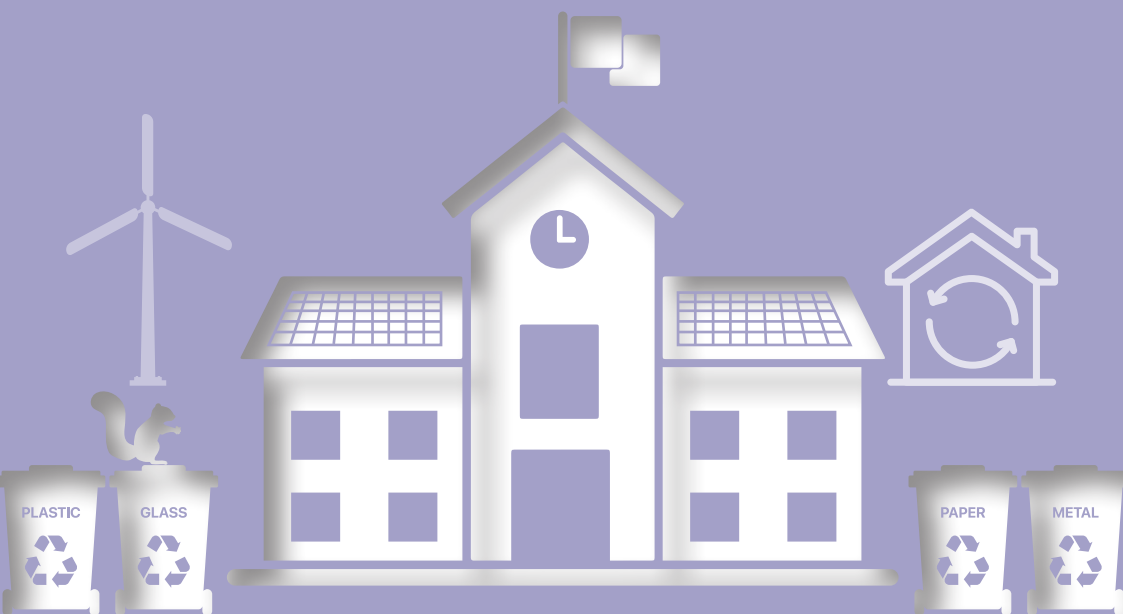


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Decarbonizing Schools

A Practical Guide



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Sam Johnson

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Introduction: Grounding the Narrative

1

The aim of this text is simple. It is to help schools and academies identify where they are on their own road to net zero carbon, and to encourage them to take the next possible step. This book will not delve deeply into the science, the technology, the funding or the politics of the debate. It will reference those only when it is useful in trying to determine the positive actions and options open to schools. As it is written in non-technical terms, it should have a broad appeal and application across all types and sizes of school and academies—from small, rural primary schools to large, urban secondary Multi-Academy Trusts (MATs). Whilst this text explores the practical aspects of decarbonization, it is designed to accompany Grove Education booklet eD 66 (*Treasuring the Earth*), where Ryan Parker looks at the theological imperative for addressing climate change in schools, along with suggestions for the curriculum and collective worship.¹

For nearly a decade I have been responsible for a large number of Voluntary Aided Church of England school buildings in the North West, working with headteachers and their governing boards to ensure they remain open, safe, warm and dry. Motivated by the Church of England's commitment to reach net zero carbon by 2030, over the past few years I have accessed government grant funding to help a relatively small number of schools to decarbonize, and a larger number of others to make good progress in terms of reducing their carbon emissions. This journey is not only one of science, it is also one of inspiration for heads, hearts and hands. Our schools are, and will remain, beacons and treasures of their communities, teaching what is important and providing life-lessons not only for their pupils but to the communities which they serve. So, as schools engage with the journey to net zero carbon, they make a powerful statement about the importance of caring for our world. This becomes a source of hope to multiple generations and, for Church of England schools, can be viewed as an expression of faith and mission. Tackling climate change witnesses to our communities that we are people who care about climate justice, now and for the future.²

Tackling climate change witnesses to our communities that we care about climate justice

Therefore, the most important quality that each school and academy can bring to this debate is a willingness to engage with the agenda. Such willingness is determined by whether we are motivated and encouraged to believe that

reducing the carbon footprint of schools is something that is both important and worthy of due attention. Often the narrative of becoming net zero carbon can feel overwhelming and quite unrealistic, which in turn acts as a real demotivating factor; this is understandable given the complexity, age, variety and spread of our national school buildings' estate. Yet taking time to consider how to reduce an individual school's carbon footprint—without necessarily having the aim or even ambition of becoming net zero—can be both freeing and exciting. The journeys to *reducing* carbon, and to the more distant destination of achieving net zero carbon, start with the same first steps.

The climate change debate contains a wide range of complex and interrelated narratives which our media discusses, presents and argues about on a daily basis. Within this rich dialogue, individuals discover their own motivations to engage—or not—in the difficult task of decarbonization. Some may be intrigued and encouraged to explore the new aspects of technology that are constantly being developed and refined to create and deliver heat and power without the use of fossil fuels. Air-source and ground-source heat pumps, solar photovoltaic products, battery storage, air-to-air heat pumps, wind and wave technology, and even micronuclear reactors are regularly investigated and explained. Others may be engaged by the politics of climate change which is rarely out of the news, whether that is on a global scale at international gatherings such as COP conferences, at national level through the approach

and policies of governments and the various political parties, or through more local interest and pressure groups.

In order to decarbonize significant capital investment is required

Alongside the technological and political aspects, financial considerations are never far from the debate. From our own home situation through to the national energy sector, we understand that in order to decarbonize significant capital investment is required—be that to fund heat pumps, wind turbines or solar panels. Detailed calculations on how long the technology needs to be used in order to pay back the initial investment follow, accompanied by the nagging questions as to whether the investment is worth it and how that worth can and should be measured. In recent years there has been a growth in funding options for the domestic customer and, to some extent, this has also been experienced in the school sector, with loan schemes available for green technologies and large-scale grants offered by government-funded schemes.

Whilst the technological, political or economic aspects of the debate may not always be the driving motivational factor actually to respond at a personal or school level, the scientific evidence can provide a powerful lever for change and inspire a willingness to engage. The sheer weight and breadth of scientific reports, maps, photographs and graphs depicting how the climate is chang-

ing, driven by planetary warming, demonstrates in a convincing manner that something real is happening and that these changes are both rapid and destructive.³ As Frankopan summarizes in a particularly rich and historical examination of the climate debate, ‘We live in a world teetering on the brink of disaster because of climate change.’⁴ If we accept this, even to some degree, it can lead to a conviction that we have a responsibility to do something. The fear that if we do not act then the planet—or at least human life on the planet—will not survive, focuses and concentrates minds, albeit potentially at the risk of increasing a sense of desperation and doom. For some, becoming disillusioned and apathetic is a real danger.

In considering the actions we are able to take, we may feel that we will never really shift the graph or the data. We can feel like a very small cog in an expansive, global machine. Gordon Brown, in his book *Seven Ways to Change the World*, recognizes this and, whilst outlining the ‘step-change in international decision-making that is needed to move this global environmental agenda forward,’ he puts great emphasis on personal decision-making. Brown reminds us that, ‘We owe it to ourselves to work together towards progress not as spectators but as agents of change, each of us with the power to reduce our own carbon footprints.’⁵ The personal becomes powerful and persuasive.

Within the power and purpose of a personal response resides a Christian theological perspective, which encourages us to consider our environmental impact and adjust our actions, not simply to save the planet but to give glory, praise and honour to God. This is a hopeful and positive narrative that can motivate and inspire individual activity and a commitment to live well with nature, to live life in proportion to the resources of the planet and, importantly for this debate, to encourage engagement with disruptive, challenging and complex environmental and decarbonization projects.

In Colossians, Paul describes the supremacy of Jesus Christ and outlines a christological approach, which may help inform and shape our response to the climate debate:

¹⁵The Son is the image of the invisible God, the firstborn over all creation. ¹⁶For in him all things were created: things in heaven and on earth, visible and invisible, whether thrones or powers or rulers or authorities; all things have been created through him and for him.

(Col 1.15–16, NIV)

For a Christian, the challenge, disruption and cost of decarbonizing schools can be viewed as part of a response to recognizing Jesus as the ‘firstborn over all creation,’ with the earth and all things in creation viewed as holy and therefore something to be treasured. Using Parker’s Grove booklet as a

helpful assistant, church schools could reflect upon the journey to net zero carbon being a contemporary outworking of their trust deed—that is, serving, educating and offering Christian love to the poor and marginalized—and doing that seriously, faithfully and joyfully. This turns the journey into an expression of hope fuelled by a belief that ‘new things are possible, options are not shut down, new creation can happen.’⁶

This booklet therefore offers a practical outworking of the Christian call to be revolutionary, society-changing, transforming and extraordinary. It provides a framework to engage constructively and hopefully in complicated agendas, encouraging all schools to focus on doing what they are able to do, and thus feel empowered and positive in the contribution that they can make to reducing their carbon footprint. The next chapter will discuss the particular challenges of decarbonizing schools. Chapter three then outlines a simple and memorable approach to help identify where each school is on its journey and gives direction as to what the next step might be. Chapters four and five are practical and building-focused, with signposting to tools and organizations which may be helpful. The conclusion encourages schools to reflect on the spiritual joy and significance of collectively engaging in the difficult task of doing something and doing it well, reflecting the importance of community with regards to climate action.

Questions for Reflection

- How can you encourage your pupils to approach issues of climate change with enthusiasm, determination and positivity?
- How does your understanding of God help motivate your commitment to caring for creation?
- What actions would you like your pupils to engage with to demonstrate a caring approach to creation?

Scoping the Challenge

In February 2020 the General Synod of the Church of England resolved that within ten years the church would be net zero carbon.⁷ This was a bold and courageous statement which took the church into the centre of the environmental debate, as it expressed both a willingness and a responsibility to engage seriously with the emerging narrative of climate crisis. Synod reflected practically and theologically on its commitment both to safeguard God's creation and also to involve itself in an agenda shaped by significant issues of social injustice, since climate change affects the world's poorest soonest and most severely. The church recognized that, in order to speak about climate change with a legitimate voice, it had to make a strong commitment—and to take unprecedented action—so as to be able to hold others to account.

The declaration to become net zero carbon included all Church of England schools and academies over which the church 'had a reasonable degree of influence and control.'⁸ Therefore, all Voluntary Aided (VA) schools and Church of England academies within church-majority Multi-Academy Trusts (MATs) were considered 'in scope.'⁹ This equates to around 2,200 schools. As the programme of work began to determine the actions required, it became clear that the schools in scope emitted over 50% of the total carbon emissions of the Church of England. This is because, in comparison to most churches, schools have much longer opening hours and cater for many more people throughout the year.

Therefore, schools formed a central place in the Church of England's *Routemap to Net Zero Carbon by 2030* which set out in some detail the vision and plan for schools, confirming that the aim was to address:¹⁰

- The emissions coming directly from a school as it burns oil or gas to heat its buildings
- The emissions created from gas-fired power stations in generating the electricity used in the school buildings
- The emissions caused by school trips (which are not covered in this publication)

Synod had presented a great many schools and academies with very significant strategic and school-level challenges.

Strategic Challenges

The different sizes, locations, responsible bodies and contexts of the schools and academies in scope create a complex context for the strategic challenge. For example, around forty Diocesan Boards of Education are granted capital funding and hold the responsibility for their VA schools. Meanwhile, responsibility for the capital and revenue aspects of the academies in scope rests solely with hundreds of individual church-majority academy trusts spread throughout the country. It is therefore a complex and extensive web of bodies and companies responsible for meeting the challenges of this declaration. This makes any strategic co-ordination quite difficult. And of course, whilst Synod is able to present and agree a declaration, there is no legal compulsion for any school, academy or MAT to recognize or support that challenge.

Adding to the organizational complexity are two issues arising from the size and context of the schools in scope. The majority of VA schools are small and rural which leads to two specific consequences:

- First, when considering the total number of schools in England, the VA Church of England schools in scope are generally already amongst the lowest emitters of carbon, simply because of their small size. Therefore, if there were a national strategic focus to reduce the carbon emissions from schools—without taking into consideration the significant other benefits of creating new habits, living justly, being a witness to the local community—then often VA schools would not be amongst the priority schools to consider. There are, of course, a number of VA schools—including secondary schools—which are very large and which are high-emitting buildings and could potentially cut significant amounts from their carbon footprint.
- Secondly, the leadership capacity, expertise and resources required to engage fully with a complex, expensive and disruptive change agenda is often difficult to find in small primary schools—and indeed in larger schools—where there is already a challenge to deliver outstanding church school education within the resources and time available. Reducing the school's carbon footprint is not always a priority.

In some regard this strategic context may be discouraging, but this book is designed to help schools recognize what they *can* do, alongside what the next

most effective and affordable action is, on their road to net zero carbon. In most cases the next best step will not be the expensive removal and replacement of gas or oil-fired boilers. It is therefore crucial to recognize that less expensive interventions, resulting in a drop in carbon emissions, can have a significant impact. The climate is a delicate system that it is impossible to model accurately, and scientists are unaware of exactly where any particular catastrophic tipping point in carbon emissions may be. So, the small amount of carbon not being emitted by a single school could help in being the determining factor in how the planet recovers from a climate crisis. Of course, the activity of reducing a school's carbon emissions can in itself become an educational resource for all the stakeholders in a given school, inspiring heads, hearts and hands for people and the planet, as well as motivating a whole community to take further action in their homes and lives.

School-level Challenges

One of the biggest challenges for a school or academy trust in managing their buildings is knowing where and when to invest in the technologies and fabric upgrades required. There is a strategic roadmap for schools to navigate, which starts with 'do nothing' and ends in 'full decarbonization.' Whilst chapters four and five will outline the options and considerations in more detail, it is helpful to reflect on a broad series of steps as follows:

- *Do nothing*—a default mindset which is being challenged by this book.
- *Reduce energy consumption*—by more effective usage policies and / or by installing more energy-efficient products, especially LED lighting.
- *Increase insulation*—especially roof insulation, which must be done professionally to ensure adequate ventilation. Installing double-glazed windows will also have a significant impact. This will keep heat in the building and therefore lower heating costs and emissions.
- *Increase renewable energy generation*—where possible installing solar panels on roofs in good condition and with a long lifespan.
- *Remove gas/oil heating source*—replacing with a heat pump solution.

Whatever the challenges and the circumstances of the school, some progress can be made on this journey which the following chapters will set out. School leaders need not feel impotent. However, it is right and proper to recognize that challenges exist and it is important that schools know what these challenges are.

Determining a school's route to net zero carbon begins with an understanding of the school building. This is not always an area in which school leaders have expertise, so looking to external experts may be necessary. Specialist Heat Decarbonization Plans (HDPs) can be commissioned which will give a comprehensive overview of the current energy performance of the school. They also provide outline plans, technologies and budgets for shifting to net zero carbon. HDPs can be relatively expensive to undertake but do identify the bespoke challenges of each school building, setting out the technological, infrastructural and financial challenges of decarbonization.

Full HDP reports consider the current condition and fabric of a building, its heating source and its capacity to move to net zero carbon. Planning for the removal of a gas or oil boiler requires consideration to be given to the full fabric of the building because such boilers usually heat water to a higher temperature than a heat pump solution. Installing the latter means buildings have to be better insulated so as to retain more of the heat being generated and circulated by a heat pump, potentially adding to both the cost and disruption of a decarbonization project. An HDP will consider all this and make recommendations for improvements such as:

- Roof insulation
- External wall insulation
- Increased air tightness
- Heat pump installation
- Window upgrades
- Lighting upgrades
- Renewable power

Importantly, HDPs also consider external factors, which can have a very significant impact on a school's ability to move along the decarbonization journey. In particular, the electricity loading capacity of a school is a key determinant. The HDP assessor identifies the amount of electricity that comes to the school and calculates how close the current electricity usage of the school actually is, compared to the electricity available. If a school's current electricity use is close to its electricity loading capacity, then adding electrically powered heat pumps can be difficult. Upgrading electricity inputs are often very expensive and time consuming and rely on working in partnership with utility companies. Reducing the electricity load by switching to more efficient products—such as LED lighting rather than fluorescent lights—can make a difference, as can adding electricity-generating technologies such as solar panels. Whilst these solutions can be explored, before too much planning has been completed it is important to recognize that the installation of any large electrically powered unit, including electricity-generating methods such as solar panels, merits a

conversation with the Distribution Network Operator (DNO) to ensure grid capacity and compatibility.

It is also important to consider the cost of a decarbonized solution. The ongoing running expenses can occasionally be prohibitive, especially if solar panels cannot be fitted to assist with electricity generation. Electricity is currently much more expensive per kilowatt hour than gas or oil, although it is hoped that there will be moves to amend this discrepancy as people make the transition to more renewable electricity. Schools with restricted budgets are therefore rightly nervous that removing a dirty and carbon-emitting heating source and replacing it with a clean, electric solution may be devastating for a tight budget, albeit better for the planet.

Recommendations across all the areas outlined in an HDP are likely to total several hundred thousand pounds per school, even for small primary schools. It is therefore important to prioritize the most cost-effective and impactful changes. The finance required to fully decarbonize every Church of England school in scope is clearly prohibitively expensive, even taking into account government grant schemes, capital funding allocations and funding made available by the Church Commissioners.¹¹

However, these challenges should not lead to discouragement. In many ways the key approach is to understand the starting point and identify the next step, whilst not focusing too much on either the destination or what cannot be done. The next chapter will help schools understand where to start, to feel empowered, enthusiastic and positive in discovering their own journeys towards net zero carbon, and to recognize the difference that can be achieved with little additional capital funding.

Questions for Reflection

- What methods could you use to counter the potentially overwhelming feeling of never being able to make a difference to the climate challenges of our planet?
- How well do you know your school building? Would external assistance be helpful in plotting an achievable route to reducing carbon emissions? Who could you contact?

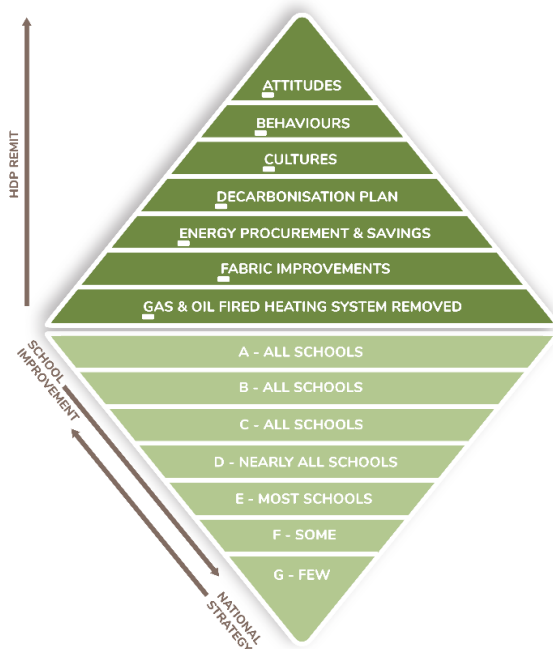
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The Decarbonization Diamond

Given the motivations to engage in the decarbonization agenda as described in chapter one, and the immense challenges set out in chapter two, schools, academies, trusts and responsible bodies require a straightforward approach which is easily understood, simple to explain, drives decisions and actions and provides a firm focus on the journey towards net zero carbon.

This chapter sets out an approach to decarbonization with which every school can engage. It encourages schools to start where they can, which means identifying and then taking the next feasible step rather than worrying about actions beyond their current levels of resource. It therefore starts by engaging schools with those measures that do not incur significant costs, but which can make a substantial difference.

The 'A to G of Decarbonization,' as presented in the Decarbonization Diamond below, captures this approach:



The diamond provides an accessible framework of steps, counteracting the temptation simply to focus on the most daunting—the removal of gas and oil-fired boilers—which might result in discouragement and inertia. Instead, it suggests inviting all schools to reflect deeply on their motivation and their approach, which process can inspire appropriate, exciting, engaging and inclusive actions that embrace the wider decarbonization agenda. So the diamond starts with an ‘ABC’ of decarbonization, the foundational context that grounds all subsequent action and which all schools can—and should—reflect upon.

A for Attitude

The starting point is A for *attitude*. In simple terms, this asks schools to consider what their attitude is, not only to climate change and decarbonization but also to sustainability, nature, biodiversity, waste and the wider environmental agenda. It encourages schools to examine their motivations and responses to the scientific, political, economic and theological aspects of the debate, also considering how that can be described and evidenced. In short, if the attitude of the school—be that the governors, leadership, trust or staff—is that journeying to net zero carbon is *not* important then the next few steps are difficult and the ones after that, impossible. Conversely, if the attitude is positive then it starts to become possible to take at least the next step.

Schools can take a number of measures to make clear statements of attitude. These do not, in themselves, deliver much change but do make a declaration that the climate agenda is something that is being taken seriously. For example, governing boards could agree an annual resilience statement that commits them to work to ‘reduce year on year emissions, and shift school decision making, policy and practice toward a more sustainable future; placing future generations at the heart of decision making and reporting.’¹² A template for creating this statement can be found on the Church of England website. Another excellent move would be to appoint a ‘green governor’ and to sign up for free to the ‘Let’s Go Zero’ campaign.¹³

Whilst establishing and articulating a school’s outlook on the broad environmental agenda may appear quite a functional activity, Robin Kimmerer reminds us that attitude is usually conveyed by the stories we tell.¹⁴ It is worth considering what stories schools can and do relay in this context.

- For example, within its Christian vision and values, Embleton Vincent Edward’s C of E Primary School in Northumberland reflects a commitment to ‘taking seriously a responsibility to care for creation.’ This has motivated them to establish an eco-school council which is conducting a comprehensive review of the school’s sustainability and biodiversity, thereby identifying both its strengths

and areas for improvement. The school states that ‘the goal is to ensure that we are doing our part in protecting the environment and promoting eco-friendliness in all aspects of our school life.’¹⁵

- Meanwhile, at St Christopher’s High School in Accrington, pupils and staff work together in the knowledge and love of God to act out faith in daily life, as they seek to ‘promote the spiritual, moral, cultural, intellectual and physical development of our pupils.’ One manifestation of this is their Eco Group which has been operating for nearly twenty years, ‘spreading awareness of sustainability in East Lancashire’ by ‘involving the students every step of the way,’ in the ‘hope they will learn and understand more about sustainable energy, both for now and in their own future careers.’¹⁶
- In addition, St Anne’s C of E Primary in Sale takes inspiration from the words ‘you are the light of the world’ (Matt 5.14). The school recognizes that, as God’s children, they are called to ‘give glory’ through their ‘good works.’ This is captured by their vision to ‘Let your light shine,’ and the encouragement they receive to ‘share the light of Jesus with those around us, transforming society and enacting positive change.’ This is partially fulfilled in their group of Earth Stewards who are committed to caring for God’s earth and are passionate advocates for climate action, ‘caring for our world, one choice at a time.’¹⁷ They are supported by a robust climate action plan.¹⁸

B for Behaviours

The natural result of having an *attitude* that recognizes the importance of engaging with a broad environmental agenda is to consider behaviour changes, as seen in the school examples above. Hence, B is for *behaviours*. Behaviour change can stretch across all elements of a school. In terms of embedding this in curricula and collective worship, Parker’s *Treasuring the Earth* gives a helpful framework for how the environment can be introduced in a practical sense across the teaching, learning and Christian distinctiveness agendas of schools.¹⁹ When it comes to behaviours relating to the school building, there are a large number of potential changes that can be made to help reduce the school’s carbon footprint—such as switching off lights, ensuring the boiler and heating controls are set to the optimal positions, composting food waste, looking at local travel plans and encouraging recycling. These will often lead to saving money.

Guides have been produced to help schools identify the quick wins in their road to net zero carbon. One of the most comprehensive, yet intuitive and easy

to use, is available through the Church of England website and was produced through a collaboration of expert consultancies including Inspired Efficiency and RAFT.²⁰ The document, *A Practical Path Towards Net Zero*, presents useful ways to demonstrate a positive attitude as well as establish behaviours in the short and medium term.²¹

C for Culture

With the right *attitude*, alongside steady progression towards *behavioural* changes within the curricula, collective worship and to the building, a school can begin to embed a culture of climate sustainability: so the third step is C for *culture*. There are a number of internal actions which could be considered as a point of cultural shift. These include creating and empowering a pupil eco group, as well as being deliberate and clear with pupils and parents about how future generations are being placed at the heart of decision making. Often it is helpful to make an external statement to symbolize, demonstrate and reinforce a cultural shift in the school's approach to environmental concerns.

Many schools have found it helpful to join the National Education Nature Park, a free programme which 'provide[s] all educators with the resources, support and guidance to embed climate and nature into learning in a way that suits [their] setting and learners.'²² The idea of the nature park is to encourage, train and then support all schools to map and log their school grounds, thereby creating a national map—and a National Nature Park—of all school grounds, noting the current habits, environment and nature that is already part of our collective school estate. Schools are then helped to work with their pupils to improve the natural habitats within their grounds, thus making a clear local statement about the importance the school is placing on the natural environment, biodiversity and caring for the earth. Actively involving the student voice in decision making also enables them to become the big drivers and catalysts for this cultural change.

By December 2025, all schools had to produce a climate action plan, strategies designed to be relevant, achievable and engaging. These are useful tools to help the school to develop a more sustainable way of operating.²³ In other words, they are a good place to encapsulate a school's *attitude* to climate action, the *behavioural* shifts required in terms of the building and curricula, and explain how a *culture* of environmental sustainability will be embedded into the school.

It is helpful to reflect on the message of Professor Katherine Hayhoe, a Christian atmospheric scientist who recognizes that hope emerges as we embrace the reality that we *can* make a difference and *can* have a positive impact on climate change. She believes that 'hopelessness only dominates if we think that no-one else is doing anything.'²⁴ The Decarbonization Diamond speaks

into this narrative, encouraging all schools to find a starting point within the ecological agenda. It helps them see where they can begin decisively and constructively to take action on their road to net zero carbon. The next chapter will discuss what a blend of action and hope can achieve regarding the practicalities of decarbonizing the school building.

Questions for Reflection

- Where is your school on the diamond? What are the next steps that you can take?
- Who do you need to help you to move to the next place on the diamond?
- How can you use your journey in reducing carbon emissions as a learning opportunity for your pupils?

Data and Energy

In order to plan appropriately for the interventions and changes required to reduce carbon footprints, schools need to understand the performance and use of their school buildings. Therefore there is a need to collect data about each school: D is for *decarbonization data*. This chapter also explores the fundamental issue of energy, and particularly how it is used, procured, generated, monitored and saved. The E is for *energy* and provides the pivot around which the decarbonization of schools can be explored.

D: Decarbonization Data

All school buildings are different and it is often difficult to assess their carbon footprint, energy efficiency or sometimes even their general state of repair. However, collecting a relatively small amount of *data* about a school can help determine the helpful and practical steps required to reduce its carbon footprint.

To help inform their decarbonization journey, schools can participate in a number of different data engagements, each of which has a slightly different purpose:

Online Tools to Help Calculate a School's Carbon Footprint

Schools can access online tools (such as Count Your Carbon) to help them determine their current carbon footprint. These usually require schools to input energy usage, waste collections, travel methods and other data in order both to understand emissions and determine how they can be lowered. Their completion helps a school establish a positive attitude towards climate change, make a commitment to modify its behaviour and demonstrate cultural change. The results can help decision makers better understand the situation whilst also engaging staff, pupils and the community with some quick wins.

Energy and Building Self Audit

As schools look to ensure a working, learning and teaching environment that is comfortable in winter and summer, with good air quality and low energy bills, they will have to learn to retrofit their current building rather than expect a new purpose-built solution. An engaging audit tool for school leaders and site managers has recently been developed by the Church of England, to help them better know their physical building. Developed by RAFT, an experienced architect-led, multi-disciplinary team with expertise in deep building retrofit and zero carbon planning, the Energy and Buildings Self Audit Tool aims to

help schools understand the energy efficiency of their buildings and assist with action plans aimed at reducing carbon emissions.²⁵

The audit considers various aspects of the fabric of the building, including roofs, walls, floors, windows, lighting, heating and the kitchen. Details of how to complete each section are provided, with helpful images and diagrams to establish how the school was built and how well it operates. It is designed to be completed by the school premises manager or caretaker, with assistance from the school business manager or office staff. Completing the Audit is important when considering the potential actions outlined in the next chapter.

Heat Decarbonization Plans

As the previous chapter demonstrated, HDPs can be a helpful addition to the suite of data being collected and used by a school. They can be commissioned through specialist consultants, a number of whom have worked with Church of England schools in all areas of the country. Their main function is to determine how a school can remove its fossil-fuel heating system and replace it with one run on electricity. If a school has a relatively new and efficient heating system, in a building that is well maintained, it is unlikely that funding will be available in the short or medium term to replace an adequate—albeit carbon-fuelled—heating source, therefore an HDP for that school is potentially unnecessary.

However, if a school has an older boiler (for example, installed for more than 12 years)—particularly if it is oil-fired—then replacing it with a heat-pump solution is something that should be explored. To do that requires an HDP which assesses potential solutions and costs, together with an analysis of the electrical infrastructure of the school, particularly its capacity to support a non-fossil fuel heating system. If an electrical upgrade to the school is required, this could prove to be prohibitively expensive. Other necessary fabric upgrades may also be needed, which will be discussed in more detail in chapter five.

E for Energy

The key component of the decarbonization journey is *energy*—including gas, oil and electricity—and how it is used.

Reducing electricity use as part of the net zero carbon journey is important for *all* schools, for three reasons:

- Any decrease in electricity use will have a positive effect on reducing the national carbon footprint. Whilst it is encouraging that renewable energy such as solar and wind generation is providing increasing amounts of electricity across the UK, at the time of writing the largest source of electricity generation for the National Grid still comes from gas.

- Reducing the amount of electricity required in a school building will make it more likely that the current electricity supply to the school will be sufficient to support a decarbonized heating source, such as a heat pump.
- Shrinking the electricity bill can free up more funds to invest in measures to reduce the fossil-fuel use of a school.

There are five particular areas that schools should consider when looking at *energy*:

Energy-efficient Products

One of the best ways to reduce energy consumption, whilst also significantly enhancing the teaching and learning environment of a school, is to replace energy-hungry fluorescent lights with energy-efficient LED lighting. Whilst there is a potential upfront capital cost in making this change, there is a government-backed scheme that all schools are allowed to access which provides a loan to cover the capital costs of making the upgrade.²⁶ This loan is paid back through the cost savings generated through using LEDs, which in most instances takes about four or five years. In addition to installing LED lights throughout, schools may also want to make a commitment to purchase only energy-efficient products going forward.

Energy Monitoring and Saving

Schools use—and many waste—a lot of electricity. EnergySparks, a company which specializes in monitoring energy use in schools and helping them take effective actions to reduce consumption, estimates that, typically, schools could reduce fuel bills by 10%. For example, school kitchens use a lot of power, yet ensuring that equipment is switched on only when absolutely necessary can generate large savings. Recent case studies have shown that, in some schools, up to 50% of energy consumption takes place outside the school day, including at weekends and in holidays. Recognizing these anomalies and addressing them helps cut emissions and costs. These trends in energy use can be identified through monitoring and smart metering, and it is recommended that all schools ensure that they have proper energy monitoring technologies. Utilizing them can also be an educational and engaging activity for children.

Energy Procurement

More of the UK's power is being generated by green energy sources than ever before. Schools have considerable buying power and could make a significant statement by ensuring that the electricity they require is being provided by an eco-friendly supplier. Shifting the school estate to green energy procurement could be coordinated centrally and might be a quick win in setting the culture for a Multi-Academy Trust. It could also showcase the Church of

England acting in the market in a manner congruent with its stated principles of safeguarding God's creation.

Solar Energy Generation

Installing solar photovoltaic (PV) panels on a school roof can be hugely beneficial. However, there are a number of issues to note:

- The roof needs to be in a good condition and unlikely to need any significant work for a number of years. It is costly and disruptive to remove and replace panels once they are *in situ*.
- It can be tempting for schools keen on reducing their energy bills to employ companies which ask for no upfront costs to install solar panels. However, there may be hidden issues which need to be explored thoroughly. The arrangements are generally loan-based, money being paid back over a number of years as the school purchases the electricity produced by the panels, meaning schools can be tied into a fixed electricity rate or calculation over a long period—of up to 25 years.
- Such Power Purchase Agreements (PPAs) are potentially problematic, both legally and financially, especially for Church of England schools. In July 2025 the Treasury paused all PPA agreements as it explored reclassifying them as public borrowing, with the potential result that each agreement requires explicit approval from the Secretary of State for Education. For church schools, trustee permission is also generally required to enter into such an agreement as, in legal terms, there is a land (or roof) lease involved.

These issues are complex and can be fast-moving, so expert legal and financial advice is recommended when looking at installing solar panels. However much of this complexity can be avoided by using capital grant funding to purchase and install panels. This option is relatively straightforward, effective and less complex than alternative funding arrangements.

Energy Storage

Technologies are constantly being developed and battery storage is beginning to be considered and trialled in schools with large numbers of solar panels, so that they benefit from off-grid electricity even when the panels are not producing energy.²⁷ As battery storage continues to become cheaper, and alternatives to lithium-based batteries become more available for larger-scale deployment, this is a technology that schools should keep in mind in their net zero carbon conversations over the next few years.

Fabric and Gas Boilers

Decarbonizing schools will eventually involve determining how and when a building can be heated without the use of fossil fuels. Whilst making this shift can be both disruptive and expensive, it is often possible to phase the work by focusing first on the fabric of the building—regularly referred to as a fabric-first approach. Therefore F is for *fabric* and addressing this is generally a prerequisite to installing an effective heat pump solution. Following that, consideration can be given to the effective replacement of the gas or oil-fired heating system. Therefore G is for *gas (and oil)*. It must be pointed out that any capital funding grant process will always examine whether to replace a boiler with a heat pump solution represents value for money since, in certain circumstances, approving and installing a non-fossil-fuel solution is simply not an effective or prudent use of limited resources. This means that, unlike all the other aspects of the Decarbonization Diamond, taking this final step may not be in the school's gift.

F is for Fabric

Insulation

The key way schools can improve their *fabric* is by adding insulation to uninsulated areas and upgrading windows with double-glazing. Internal methods such as loft lagging, cavity-wall insulation and cladding internal walls, plus external rendering, are relatively cost-effective ways of reducing heat loss and therefore cutting carbon emissions. However, they should always be installed properly, with advice taken from construction professionals. Poorly applied insulation can cause issues especially regarding ventilation. Adding insulation often results in fossil-fuel heating systems becoming much more efficient since the heat they produce stays within the building rather than leaking out. By better insulating buildings and increasing their airtightness, savings in both carbon footprint and financial costs can be made before any change is made to the heating system.

Improving insulation prior to installing a heat pump becomes a requisite. This is because traditional gas and oil-fired heating systems heat water to around 70°C before it is pumped around the building, which results in radiators becoming very hot. However, with a heat-pump solution, water is only heated to a cooler 45°C. Without good insulation further costs may be

incurred by having to install additional radiators. Therefore, retaining the heat that has been generated within the building is critical to maintaining a pleasant working environment, as well as keeping down the costs of running the heat-pump system.

Whilst there is a strong emphasis on keeping heat in a building, there is also a growing need to ensure that our schools are places that respond well to periods of significant heatwaves, when classrooms are required to be as cool as possible. Therefore, fitting heat-reflective window coatings and/or effective blinds can significantly improve the comfort of a classroom in hot weather, without compromising the insulation of the building. External window shutters may also be worth considering. When planning a package of fabric upgrades which includes insulation and heat-reflective windows, schools should recognize that large, unshaded south, west or east facing windows may be the ones which need the most attention.

G is for Gas and Oil

Decarbonization is not possible without removing *gas* and *oil* boilers, which are very widespread across the school estate. Removing these is expensive and disruptive and can often only be done with significant external funding.

Replacing Gas and Oil in Favour of Heat Pump Solutions

The three most common heat-pump solutions are ground-source heat pumps (both linear and bore-hole), air-source heat pumps and air-to-air heat pumps. The first two have been the preferred options since 2020 due mainly to the fact they were the eligible technologies allowed within the government grant funding streams. Both ground-source and air-source heat pumps are designed to heat water, which is then pumped around the school in the traditional way. These are therefore known as wet systems and have been used across the school estate in recent years.

Linear ground-source heat pumps require extensive school playing fields under which to lay pipework at a depth of around 3 meters. This is costly and there are also issues of reinstating the disrupted ground to a suitable condition. Bore-hole heat pumps require a number of drill-holes at a depth of around 150m, which needs less external space than linear pipes, but again is usually on the school playing field. Therefore ground-source heat pumps are not possible for schools lacking sufficient eligible land, although much of the work necessary inside the school building can be enclosed within the old boiler room once that has been emptied.

Air-source heat pumps are easier to install but require appropriate space outside the building to house the units. There is the potential of noise pollution with these products, some schools having had to install expensive noise-

reduction frameworks to protect local residents. In most instances, however, the units can be located in areas which do not affect those beyond the school boundary. As with ground-source heat pumps, this technology relies on effective pipework and radiator systems in the school—which may need to be upgraded—adding distribution and cost to any project.

More recently there has been a move away from installing wet systems and towards using air-to-air heat pumps, now the preferred solution for schools. Costs are significantly cut because internal pipework and radiators do not need to be replaced or upgraded. In effect air-to-air heat systems are electric heating and cooling units installed within each classroom. They need to be designed by appropriate mechanical, electrical and heating engineers to ensure they are as effective and efficient as possible. However, they are a solution which schools looking to replace their boilers could more easily consider, despite the disruption required during installation and their reduced efficiency in extreme cold.

All these heat pump solutions are powered by electricity and, at the time of writing, electricity is more expensive than gas. Schools therefore often have concerns about the running costs of decarbonized solutions. Whilst these concerns are natural, there are ways to mitigate the costs by:

- Ensuring the building is retaining as much heat generated as possible, so that the system is not working too hard or for too long
- Maintaining good housekeeping regarding the use of electricity on site
- Generating as much power as possible *in situ*, by installing solar panels to support a heat-pump solution (and potentially battery storage)
- Checking the school is on the best energy tariff, preferably with a green energy provider²⁸

Financial Outlay

Determining the point at which schools should make the shift to a decarbonized heating system is not always straightforward. Clearly the best time to install a net zero carbon system is when the school is being built, and recent legislation requires that all new school buildings are heated using a non-carbon source. New standalone-built units or blocks should also be designed to be net zero carbon. However, the majority of the existing school estate needs to be retrofitted with a decarbonized solution.

Calculating the cost effectiveness and savings of making that shift is often difficult. In a strategic sense—for responsible bodies and MATs—there are at least two potential approaches to consider:

- Focus efforts and resources on the largest emitting school buildings. These are often secondary schools and taking them to net zero carbon can make both a bold political statement and reduce significantly the overall carbon footprint of the diocese or MAT. However, working with such a large estate is expensive and may focus efforts to the point where there is little resource or consideration given to supporting other schools on their net zero carbon journey. In addition, focusing on a single institution can result in making decisions that are not particularly sensible, such as removing fully working and relatively new heating systems. If a large school has been well maintained and updated it may be reasonably energy efficient. So, although in absolute terms, it may be a high emitter, in relative terms it may be performing reasonably well.
- Focus on removing all oil boilers from the estate, and all gas boilers over 15 years old, regardless of the size of the school. Oil boilers tend to be in schools situated away from the gas mains grid, and are therefore often in small, rural and sometimes historic school buildings. Their overall carbon footprint may be tiny compared to a secondary school but the relative amount of carbon saving that can be purchased for every pound of investment may be substantial. These schools occasionally have poor fabric, so upgrading windows and adding insulation can become an important part of the project. In the past, funding bodies have welcomed applications from institutions which demonstrate good carbon savings per pound spent, and often it is these small schools that best match their criteria.

As costs fall and new technologies are developed it is hoped that more affordable solutions can be found for schools of all sizes to move to this final stage of their decarbonization journey.

Questions for Reflection

- What actions do you need to take to ensure that the school is as energy-efficient as possible?
- Is there anyone you should contact to determine whether capital funding is available to replace gas (or oil) as your heating source?

Conclusion: Rooting the Hope

Decarbonizing schools is not easy. It is disruptive, expensive and part of an ever-changing technological, political, financial, scientific and social context. Given this complexity and fluidity, setting deadlines for when decarbonization should be completed is not always helpful. But it does have the benefit of creating a sense of momentum, an expectation that some action should be taken, generating a space which ensures that this continues to be a live and active debate. Not all schools—perhaps not even a majority of schools—will be decarbonized by 2030, but each can progress further down the diamond, becoming engaged in climate action and establishing a more positive relationship with nature, biodiversity and the environment.

The A to G Decarbonization Diamond is a framework within which schools can locate their conversations and engagement as they journey to net zero carbon. Each discussion therefore has an immediate context and can be placed in relation to other conversations, interventions or activities taking place in the school. This helps to maintain a focus and a structure when the process can quickly become confusing, or so all-encompassing that finding effective responses can be difficult.

But within all this, it is important to remember—and return to—the very human and personal aspects of this journey, particularly for the children and young people in our schools.

In a recent book, Jonathan Haidt considers the serious effects that a constant engagement with social media, coupled with the decline in outdoor, physical, risky play, has had on Generation Z.²⁹ The differences in experiences between this and previous generations are so deep and profound that Haidt describes what is happening as a ‘great rewiring of childhood.’ He concludes that this is causing ‘an epidemic of mental illness’ resulting in an ‘anxious generation.’ Climate change is recognized as a key contributing factor to the anxiety and depression that is so widespread across this age group.

Haidt is, however, not without some solutions. One of the interesting observations he makes is that spirituality and raising awareness of the soul’s needs are vital aspects of mental well-being, especially within the context of navigating complex issues such as climate anxiety. Whilst this book has focused on the practical and technical route map to net zero carbon, it is important to

understand that there is a parallel emotional, theological and spiritual journey which needs to be travelled, and just as much care needs to be given to that as to any technical solution.

One of the reasons why spirituality is so important in this debate on climate action is because it is not an individualistic activity but always points to wider and broader relationships, as well as ideas which spread across time and space. This in itself connects people and creates something communal—and it is through community that people begin to feel safer, more empowered and more hopeful. Whilst Haidt notes that ‘every generation grows up during a disaster or under the threat of an impending disaster,’ he recognizes that young people ‘don’t get depressed when they face threats collectively; they get depressed when they feel isolated, lonely, or useless.’³⁰ It is therefore vital that the challenge of climate change is conducted within a communal and social realm.

Therefore, schools are encouraged to link together the sacred and communal as a vital part of the decarbonization journey. Potential outcomes may involve schools providing more opportunities to experience awe in nature and sharing together as a community in sacred events such as harvest festivals, as well as bringing simple stillness and silence into daily routines. These are not trivial or meaningless activities; they have significant impact on individuals and communities and all become important ingredients in a school progressing towards net zero carbon. Whilst the impact of each of these community behaviours might not be measurable in terms of carbon reduction, they are grounding practices whose effects will be felt in the lives, attitudes and actions of young people. These are the ones who need to know they are not isolated, lonely or useless but instead are active agents, able to cocreate a better future, who become confident in their abilities to do something and do it well.

This is captured perfectly in a spiritual reflection often referred to as the Romero Prayer, which invites everyone consider their impact on the world and their attempts to build and announce the kingdom of God on earth. It is a beautiful exploration of how everyone is part of an organic, growing system in which each is called to play a small but important part:

We plant the seeds that one day will grow.
We water seeds already planted, knowing that they hold future promise.
We lay foundations that will need further development.
We provide yeast that produces far beyond our capabilities.
We cannot do everything, and there is a sense of liberation in realizing that.

This enables us to do something, and to do it very well.
It may be incomplete, but it is a beginning, a step along the way,

an opportunity for the Lord's grace to enter and do the rest.
We may never see the end results,
but that is the difference between the master builder and the worker.

And so it is with the journey to decarbonize places of learning. It is only a *journey* if schools begin moving, if they take those steps that they are able to take, and look for opportunities to go beyond what they currently feel is possible. Hopefully this book has helped inspire and motivate school and academy leaders and their diocesan colleagues to determine where they are within the process, and what the next steps may be. As such, collectively they look to embrace the conclusion of the Romero Prayer:

We are workers, not master builders; ministers, not messiahs.
We are prophets of a future not our own.³¹

Notes

- 1 R Parker, *Treasuring the Earth: Inspiring Head, Hearts and Hands in School Communities for People and Planet* (Grove Education booklet eD 66).
- 2 <https://www.churchofengland.org/about/environment-and-climate-change/net-zero-carbon-routemap/reducing-emissions-churches>: accessed 2 January 2026.
- 3 For example, see <https://www.climate.gov/news-features/understanding-climate/climate-change-global-temperature>: accessed 2 January 2026; 'Monthly Global Climate Report, 2024 Annual,' in *NOAA National Centres for Environmental Information*, from <https://www.ncei.noaa.gov/access/monitoring/monthly-report/global/202413>: published online January 2025; retrieved 2 January 2026; and *Progress in reducing emissions—2025 report to Parliament* retrieved from <https://www.theccc.org.uk/publication/progress-in-reducing-emissions-2025-report-to-parliament/> (Climate Change Committee, 2025): accessed 2 January 2026.
- 4 P Frankopan, *The Earth Transformed: An Untold History* (London: Bloomsbury Publishing, 2023) p 4.
- 5 G Brown, *Seven Ways to Change the World: How to Fix the Most Pressing Problems We Face* (London: Simon and Schuster, 2021) p 195.
- 6 T Wright, *Surprised by Hope* (London: SPCK, 2007).
- 7 <https://www.churchofengland.org/general-synod-sets-2030-net-zero-carbon-target>: accessed 2 January 2026. For the Church of England, being net zero carbon means that 'the carbon emissions of our buildings and travel will be reduced to less than 10 per cent of our baseline levels.'
- 8 <https://www.churchofengland.org/sites/default/files/2022-09/RoutemapToNetZeroCarbonFinal.pdf>: accessed 2 January 2026.
- 9 Those out of scope include Voluntary Controlled (VC) schools and church academies in church minority or community MATs.

- 10 <https://www.churchofengland.org/sites/default/files/2022-09/RoutemapTo-NetZeroCarbonFinal.pdf>: accessed 2 January 2026.
- 11 The Church of England Net Zero Carbon Programme Board allocated £2M to the decarbonization of Church of England schools from the funding from the Church Commissioners for the first triennium.
- 12 https://www.churchofengland.org/sites/default/files/2024-02/_annual-resilience-statement-or-schools-and-academies.pdf: accessed 2 January 2026.
- 13 <https://letsgozero.org/>: accessed 2 January 2026.
- 14 R Kimmerer, *Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge and the Teaching of Plants* (London: Penguin, 2013).
- 15 https://www.embletonprimaryschool.com/our_environmental_review_and_action_plan: accessed 2 January 2026.
- 16 <https://www.st-christophers.org/main-parents-students/extracurricular/eco-group>: accessed 2 January 2026.
- 17 https://www.youtube.com/watch?v=MFpviuVN8UU&list=PLdZ3q4lykTuAos0Sx6xaTs_OkvGW5IKcN&index=3: accessed 2 January 2026.
- 18 <https://www.st-annes.trafford.sch.uk/key-information/climate-action-and-sustainability>.
- 19 R Parker, *Treasuring the Earth*, *op cit*.
- 20 <https://inspiredefficiency.co.uk/> and <https://www.retrofitaction.org.uk/>
- 21 https://www.churchofengland.org/sites/default/files/2024-02/r026_practical-path-to-net-zero_p01.pdf
- 22 <https://www.educationnaturepark.org.uk/>
- 23 <https://www.gov.uk/guidance/sustainability-leadership-and-climate-action-plans-in-education> (Department for Education, 2023, updated 2025): accessed 2 January 2026.
- 24 K Hayhoe, J Schmizzi, P Chandler, 'Session 4: Hope and Transformative Climate Action,' in *Discovering, Iterating and Sharing Climate Resources: A Climate Literacy Principles Professional Learning Series* (OER Commons): <https://www.youtube.com/watch?v=4Q0GtcgLMDk>: accessed 2 January 2026.
- 25 https://www.churchofengland.org/sites/default/files/2024-03/r026_energy-buildings-self-audit_p01-2.pdf: accessed 2 January 2026.
- 26 <https://www.laserenergy.org.uk/our-solutions/net-zero-frameworks/led-lighting/>: accessed 2 January 2026.
- 27 Accrington St Christopher's High School is trialling battery-storage technology.
- 28 Green energy tariffs can be slightly more expensive than standard ones due to suppliers' higher costs for sourcing genuinely renewable power, but they often stay competitive with standard variable tariffs.
- 29 There are different definitions as to who is included in Generation Z. In broad term it refers to those people born during the run up to the turn of the millennium and since.
- 30 J Haidt, *The Anxious Generation: How the Great Rewiring of Childhood Is Causing an Epidemic of Mental Illness* (London: Penguin, 2024) p 38.
- 31 <https://www.romerotrout.org.uk/romero-prayer/>

Reducing carbon emissions is a crucial aim as we seek to live responsibly as good stewards of God's creation. This booklet offers wise, expert advice to enable systematic planning and progressive, comprehensive actions which are affordable and effective as schools and academies seek to move towards the goal of net zero carbon.



Sam Johnson is CEO of DBE Services, a company owned by six northern diocesan boards of education. The company provides school improvement and building services for hundreds of schools across the north, and has delivered some major capital decarbonization projects. Sam is a Licensed Lay Minister in the Diocese of Blackburn.

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