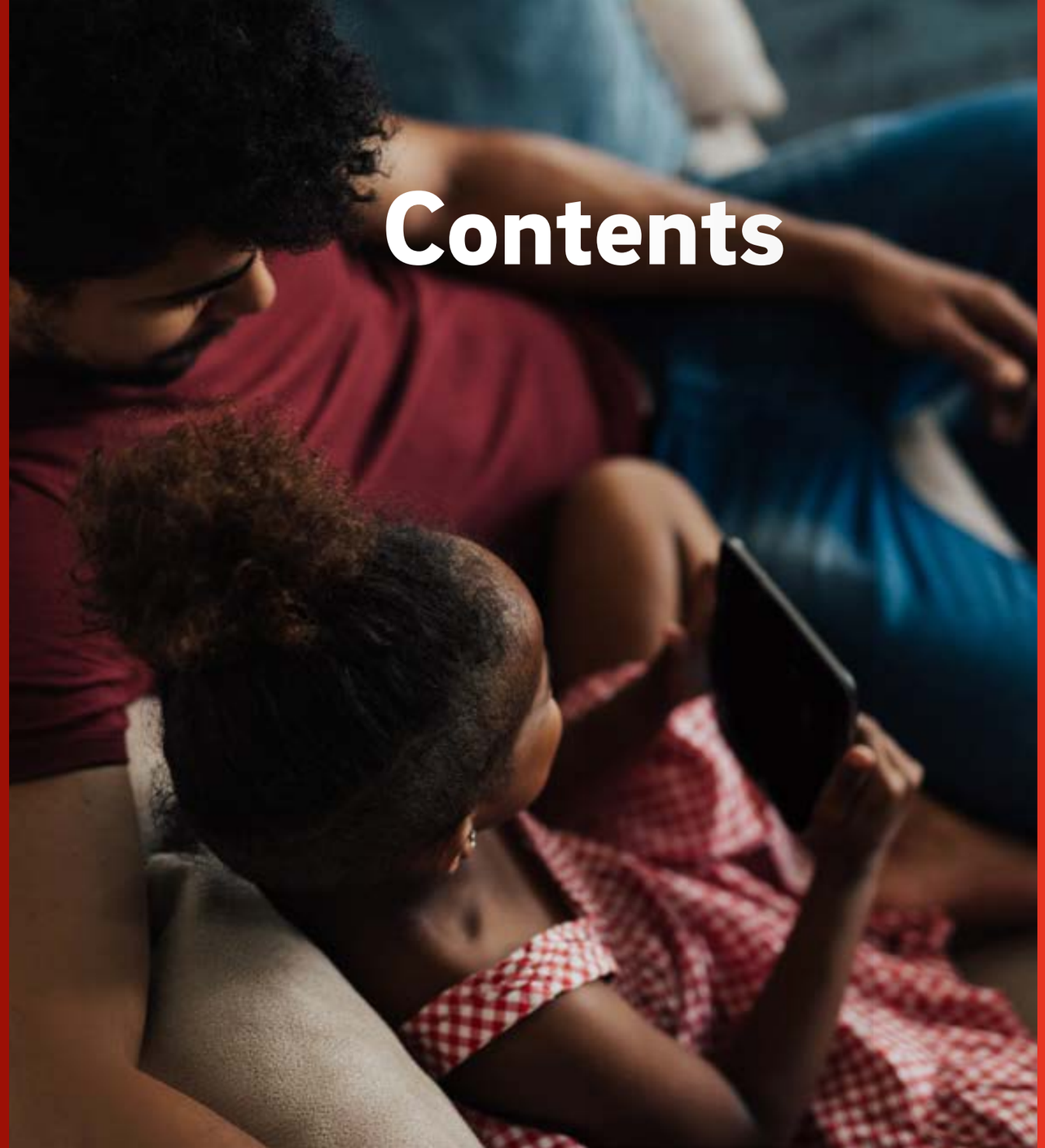
The Carbon Countdown

Road to 2030

e·on

WE has no limits



Contents

"The next decade will be critical if we are to meet that 2050 target..."

Foreword

The clock is ticking: accelerating the move towards a net zero future

Michael Lewis
Chief Executive,
E.ON UK

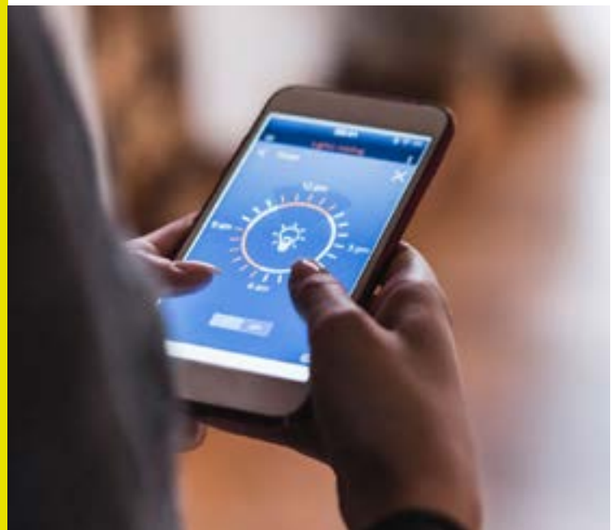
The good news is we are already on our net zero journey: the rise of renewables across our electricity grid means UK greenhouse gas emissions have fallen steadily with a 30% reduction in the last 15 years - a world-leading performance.

This is only the beginning though, and if we are to stay on track to meet our 2030 contribution to the Paris Agreement, we will have to cut emissions by a further 40%. We can do this, but it will require fresh impetus and new policies to accelerate that change.

The UK has a bold target of achieving zero net carbon emissions by 2050. By drastically reducing carbon usage, building out green energy infrastructure, adopting cleaner technologies at home and at work, changing motoring habits and other measures, the aim is any emissions we still produce will be balanced by schemes to offset an equivalent amount of greenhouse gases from the atmosphere. The sustainability of our planet depends on all of us – as well as other nations around the world – taking urgent action to achieve these goals.

Rapid decarbonisation of the electricity grid – the foundation stone to this transformation – was just the start. The next stage will be people-based, transforming the energy sector at the customer level. Smart meters are increasingly common in our homes, helping consumers to manage and reduce their energy consumption. And the Government's decision to end sales of new petrol and diesel vehicles by 2030 has spurred the market for electric cars, further reducing our dependence on fossil fuels.

The decisions we take in the years between now and 2030 will determine whether we are able to gain sufficient momentum to achieve success.



40%

Of the almost 40% reduction in UK emissions between 1990 and 2017, the lion's share is down to the **transition away from coal**

Those decisions will require a wholesale rethink of the way our economy works and the way we as people go about our lives. That means continuing to reduce emissions from the biggest greenhouse gas producers like fossil fuel energy generation. We also need to recognise that gas central heating – now one of the UK's largest sources of emissions – must be replaced with cleaner alternatives, electric heat pumps right now with perhaps a role for hydrogen down the line. We have to take petroleum out of transport. We need to solve the problem of storing energy at scale so it can be made available when most needed.

Crucially, there will have to be a greater focus on what efforts homeowners and businesses need to make now. Together, they represent nearly a third of our emissions and reducing them cannot be done just by setting targets or changing legislation. There needs to be a greater effort into greening our cities, where some of the biggest challenges – and opportunities – lie.

Here we look at the changes needed in our homes, our businesses and our city infrastructure to get to net zero within the timeframe. We examine how far and how fast that acceleration needs to go in order to get there, what we can all do to speed things up, and policies to ensure the country is able to achieve those ambitions.

Energy companies like ourselves will play a crucial role in ensuring greener energy is delivered in the most efficient, lowest cost, customer-focused way. At E.ON, this means continuing our own journey towards providing personalised, smart and sustainable solutions for each and every customer. For two decades and more, we were a pioneer in offshore wind. We were the first supplier to offer 100% renewable electricity as standard for all residential customers[1] – plus, small and medium businesses (SMEs) who sign up directly with us for their electricity supply. And we are evolving ourselves, challenging what we are as we go; for example our new E.ON Next platform gives us a quicker and more personal service for customers. Providing electricity from renewables as efficiently as possible and providing the smart and sustainable solutions people need is, we believe, the best way of supporting our customers and the economy towards a net zero future.

Getting to net zero carbon in 2050 was always going to be a challenge, even before the Covid-19 epidemic sent the world economy into turmoil. But the decisions we take, the investments we make, and the path we follow in the next 10 years will decide whether we are on the right road to meet the goal. Net zero by 2050 is achievable. We all have a responsibility to play our part to make sure we get there.

The 2020s: make or break

"We cannot be radical enough in dealing with the issues that face us at the moment."

Sir David Attenborough

The next few years will be vital to get the UK on track to meet what are some of the most ambitious climate change targets in the world – bringing our greenhouse gas emissions to net zero by 2050[2]. That target, adopted in legislation in the summer of 2019, means achieving an overall balance between the emissions we produce as a country and the emissions which can be taken out of the atmosphere. For example, by planting trees or deploying carbon capture technology – if it can be made workable.

-44%

UK greenhouse gas emissions were 44% lower in 2019 than they were in 1990[3]

Since the new targets came into force, Covid-19 has impacted the global economy and put huge pressure on governments, businesses and consumers. The path to recovery is still uncertain; decisions need to be made on taxing and spending to bring the economy back towards a sustainable, long-term path. What was already likely to be a challenging environmental task has become even tougher with new financial constraints.

However, if Covid-19 has provided any positives it is the sense that given the right ambition, huge advances are possible. The climate crisis is magnitudes larger and more destructive than the pandemic but the global response to the virus did demonstrate how emissions can be dropped at scale in real-time. That said, the effects have been short term and by 2030[2], global temperatures are estimated to only be around 0.01C lower as a result of Covid-19.

Some impressive strides have already been made. Huge investment in renewables mean UK greenhouse gas emissions were 44% lower in 2019 than they were in 1990[3] but many influential observers now believe we have fallen behind and are no longer on track to reach our targets. In a progress report last summer reviewing the previous 12 months, the Climate Change Committee (CCC), the UK's independent adviser on tackling climate change, wrote:

"There were important new announcements on transport, buildings, industry, energy supply, agriculture and land use. But these steps do not yet measure up to meet the size of the net zero challenge and we are not making adequate progress in preparing for climate change."[4]

UK Climate Change Committee

When asked at a House of Commons committee whether the UK was making sufficiently quick progress towards achieving the target, CCC chairman Lord Deben said: "We are clearly not. In almost every sector we are failing... we have simply not done the radical things that need to be done."[5]

A CCC report in December 2020 also reinforced the urgency of the next ten years. It said: "The 2020s must be the decisive decade of progress and action on climate change."[6]

Meanwhile the House of Commons Environmental Audit Committee has also pointed to the need to accelerate progress. In a report about making net zero the heart of a post Covid-19 economic recovery plan, it wrote: "Considerable progress has been made in moving to clean electricity generation in the last decade, but the UK is lagging in introducing measures to decarbonise transport, industry and buildings."

"We cannot be radical enough in dealing with the issues that face us at the moment. The question is what is practically possible. How can we take the electorate with us in dealing with these things?"

Sir David Attenborough (speaking to the Business, Energy and Industrial Strategy Committee, 9 July 2019)

That decade of progress and action will require huge changes at a cost of an estimated £50bn. While much of this cost could be recouped in the longer term through efficiency gains – bill savings at home, cheaper transport costs, returns on business investments – there will still be upfront costs to bear. For businesses, it is likely to mean investing in new technology and new processes, just as they are recovering from the pandemic. Our cities will need new infrastructure to meet the changing needs of their people and industries in a post-Covid world. They also need to reduce dependence on carbon-intensive energy sources, both by making better use of renewables through battery storage and flexibility, as well as building ever more renewable energy sources around the country.

Our households face probably the biggest challenges. Whether it is through energy – how we use it, generate it and store it – the way we work or the transport we take, millions of homes will need to be improved to reduce emissions – but at the same time making them more comfortable and cheaper to heat. How we interact with houses will see significant change more quickly than many of us may be expecting. The path to net zero 2050 begins at home.

Getting to net zero by 2050 is a once in a lifetime project

Thomas Birr
Chief Strategy & Innovation Officer
E.ON

But those of us in business, or in Government, need to create a spark of energy across populations if we are to make the transformation happen. It is the people who consume our products and services who need to feel that the energy transition is something exciting, something that will improve their lives, not just something which is a burden.

We need to recreate the journey seen elsewhere, make things more valuable, more convenient and more cost-effective, as we've seen with digital TV and broadband, smart phones, even electric vehicles (EVs). Many years ago, when EVs were being introduced, they were seen as expensive and impractical. At the same time, people understood – perhaps grudgingly – that they were ultimately necessary to help our planet.

The moment EV sales start to pick-up substantially was when people realised e-mobility was a convenient and cost-effective alternative to an internal combustion engine, and how appealing it could be to own one. Being part of the journey to 2050 needs to become embedded in people's thoughts in a similar way – not just as something consumers and businesses need to do but something they want to do.

As a sustainable energy company, it is our responsibility to inform our customers just how rewarding this journey will be. It is our challenge and our promise to help explain how much benefit it will bring in day-to-day lives, as well as to the economy and the planet as a whole.

Continued overleaf

Energy tribalism gets us nowhere

There's barely a question in climate protection more debated than this: will the future of transport be electric or hydrogen-powered? The answer is relatively simple: both. The future of energy will be dual fuel.

The world has already embraced electric cars as the new norm. Now, electric trucks are slowly beginning to catch up. In recent years, the first manufacturers, such as Tesla, Volvo, Mercedes and Renault, have started planning and even producing medium-duty electric trucks, mainly used for inner-city deliveries. They offer a number of green advantages, such as the ability to recover kinetic energy and operate largely from a renewable energy source.

However the use of electric battery-powered vehicles for transport is still limited by recharging time and range. That's where hydrogen comes into play. While battery-electric vehicles are the most competitive alternative for smaller vehicles and short ranges, hydrogen-powered transport offers increased flexibility in long-distance driving and high-intensity usage, which is essential for heavy-duty vehicles, such as trains, trucks and buses.

67%

of E.ON customer households already own **one or more smart solution** such as a smart meter, solar panels or heat pump[7]

Hydrogen fuel-cell vehicles are still lagging in terms of development, but probably not for much longer. While the statistics show that in 2019 there were only 17,000 fuel-cell vehicles worldwide, a growing number of hydrogen projects could flip the scale very soon. In the German town of Kaisersesch, for example, all inner-city buses will be powered by hydrogen by 2023.

Meeting the energy needs of the future is going to take both direct and indirect use of green electrons, a two-pronged approach to decarbonisation. Yet, too often, we talk about it as if it were a zero-sum game. This way of thinking needs to change, as both electricity and hydrogen are mutually beneficial. And that means we need to start developing and investing in both, side by side. If our common goal is a sustainable energy future, this is no time for tribalism. It's time for collaboration.

Thomas Birr
Chief Strategy & Innovation Officer
E.ON

Households: why upgrading our homes and changing the way we live our lives is vital to meet the 2050 challenge

82%
of people with a **smart meter** have taken steps to reduce energy waste

"...an urgent need to identify and implement solutions for promoting greater engagement and action from citizens."
UK Climate Change Committee

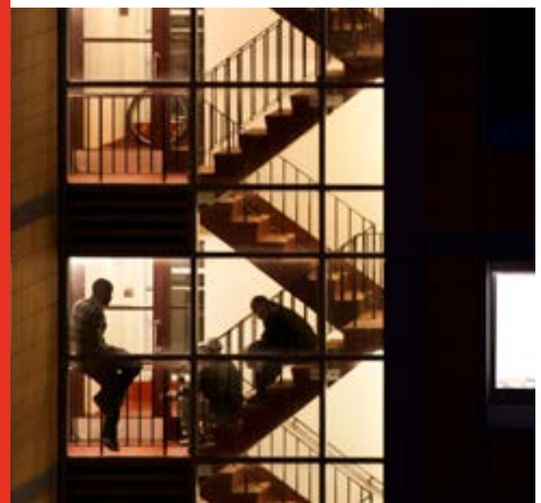
Accelerating the path towards 2050 means we need to adapt our lives in two main ways: upgrading our homes and speeding up our switch towards the greater use of electric vehicles.

When it comes to electric vehicles, the UK has already set hard dates which will force their take-up. New cars and vans powered wholly by petrol and diesel will not be sold in the UK from 2030[12]. Decarbonising transport will cost about £12bn a year by 2035, estimates say, with drivers benefiting from operational savings totalling £20bn per year by the same date[13]. Electric vehicles are now firmly on motorists' radars, making up one in eight of all new cars registered[2]. When it comes to our cars then, there is a clear roadmap to reaching our targets.

Housing presents more of a challenge. It's an unpopular but sadly necessary point to make: our homes as a whole are in a poor state, and collectively they are now one of the UK's largest contributors to the climate crisis. According to the House of Commons Environmental Audit Committee, homes account for around 19% of greenhouse gas emissions but are one of the few sectors where emissions reductions have stalled[14]. The committee wrote:

"The task is colossal: in England alone, over ten million owner occupied homes and over three million private rented sector landlords need to upgrade the energy efficiency of their homes to become A, B or C rated by 2035 for the Government to achieve its climate aspirations. We consider the Government has significantly underestimated how much decarbonising our homes will cost, and it needs to get a grip on this now, before it is too late."

House of Commons Environmental Audit Committee



The problem is the UK's existing housing stock – much of it dating from the Victorian and Edwardian eras – was never designed with sustainability and energy efficiency in mind. Many of our streets are lined with properties built at a time of energy abundance, before energy security, the climate emergency and the health of our planet were viewed as concerns.

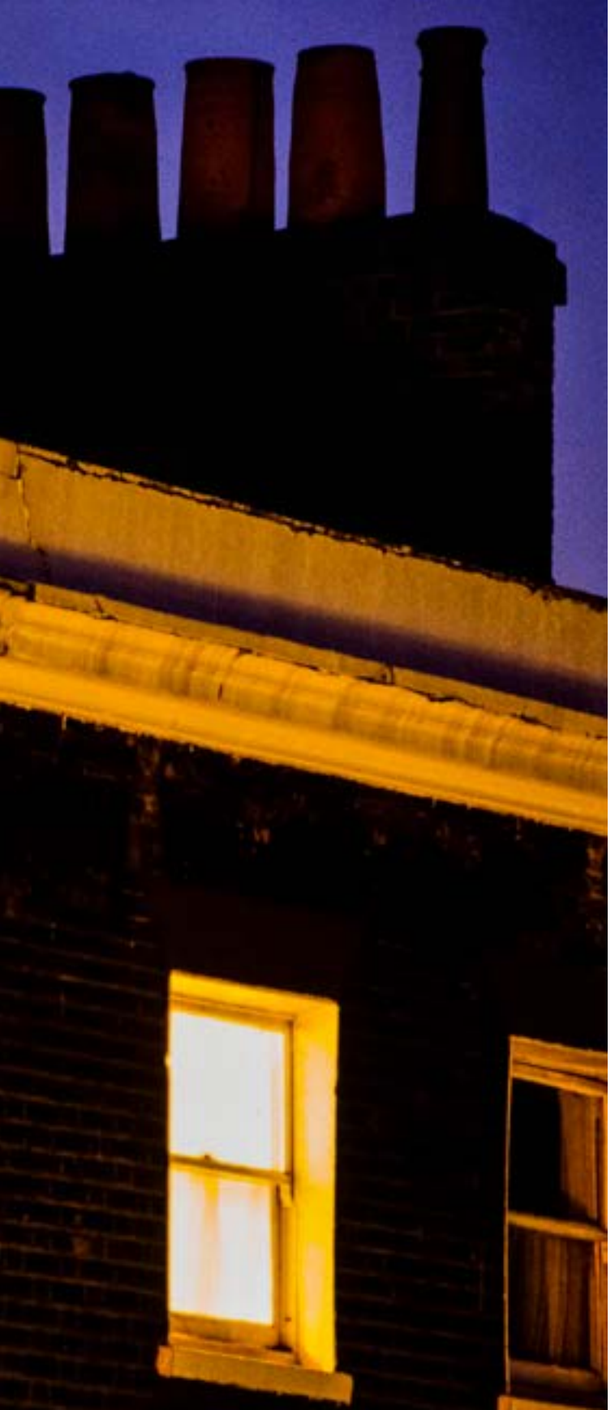
Cost and convenience are two of the bigger issues we face in speeding up change in existing homes. The CCC has estimated that "to upgrade energy efficiency of existing properties and to install low carbon heating methods would cost £250 billion to 2050". While 63% of homes need spend no more than £1,000 on retrofitting energy efficiency measures, older properties requiring the most work could require up to £28,000 of investment each to bring them in line with the intended efficiency standards[15].

Yet, while there are obvious financial and comfort benefits in a warmer, more efficient home, for many people we will still need to overcome a number of issues. Firstly the knowledge gap to educate people who might not even know about heat pumps or alternatives to a more traditional gas boiler, before tackling issues around the upfront costs and the disruption involved. While there are many different grants available for those on lower incomes, there is an argument there are too many, which can make applying for them confusing: the latest and most politically prominent scheme in England, the Green Homes Grant, was scrapped after reaching just 10% of the 600,000 homes the Chancellor promised would be improved[16]. We need to make the process of ensuring that our homes are energy efficient simpler, more convenient, and something homeowners really value.

£500m

Warm Home Discount
rebate given to E.ON customers since 2011

Unlike existing homes, ensuring new-build properties are 2050-compliant should, in theory, be easier. However, while it is possible to build a new property that is already energy-efficient – for example with a smart meter, triple glazing, underfloor heating, insulation, solar panels, efficient boiler or heat pump – there is insufficient incentive for housebuilders to construct them, as they are likely to be more expensive to buy, putting off potential purchasers.



1/3

Heating homes and businesses accounts for **more than a third** of UK emissions

Accelerating the process of improvement over the next decade will therefore require efforts with both our existing homes and with new builds. When it comes to the existing stock, that means taking a series of steps including replacing boilers, better insulation and improved windows. New-build homes meanwhile should be fully fit to meet the 2050 objectives. When a buyer signs up for a newly-built house, they should have the comfort of knowing there will be no extra costs to improve their home in the future. In addition, to support the acceleration of sustainability within the private rented sector, standards should be tightened to ensure better insulation and more efficient, safe, heating systems.

Other solutions to speed the change in our homes – whether existing or new build – could include greener mortgages (where providers offer bigger loans to more sustainable households), improving the way our energy bills are structured by ending rules which have the effect of subsidising gas at the expense of renewable energy, or ensuring consumers are connected simply and automatically with trusted suppliers to carry out the work required.

Let's make the energy transition aspirational

The climate emergency needs to come home – and consumers need to understand the scale of the challenge and their role in tackling it.

Until now, the focus has been on large-scale infrastructure projects such as offshore wind farms. The next stage will involve millions of people taking their own actions. The House of Commons Environmental Audit Committee says many homeowners are unaware that their involvement is needed, and will need financial support and advice to upgrade and retrofit their homes[17]. For countries like the UK, the CCC wrote:

"There is an urgent need to identify and implement solutions for promoting greater engagement and action from citizens and consumers... high-impact shifts in consumer behaviours and choices are needed that are consistent with the scale of the climate challenge, build optimism and commitment, and give weight to new ambitious narratives that inspire wide public participation."[18]

UK Climate Change Committee

Solving that challenge demands a 'hearts and minds' campaign from industry, Government and others to persuade people that the transition is not a chore, but a positive move that will not just reduce their costs and their environmental footprint, but also transform their lives. That it means warmer homes, cleaner air and a healthier way of living.

E.ON leading the way: home energy efficiency project

Scottish Highlands

Improving the energy efficiency of homes is only achievable in large numbers when the relevant methods are affordable and can be installed without disrupting people's everyday lives. As part of the Scottish Government's fuel poverty strategy, we have been involved in an eight-year project refurbishing about 3,000 homes in the Highlands.

Working with The Highland Council as part of the Home Energy Efficiency Programme for Scotland: Area Based Scheme (HEEPS:ABS) more than £40 million has been invested in revitalising ageing homes while cutting carbon emissions, lowering energy bills and reducing fuel poverty in the area.

The success of the project has come from installing a range of energy saving measures including external wall, loft and cavity wall insulation, air source heat pumps and solar panels – improving housing that was previously considered too difficult or too expensive to tackle in the past.

The long-term economic benefits for those taking part have been especially positive, with people seeing annual energy savings of between £150 and £460 per year. From an environmental perspective, it is estimated the improvements will generate lifetime carbon emissions savings of more than 44 million tonnes. In addition to local job creation, through a commitment to working with local trades and installers, property valuations taken after the energy efficiency improvements show that house prices have risen by around 15%.

Crucially, the HEEPS:ABS project could not have succeeded without dedicated and varied community engagement. E.ON's teams undertook school visits and community events to communicate energy saving tips in the home as well as the wider benefits of the scheme's roll-out. Customer satisfaction surveys showed a positive reaction to the work, with 96% of those surveyed saying they were either satisfied or very satisfied with the final results.

What householders can do today

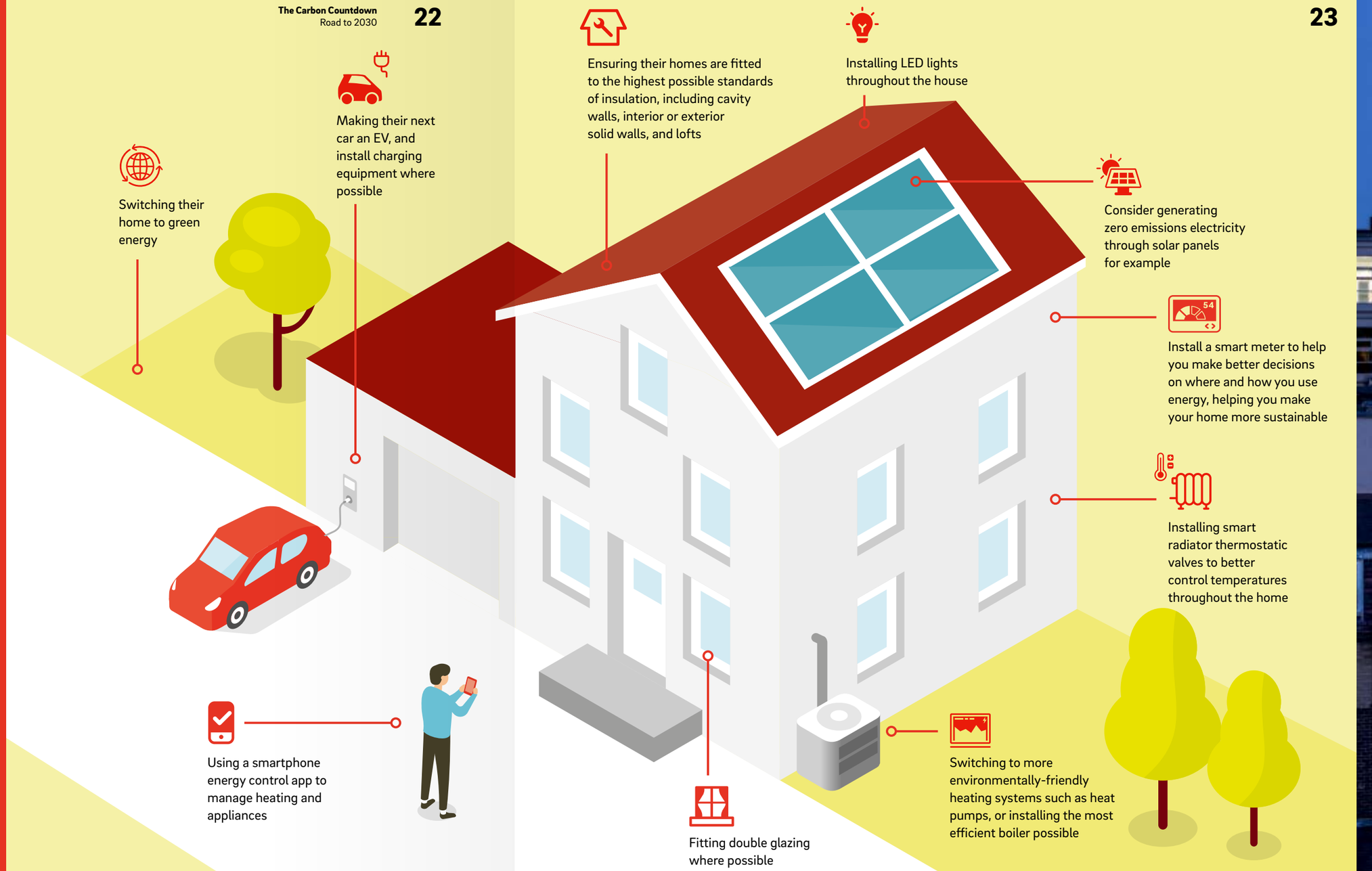
Supporting the acceleration of the move to 2050 can seem like so vast a challenge that householders may feel daunted at the prospect of getting started and simply rely on the Government to lead the way.

Yet there are simple steps they can make that will have an immediate impact. They include the options in this image; from creating a warmer, more comfortable home, to opting for 100% renewable electricity, generating your own power from the sun, or switching to a more sustainable form of transport.

What E.ON is doing

E.ON customers get 100% renewable electricity at no extra cost. We can also install solar panels, batteries, heat pumps and electric vehicle charging facilities, helping customers improve their own energy efficiency and start to create their smart, personalised and sustainable future. We are one of the driving forces behind the Government's push to make homes more energy efficient: our colleagues are out and about in our communities helping make homes more sustainable.

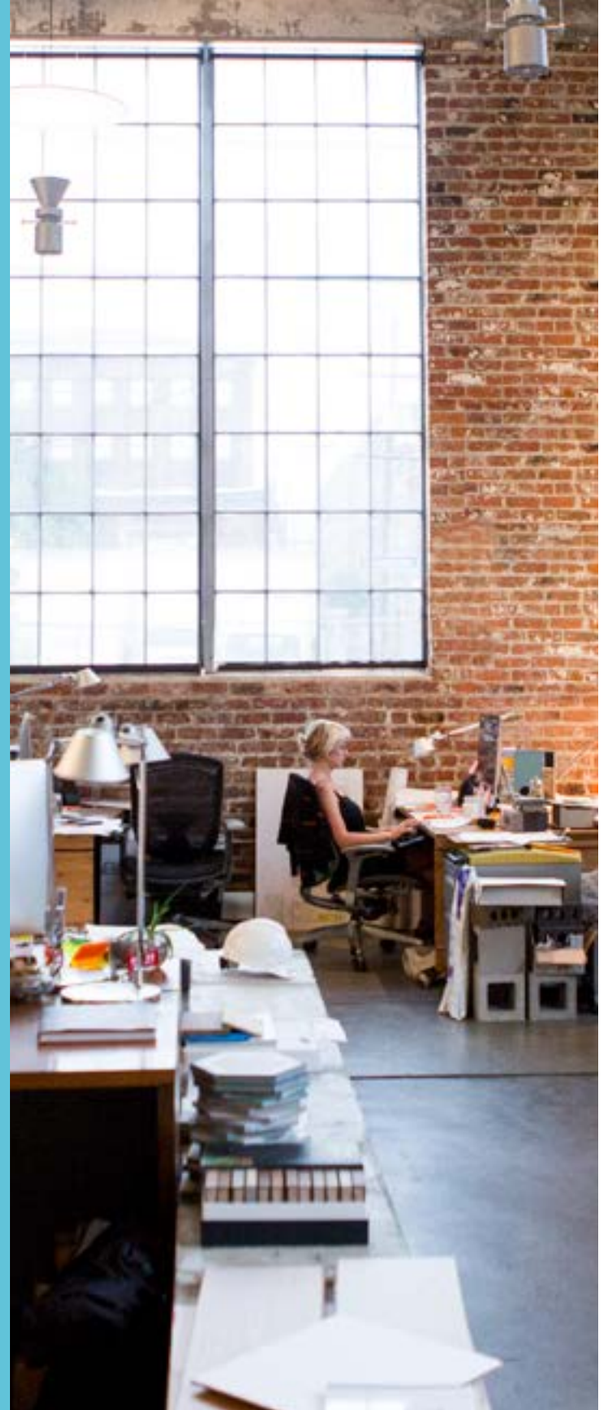
More information from E.ON on the steps homeowners can take is available at eonenergy.com/save



Businesses rise to the challenge of net zero 2050

Greater demand by businesses for an environmentally friendly supply chain will stimulate competition and drive down prices for green goods

50%
of UK businesses
'targeting carbon neutrality by 2030'

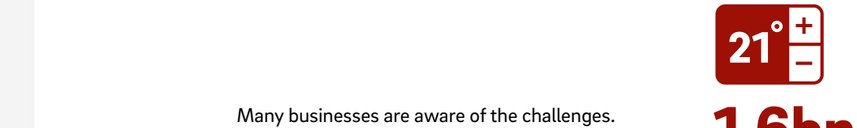


Getting the UK on track to meet its 2050 goals will require substantial investment over the next few years. Yet businesses – and SMEs in particular – will still be dealing with the ongoing impact of Covid-19 on top of all other business pressures. Due to the pandemic, many have lost sales and seen their profits disappear, while many more will spend the next few years paying off the loans they have taken out just to survive. It would be perfectly understandable if, faced with such challenges, a business put improving its environmental footprint well down the priority list.

In addition, many SMEs and bigger businesses face issues similar to households – that the age and condition of much of our office and factory infrastructure makes it unconducive to more sustainable working. The CCC puts the required investment costs in public and commercial buildings to 2050 at around £110bn[19]. There is also a more general risk that with so much focus on corporate environmental responsibility and the need to adopt more sustainable ways of working, many businesses could feel under pressure to rush to produce a net zero plan, or make ambitious decarbonisation commitments without working out how they will achieve them.

Many businesses are aware of the challenges. Sustainability, with carbon reduction firmly in their sights, is a trend that has accelerated over the last five years. Research shows three quarters of UK businesses now have metrics in place to measure environmental sustainability, and almost the same number plan to introduce net zero emissions goals to their own operations and across their supply chains[20]. Businesses as a whole have bought into the need for net zero, they are committed to playing their part and feel they can make a positive difference when it comes to attaining the 2050 goal.

However, there is a growing gap between the ambition of businesses to make the change and the reality of the policies needed to support them in their move. At the moment, much of the Government effort is concentrated on consultation and evidence-gathering. While these are important, businesses are looking to see the kinds of specific actions – even if they are just small-scale pilots – that will need to happen across the economy to reach the target.



1.6bn kWh

E.ON delivers more than 1.6 billion kWh of heat
to industrial customers

This is particularly true when it comes to large, energy-intensive industries such as the steel and chemicals sectors, which will require more help and a clearer, longer-term timeframe to phase out their fossil fuel use. Until now, the retail sector has driven through much of the change: perhaps not surprising considering it deals directly with consumers who might base immediate purchasing decisions on seeing decisive examples of environmental consideration in action. For large consumers of energy however, it can be a difficult and long-term effort to change manufacturing processes.

Industry as a whole needs a policy framework on a national scale that drives deeper, faster change. That means being more ambitious when it comes to supporting the shift towards electrification, adopting greener gases such as hydrogen when available at commercial scale, accelerating incentives for energy efficiency and driving greater use of renewables. It also means further reducing our dependence on coal and gas, by changing taxes and subsidies to persuade businesses to switch, and setting a carbon pricing framework – and potentially the regulation around it – that includes long-range targets that encourage a shift away from fossil fuels within a timetable that is both realistic and cost effective.

50%

SMEs account for over 99% of businesses in the UK and are responsible for **over 50% of energy use**

There are other issues businesses face. We know many SMEs rent rather than own their premises so could face difficulties installing insulation, efficient heating or solar panels even if they wanted to. Yet, from a landlord's point of view, the situation is equally problematic: any investments will add to their costs and take between 12 and 15 years to recoup, the argument goes. In addition, the benefits that do accrue are likely to come not to them, but to their tenants in terms of lower utility bills over the long term: any attempt to increase rents simply because the property is more sustainable is likely to be given short shrift. Tackling this split will involve such things as shared investment/revenue schemes, where both tenant and landlord agree to combine the cost and payback over a period of time, or a power purchase scheme where the landlord invests in technology such as solar and effectively 'sells' the energy into the leaseholder, creating a benefit for both.

There is impetus for change. Investors and customers, aware of the increasing public focus on environmental issues, are putting pressure on businesses to adapt. In September 2020, the Financial Times reported that more than 500 investors including BlackRock and Pimco, with assets totalling more than $47 trillion, had written to 160 of the world's largest greenhouse gas-emitting companies demanding they put in place a net zero strategy for 2050 or earlier[21]. Meanwhile consumers often say they are willing to pay more for goods that they know have been produced sustainably[22]. Taking measures that will help speed up the country in its move to net zero emissions by 2050 could be among the clearest ways a company can demonstrate it is taking the environment seriously.

There is a further potential upside. Many employees now put the values a company espouses as a key reason to work there. Being proactive in making their own move towards net zero provides a positive differentiator when it comes to recruiting the best, most motivated employees. A global survey last year found that job loyalty rises as businesses address employee needs, from diversity and inclusion to sustainability and reskilling[23]. Leading the way offers businesses the opportunity to develop and build a more loyal workforce with the skills and capabilities to help deliver the energy transformation, and by doing so engage a greater cohort of people who feel passionate about change.

34%

We've helped a major UK retailer use 34% **less energy, on average**, across their stores

Over the long term, responding to changes in these ways should create a virtuous circle, pushing businesses towards a greener path. Greater demand by businesses for an environmentally friendly supply chain will stimulate competition and drive down prices for green goods. Technological progress is also likely to help. When the decision to ban fossil fuel engines from new car sales was taken, many felt the target would be unattainable, yet setting a deadline has prompted innovation which has brought prices down. Similarly, the level of technological advancement in constructing windfarms over the last decade has meant the cost of renewable energy has dropped significantly in recent years. Setting targets for businesses to adopt greener technology or processes is likely to spur similar levels of progress, easing the costs of the transition.

In summary, there needs to be a greater focus on businesses of all sizes to explain the benefits of changing. Businesses will also need greater clarity from Government of what is expected of them, with a clear roadmap of the policy framework that will achieve it. Critically however, those polices need to be developed without harming the country's international competitiveness. The Government will need to strike a delicate balance in supporting decarbonisation without increasing costs for businesses and making them uncompetitive against overseas rivals. The climate emergency is a global problem that would only be exacerbated by exporting jobs, processes and their associated emissions to countries which have lower standards, just because the UK has a tougher carbon regime.

E.ON leading the way: global drinks manufacturer

Scotland

We were approached by a global manufacturer – home to more than 200 beverage brands across 150 manufacturing sites – looking to reduce the environmental impact of one of their key sites in the UK that supplies products around the globe. This activity is in line with the company's global objective of becoming carbon neutral by 2030 and delivering 100% renewable electricity across direct operations.

E.ON created a tailored plan combining the installation of low carbon technologies over a phased period that offset fossil fuelled power generation and reduced carbon emissions, sending send a clear message that the company is serious about taking action against climate change.

Our plan began with a 4.1MW array of solar panels on an unoccupied area of the site, followed by a 1.5MW wind turbine and energy efficiency measures including heat recovery systems across the site. The solar panels feature power optimisation technology which unlocks 25% more energy generation and requires 50% less technology, making the installation process quicker and more cost effective than conventional systems.

Longer-term, the energy measures on site would include heat pumps and heat recovery units, as well as potential for battery storage facilities to maximise efficiencies in power management for years to come. The energy generated on site will save the business in the region of £400,000 a year that would previously have been allocated towards fossil fuel power generation.

The proactivity of this business in seeking solutions is helping it to create a more sustainable business, as well as showing employees and customers the tangible changes it is making in the face of the climate emergency. This is in addition to standing out against competitors and now having a low-carbon asset in its network that can be used as a blueprint for further sites across Europe.

What businesses can do today

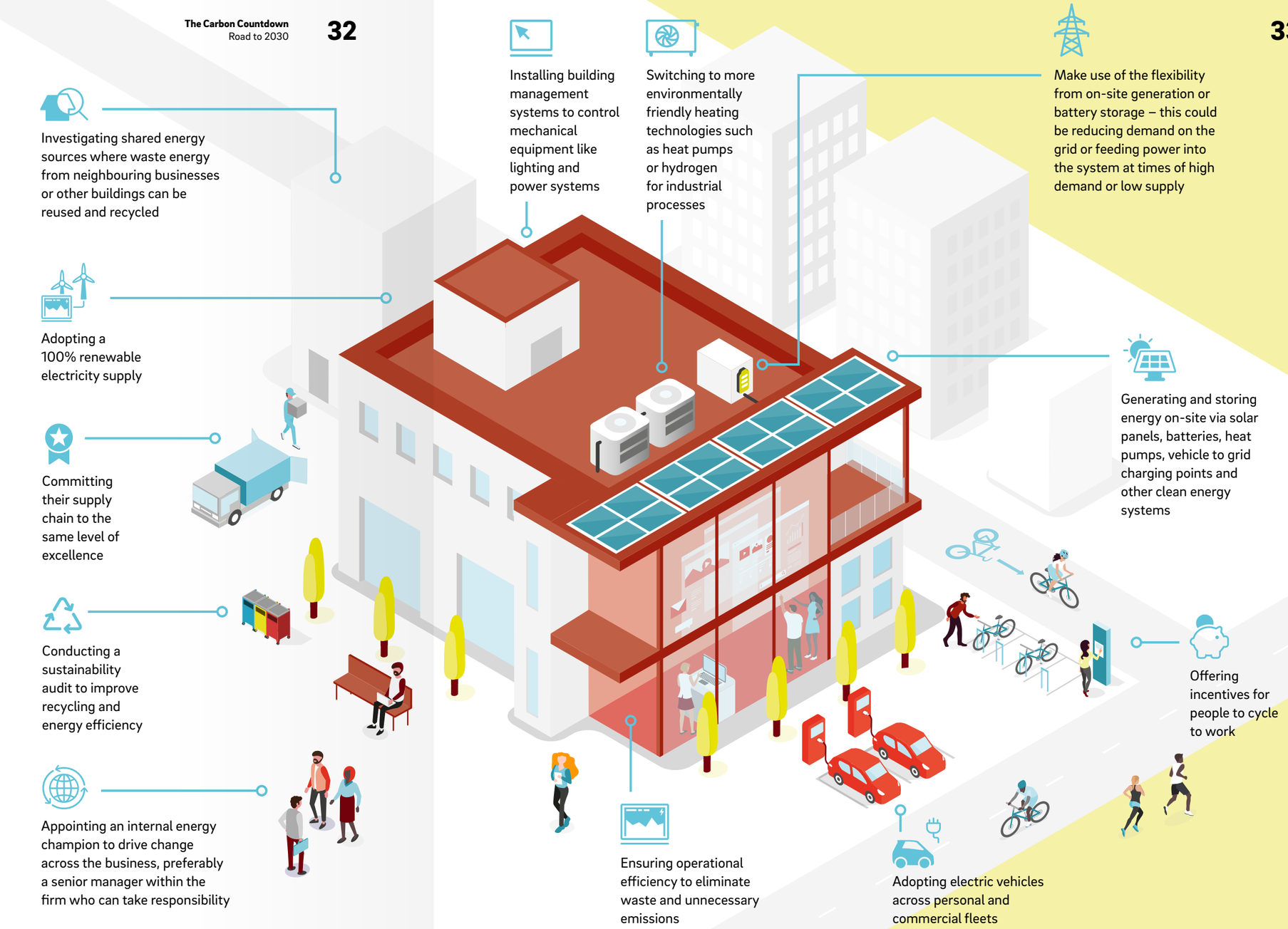
Playing a part in the carbon transition could feel like a low priority compared with simply staying in business, innovating and battling to keep ahead of the competition. Yet improving businesses' environmental footprint will be critical to the UK meeting its goals: in 2019 they were responsible for 18% of net greenhouse gas emissions[24].

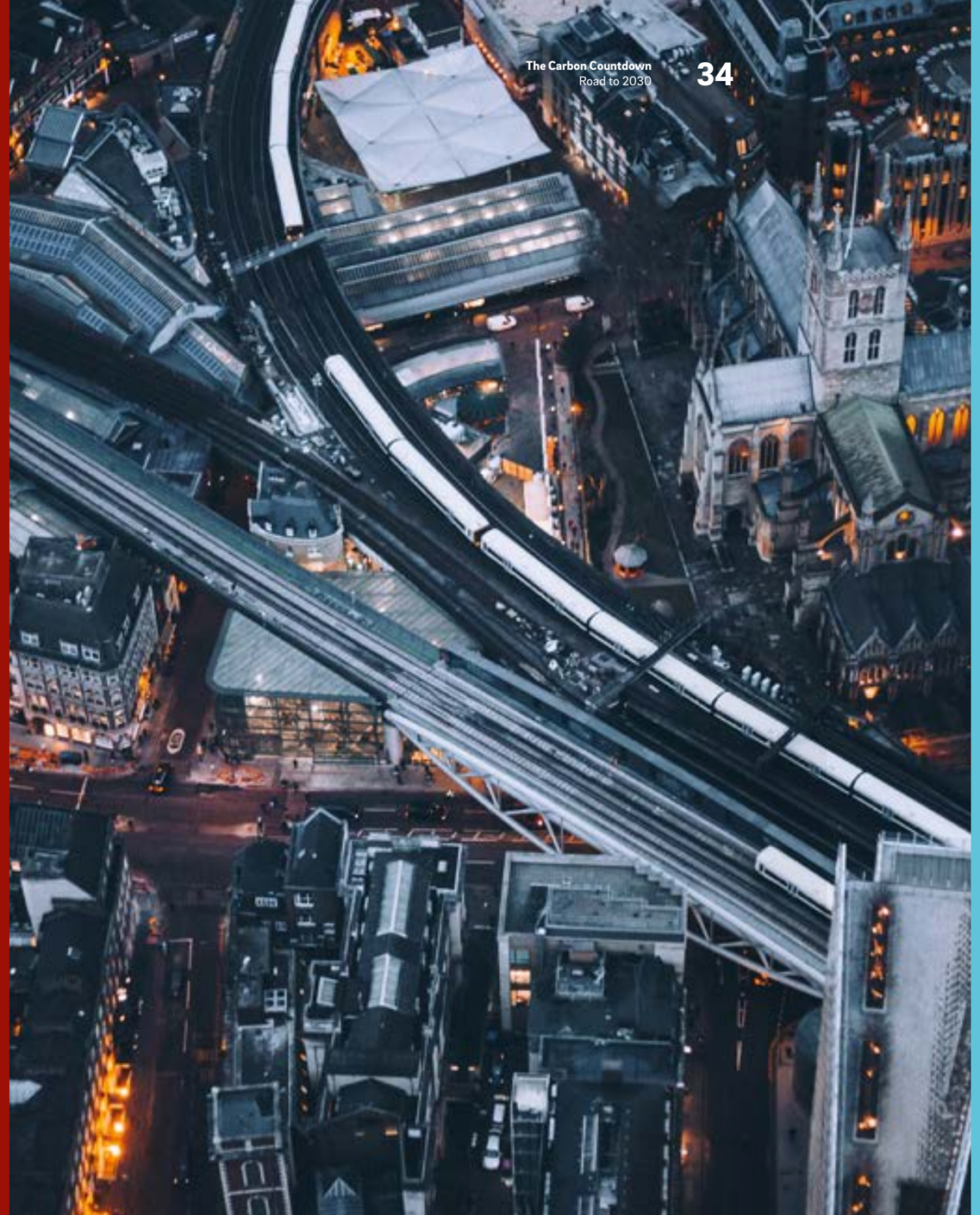
Some measures they can take include: generating and storing their own energy, perhaps earning a return on investment by supporting the grid at peak times, 'greening' vehicle fleets and working with staff to make more sustainable choices.

What E.ON is doing

We're working with our industry partners to create smarter buildings, allowing businesses to take control of their energy. In total, we've helped thousands of business customers reduce their carbon emissions by helping them to generate it themselves and taking an active part in advising them on how to run their energy systems more efficiently. Established in 2005, our Energy Management Centre located in the heart of Glasgow remotely manages more than 6,000 business' buildings across the UK and Europe. We've helped one of the UK's leading retailers use 34% less energy, on average, across more than 500 stores, and helped a major UK hotel and restaurant chain achieve energy savings of up to 35% across its sites through more efficient use of energy and appliances. We've introduced 100% renewable electricity for our small business customers who join or renew with us direct and we offer renewables-backed electricity to customers in the industrial and commercial sector as well.

More information on how businesses can support the move to zero carbon is available at eonenergy.com/business/energy-efficiency





25%
Transport contributes around 25% of all **UK emissions**

Greening our cities: the challenges and opportunities

"The built environment contributes around 40% of the UK's total carbon footprint."

UK Green Building Council

Transforming our cities and their infrastructure represents a huge challenge. Many of the issues associated with housing, transport and business are magnified many times over in an urban setting. Power and transport networks were generally built for an age that placed less emphasis on the environment, meaning cities are suffering more pollution and congestion than was ever envisioned, where getting around can be frustrating and time consuming, and where open space is at a premium. Building new infrastructure and installing new technology is more difficult in a sometimes dense, urban area.

£400bn estimated for investment in green infrastructure to meet 2050 targets

35,000+

E.ON district heating customers
across 60 networks

Figures bear out the scale of the problem. According to the UK Green Building Council: "The built environment contributes around 40% of the UK's total carbon footprint."[25]

Yet if cities are part of the problem, they are also part of the answer. Bigger challenges mean bigger solutions; solutions which would not be appropriate or feasible in a suburban, village or rural environment. For example, dense populations mean energy can be generated and consumed in close proximity, reducing the need for high-scale distribution losses and taking advantage of smarter energy systems that allow the sharing of energy flows (such as using waste heat from business as a domestic energy source) and reducing the gap between peak and off-peak demand times by storing and sharing electricity. Cities also offer the opportunity to solve the problems of a large population at the same time, engaging a wide community and redesigning work, leisure, shopping, and lower emissions transport and mobility.

Indeed, the Covid-19 pandemic has accelerated many of the changes that were already under way in our cities, changes that involve a move towards more remote working, digitalisation and a greater emphasis on green transport. In the future, that means we are more likely to see hybrid buildings – where people come together both to live and to work – as well as improved digital connectivity and a greater emphasis on quality of life[28]. A fundamental rethink of how our cities are used, and the way in which they are reconfigured to meet our needs, will be required. The need to adapt our cities gives us a once-in-a-generation opportunity not only to upgrade their infrastructure, but also to embrace greener energy.

Local administrations, mayors and other regional bodies often know their communities better than central Government, and better understand their needs too. Bristol and Leeds, for example, are in the vanguard of places taking a city-wide approach to the issue, exploring innovative, smart, sustainable projects to energise community groups and create healthier and fairer cities. And while this certainly includes the creation of new infrastructure, continued development of efficient retrofitting processes for existing properties is also paramount.

Local authorities as a whole will play a key role in driving change. As significant landlords themselves, they led the way in the 1990s in the installation of cavity wall insulation and condensing boilers across thousands of homes. Repeating the process with the new technology available will help generate a sense of momentum for the private housing sector to pick up on. The increase in home working thanks to the Covid-19 pandemic may also work in favour of transitioning our cities. Fewer commuters should mean less pollution and less overcrowding.

600+ km

Length of **E.ON's UK** heat network

District heating schemes, which distribute heat generated in a centralised location through a pipeline network to houses and commercial properties, are likely to play a significant role in urban settings. They are more viable economically where there are multiple homes and businesses to heat in a dense area. And while they are easier to install in new developments, the scale of the gains means they can be appropriate – with the relevant planning and consultation – in existing urban areas too. Currently, however, the responsibility for planning and implementing these is often unclear. Nevertheless, such schemes offer the opportunity for cities to embrace more efficient heating with lower emissions – both at a local air quality and national level.

The Government believes up to 20% of our heating demand can be met by district heating by 2050, compared to just 2% today[26]. That will only be possible if policies are put in place to drive better building standards and introduce zoning to make clear which parts of our cities are to be supplied in such a way. Moves like these will be important to incentivise district heating providers, as they will be assured of sufficient customers connected to the network to make the investment viable.

In broad terms there is likely to be a mix of solutions to cities' energy problems. Some areas within a city may be appropriate for district heating while in others a better outcome could be fuelling homes with greener gases. Some urban areas may also be more appropriate when it comes to future development of hydrogen as a power or heating fuel. The CCC envisages geographic clusters of heavy industry where hydrogen can be developed as a solution[27]. Where these are close to residential centres, it may be possible to link not just businesses, but also homes. In the future, our cities are likely to resemble a patchwork of zones where different energy solutions are provided in different areas.

59%

Indirect building emissions:
Buildings are responsible for 59% of UK electricity consumption

Each of our cities faces its own unique challenge. Meeting those challenges will require central Government and local authorities combined to take a longer-term view and will need substantial up-front investment. However, these solutions could lead to benefits in terms of attracting investment, improved air quality, social mobility, health and wellbeing over time. Our cities offer a way of speeding the move by both households and businesses to a greener future.

E.ON leading the way: Elephant Park

London

Cities are in a constant state of metamorphosis. Elephant Park is a major regeneration site in London, which is being redeveloped to include multiple building types (residential, business, education and leisure) with great transport connections into the centre of the capital.

As part of the regeneration, E.ON developed an eco-friendly, smart warmth concept for a community of 3,000 apartments, and 50 shops, restaurants and cafes. Two gas-fired combined heat and power (CHP) plants each produce 800kW of electrical energy. As part of a holistic concept, they guarantee a climate-friendly and sustainable heat supply via the combination of renewable energies, heat storage facilities and intelligent grids. By 2023, the current proportion of biogas in the area will increase from 43% to 100%, so the 3,000 apartments and 50 business units will be supplied with totally CO_2-neutral, sustainable heat for the long term.

The project has transformed the area by creating a 25% reduction in local CO_2 emissions, and generating savings of 30% on energy costs to the surrounding community. As with other projects, community engagement is a key factor in generating public excitement and support for the project. At the heart of the development is the E.ON Energy Centre, where – through huge glass windows – people living and working locally can see the installed elements in technicolour and understand how the heat they use is sustainably generated.

What cities can do today

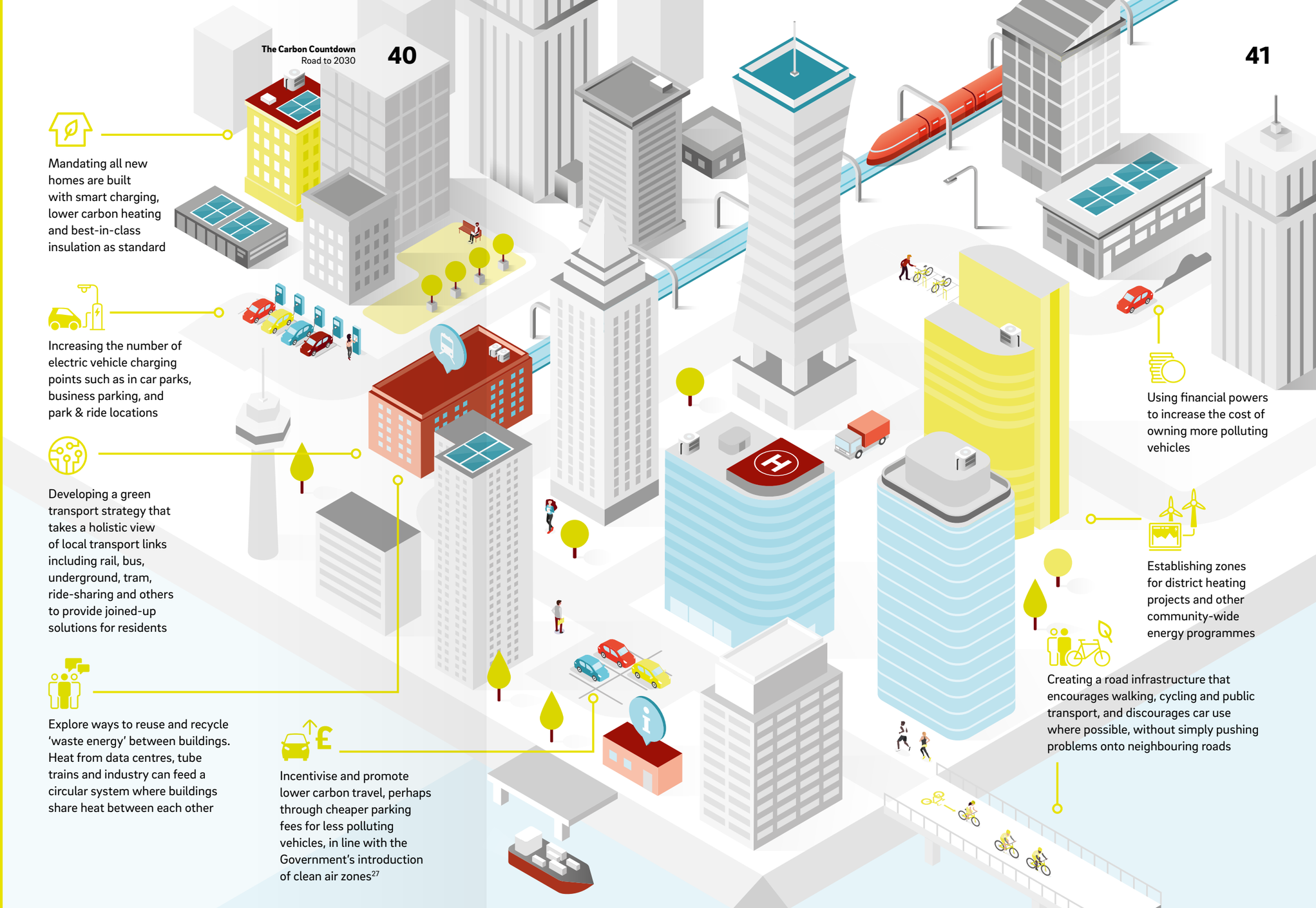
Unlike for householders and businesses, many initiatives in our cities cannot be undertaken quickly; decision making can be more complex, planning issues can take time. However, cities also bring scale and the potential to deliver significant changes and wholesale improvements across whole communities. That puts a premium on decision makers at all levels – both central and local Government – to identify responsibilities and timelines within which change can happen – or start to happen – quickly. We don't have to end the marathon this decade, but we do have to begin it.

Some of these immediate steps include: developing clean air zones and greater use of pedestrian or clean transport infrastructure. It could also include developing lower carbon heating solutions for who communities and mandating high energy efficiency standards for new-build developments.

What E.ON is doing

We work with local authorities right across the country, establishing the appropriate sustainable energy solutions for each location. We have been doing this for more than a decade, and have delivered a series of district heating networks and bespoke energy efficiency measures throughout the country. We also provide electric car charging points, 100% renewable electricity for homes and SMEs, solar panel installations, and greener heating and cooling for larger businesses.

More infromation available at eonenergy.com/business/challenge/smart-cities-and-communities.html



Mandating all new homes are built with smart charging, lower carbon heating and best-in-class insulation as standard

Increasing the number of electric vehicle charging points such as in car parks, business parking, and park & ride locations

Developing a green transport strategy that takes a holistic view of local transport links including rail, bus, underground, tram, ride-sharing and others to provide joined-up solutions for residents

Explore ways to reuse and recycle 'waste energy' between buildings. Heat from data centres, tube trains and industry can feed a circular system where buildings share heat between each other

Incentivise and promote lower carbon travel, perhaps through cheaper parking fees for less polluting vehicles, in line with the Government's introduction of clean air zones[27]

Using financial powers to increase the cost of owning more polluting vehicles

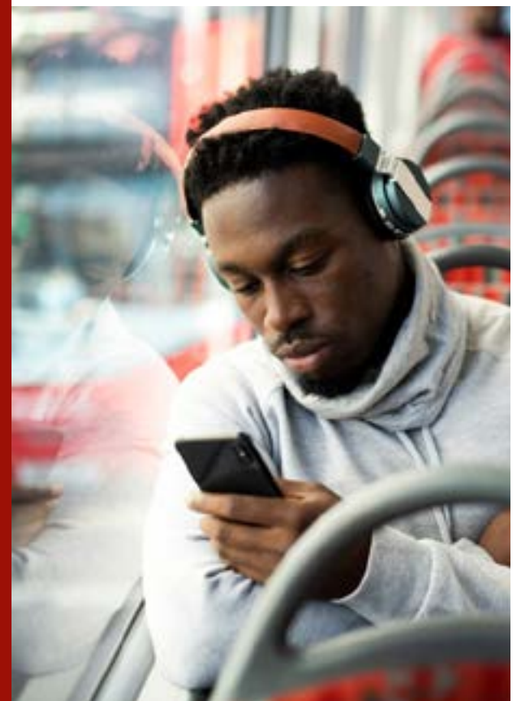
Establishing zones for district heating projects and other community-wide energy programmes

Creating a road infrastructure that encourages walking, cycling and public transport, and discourages car use where possible, without simply pushing problems onto neighbouring roads

Putting the right policies in place

Accelerating the move to a greener economy and helping households, businesses and cities play their part will require a combination of changes across Government policy such as taxation, smart regulation, subsidies and other measures to create a system that will actively help to change consumer behaviour

There are also bigger questions to consider. To what extent should the Government support and subsidise new and emerging technologies – such as heat pumps or hydrogen – that will be crucial to the energy transformation? Which groups of people or areas of the country should be the focus for different heating solutions? How should the finance industry be harnessed and incentivised to help people make the investments in their homes and businesses?



However, here are the ten key policy areas to act on right now if we are to accelerate the move. Some are focused on changing individual behaviours, others on driving greater urgency among businesses and consumers, others still on making sure we are able to harness the right technologies effectively.

1. Develop a more detailed roadmap to 2050.

The Government has been clear about the overarching aim of getting to net zero carbon emissions by 2050 but there has been insufficient detail about the pace needed and the steps required to actually get there. In order to focus minds towards this objective, clear targets are needed for each individual stage of the transition to a greener future, setting out a series of dates by which critical objectives need to be met to ensure success. A detailed roadmap and concrete policies would provide clear directions to the public and to businesses so they can make these changes in a way that is most convenient or appropriate to them. It would also allow supply chains to innovate and build up capacity as demand grows. For example, in its ten-point plan last November, the Government announced a target of installing 600,000 heat pumps every year by 2028 and removing 10MT of carbon dioxide by 2030. That move sets a target, but gives no real insight into the concrete policies needed to deliver them. Other such measures could include a fixed date for all homes to meet minimum energy performance standards or when cities should ban the use of fossil fuel vehicles.

2. Improve the UK's heating profile by introducing a sell-by date for gas boilers.

The ban on new petrol and diesel car sales from 2030 has focused the minds of drivers and carmakers. It has accelerated the market for electric vehicles and more and more manufacturers are producing them or planning to do so. Yet many householders and businesses are unaware of the emissions from heating buildings and are not focused in the same way on the changes they need to make. The Government should take the lead in improving the country's heating by setting a date by which gas boilers should be abolished – concentrating the minds of both individuals and businesses on the need to switch to a cleaner supply and ensuring this key measure is taken within the appropriate timeframe. It will also provide clarity to UK heating manufacturers and installers to help them transition to a low carbon future.

3. Building standards should mean all new properties are zero carbon.

The Government can also support the clean energy drive by toughening regulations to mandate that new build properties – residential and commercial – must be built to zero carbon standards. By, for example, requiring all housebuilders to develop new homes that have a heat pump or other form of clean energy, or for new-build business premises to have the highest level of heating efficiency, they can raise standards and assure prospective buyers that there will be no future costs to meeting their obligations under the plans to reach the 2050 goal.

4. Simplify schemes that support most in-need households.

The complexity of applying for what is a vast range of schemes providing help for those on lower incomes may actually serve to put people off. In addition, there is the risk many of those who might apply for them feel a lack of confidence, given the sudden scrapping of prominent schemes in recent years. Simplifying and standardising the system, and clamping down on potential rogue traders and low-quality suppliers, will ensure householders understand what they are entitled to, and lead to a better take up of the support that is offered.

5. Prompt householders to take action now.

All property owners should be encouraged to take up green measures. This should come from an increased focus on persuading householders that it is in their interests to adopt new standards, changing the structure of existing incentives, and introducing new rules. There should be a campaign by Government and industry to explain to householders about the need to change and the role they will play. Meanwhile, existing incentives should be reallocated to better support the journey to zero carbon 2050 by, for example, linking council tax charges to the sustainability of the home or reducing stamp duty on the sale of houses that are energy efficient. This should be complemented by ensuring rented and owner-occupied properties are required to meet minimum standards by a certain timeframe, consistent with the roadmap to 2050. These would make it attractive for home buyers and sellers to seek a greener home, as well as ensuring renters live in warm, comfortable properties.

6. Polluters should pay – but in a fair way.

Government subsidies for renewable energy and social support are weighted on the electricity side of the bill rather than on gas. That means energy bills today effectively make gas cheaper than electricity, penalising low carbon electric heating systems such as heat pumps at the expense of more polluting fuels like gas for heating. Government should ensure all its policies are lined up behind net zero, such as extending carbon pricing to fossil fuel domestic heating and using the proceeds to take renewable policy levies off the domestic electricity bill. This will help promote low carbon heating alternatives while protecting consumers who remain on gas in the short term, consistent with a fair and just transition.

7. Give consumers confidence in their renovation journey.

Reaching net zero will require households and businesses to make significant changes, both to their lives and to the buildings in which they live and work. With new and often unfamiliar technology being key to this transformation, there is a risk many people will lack the understanding about how to make informed decisions. ‘Building renovation passports’ will give individual homes a roadmap to decarbonisation over the next 10-15 years, specifying what actions the owners will need to take, and when, based on personalised expert information. This will give homeowners confidence in and control of their energy transition journey.

8. Facilitate the industrial decarbonisation strategy for larger businesses – but protect UK industry.

Larger businesses need a carbon pricing framework setting long-range targets to encourage a shift away from fossil fuels, along with a timetable that is both realistic and cost effective – both for the businesses and to allow the necessary fuels and technology, such as hydrogen, to reach scale. Part of that is continuing the free allowances for some carbon emissions at the start of the new UK Emissions Trading Scheme (UK ETS). This means they will be treated in the same way as under the European Union scheme, with certainty and continuity post-Brexit.

However, over time we need to replace this with more sustainable carbon leakage protection for the UK that prompts bigger businesses to make changes. These could include:

a. Ensure a level playing field for UK industry – Carbon Border Taxes ensure imported goods pay an equivalent cost of carbon (this will either be to their own governments at source or to the UK as a border tax).

b. Support UK industry to make the transition to net zero – redeploy existing incentives by increasing financial support for the decarbonisation of UK industry, which should be phased in as free carbon allocations are phased out.

c. Carbon reports and assessments (such as ESOS) must lead to mandated improvements in energy efficiency and reduced carbon emissions.

d. Allow customers to take a greater role in the flexibility markets by addressing regulatory and industry codes that have allowed network operators to monopolise the market in supporting the grid at times of high demand.

9. Put a greater focus on small business.

As with domestic customers, there needs to be clarity on the final delivery model for an energy efficiency scheme incentivising early action from small businesses. This has to include the fact that many, if not the majority, of small businesses operate from rented premises where they either have to seek the permission of the freeholder, or where they have to share investment decisions and consider how the rewards are divided. This could be done by, for example, revamping the way business rates are calculated by charging less to those who have taken measures and more to those who are falling behind. In addition, there needs to be a 'hearts and minds' campaign by energy companies and Government to show small businesses what simple steps they can take to improve their environmental profile.

10. Support our cities by accelerating the roll-out of district heating.

Low carbon heat networks offer the opportunity for large-scale deployment of efficient and/or green technologies in densely populated areas like cities. Such developments need to be factored into plans from the very start, meaning time is critical if we are not to miss out on opportunities to grow capacity. The Government needs to clarify exactly who is responsible for their development and provide more details about which parts of the country should be prioritised. Local zoning plans for our largest conurbations will outline which areas are most appropriate for district heating or for other forms of cleaner energy. Consultations with householders and businesses are needed to explain the concept and the benefits, as well as any restrictions: although heat networks reduce carbon and can cut bills, the large-scale investment does mean customers need to sign up to the new network for the long term, reducing their opportunities to switch suppliers.

E.ON leading the energy transition

We have a rich history of being in the vanguard of change within the energy sector. Here are just some of the ways in which E.ON has taken tangible action to drive forward our collective transition to a more sustainable, low carbon future

UK

5.6m
UK customers

8,000
UK employees

4m+
Smart meters installed to date

1,200
Business EV charge points installed by 2022

159
ULEV vehicles
Full electrification of E.ON UK fleet by 2030

£3.5bn
Invested in UK renewables since 2009

340
UK apprentices

E.ON Group across Europe

€12bn
Invested in renewables to date

Low carbon tech installed in Europe to date includes:

10m+
Smart meters

90k
Number of solar and heating devices installed in 2020 (246+ per day)

36k+
EV charging points

CO_2
E.ON will be carbon neutral by 2040

€60m
Budget of Smart Quart, an E.ON project that explores how individual European neighbourhoods can achieve a climate-neutral energy supply

Commissioned Europe's largest rooftop solar array at an Audi facility in Györ, Hungary

26m
E.ON Future Energy Home and e-mobility installations in 2020 led to customer annual CO_2 savings of more than 340,000 metric tonnes.
This is equivalent to a forest of around 26 million trees

25
Together with innogy, we offer e-mobility solutions in 25 countries

1.31m km
The total length of E.ON's networks

40.7m
Customers across Europe

22,110
Metric tons of carbon being avoided each year through two organic Rankine cycle power plants in Germany

100%
Our flagship cities project is to supply an entire district in Malmö – 300,000 people and hundreds of businesses – with 100% renewable energy by 2030

55-60%
The average carbon savings delivered by our decentralised energy generation projects (CHP, solar) relative to customer's previous energy use

€2.25bn
In 2020 E.ON issued three Green Bonds totalling €2.25bn.
A Green Bond is a fixed interest security where proceeds are used to fund low carbon infrastructure and energy efficiency projects

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