proposal are 14.1%/ 7.1 years, for C2 option 3 are 15.1%/ 6.6 years, and for option 4 10% and 10 years.
- The annual carbon savings for each proposal broadly reflect the estimated system output.
- Both proposals assume a flat unit rate for electricity consumed, which makes comparison more straightforward, but the building is currently on a time of use tariff with 3 different unit rates. Actual savings will be influenced by this, and would also benefit from overnight battery charging at cheap rate during the winter when PV generation would be lower and energy consumption higher. A more detailed estimate may be possible if half-hourly meter readings were available, but this would not necessarily be helpful in making a choice between the proposals.