# Introduction

We know we care about climate change, but we are not clear on what to do about it or how to think about it.

This is hardly surprising. A chorus of political, business and media leaders tell us not to worry. 'New technologies are on the way; we are going to solve climate change and grow the economy!' they say. That sounds good, but should we not see more change by now? The number and size of cars and trucks on the road seem only to keep increasing. The volumes of concrete used to make roads, bridges and offices look unchanged. The number of fossil-fuel aeroplanes taking off each year has quadrupled since we committed at the United Nations to reducing emissions in 1992. Closing factories in one country to import goods from elsewhere cannot actually lead to a reduction in emissions . . . If we really are on course for zero emissions, is it not surprising that we cannot see more action? The promise that solutions will emerge from today's politics and markets is wearing thin.

To make sense of all the claims about climate change, we need data – to identify the main causes of emissions and how they have grown over time. We need to know what options we have to eliminate emissions and we need a plan to implement the required changes rapidly. None of that information is complicated or difficult to understand, but it



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is surprisingly hard to find. So, we have assembled the evidence here, in the Appendix, and in writing it we have pointed to all the open-access sources we used to allow readers to check for themselves. Some readers may in fact want to start with the Appendix, to ground themselves in the physical reality of what we can do about climate change, before thinking about how our options for change interact with our motivation to do so.

We need the data, and we need a clear-headed assessment of what will make an impact and what will not. But clarity from science is not enough. The climate science has been clear for a long time now. Science is great, as is excitement about new technology. But if, more than thirty years after we decided to act, science has not shifted the dial anything like enough – and it has not, either for individual choices or government policy – then it is not likely that more science or more technology excitement is going to turn that around quickly enough. That is why we have also turned to values in this book: to the virtues and some insights from the Christian tradition. We are being specific, turning to one faith, because people belong to specific traditions, and generalities do not have the same authority. It is not that we think that Christianity has the monopoly here. Indeed, one of the benefits of exploring the virtues is that they are a framework shared by writers from many religions and none. We think this is a book anyone might gain from – we certainly hope so – but it would be even better if it were just one among many similar books, drawing on all the great traditions of value and meaning, because that is the realm where change will come from – at least change of the size we need.



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If new technologies were going to solve climate change profitably, we would not need this book. However, as we look at the options and the data, it is soon clear that we have a problem delivering this solution in time. For it to succeed, we would have to build a vast amount of large equipment very rapidly.

Even once the spades hit the ground, it takes a long time to build new power stations, train lines or factories because they are complicated construction projects. But before we get the spades out, we need a lot of public discussion. Who owns the land and will they agree to sell? Are we happy about how other ecosystems will be affected by the project? Will the government underwrite all the risks of the project? Do local communities want the development? Do we agree to cut the health budget, for example, to subsidise expensive industries? The answer to all these questions may be 'yes', but collectively we want to be consulted and involved in the decisions, and that takes time, even with familiar technologies like wind turbines, nuclear power stations and solar farms.

For new technological options, currently only at lab scale, it takes even longer to decide to scale them up. None of us wants to be told without consultation that a company is going to build a new, untested type of nuclear power station in our neighbourhood or store compressed gas under the local school. We build confidence in new technologies slowly, constructing and evaluating them at each new scale, to reduce the danger of accidents and unanticipated side-effects.

Of course, some new technologies will eventually scale up to support living well with zero emissions, but time is



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now critical. If we cannot make the climate safe, we will soon face unimaginable suffering from food shortages. So, as we are now virtually certain that new technologies will not deliver in time, we need to find a different path to zero emissions. For thirty years, the promise of new technologies has allowed us to delay other actions, such as reducing our use of energy or cutting down on activities that cause emissions, regardless of how they are powered. Yet the scientists who anticipate the harms caused by climate change tell us we need to reach zero emissions by 2050. Compared to the timescales of building new nuclear power stations, for example, that is very soon and we cannot afford any more delay.

We need to act now to reach zero emissions with the technologies we have. That is the heart of this book's message. We can think about using new technologies later, if they do arrive at a meaningful scale, but we cannot wait any longer to get started.

Acting now cannot be enforced by political or business leaders on their own. Eliminating all our emissions rapidly requires a journey in which we will all be involved because it needs restraint.

Over the time period in which we have to act, we will not have as much energy as we are used to. So, we will have to use less of it, but that does not mean relentless suffering. For example, it is not a human right that we drive energy-wasting cars that weigh twelve times more than the people in them, although that is the average in Europe at present. We could live well with much smaller (and electric) cars. For a few emitting activities, we have no substitute, so we



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will have to stop them. For example, there are currently no zero-emissions substitutes for cement operating at scale, so we will have to shift from constructing new buildings to adapting and maintaining old ones. And some substitutes will use so much energy that we will have to cut our use of them to a tiny fraction of what has become our habit today. It is possible to make aeroplanes fly with hydrogen, for example, but there is no hydrogen in nature, so if we want it, we have to make it. That requires a much greater supply of emissions-free electricity than we are going to have in the next few decades. As a result, for a period, we will have to restrain ourselves from flying. Flying in fossil-fuel planes is a two-generation-old habit that has become embedded in our ideas about holidays, but for a time we will have to give it up.

Ensuring a safe climate requires that we embrace some very specific restraints for a period of a few decades.

Restraint is unfamiliar in the rhetoric of business and political leaders, and it has not yet been prominent in the media, so public discussion of climate action has become rather hollow. Journalists celebrate each new corporate or political pledge and each new science-led innovation without interrogating the plan to deliver on the pledge or scale the innovation. For example, it is entertaining to read that aeroplanes can fly on a fuel made from used cooking oil, but the supply of all the world's used cooking oil is a tiny fraction of our current use of aviation fuel. Meanwhile, social protestors rightly call for 'faster climate action now' but do not make clear what specific restraints they want to embrace to ensure that faster action is possible. As a result,



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while a crowd of over 100,000 people responded with passionate enthusiasm to Greta Thunberg's well-informed and perfectly delivered speech on the Pyramid Stage at Glastonbury in 2022, many will within weeks have booked a cheap fossil-fuel flight for their next holiday without noticing the contradiction.

Knowing about the causes of emissions and about our options to eliminate them allows us to be more explicit about the meaning of 'faster action now'. In our personal lives, four actions dominate our contribution to greenhouse gas emissions. Our use of fossil-fuel boilers, fossil-fuel cars, fossil-fuel aeroplanes, ruminant animals (which supply beef, lamb and dairy foods) and conventionally grown rice is far more important than any other activities. In the UK, for example, these four activities add up to about a third of our national emissions.

We already know what our options are to eliminate these emissions: we can switch to electric heat pumps and electric cars, but for some period, while new technologies go through their long processes of scale-up, we must give up flying and eating beef, lamb, dairy and rice grown the conventional way.

Knowing the priorities and options is important, but it does not necessarily make the action easy. Electric heat pumps and cars are more expensive than their emitting alternatives, and most of us feel that our own use of aeroplanes and ruminants is special so should continue. Recognising that restraint is an essential part of reaching zero emissions is important, but to act on that knowledge, we need help.

Restraint is a familiar topic in times of crisis, ranging from the heroic sacrifices of war to the need for thrift in



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response to recent rapid rises in energy prices. We know that we can embrace restraint in pursuit of a collective good or out of necessity, and elements of restraint are central to all moral and ethical codes and ways of life.

Restraint is also familiar among people of faith, not least in fasting. Observant Jews typically observe six fasting days in the year, two for a full day, four for the daylight hours. During Ramadan, Muslims fast during daylight hours for a full month. Fasting is optional in Buddhism, but the whole religion is orientated towards restraint and detachment.

Within the Christian faith, restraint is practised explicitly during the preparatory periods of Lent and Advent as a way of sharpening attention and focus; deliberately taking a step, however small, away from the habits of unthinking materialism to reflect on our purpose and the Christian story. It is also there in Christian thinking throughout the year: 'love your neighbour as yourself' implies a continued discipline of restraint in sharing out what you might otherwise keep solely for your own use. As with Buddhism, the way in which a minority within Christianity embrace a monastic life is also testament to the value of restraint, undertaken in community, far from being an isolated or joyless thing.

This book, then, arises from a distinctive vision about climate mitigation. Rather than prioritising economic growth, it prioritises the safety of the climate, recognising that the journey to delivery will require some actions that cannot be motivated by profit. Having articulated the required changes, we need to find a way to see the good in them and act on them, even though that requires restraint.



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Placing those restraints in the context of Christian faith can re-frame them from losses to gains. If the discipline of restraint allows us to savour a more complete life, then let us celebrate and embrace the required restraints together and the virtue we are going to have to show in doing that.

The book is written out of a friendship, bringing together our two usually widely separated disciplines to reveal a space for action and thinking that we could not otherwise have found. From engineering, largely in the odd-numbered chapters, we can draw on a physical description of what is possible and what can be delivered in the time available. From theology, mainly in the even-numbered chapters, in our exploration of the seven virtues, we can explore who we are, how we support each other in embracing restraint and what we aim for in a full life.

Across a broad swathe of Christian thought, to be a good person is to be a virtuous one. 'Virtue' is a familiar term, although rather threadbare today. 'Virtue' probably sounds prim and chilly, recalling some admirable aunt, at best, but just as likely suggesting a lack of fun. That is a shame because virtue meant something impressive and appealing to Christians before us. To be virtuous was to be perceptive, creative, magnanimous, aflame with goodness, fully alive. A hint of that remains in the roots of the word 'virtue' itself. It comes from the Latin word *virtus*, which means strength as well as goodness. A virtuous person has strength of character.

A virtuous person will have a full and broad humanity. Push further back in the word's history and we come to the word *vir*, meaning man. Admittedly, that did mean man, as opposed to woman, which is unpalatable. The Greeks were



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wrong to think that men set the standard for humanity. Rather than reject the notion of virtue for that reason, we will celebrate these strengths of character but recognise them as the glory of men and women alike.

The virtues are about filling out, fully and well, what it means to be human. Equally, to be a human being character-fully and well is to be virtuous. That is why there is nothing pinched or parsimonious about it. A virtuous person excels in human joys and duties, such as hospitality and good humour.

The interleaving chapters of this book are structured around the virtues. Much that Christians have thought and written about moral challenges has a foundation there. They also usefully keep the whole of our humanity in view – bodies and minds, decisions and routines, reasons and desires – and we think that the only way to respond to climate change properly will be in that integrated or joined-up sort of way. Finally, we are convinced that our response to climate change has to be a rousing one, one that pulls on our heartstrings, and therefore it is fundamentally upbeat. Although the science of climate change shows that we are staring disaster in the face if we fail to act, our responses need to be stirring, not shrinking. The virtues are big-hearted. They recognise that we are creatures of desire who look for fulfilment, even if they also remind us that fulfilment rarely looks quite like what our twenty-first-century, advertising-saturated world would have us imagine. We want to think about a different way of life that reconnects us with our humanity, not one that curtails it, and the virtues can do that.

The ancient Greeks and Romans thought a good deal about the virtues and focussed on four: the 'cardinal'



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virtues. Christianity added three more: faith, hope and love. We will come to those three, but the ancient four still do good service, and that is where we begin. They are justice, prudence, courage and temperance. Jews and Christians – among others – have long recognised their importance. We see that when we find them in the Jewish Book of Wisdom (written around the time of the birth of Christ, placed in the Bible by some Christians and valued by many who do not) or the works of St Augustine (AD 354–430).

The four cardinal virtues work together. We can describe that in terms of a journey, especially the sort of journey we come across in folk stories the world over. Imagine that some great prize lies ahead of us, perhaps treasure or marriage. To get there, we will have to travel through dangerous territory. To do that, we need to work out which route to take and chart our course, step by step. That represents the virtue of prudence, while justice, in this picture, would be the place we are out to seek. Justice is virtue's goal. From time to time, we encounter obstacles on the path which threaten to dishearten us, or scare us off, so that we risk giving up and turning around: there is perhaps a ravine to cross or a dragon to fight. That calls for the virtue of courage. Finally, there are sometimes temptations that might lure us from the path. In a folk story, that enticement might come from a mythical creature, such as a siren, or it might be a spot where we could build a home and plant a garden: somewhere to settle down rather than having to face the arduous path ahead. Only if we are practised in the virtue of temperance can we overcome such distractions.



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Continuing to believe that new technologies will take away the problem of climate change in the limited time we have left to act is like putting our collective heads in the sands of false hope. We want instead to look up and embrace all the options for delivering a safe climate, even if they do not fit with prevailing politics and markets.

Adam McKay and David Sirota's film *Don't Look Up* satirises inaction on climate change with a story about scientists revealing that an incoming meteorite will cause extinction, leading to political and business inaction championed under the populist slogan 'Don't Look Up'. In writing this book, we wanted in contrast to look up bravely to the truth of our options to make the climate safe, even if that turned out to be uncomfortable. We are more likely to find a good outcome if we face the problem with the tools we have at our disposal now rather than delaying action in the hope that an easier solution will arrive later.

And in further contrast to the self-deception parodied so well in the film, we are struck by a connection to Jesus' words in Luke, chapter 21:

> There will be signs in the sun, the moon, and the stars, and on the earth distress among nations confused by the roaring of the sea and the waves. People will faint from fear and foreboding of what is coming upon the world, for the powers of the heavens will be shaken . . . Now when these things begin to take place, look up and lift up your heads, because your redemption is drawing near.

Of course, that passage refers to the second coming, not to climate change – as made clear in the verse we omitted: 'Then



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they will see the Son of Man coming in a cloud with power and great glory.' But the metaphor of fear and foreboding is pertinent, as is the invocation to look up.

We think that our intention in this book rings true to the invocation, 'look up and lift up your heads'. It is a gesture – a posture, even – that suggests attention, action and taking a cheerful responsibility for our humanity. The restraint, perhaps lasting for two or three decades, that is required to deal with climate change is not only a sacrifice. Embracing it can also help us to find a different good life as responsible and joyful custodians of creation. In the seven virtues, we have found a framework to inspire us to lift up our heads, support our honesty about the options, motivate our action and encourage us to find a safe climate, in good faith.



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