THE PRINCE OF WALES'S
CORPORATE LEADERS GROUP

Briefing

Ten years of UK climate action under the Climate Change Act

This briefing looks at what has changed in the ten years since the UK Climate Change Act was passed. It highlights the dramatic changes observed in power generation, a tipping point linked to electrification in the transport sector, an untapped opportunity to reduce emissions from buildings, stronger policies needed in the agricultural sector, new pathways for the decarbonisation of industry, innovative business models based on rethinking demand, and a growing momentum from business and government towards achieving net zero emissions by 2050. In light of this analysis, the briefing concludes that there is an increased opportunity for the UK government and businesses to lead together to demonstrate international leadership on addressing climate change.

1. Introduction

The United Kingdom (UK) Climate Change Act[1] received royal assent on 26 November 2008, creating a legal architecture for British climate action that was unprecedented in its scope, scale and ambition. The UK Climate Change Act has since been emulated by many other countries, including Sweden[2], Denmark, Ireland and Finland[3].

The Act established a legally binding target to reduce the UK's greenhouse gas emissions, as well as an independent Committee on Climate Change (CCC). The CCC is a group of experts backed by researchers and analysts with the mandate to recommend a rolling programme of five-year carbon budgets to achieve the long-term goal. The CCC reports to Parliament annually on progress against targets. It does not have the authority to force the government to accept its recommendations, but to date all governments, of all political colours, have done so.

The Climate Change Act became law with near unanimous support in Parliament setting, for the first time, a legally binding target to reduce emissions by 80 per cent (relative to 1990 levels) across the whole economy by 2050. This level of reduction was seen as ambitious at the time.

The Act provided a commitment to long-term action on climate change while learning lessons from earlier policies. The establishment of the CCC in particular has helped to limit the politics around the assessment of what mitigation was needed and what was achievable. The 2050 target set the long-term trajectory while the rolling five-year budgets gave both government and stakeholders an understanding of what that trajectory looked like in the near term.

This briefing looks at what has changed in the ten years since the UK Climate Change Act was passed.

2.1. Dramatic changes in power generation

High on the government's priorities for tackling climate change in 2008 was the energy sector. With a policy rationale of 'let the markets decide', a clear preference emerged for a carbon price that would encourage fuel switching from coal to gas. Less popular with the UK government were the renewable energy targets imposed by the EU Renewable Energy Directive,[4] which set the UK a target of achieving 15 per cent of all energy needs from renewable sources by 2020. These targets required a massive growth in electricity production from renewable sources. The UK government, along with a number of other EU Member States, has sought to retain the right to determine its own energy mix and overall approach, consistent with delivering progress on decarbonisation and maintaining security of supply at lowest possible cost, as well as retaining competitiveness.

The move away from coal in the UK has largely been achieved (see Figure 1), and in early 2018, the UK government committed to end unabated coal generation in Great Britain by 2025.[6] Alongside Canada, the UK launched the global Powering Past Coal Alliance in 2017,[7] and in December 2018, it launched a Powering Past Coal Calculator[8] to support countries, financial institutions, companies and others in developing their own plans to phase out coal.

In the UK, there has been a dramatic decline in fossil fuel generation since 2008, as renewables have expanded and demand has declined, in part, driven by regulatory changes.

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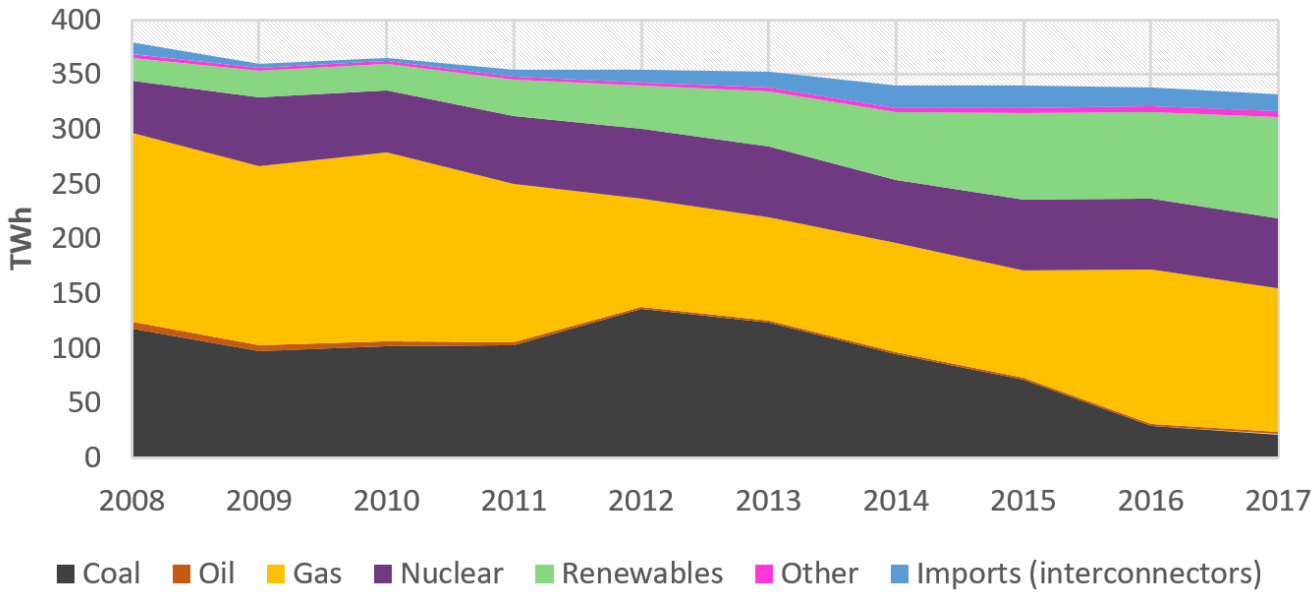

Figure 1: UK electricity generation by fuel type, 2008–17, terawatt hours (TWh)[5]

Electricity supply from renewables increased from 11 per cent of supply in 2012 to 28 per cent in 2017,[5] a level considered virtually unachievable earlier in the century. The shift has largely been brought about by policies that support renewable generation such as the 'Renewables Obligation' scheme[9] and its successor, the 'Contracts for Difference' (CfD) mechanism[10] (both for large-scale generation), and the 'Feed in Tariffs' scheme[11] for small-scale technologies.

The CfD auctions provide an illustration of how much the cost of renewables has dropped in a relatively short period of time, and far faster than anticipated. Analysis (see Figure 2) shows that the CfD auctions have come in at well below expected prices, have dropped rapidly as the technology has progressed, and are expected to drop further over the next few years.

One of the concerns about reliance on renewables is the intermittency of wind and sun. Since 2008, the ability to manage electricity supply and demand has improved significantly; smarter grids, smart meters, demand-side response measures, interconnectors and battery storage have all contributed to a more flexible system, and will continue to do so. The first ever *National Infrastructure Assessment*[13] for the UK undertaken by the National Infrastructure Commission (NIC) found that flexibility in supply, particularly in extended periods of low sun and wind, can be achieved through the range of flexible technologies now available, with the increasing uptake of electric vehicles also offering alternative battery storage ('vehicle to grid'). The NIC's *Smart Power* report identifies how investment in three particular technologies – interconnection, storage, and demand flexibility – could save the UK as much as £8 billion a year by 2030 and help meet its 2050 carbon targets.[14]

2.2. Approaching a transport tipping point?

Since 2008, the sale of electric vehicles in the UK, while still accounting for a small percentage of overall sales, is beginning to show signs of exponential growth (see Figure 3). In August 2018, sales of electric vehicles were nearly 90 per cent higher than in the same month in 2017.[15]

In 2017, to reduce air pollution, the UK government committed to "ending the sale of new conventional petrol and diesel cars and vans by 2040".[17] The UK Select Committee on Business, Energy and Industrial Strategy has criticised the UK targets as "vague and unambitious" and has recommended that the date for the ban on petrol and diesel sales be brought forward to 2032.[18] This would be in line with

Administrative strike prices set for first allocation round	*Strike prices achieved in first allocation round*	*Administrative strike prices set for second allocation round*	*Strike prices achieved in first allocation round*
£140/MWh *Delivery years 2017/18, 2018/19*	**£119.89** *Delivery year 2017/18* **£114.39** *Delivery year 2018/19*	**£105** *Delivery year 2021/22* **£100** *Delivery year 2022/23*	**£74.75** *Delivery year 2021/22* **£57.50** *Delivery year 2022/23*

Figure 2: How the costs have come down for offshore wind (£/MWh) [12]

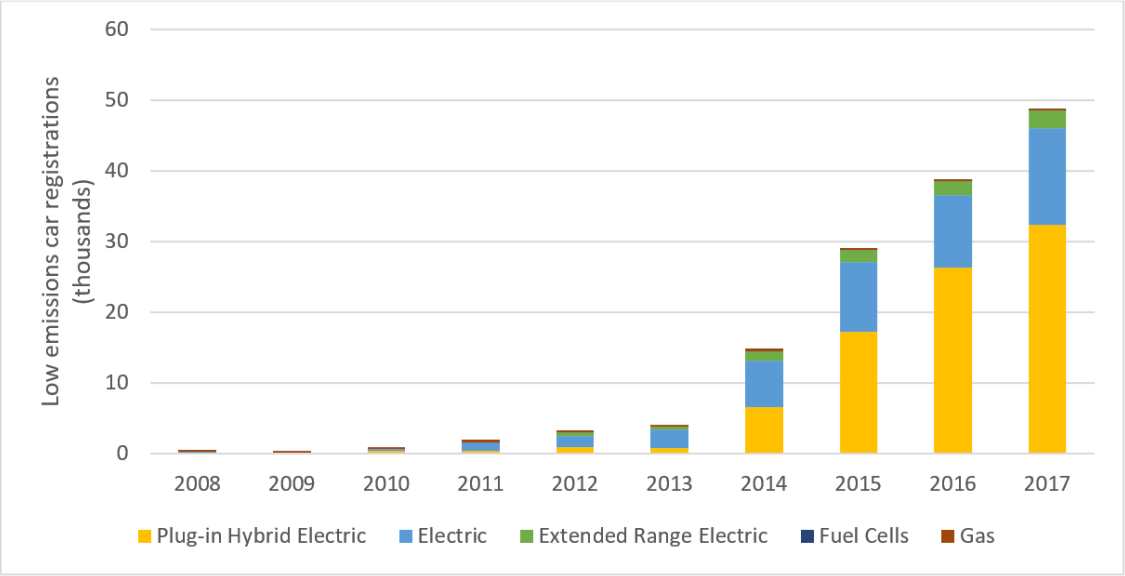

Figure 3: Low emissions car registrations (000s) 2008–17[16]

countries such as India, who have set a similar target for 2030, although less ambitious than countries such as Norway, who have set a similar target for 2025.[19] Regardless of the precise date, it is anticipated that a tipping point is approaching that will have a profound impact on transport emissions. While emissions from road use are projected to decline due to greater efficiencies in traditional vehicles and growth in electrification of transportation, air travel will account for a growing proportion of overall emissions due to challenges with its decarbonisation.

2.3. Buildings – the unpicked low-hanging fruit?

Not all sectors have made such dramatic progress. The built environment contributes to approximately 40 per cent of total UK carbon emissions, approximately half of which is from energy use in buildings.[20] In 2006, homes accounted for 27 per cent of the country's greenhouse gas emissions. Then Chancellor Gordon Brown announced that by 2016, all new homes in the UK would be zero carbon, and for a time-limited period, such homes would be exempted from stamp duty.[21] However, in July 2015, the government overturned those plans to the dismay of many in the sector, and by 2016, although a reduction had been achieved, the residential building sector still accounted for 22 per cent of total UK emissions.

The reduction in emissions to date is largely due to the decarbonisation of UK electricity generation and its consequent impact on residential emissions. Carbon dioxide emissions from homes dropped from 156.4 million tonnes of carbon dioxide equivalent ($MtCO_2e$) in 1990 to 101.4 $MtCO_2e$ in 2016, a 35 per cent reduction.[22] Declining residential demand is thought to be due to a number of factors, including energy efficiency regulation, energy-efficient lighting, and consumers being more environmentally aware.[23] For example, the reduction in emissions from homes follows government mandating the use of condensing boilers in 2005, demonstrating the value of regulation and mandatory measures in this sector.[24] In the recent Corporate Leaders Group (CLG) report, *Renovation Roadmap: Making Europe's homes fit for the 21st century*,[25] companies advocated a stronger regulatory approach to drive a faster rate of renovation in a sector where, in the UK, the majority of the housing stock are old buildings and approximately 19 million homes have poor levels of energy efficiency.[26]

Renovation of both residential and non-residential buildings will remain a challenge; 80 per cent of the buildings that will be occupied in 2050 in the UK have already been built.[27] The CLG briefing *Materials 'passporting': Rethinking building construction and renovation for a circular economy,*[28] explores the urgent need to reflect on and address the embodied carbon that can represent a substantial part of total emissions over a building's lifetime.[29]

2.4. Agriculture – stronger policies needed

The agricultural sector is considered one of those that is 'difficult to reduce', with no reductions in emissions over the last six years.[30] Between 1990 and 2016, the percentage share of emissions from agriculture rose from 7 per cent to 10 per cent, in part due to emissions in the sector flatlining since 2008, combined with emissions reduction accelerating in other sectors. Just under half of all farmers report taking no action on emissions and half say it is not a consideration in their decision-making.[30]

To date, there has been a voluntary approach to agricultural emissions reductions, however, the CCC is now calling for stronger policies to accelerate reductions.[31] The sector is already showing signs of action; the President of the National Farmers Union (NFU), Minette Batters, has declared that the sector needs to get to net zero by 2040.[32] A report released by the NFU in December 2018 outlines the willingness of the sector to take action, and calls for more effective policy support in areas such as collection of data, investment, supporting research and development, and routes to market for renewable energy generation.[33]

2.5. Re-industrialisation – clean economic growth

Ten years ago, heavy industry was perceived as one of the

hardest areas to decarbonise. Energy intensive sectors such as steel, cement, chemicals and aluminium are heavily exposed to energy prices and have a strong incentive to be efficient as a result. These sectors have shown some of the strongest resistance to climate change policies, as companies cited the challenge of international competition. In recent years, new analyses, for example, the Energy Transitions Commission's *Mission Possible: Reaching net-zero carbon emissions from harder-to-abate sectors by mid-century* report,[34] identify pathways to deep decarbonisation for these energy intensive sectors. As well as exploring innovations on the supply side, such as using carbon capture and storage to capture greenhouse gas emissions, these analyses draw on the concept of the circular economy and identifying new pathways to change patterns of demand for primary commodities.

Over the last ten years, the UK government has sought to support industry to decarbonise. During this period, while the UK economy has grown by around 70 per cent, carbon emissions have fallen by over 40 per cent.[35] In 2009, the government set out a vision for their low carbon industrial strategy, seeking to enable UK businesses to seize opportunities, look at the skills required for a low carbon economy and ensure the energy systems support the transition. More recently, the current government has published the Clean Growth Strategy, seeking to further grow the economy while reducing emissions.[35]

Building on this, at the end of 2018, the government launched an ambition to create the world's first "net-zero carbon" cluster of heavy industry by 2040.[36] As heavy industries in the UK are often located together in clusters, the aim is to provide funding to enable them to work collaboratively through sharing expertise and innovative low carbon solutions. This ambition supports the implementation of the UK's industrial strategy and one of the four grand challenges, 'clean growth' through "leading the world in the development, manufacture and use of low carbon technologies, systems and services that cost less than high carbon alternatives."[37]

2.6. Rethinking demand – new business models for the 21st century

Digital technologies have opened up the sharing economy. A primary example to date is mobility, while online streaming and services present an alternative to traditional purchasing options. The UK sharing economy grew by 60 per cent in the period between January 2016 and July 2017.[38] This included services such as places to stay, car rides, rental cars, parking, meals, pre-owned goods and crowdfunding, with environmental considerations being part of the decision to use these services. The sharing economy presents an opportunity to reduce emissions; a 2014 study for the UK government identified one car-sharing provider as lowering emissions for users,[39] however, the government has not yet undertaken an analysis to identify the full opportunity this presents.

These changes create the opportunity to make our economies more resource efficient and can further reduce a business's impact on the planet. In the mid-2000s, the approach that most UK businesses took in response to the climate challenge was to reduce emissions from their operations. For example, switching from fossil fuels to renewables and other low carbon solutions where possible, and informing employees about energy efficiency and climate change. These efforts were good. Most companies who took a proactive stance on reducing emissions significantly reduced fuel use and thereby saved money.

Recent initiatives, such as the RE100, which launched in the UK in 2014[40], seek to use business decisions to accelerate the switch to a low carbon economy, for example, through increasing demand and delivery of renewable energy. Nearly a third of electricity, gas and solid fuel use in the UK is by industry.[41] Switching this demand to low carbon sources such as renewables will accelerate emissions reductions and the transformation of the energy sector. Companies joining RE100 set a public goal to source 100 per cent of their electricity from renewable sources by a specified year. They disclose their electricity data annually, and RE100 reports on their progress.

Alongside the move away from fossil fuels, in the decade since the Climate Change Act, business responses have become even more sophisticated. In 2017, the CLG report *European industry in the 21st century: New models for resource productivity*,[42] explored these new approaches: "All companies interviewed are changing the way they operate: redesigning value chains and products to use less materials and to last longer, choosing innovative bio-based materials over fossil-fuel-based materials, and circling waste back into production processes. There is a focus on designing waste out of the system at an early stage, to avoid relying on end-of-life disposal activities. Business models are changing from selling a product to selling a function, or level of performance, allowing the company to retain ownership of the materials, and to move much quicker to provide customers with technology and product upgrades, staying ahead of the market." For example, CLG member **Signify (formerly Philips Lighting)** has transitioned from selling light products to lighting services.[43]

These changes are still at an early stage but they are not all altruistic. With the growth of big emerging economies there is greater competition for resources and a greater need to differentiate businesses to remain relevant and profitable into the 21st century. Changing business models to reflect the changes in society is helping companies in a number of ways, including focusing on innovation. There are already policies in place in some countries to encourage these shifts, for example, Sweden provides tax reductions on maintenance to encourage repair rather than replacement,[44] and the EU has proposed 'right to repair' legislation, which if introduced, is likely to be replicated in the UK.[45]

2.7. Aiming for zero

Both the UK government and businesses are now considering setting targets aiming for 'net zero'. Net zero is the state that occurs when greenhouse gas emissions resulting from human activity are effectively neutral. It is often used interchangeably with the terms 'carbon neutrality' and 'climate neutrality' even though these terms have differing scientific definitions. In practice net zero greenhouse gas emissions means deep decarbonisation, usually across the whole economy, combined with efforts to draw down emissions from the atmosphere.

CLG members recognise that setting themselves challenging targets towards net zero drives innovation and helps them not just reduce their impact on the planet, but also to redefine their business and business models for the 21st century. This is essential when the competition from large, emerging economies is increasingly intense. Today an increasing number of businesses are recognising the benefits of these 'stretching targets', including the following examples from CLG members:

- In 2017, **Tesco** committed to using 100 per cent renewable electricity by 2030 to meet tougher science-based targets, which it set to be aligned to a 1.5oC trajectory and enable it to meet its zero carbon ambition.
- Nigel Stansfield, CEO of **Interface**, points out how such targets can drive innovation: "If you really want to drive a genuine innovation platform that can truly revolutionise an industry, or a sector, then stretch the target." Interface has been able to achieve a 96 per cent reduction in their greenhouse gas emissions and is now utilising 88 per cent renewable energy in their facilities.[46]
- **EDF Group**, the world's second biggest electricity producer, has committed to pursue the goal of achieving carbon neutrality by 2050. Jean-Bernard Lévy, EDF Group's CEO and Chairman, highlights that: "in order to respect the Paris Agreement and its goal to keep the global temperature rise below 2°C, both businesses and government need to take action."[46]
- Peter Simpson, CEO of **Anglian Water**, acknowledges that a stretching target can "unlock ambition" and represent "a tremendous motivator"[46] for businesses and their supply chains to take action. Anglian Water has committed to becoming a carbon neutral business by 2050 through resource and energy efficiency measures as well as a comprehensive renewable energy generation strategy.
- The European President of **Signify**, Maria Letizia Mariani, equates the challenge and the benefits to the Apollo mission: "… a vision, plus an ambitious target, put a man on the moon. It was something that was unbelievable at the time, and the energy and the innovation that was stimulated by that ambitious vision, plus a clear target, is still something that we benefit [from] today."[46]
- An example from **Thames Water** demonstrates how such targets can stimulate innovation. The water company is working to increase a 45 per cent energy recovery rate to around 90 per cent by challenging their engineers to create an innovative process by using existing technology from other sectors. The company already sources 100 per cent of its electricity from renewable sources with over 20 per cent being self-generated.
- Karl-Henrik Sundström, CEO of **Stora Enso**, a leading paper and pulp company, says: "working with tough targets challenges you in a different way. You need to think slightly differently … You have to work across your whole value chain."[46]

The benefits of pushing beyond the usual boundaries are innovative solutions that can help make life easier, create jobs, and add value for the incumbent businesses that are brave enough to try. What these companies would now like to see is a push from governments that helps them go further by sanctioning the investment needed to take creative thinking to the next level.

In October 2018, the UK government asked the CCC to advise on setting a date for the UK to achieve "net zero greenhouse gas emissions from across the economy, including from transport, industry and agriculture."[47] This includes advising on whether government needs to review the 80 per cent by 2050 target set by the Climate Change Act, how the emissions reductions may be achieved, and expected costs or benefits relative to current targets. This review makes the UK one of the first G7 countries to formally explore setting a more ambitious target, reinforcing its international leadership position on climate change.

2.8. Urgency and international leadership

Strengthened by the credibility provided by having a strong domestic policy with the Climate Change Act, the UK has been noted for its international leadership on climate change, supported by progressive industries and companies, such as the CLG. It has used its diplomatic resources to help make the case for a global agreement, which bore results in December 2015, when the Paris Agreement[48] was negotiated by 195 nations. The aim of the Paris Agreement was to strengthen the global response to the threat of climate change by "holding the increase in the global average temperature to well below 2°C above pre- industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels." Crucially, and as a response to the requests of vulnerable countries that are most at risk from climate impacts, this was more ambitious than the UK government had in mind when it introduced the Climate Change Act a decade ago.

As part of the decision to adopt the Paris Agreement, the Intergovernmental Panel on Climate Change (IPCC) was asked to produce a report on global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways. The report, published in October 2018,[49] looked at these issues in the context of strengthening the global response to the threat of climate change, sustainable

development, and efforts to eradicate poverty. The report highlights a number of climate change impacts that could be avoided by limiting global warming to 1.5°C compared with 2° C or more. For instance, by 2100, global sea level rise would be 10 centimetres lower with global warming of 1.5°C compared with 2°C. Following the launch of the report, Claire Perry, Minister for Energy and Clean Growth, said: "We're a world leader when it comes to tackling climate change and cutting carbon intensity, but the evidence is clear – governments, businesses and communities must take further action to confront one of the greatest global challenges we've ever faced … The case for tackling climate change is more stark than ever before."[47]

3. Conclusion – an opportunity for government and business to lead together

Huge changes have occurred since the Climate Change Act came into force that have moved the UK further and faster towards a zero carbon economy than was ever expected in 2008. Deployment of renewables is cheaper and more widespread than anticipated and the electrification of transport has reached a tipping point far sooner than was envisaged. The creativity of business and new ideas, including the circular economy, indicate the potential to build on this progress. There are further challenges around buildings and agriculture that need to be addressed. However, the last ten years demonstrate that progressive businesses can respond to targets and policy, and the most ambitious of these will deliver innovative solutions to lower carbon emissions.

CLG members have called on governments to develop strong, credible and appropriate 2050 strategies, which are consistent with a net zero goal.[50] To reinforce this message, the CEOs of CLG members sent a letter to the UK Prime Minister in November 2018, calling on the UK government to fulfil the promises made in the Paris Climate Agreement and aim for net zero emissions by 2050 at the latest.[51] Plans developed in such a way are likely to include key policies such as a robust carbon pricing policy framework, sustainable finance, and support for low carbon innovation. They are likely to transform key sectors to deliver essential milestones, including zero carbon energy, net zero carbon buildings and electrified transport, as well as greater resource efficiency and new bio-based, circular models.

Ten years on from the UK Climate Change Act, there is an increased opportunity for the UK government to demonstrate international leadership on climate change and to address climate change as the core economic and security challenge it is. Working together with leading businesses, the UK government should:

- Be ambitious – ambition unlocks economies of scale and innovative solutions from business, which caution does not.
- Learn lessons – not all policies are appropriate all the time and the regulatory landscape can become burdensome. Policymakers need to review their policies and adjust or remove those that are not working.
- Collaborate – some of the most creative and unexpected innovations come from business overcoming new challenges or adapting new technologies. Policymakers can learn a lot from business about the art of the possible, and businesses need to work with policymakers to help deliver systemic change.
- Engage leaders – the engagement of senior management in a business is crucial in influencing the extent to which they thoughtfully address climate challenges and drive innovation.

The Prince of Wales's Corporate Leaders Group

The Prince of Wales's Corporate Leaders Group (CLG) brings together European business leaders to accelerate progress towards a low carbon, sustainable economy.Through exchange of ideas, experience, and a dialogue with policymakers, the CLG facilitates solutions that support a resilient and prosperous future.

The CLG is convened by the University of Cambridge Institute for Sustainability Leadership (CISL).

The CLG is a founding member of the We Mean Business coalition.

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