Visit report from Nigel Cooper about King's Chapel roof

I visited King's on Friday 4 November 2022 in the company of Philip Orchard and Geoffrey Hunter. We met several representatives of the applicant.

This report pulls together both the visit and all my other thoughts on this application, so it is not just about what we saw and learned on site. I have organised the material around the two principal issues to be balanced in the decision: harm to the significance of the chapel and the benefit of the PV array.

Harm to the significance of the chapel

1. Undoubtedly, the proposed PV array will affect the appearance of the most important building in Cambridge and one of the most important in the country. The two related questions are how visible would the array be and what is its level of harm.
2. From the submissions of the applicant and Historic England, it is clear that it would be visible from certain locations, but one would have to look carefully and with intention to notice it. Following the site visit itself, the DAC delegation looked at the roof from the street beside the Corpus Clock and from the roof of the Grand Arcade car park. Our view had to be interpreted because of the presence of the scaffold, but it appeared that it would be mostly hidden or broken up by the parapet and other stonework.
    a. It is of interest that perhaps the clearest view of the roof from a public place, the car park, was not one that previous people had assessed. Although people parking there would notice with implicit admiration the chapel building, it would take a special type of person to go there specially to view the chapel.
3. We were told by the college staff that there had been conversations between visitors and the college guides about the PV when the mock-up, but not the scaffold, had been in position. The public did not notice the mock-ups, but had to have them pointed out to them. This is evidence of the low impact of the PV panels on people's normal visual experience of the chapel.
    a. Although the college has announced in various ways its plans for the array, we were told that there had been very few complaints.
4. I consider that the visual impact would, therefore, be very slight.
5. What is the level of harm? That is, balancing within the category of 'harm':
6. I first want to distinguish harm to intentional design from harm to necessitated design. The original builders of the chapel had clear intentions in their design of the parapets etc, and of the roof height and pitch. The choice of lead to cover the roof, however, was necessitated by the lack of practical alternatives at that point in history. That means that the hypothetical question, "Supposing the builder could have chosen between lead and a PV array for covering the roof, which would s/he have preferred?" cannot be answered either way. Changing to a PV surface is not demonstrably contrary to the original builder's intention. Of course, the 'intentional fallacy' might be invoked and, certainly, there is the fact that the roof actually is lead. However, surely twenty-first century changes to a clear original intention will be more harmful than changes to necessitated design, as in this case.
7. Secondly, I ask whether it is obvious that lead is aesthetically preferable to a PV array. This is an aesthetic judgement that people will vary on. Most people in the building conservation world probably prefer traditional technology and finishes, even technologies that were controversial at

the time. However, roof coverings are not 'ornaments' on the buildings they protect, but practical engineering solutions to keeping the rain out. And in engineering, even more than in architecture, form follows function, and so well-engineered elements are aesthetically pleasing as much from the clarity and simplicity of their functionality as from more ornamental features. In our contemporary predicament many people will delight to see well-designed solar arrays on roofs as they demonstrate the values of the building's proprietors.

8. To illustrate something of these two points, I wish to compare the introduction of the Reubens painting into the chapel in the mid-1960s. This remains a controversial introduction and perhaps would not be allowed now. However, it was a case of harming intentional design, albeit some of that design was itself not original to the early chapel. The introduction of the Reubens caused harm, but added beauty or 'positive harm' (i.e. an improvement, not a detraction). Is it merely a matter of taste as to whether one prefers the earlier east end or the present one? I delight in the simplicity of the current east end that gives focus to the 'Adoration' and the east window above it. (Images of both stages can be viewed at https://www.kings.cam.ac.uk/archive-centre/online-resources/tour-of-the-college-archives/religion#toc-6.)
    a. In the case of the roof the 'positive harm' of the aesthetic approval some people might attribute to a PV array is obviously not of the same order as the 'positive harm' of the Reubens. However, the point I am trying to make is that, in weighing the harm of the array, it is not merely a question of how much it can be seen. There are also the questions of the degree of significance of a lead roof as an original design feature and the (argueably) positive aesthetic of a PV array in present circumstances.
9. Thirdly, there is the issue of harm to other historic architectural heritage. Climate change is expected to increase the risk of harm to cultural heritage. Does the harm of the PV array on King's outweigh the harm elsewhere? Of course, a harm to another heritage building could not be directly attributed to failing to install the PV on King's, but failing to do so will make a contribution to increasing this risk, albeit a small one, but the risk from climate change when applied across the global heritage will mean some very definite and serious actual harms.
    a. To indicate the level of seriousness of this concern, UNESCO and others have recently reviewed the situation: https://www.ucsusa.org/sites/default/files/attach/2016/05/world-heritage-and-tourism-in-a-changing-climate.pdf. Among other global case studies, Stonehenge and Orkney are highlighted as at risk on page 76.
    b. HE describes these risks as follows: "**Buildings**.
    Multiple factors will also affect historic buildings, increasing and varying the types of maintenance needed.
    Whilst unpredictable and severe weather in the form of floods and storms is likely to be an ongoing issue, continued change will more regularly stem from individually less severe, but nevertheless cumulatively significant impacts.
    Global warming is likely to encourage both fungal and plant growth and insect infestation, affecting historic building materials. Structural problems may also increase from changing extremes and fluctuations (heat as well as cold) in temperature.
    In dry conditions soil shrinkage, particularly of those that are clay-rich, can lead to building subsidence, structural deformation and collapse in the most severe cases.
    Flooding is also a major problem, both inland and on the coast."
    https://historicengland.org.uk/research/current/threats/heritage-climate-change-environment/what-effects/ (and see related pages, plus https://historicengland.org.uk/research/results/reports/8614/ClimateChangeAdaptationReport. [i])

c. This might be summed up with quotation from Historic England: “We will not meet our emission targets and sustain our heritage without changing our approach.” https://historicengland.org.uk/content/docs/about/heritage-and-climate-change-strategy/

The benefit of the PV array

10. The NPPF states that it is not necessary for applicants to restate the evidence for climate change and the need for renewable electricity generation. Within the ecclesiastical context, in the light of General Synod’s 2020 resolution on Net Zero it would also hardly seem necessary. However, since the publication of the latest NPPF and even the Synod resolution, the evidence has become both stronger and more concerning. There have been the three AR6 reports from the IPCC and, more recently still, the slew of UN reports in the run-up to COP 27[ii]. “Code Red for humanity.” [iii]
11. There has been discussion among DAC members around three questions:
    a. What is the benefit of installing PV on the church itself, which may be of greater historic significance, rather than on another PCC building, such as a church hall
    b. What is the benefit of installing PV on such a church rather than just obtaining the PCC's electricity from a renewable supplier, who will be constructing PV and wind generators on other land? This assumes that the PCC will also use a renewable supplier for the additional electricity it uses that is not generated onsite.
        i. Is there a benefit from using the electricity in the building itself over sending it through the grid? Or is there a disbenefit in sending electricity into the grid in a dispersed way?
    c. What is the benefit in terms of exemplar of installing PV on a church roof? How might that be characterised in a quantitative or comparative way?
12. I put some or all of these questions to the Church of England central Net Zero team, our Diocesan Environmental Task Group, ARU’s Global Sustainability Institute and to the applicant’s architect, as well as doing my own searches. I have compiled the responses as an annex to this document. The details in the responses varied somewhat, but the sense of the replies was clear and united.
    a. Both within Britain and globally, the commissioning of renewable generation is woefully behind schedule. Globally, the IEA have set a target of increasing the rate of annual capacity deployment by three-fold. Every new installation helps to contribute to this. Therefore, installing one’s own arrays is better than taking renewable electricity out of the grid. The more the better.
        i. It was also pointed out that many infrastructure projects, especially solar farms, take land out of food production. In the climate crisis we need both mitigation (such as PV) and adaptation – in which food security will be critical. Rooftop arrays contribute to mitigation without undermining adaptation, unlike many installations by green energy suppliers.
    b. Although there are technical issues, in general it is much better for electricity to be used close to its generation. There is energy loss as electricity is moved about the grid (it is like a heating coil in an electric heater, except that it does not get that hot, of course).

    c. Positive actions by churches that lead others to install arrays will bring both these benefits to sites elsewhere.

13. This last point is particularly relevant to the King's application. As it is such a notable building, being able to explain to visitors and the wider public, and the building world, that the chapel has such an extensive PV array on its roof will encourage others to fit their own. This is, therefore, a multiplying effect. We can expect that much more electricity will be generated on rooftop arrays around the country, including on churches, as a further public benefit of what King's are applying to do.
    a. Some in the heritage world may be anxious about this and see it as an unwanted precedent. To some extent it is a precedent, though, as the array will have very low visibility, it will not be a precedent for applications that are highly visible. In the climate crisis other people will judge that it is a long overdue precedent.
14. The submissions from King's demonstrate that their application is part of a coherent set of sustainability plans and that the electricity generated will be mostly used onsite. I have questioned the King's representatives in considerable detail on this as part of checking that they have followed the CBC's advice on fitting solar. There are some things one might have liked, such as more on how their agricultural holdings are contributing, but landowners are very limited in what they can ask their agricultural tenants to do. It is clear that King's have sought expert advice on how to green their domus estate and are working systematically through this. The chapel roof is not only a major contributor to this program, there is also the opportunity window of the scaffold and other work involved in renewing the lead. The scaffold costs are roughly twice the cost of installing the array, we were told (approximately £700k and £350k respectively) – put another way, if the array is not installed now, it would cost three times as much if installed later as a stand-alone project.
15. I have no hesitation myself in putting this conclusion to my fellow members of the DAC that we should RECOMMEND this application.

Nigel Cooper

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Annex

I sent an email along these lines to a few people:

The DAC is deliberating on an application to fit PV to a church roof. Two members have raised questions that I have not much thought about before. Are you able to give us some advice and, if possible, give some references as well? This would need doing fairly speedily. Geoffrey is more up on the timetable than me, but perhaps by the end of next week.

N.B. I did not disclose that these questions related to King's College Chapel

The questions were:

1. What is the benefit of installing PV on the church itself, which may be of greater historic significance, rather than on another PCC building, such as a church hall? (This, I think, is straightforward: one needs to install the PV on the roof that will generate the most electricity. Have I missed something, though?)

2. What is the benefit of installing PV on such a church rather than just obtaining the PCC's electricity from a renewable supplier, who will be constructing PV and wind generators on other land? This assumes that the PCC will also use a renewable supplier for the additional electricity it uses that is not generated onsite. (This seems the most challenging question. If I am right on Q1, then it makes most sense to generate electricity on specially constructed sites which can maximise all the efficiencies.)
    1. Is there a benefit from using the electricity in the building itself over sending it through the grid? Or is there a disbenefit in sending electricity into the grid in a dispersed way (I have heard of difficulties over destabilising the power network from these local sources)?
3. What is the benefit in terms of exemplar of installing PV on a church roof? How might that be characterised in a quantitative or comparative way?

Replies:

From Geoffrey Hunter:

I'm hoping Bob's technical knowledge will be able to help us with the issues of dispersal. It must surely also relate to transmission – if the electricity is being used by a nearby house or village, would that not be more efficient than transmitting it tens or hundreds of miles via pylons, and presumably having to transform its voltage accordingly (my peripheral knowledge of physics is probably letting me down there…)?

I raised the matter of rural churches an solar panels at the recent CBC conference. The general attitude seemed to be that if a church can't use the electricity generated, why should they install solar panels, particularly since the end of the feed-in tariff? My argument was as follows:

The C of E's target is NET zero, so a church that generates electricity and exports it to the grid is contributing to that target, indeed may become a NET contributor to the target, making up the slack from other churches which will find it more difficult to reach net zero.

In the domestic market there are firms which pay a wholesale price for electricity generated. Peak rate (Mon-Fri 7am-9pm) electricity is particularly sought after, and this is the time when these buildings are less likely to be in use for services and will therefore be exporting to the grid.

Assuming tariffs of this type become available in the commercial sector, net contributors will be actually be paid for their net contribution, which must be a very significant incentive.

A peripheral benefit – any lead roof under the panels will become very difficult to steal, potentially saving the church the expense of an alarm.

For the time being it sounds like it will remain a challenge to get visible installations agreed (even very marginally visible), but there are still many churches out there with completely hidden aisle or nave roofs which are basically there for the using (subject to, etc).

Bob Skelton:

1 In general churches have large south facing roofs which make the ideal for SPV. There are cases where other locations may be suitable and perhaps they should be used as well if possible.

2 The current amount of low carbon electricity generation capacity is limited so it makes sense to use all available locations. It is much better to use church roofs than valuable agricultural land as the food that was grown on that land has to be imported with a significant carbon penalty. It also gives the church an income. I don't really buy the greater efficiency idea as all SPV is modular so the gain is minimal. There may be small efficiency gains with the inverters but again they are modular. Large inverter sets need cooling whereas small one do not giving energy savings. It also means that existing distribution networks can be used removing the need for more overhead cables. Nigel's point re transmission loses is also valid. There is some risk of destabilisation where the network is weak and we will need a lots of network enhancement anyway to meet increased demand.

3 Installing SPV is a mission statement that the church is doing something for the environment, it may be difficult to quantify but must be good PR. The payback time is now very much shorter as electricity prices rise and SPV panels become cheaper.

I personally think the CoE is in a very good position to make a significant contribution to the very large increase in low carbon electricity generation capacity which is vital as we move to electric vehicles and heating. We have a very large area of eminently suitable sites for SPV and it is high time we dropped the ludicrous restrictions on its use. I am at a total loss to see why SPV panels look any worse than lead which, let's face it, is not very attractive anyway. If we are really serous about climate change (which I actually doubt with the current government) then attitudes and planning rules must change. What use are pickled in aspic buildings if they are too hot to use or under water?

We have hundreds of redundant or little used buildings which could be converted into micro power stations using the interior space to house batteries. The national church could become a significant electricity utility and use the profits for mission. This would release acres of land back to agricultural use.

Catherine Ross: (I just asked her Q2)

Well, there are two responses to that; one is the pragmatic, which is to work with the church on the things they do want to do, especially around reducing their use of energy. It's their church, and if the appetite isn't there, then you can't make them.

The second is to get into the logic of the benefits of local generation, whilst the grid decarbonises:

- Purchasing from a 100% green tariff is a good thing, and with the calculation of net zero carbon used by the EFT, the church will be (very nearly) net zero carbon.
- Generating additional clean electricity is an even better thing; it increases the supply of renewable electricity in the UK, by a fraction. Someone, somewhere, will no longer need the 'brown' electricity that they otherwise would have consumed.
- However, as the grid decarbonises between now and c.2035, due to the UK's investment in renewables, the marginal benefit of roof-top generation will become gradually less. By the

end of the life of any solar panels installed on a church now, they should not need to be replaced.

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Geoffrey responded:
Can I suggest a third bullet?

Is it safe to assume that those churches who are net contributors to the grid (as well as the net zero target) might hope to get paid for what they generate, at a wholesale rate? I know this is what Octopus Energy is doing for domestic users. That would surely mean that even after the grid has decarbonised, the churches would continue to accrue financial benefit from their installations.

Further message from me to the DETG group and Chris Foulds:

I have done some further investigation.

One argument might be that the UK (and the world) need to install new SPV at a faster rate than is currently achieved, and so churches contributing to this effort is a small but genuine contribution to increased sustainability.

I have found the figures confusing as the BEIS national statistics appear to give current capacity as 14GW and annual new capacity at 286MW. This is approximately similar to figures from Solar Energy UK.

However, EnergyGain and EnAppSys give figures that are much larger. EnergyGain's figures for 2019 for new installations is 114GW and EnAppSys gives annual capacity of 16TWh.

The Climate Change Committee's Sixth Carbon Budget sets out targets for capacity to increase from 10TWh in 2019 to 60TWh in 2035 which requires an average of 3GW new installations p.a.

Globally, the IEA set a target of increasing the rate of annual capacity deployment by three-fold.

Further replies from DETG:

Bob:

As you say the numbers look complex and they are further complicated by the domestic/commercial split As far as I can see the 14GW installed is about right based on the rooftop/other ratio in Solar Energy UK. Gridwatch gives the max Grid capacity as 10GW. I think the EnergyGain figure is in fact worldwide.

Based on Energy saving Trust numbers for domestic installations a 1Kw panel should generate about 800kWh per year so 14 GW should give about 11.2 TWh though commercial plant may be a bit more efficient so the ENAppSys is not a long way out and ties up with CCCs numbers.

Nigel Walter:

A few points to reiterate from Bob's contributions:

- Our domestic 4kW array generates between 3.1 and 3.6 MWh pa.
- Sending electricity long distances is wasteful – National Grid transmission losses are around 1/3, if I remember rightly. Clare College buys its electricity on a 100% green tariff, and is keen to state that much of this is local – i.e. South Cambs.
- PVs on agricultural land is not a good thing – we should do buildings first.

- Yes, we should take all the opportunities we can – both church and adjacent hall.
- But I believe the service provider or UKPN can limit the size of your array according to local capacity
- And yes, places PVs on historic buildings is missional/exemplary and should be welcomed.

On a related note, Octopus energy has a Tesla Energy Plan tariff which pays export and import at the same rate. The Tesla bit refers to the Tesla powerwall battery, rather than the car. I wonder whether this could be available for non-domestic properties – in which case a low usage church with a decent array could earn well. No idea whether it could be made to stack up financially, given battery costs. One to watch, perhaps.

Bob's response:

Thanks for your support re PV on historic buildings but you are way out re T&D losses. There are a wide variety of figures around but taking the U.K. government statistics gives a transmission loss of 2.5% and a distribution loss of 5.8% so most of the problems are in the local LV network not the HV grid. This ties up with other numbers of about 7.5%.

The local distribution losses may well increase as the system becomes overloaded because loses go up as the square of the current. We are going to have to invest large sums in our local networks if we are to meet the almost certain big increase in demand.

EDF also offer a similar tariff but there is a problem at the moment with three phase supply due to lack of suitable smart meters.

Nigel's reply:

Thanks Bob for the correction. I think I 'learned' that figure doing physics at school – delighted to be disabused. So good to have you to refer to!

On need for increased capacity, here at home our electrical use is around 4 MWh pa, and I'm expecting the car to add perhaps another 2 MWh (assuming 8,000 miles pa and 90% charging at home). That's before we consider going to a heat pump, or adding another electric car. Against that 6 MWh usage we generate around 3.3 MWh from the PVs. Probably should think about a second PV installation, for which there is some scope...

Reply from Chris Foulds (Assoc Prof at GSI, ARU):

Hi Nigel – lovely to hear from you and I hope you are doing well – but, alas, I don't think I can be very helpful for you at this moment in time…

One thing that I would add though in terms of targets is that, as you point out, there is a bit of step change at the moment in ambition. Take the EU for example… its new REPowerRU legislation is targeting a doubling of solar PV by 2025 and a MASSIVE 600GW by 2030… to put that into perspective: I think that the EU has cumulatively only got to about 150/200GW to date now (bit of a guess there, though!), and so there is a huge amount of investment needed to get up to 600GW by 2030 and I think many energy researchers/policymakers are sceptical if it will happen.

Solar PV is a very good thing. The first step is always to reduce energy use though, to ensure that the investment in solar PV doesn't need to be as big. This is often talked about as the energy hierarchy: energy conservations (turn things off) à energy efficiency (have tech that

uses energy at a more efficient rate, yet still delivers the same service) à finally fuel substitution (e.g. solar PV).

I don't really have references to direct you to, I'm afraid. But, yes, for me, I would be more open to solar panels (in theory) providing that I had full assurances that the energy efficiency of the building had been tackled as best as it could be (bearing in mind it is probably listed etc).

Response from Oliver Caroe to this basic question:

Why should a church seek to generate non-emitting energy on site, if it is already buying 'green' electricity?

1. National Policy position:

a. The projections for Grid de-carbonisation are predicated on ALL possible forecast renewable and non-emitting energy sources being delivered. There is no policy or financial strategy for achieving the theoretical decarbonisation curve. Therefore ALL opportunities for non-emitting sources are needed. Therefore investing in PV is a wider public good as the Grid's renewables capacity is increased (or made available to another customer).

b. As shown in the Dr Julian Allwood graph that we shared in our application; based on current COP 'zones of policy' targets, compared with potential or actual Carbon Capture and Storage and non-emitting capacity the world is way-off the landing zone needed. All non-emitting sources should therefore be considered.

c. Given the capacity constraints to connect PV to the grid, which is a major national issue and limitation to progress, PV arrays that are sized to the needs of the user on site are a vital part of stretching that connected capacity

2. Church and parish reasons:

a. The 5th mark of mission suggests that we all, as individuals and organisations, should own the ethical and moral responsibility for stewardship, if we reasonably can. Therefore generating one's own non-emitting power is also about taking personal accountability .

b. Cost: at a (temporary) price cap of 34p/Unit a PV array will potentially payback in 2-3 years (subject to cost and complexity); the economic benefit to the Parish for the remaining 25+ duration of the investment is therefore evident, which will serve mission and viability.

c. Owning a funded PV array also de-risks crippling cost price inflation and helps deliver resilience of supply (in the face of possible power cuts). Both factors are good reasons to invest.

End Notes

[i] See also:

Historic Environment Scotland A Guide To Climate Change Impacts | Historic Environment Scotland

The Third Climate Change Risk Assessment, Technical chapter https://www.ukclimaterisk.org/wp-content/uploads/2021/06/CCRA3-Chapter-5-FINAL.pdf, see section 5.12 and https://www.ukclimaterisk.org/wp-content/uploads/2021/06/CCRA3-Briefing-Cultural-Heritage.pdf

EU policy:
file:///C:/Users/nigel/Downloads/strengthening%20cultural%20heritage%20resilience%20for%20climate-NC0822056ENN.pdf (There is a rather old research project report at https://www.researchgate.net/publication/281265343_Global_climate_change_impact_on_built_heritage_and_cultural_landscapes)

Church of England pages on climate resilience:
https://www.churchofengland.org/resources/churchcare/climate-resilient-church

[ii] I am referring here to:
On climate:
https://public.wmo.int/en/our-mandate/climate/wmo-statement-state-of-global-climate
On climate in Europe:
https://climate.copernicus.eu/esotc/2021
On greenhouse gas concentrations:
https://public.wmo.int/en/media/press-release/more-bad-news-planet-greenhouse-gas-levels-hit-new-highs
On emissions gap:
https://www.unep.org/news-and-stories/press-release/inadequate-progress-climate-action-makes-rapid-transformation
World Energy Outlook
https://www.iea.org/reports/world-energy-outlook-2022
On global carbon budget:
https://www.globalcarbonproject.org/carbonbudget/22/highlights.htm
On health:
https://lancetcountdown.org/2022-report/
On finance: https://www.lse.ac.uk/granthaminstitute/publication/finance-for-climate-action-scaling-up-investment-for-climate-and-development/

[iii] I wrote on this on 26 October to other DAC members as follows:
As the DAC environmental specialist, I thought it would be helpful to set out in more detail the public environmental benefit from putting PV panels on the roof of the chapel, together with the reasons why I consider these to be of national significance.

Last year I engaged in friendly correspondence with a climate change denier. I began my detailed study of the topic anticipating that the evidence would be persuasive, but that there would be some doubts that deniers could hold onto. As it turned out, I concluded that the evidence was overwhelming and the science of anthropogenic climate change was as close to certainty as anything in science can be. I also concluded that I, judging by my lifestyle and actions, was a climate change denier in practice – as are nearly all of us.

The IPCC is a cautious body as its main documents have to be approved by governments around the world. It also takes time to compile each report, and the trajectory is that each round of reports is more pessimistic than the last. The three sections of AR6 came out over last year and this. You might recall the headline 'Code Red for Humanity' as a summary of the third report on mitigation. The COP in Paris set an aspiration for no more than +2C and, if possible, keeping to +1.5C. Any temperature increase greater than this is predicted to have very serious impacts. Even in Britain, where it is likely that we shall escape the worst of the impacts (other than knock-on impacts from global instability), things could be serious. Just this week the UK Health Protection Agency has warned of increasing risk of serious diseases - https://www.theguardian.com/environment/2022/oct/23/climate-change-

poses-growing-threat-to-health-in-uk-says-expert, for instance. Impacts elsewhere in the world are likely to be very serious indeed.
So, if we are to keep below +2C, or ideally to +1.5C, what needs to be done? I find the easiest way to communicate this is by exploring carbon budgets. This is a little simplistic, but scientists can estimate how much extra CO2 in the atmosphere will lead to what temperature increases with certain probabilities. This can then be compared with current annual CO2 emissions to see how many years there are left before we probably exceed these targets if emissions rates remain unchanged. A very simple infographic on this is here: https://carbontracker.org/wp-content/uploads/2022/01/infographic_carbon-budgets_2021_66prob-01-1.png. A much more detailed blog is here: https://www.carbonbrief.org/analysis-what-the-new-ipcc-report-says-about-when-world-may-pass-1-5c-and-2c/. You will note that the infographic states that we have just nine years left to stay below +1.5C if emissions are not cut. The global trend is for emissions (apart from the covid years) to continue to rise.
Of course, it is easy to blame 'China' or other countries for this, though our national emissions are partly outsourced to such countries. Yet, whatever responsibility other countries have, this does not excuse our own, particularly as we have been significant emitters ever since the industrial revolution, so over many more years than most other countries. The statutory Climate Change Committee, chaired by Lord Deben (John Gummer), has set out a carbon budget for the UK: https://www.theccc.org.uk/publication/sixth-carbon-budget/. The headline of this is, "Our recommended pathway requires a 78% reduction in UK territorial emissions between 1990 and 2035. In effect, bringing forward the UK's previous 80% target by nearly 15 years." In such a context General Synod's target of Net Zero Carbon by 2030 may be practically unachievable, but it is the right order of magnitude if we are to address the climate crisis appropriately.
I think that few people are taking this as seriously as the science requires.

Each church needs to take what steps it can to significantly reduce its emissions. King's desires to make a useful contribution to its own carbon emissions with this PV proposal. In my questions to them I have pressed them to evidence what else they are doing. This will support their case to the degree they can show they are taking other significant initiatives. Yet, even if they could do much more elsewhere on their estate than they are doing, that does not detract from the significant benefit the PV array itself will bring.

However, because of its national status, a solar array on King's Chapel roof will have a far greater impact on emissions than merely the reduction in the college's own footprint. It will encourage many other churches, and owners of notable secular buildings, to consider installing PV. It will also encourage planners to look favourably on applications.

In my opinion the public benefit of this installation is of major national significance and that the detrimental impact of the array on the building's architectural significance would need to be very great indeed to outweigh this benefit.