

POLITEIA



Going Green?

What Should UK Policy Be?

John Redwood

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A Forum for Social and Economic Thinking

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I

The Green Revolution

What is the reality?

The hectic pace of change - the green and digital revolutions define our era

Our world is being transformed by two great revolutions. The digital revolution is popular, private sector driven and thrives on the ready take up of its products and services by billions of people. The green revolution is driven by governments, is placed upon people through taxes and regulations, and encounters resistance to some of its products and services from people who accept the science but do not want to buy the products to help with the journey.

There are queues for new iPhones, strong demand for better computer pads, enthusiasm for Netflix and Amazon subscriptions and for keeping in touch by social media. Covid 19 restrictions have just accelerated the digital revolution, adding millions more to the numbers of users who now understand and deploy the technology, adding hundreds of millions of new devices, and enrolling many more people in download services. Many have had to buy new smartphones to access all that is available, acquire laptops for home working and for online education for their children. Many have added a range of devices to strengthen their home entertainment and home working capability. Online shopping has made further large advances at the expense of traditional retail, and social media has boomed as people keep in touch through Facebook, Twitter, WhatsApp and the rest.

The best of the green revolution is rooted in common sense. Most of us wish to be kind to nature and to enjoy a clean air, fresh water and good countryside. There is a market for better insulation, a wish to cut the food miles and a passion for the beauty of nature. In contrast there is a reluctance to commit to the iconic products of the governmental revolution. Sales of all electric vehicles remain small despite rapid growth rates on a tiny base. There is general disinterest in heat pumps and a wish to cling to the old gas boiler which works fine. All electric home heating is difficult to find and perceived to be expensive. In the UK there is considerable resistance to smart meters, offered free to users paid for by the taxpayer. The Green revolution

is to proceed by bans, legal requirements, taxes and subsidies as governments wrestle with the lack of appeal so far of the main items of change.

The green revolution is driven by governments determined to end the use of fossil fuels, and to reach net zero carbon dioxide emissions for their economies as a whole. What was an EU led policy initiative is now strongly promoted by the USA and the newly independent UK as well. The world's second largest economy and biggest carbon dioxide emitter, China, also supports the idea of getting to net zero, though she reserves the right to increase her carbon dioxide outputs for a bit longer before turning her attention to cuts. China is keen to have a strong position in the supply of green products and investment goods, knowing the west's governments will be working to make their people buyers. The magnitude of the task is set out in the comprehensive 6th UK carbon budget showing just how much carbon dioxide has to be removed from the economy. (Figure 1)

Figure 1

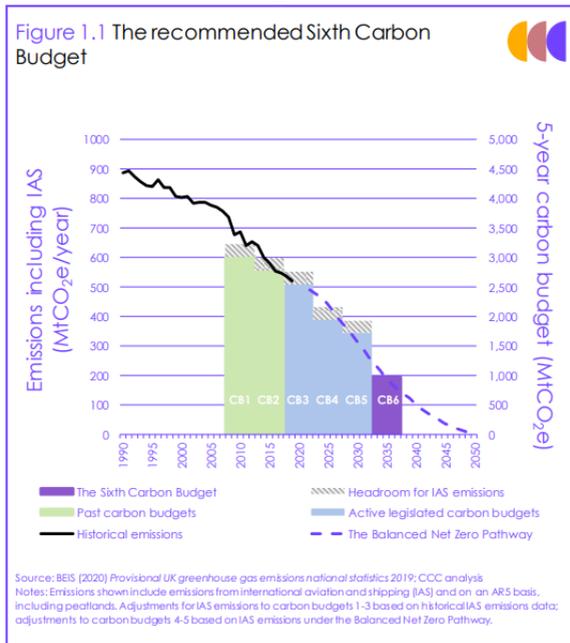


Table sourced from The Sixth Carbon Budget: The UK's path to Net Zero, Page 14.

The theory behind this passion is the simple science that carbon dioxide is a greenhouse gas. If mankind continues to increase the amount of carbon

dioxide we create through burning fossil fuels, the world will warm up, assuming all else stays the same. Few doubt the science of greenhouse gases, which is as settled as scientific theory can be. Some do question whether it is possible to extrapolate easily from the increase in manmade carbon dioxide to conclude that warming always follows, given how many other variables affect weather and climate. What is happening to carbon sinks including the oceans? What is the likely future pattern of natural carbon dioxide generation from volcanic and other action? Some argue that different patterns of solar output could have a cooling effect. Others argue water vapour is a crucial force in weather. They think it is difficult to predict how much water vapour and cloud there might be in the future, or what patterns of cloud cover might do to weather. Could a shift in ocean currents and wind patterns lead to more cloud covered days? Persuasive climate models need to include many weather variables from winds to currents, from water vapour to CO₂, from solar activity to volcanic action, that makes getting an accurate long term forecast complex. There will continue to be changes made to climate forecasts. Meanwhile governments will spend large sums on employing and commissioning the scientists who use this theory and wish to develop it.

All main governments and many large companies believe the idea that the world will warm over the years ahead and that manmade carbon dioxide will be the main driver. All major governments intend to follow policies geared to cutting manmade carbon dioxide. (Table 1) Let us accept that they will for the foreseeable future make cutting CO₂ a central policy requirement. It is my purpose to look at the economic and social consequences of the green revolution they are unleashing, and to ask if there are better ways of going in the direction they wish than the ones so far identified. All the time governments are seeking a big change in the present living styles and consumption patterns of many people it will be an uphill struggle to do what they wish. They will resort to more and more laws, regulations, controls, taxes and subsidies to try to force the behaviours that left unrestrained people would not carry out. The new urgency all governments are communicating means a wish to see big economic and structural changes soon. Governments wish to phase out the entire oil and gas industry, transform the vehicle and transport industries, alter the way we heat our homes and workplaces and reform our farming and diets. They will

find it easier if they work with the private sector to produce a range of products and services that are both green and popular, because they offer us something better or cheaper. People swapped the horse for the horseless carriage because it was faster and easier to look after and handle. They swapped the coal boiler for the gas one because it was less work and better value.

Table 1 - Comparison of the UK decarbonisation actions with global average pathways

	UK – Balanced Net Zero Pathway	Global average - 1.5°C pathways	Global average - 2°C pathways
Coal % of electricity generation – 2030	0% (by 2024)	8%	13%
Low-carbon % of generation – 2030	87%	72%	67%
Electric Vehicles % of car fleet – 2030	43%	20 – 40%	13%
Electric Vehicles % of car sales – 2030	97%	52%	40%
Average heat pump installation rate – 2030 (heat pumps/thousand people/yr)	15.3	8.8	7.7
Low-carbon hydrogen production – 2030 (kg / person /yr)	10.7	-	0.9
CCS per capita – 2030 (tCO ₂ /person/yr)	0.32	0.25	0.1
Engineered removals – 2030 (tCO ₂ /person/yr)	0.07	0.04	0.01

Source: CCC analysis; 1 Huppmann, D. et al. (2018) A new scenario resource for integrated 1.5°C research. Nature Climate Change, 8 (12), 1027; 2 Climate Action Tracker Initiative (2020) Paris Agreement Compatible Sectoral Benchmarks; 3 IEA (2020) World Energy Outlook 2020. Notes: The UK Government has now committed to a full phase-out of petrol and diesel cars by 2030. Electric car fleet figures here include plug-in hybrids. For Europe as a whole, analysis from Climate Action Tracker suggests a benchmark for EV fleets reaching 40-55%. Median figures are used for the IPCCSR1.5 pathways, with a wide range around these medians across the scenario ensemble. CCS is often used extensively within IPCC-SR1.5 pathways, to greater extents than in other global pathways (e.g. those from the IEA). Global 1.5°C pathways have ~50% probability of limiting global warming to 1.5°C and ‘well below 2°C’ pathways have at least 66% probability of limiting to 2°C. Table sourced from the The Sixth Carbon Budget: The UK’s path to Net Zero, Page 19.

II

Structural Changes and its consequences

The scale of the write offs and job losses

Structural change is not a new phenomenon. The twentieth century saw huge transformations powered by technology and by individual preferences. Out went horse and cart technology and in came the motor vehicles. Out went gas lights and solid fuel heating and in came electric lights and gas central heating. Whole new industries from car manufacture to oil and gas production and supply emerged. The Green revolution we are looking at today, to be shoehorned into the next couple of decades, is on an even larger and faster scale. (Figure 2)

Oil and gas companies have started writing off their hydrocarbon reserves in the dearer and longer-term deposits they have accumulated. They now reckon these reserves will not be produced. They also are writing down valuations based on assumptions of lower forward prices as demand drops off. Some of the major corporations are attentive to green trends. They are selling oil and gas production assets and investing in alternative energy sources to try to adapt to the changing moods and times. There will be severe consequences for the oil service industry, with the decline in demand for drilling rigs, production platforms and pipelines. Joe Biden made cancelling a new major pipeline from Canada to the USA one of his first Executive actions. There could easily be write offs of many hundreds of billions of dollars. In the first three quarters of 2020 there were accumulated write offs of \$145 bn from major American and European oil companies, a mixture of long term worries about the value of their reserves and short term down trends in price brought on by Covid 19. Car companies will have to write off most of their massive investment in diesel and petrol cars in advanced countries by 2030, when many phase out entirely purchases of new fossil fuel vehicles. Many of the factories will simply close, as the machine tools and equipment for an electric vehicle factory are very different to a diesel car plant. So far electric vehicles are shifting purchasing from traditional manufacturers to new companies like Tesla and the leading Chinese vehicle groups. Well known diesel and petrol car brands are now mounting a fight back by launching new model ranges powered by batteries. In the UK alone

there is capacity to produce 1.8m fossil fuel cars a year. Worldwide the global industry sold 93 m new cars in 2019, mainly internal combustion engine products. There is little capacity so far to produce electric vehicles. The UK has very little car battery capacity, and the battery is more than 30 per cent of the value of an EV. The write offs for just UK motor manufacturers could be many billions as petrol and diesel plants or production lines close.

The aim is to get people to replace their petrol and diesel cars with electric ones. The UK stock is currently around 32 million vehicles, with a suggested value of many billions. That too will need writing off, though much of it will happen through running the cars for longer after the ban on new diesels, with elongated depreciation over the lengthened life for the single user. Worldwide an estimated 1.4bn vehicles will gradually be switched to electric or green hydrogen, a massive undertaking. As the table reveals, transport emissions have been rising over the last thirty years so there needs to be a very large change in buying habits.

Figure 2

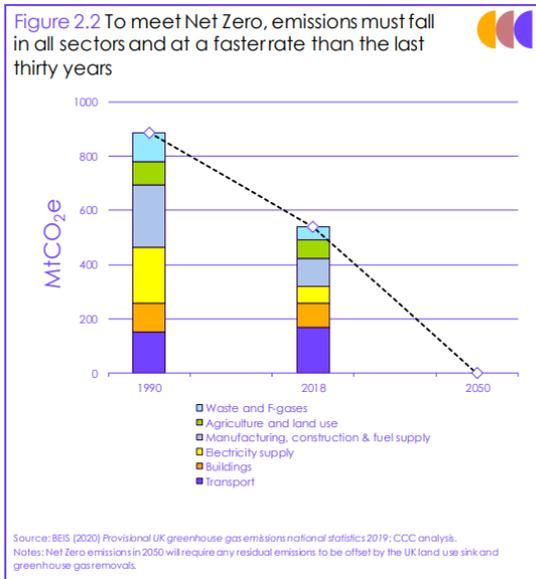


Table sourced from The Sixth Carbon Budget: The UK’s path to Net Zero, Page 62.

The power of the market does allow such big changes to occur. The switch from horse and carriage to motor car was swift. It was driven by the obvious superiority of the replacement and occurred despite the need to quickly produce a chain of filling stations to make using a car feasible.

The switch to electric could also take place quickly if consumers thought the electric vehicles were cheaper, better, easier to use. The problem at the moment is not enough people want to buy one, so there are delays in putting in the chain of charging points and accelerating the charging systems which in turn would be a precondition for making the electric car more appealing to more buyers.

The aim is also to get households to switch from gas and solid fuel heating systems to electric heating and heat pumps. If we assume 25 million households in the UK need to write off and replace their current boilers at a value of say £300 each that is a loss of £7.5bn This of course can take place over time as boilers fall due for replacement, reducing the financial pain. So far there is no aggressive sales campaign by heating engineers to put in all electric heating for people, or to substitute a heat pump for a gas boiler. Progress is more likely in the new equipment market supplied by housebuilders, who will be subject to more stringent regulatory requirements than householders with existing homes and systems.

It is difficult to know if there will be accelerated write offs and redundancies of planes, trucks, trains and all the other transport systems that use oil-based fuels today. The idea of converting these to hydrogen or biomass derived products is not as far advanced as battery cars. Fleet operators of heavy trucks and ships will change as the regulations require them to. Marine diesels are currently needing to meet higher specifications but are not banned. There will also need to be accelerated changes to space heating for offices and factories, and some changes in power sources for industrial processes.

The scale of the job losses

We hear a great deal about the new green jobs that electric vehicles, batteries, renewable power and the rest will bring, and they will be welcome and needed. We hear less about the big job losses that will be witnessed in oil,

gas and coal, in traditional heating systems engineering, in diesel and petrol vehicle manufacture, and in capital goods businesses serving the fossil fuel markets. There will be many jobs at risk in all the services required to find, produce and refine fossil fuels, and in the makers of internal combustion engines and associated vehicles using fossil fuels. These have been big growth industries of the last hundred years. As the UK Carbon budget reveals, electrification accounts for a substantial portion of the planned reduction in carbon dioxide, as hydrogen technology is in an earlier stage of development and commercialisation and requires more renewable electricity to produce the green hydrogen anyway. (For types abatement see Figure 3, for energy demand by sector in the balanced net-zero pathway see Figure 4, and for types of land use see Figure 5.)

Figure 3

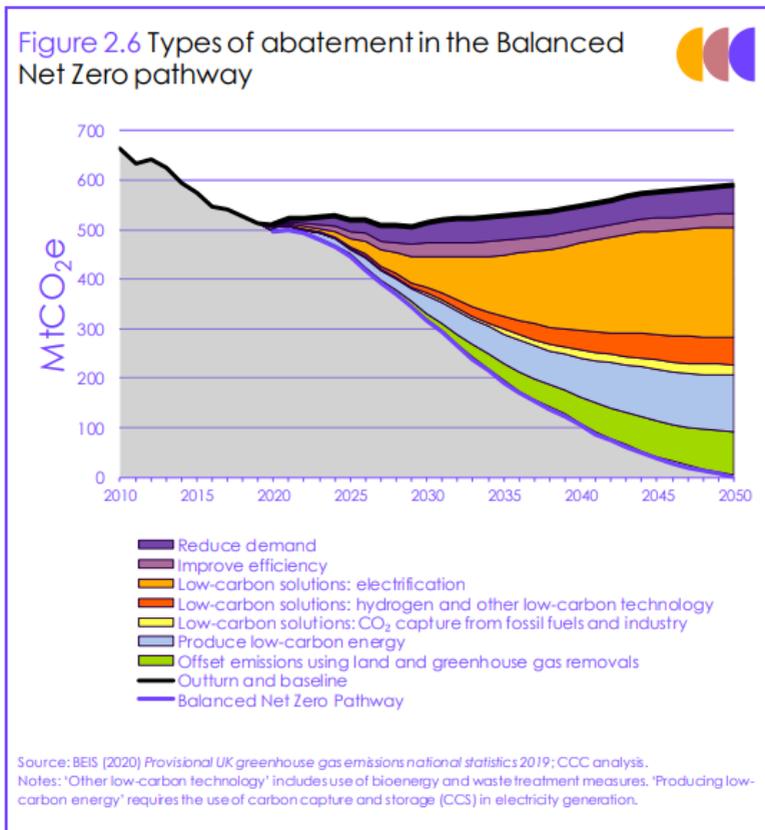


Table sourced from The Sixth Carbon Budget: The UK's path to Net Zero, Page 69.

III

The Options and Their Implications

The search for green products

The green revolutionaries need to do more research into what consumers want, to try to find the iconic products that can lift and power this revolution. Despite massive hype and plenty of subsidies and encouragements, electric vehicles are a slow sell in most countries. Only where there is a large taxpayer subsidy do electric vehicles attract more customers. Progress in ripping out oil and gas boilers is also very slow, and in the UK even getting people to adopt smart meters which are offered free is proving difficult as many consumers distrust the motives of the big power companies and the government on this matter. Many people think smart meters will be used against them, to ration or cut off supply if renewables cause shortages, or to allow flexible tariffs to be used against consumers in due course.

So far there is no VW Beetle or Mini as the iconic electric car to sweep car buyers off their feet. Tesla has got nearest to it with its cars, but they are at the luxury end of the market so they do not qualify as the people's car of the electric revolution on price. BMW is now projecting an electric Mini as its best hope. This is a 20 year old revamp of a 60 year old car, originally designed for a transverse petrol engine which was a revolutionary concept in its day. VW is adapting the Golf, another success story from the last century. There is no reason why an electric car has to look like a petrol one, as it does not need a bonnet and front end to house a large engine. Where are the designers to produce very new look vehicle?

Electric cars have not yet taken off for several reasons. They remain dear. Many canny consumers knowing how much governments want us to buy them will play hard to get until the tax and subsidy packages are more convincing. Consumers are also concerned that once there are more electric cars on the road governments will then introduce an electricity tax on cars to make up for lost revenue on petrol and diesel. They do not like that unknown. The two biggest problems after price for selling electric cars are range and charge time. People have got used to a 400 mile plus range on a typical internal combustion engine vehicle. It means you can get there and back on

a single tank for most of your journey needs and can get through a week's commuting without range anxiety. Electric cars often have disappointing advertised ranges. These ranges can contract rapidly on a journey if you suddenly need to use the windscreen wipers, heater and lights. That adds to range anxiety when you are stuck in an unexpected traffic jams with many electric systems having to run and the battery fading. The worry is increased by the time it takes to recharge. A petrol or diesel car not only has a range of 400 miles plus but it can be refuelled anywhere in the UK in five minutes from one of 20,000 filling stations. You can refuel your car on a visit to the local superstore or shops at no extra cost in fuel or time other than the refuelling time.

As a result of the government enthusiasm for electric cars, there has been a savage downturn in demand for new diesels and petrols as people worry about longer term values, but no great offset in purchases of pure electric vehicles. People might well have switched more to hybrids as a sensible compromise, but the government then killed a lot of that off by treating hybrids more like petrol or diesel cars than electric vehicles.

Nor so far are there must haves in heat pumps and electric heating systems. New heating systems are usually a last-minute distress purchase when the old system has failed and the heating engineer recommends a replacement. There is a better market for original equipment in new homes, and for new systems in major home facelifts or restorations. Governments need to find a way to make or persuade the millions of homeowners with systems that work fine to take them out and go green. So far we await the exciting products. They would need to demonstrate they were cheaper to run, offered better heat and hot water, were more reliable or took up less space to warrant people making the commitment. There could be a style element, and new flexibility over where the installation went in smaller homes short of space. Good financing packages will also be important as most people do not have the capital sum for replacement.

Figure 4

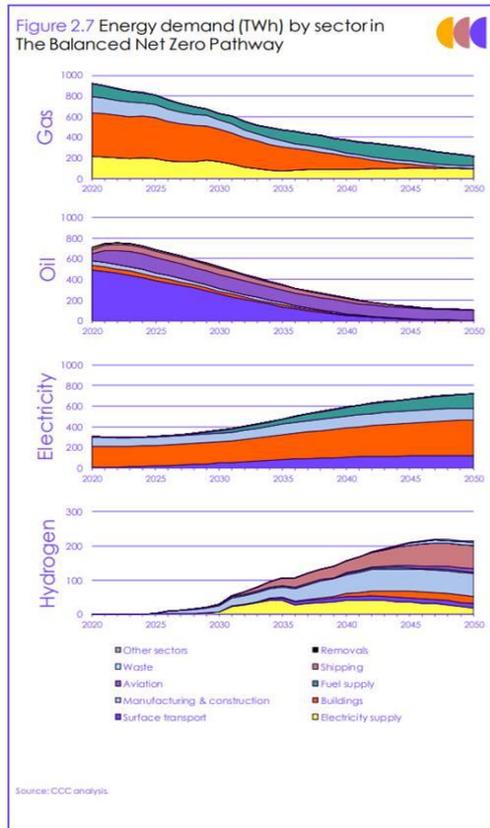


Table sourced from The Sixth Carbon Budget: The UK’s path to Net Zero, Page 73

The supply of alternative power – the implications

At the same time as governments want a major switch from coal, oil and gas to electricity as the main fuel for most purposes, they also wish to discontinue many of the ways of generating power. They have ordered the closure of coal power stations in most of the advanced world, and Germany has decided on the closure of nuclear stations at the same time. The UK government favours nuclear but faces the retirement of most of the fleet of nuclear power stations soon and has been unable to agree replacements for most of the output. The table illustrates a UK pathway with major reductions in oil and gas balanced by a rise in electricity and hydrogen. These latter two between them will have to more than maybe treble by 2050 to keep the lights on and the homes heated.

The EU and UK is becoming more dependent on interruptible solar and wind energy. This requires substantial back up power from sources that do not depend on the vagaries of the weather. The UK if it is serious about its electric revolution needs to be planning to more than double current electricity capacity to take care of massive growth in demand for car recharging and for space heating. Most policy attention revolves around getting the existing power production system down to net zero carbon. There are no announced plans to make a major increase in electricity output, nor to beef up cables so the supply of power to homes can cope with every car and fleet owner moving over to electric vehicles. The choice of the UK and EU to go for dearer renewable power with backup will reduce the competitiveness of EU and UK industry further, pushing the economies into importing more fuel intensive products from places with cheaper energy policies.

Figure 5

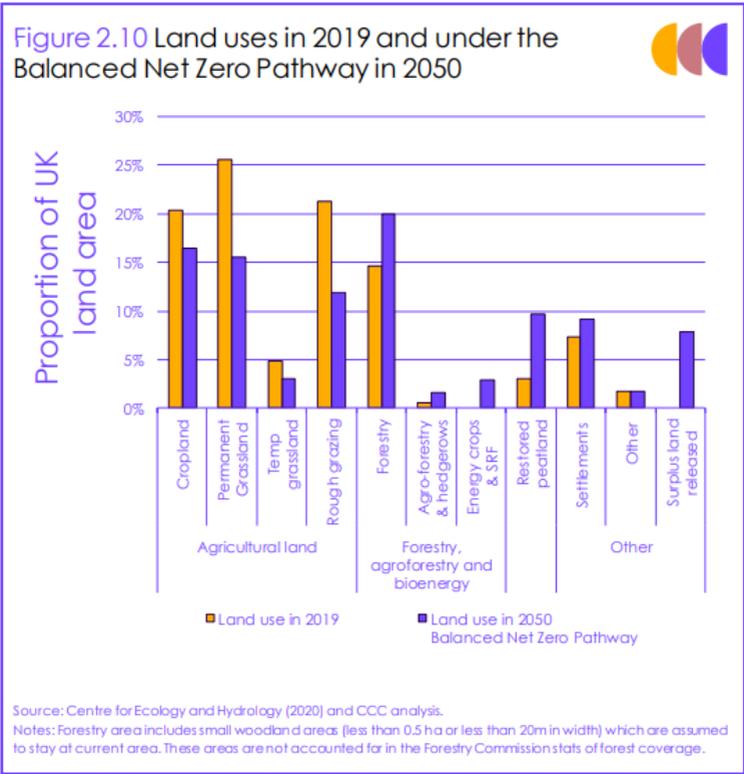


Table sourced from The Sixth Carbon Budget: The UK’s path to Net Zero, Page 76.

Counter-productive greenery

The government needs to undertake an audit of the net effects on carbon dioxide output of its various green initiatives. The big shift to electric vehicles will entail considerable CO₂ generation in the making of the vehicles. Some studies suggest it will generate more carbon for those vehicles if they then run relatively low mileages. There are substantial environmental issues with battery production and battery disposal. Some heating systems that rest on heat pumps do not generate sufficient warmth or hot water and require backup systems which need to be added into the sums over carbon accounts.

The aim is also to revolutionise agriculture. Land uses will change substantially according to the UK Plan, with a big increase in forests and restored peatland, and a large reduction in grassland for animal husbandry and fields for crops. The countryside will look very different with fewer traditional farms. The aim is to change diets, persuading people to eat less meat and dairy products as these are seen to be carbon intensive. This too will require substantial write offs, new investments and a changed approach to agriculture. The government is well placed to help bring this about given the substantial subsidy regime and tax breaks it has at its disposal. There is a hunger to eat more UK grown and reared food which needs an industry and government response.

IV

Next Steps

Recommendations for government

- (i) Order an overhaul of electricity regulation and pricing to ensure faster growth in total capacity. Add pump storage and more hydro to the mix to have more reliable renewable power. Solve the problem of nuclear replacement with firm contracts or alternatives;
- (ii) Offer more biomass UK power stations as baseload, using wood from sustainable timber grown in the UK;
- (iii) Offer launch funding for a new generation of heating systems and vehicles that could capture the public imagination and offer improvements on current products to foster acquisition and use;
- (iv) Run pilot projects on greening buildings and services in the public sector, creating demand for suitable products to convert existing facilities;
- (v) Set out proposals for taxing vehicles across the transition to more electric ones;
- (vi) Convert public housing stock to higher green standards; and
- (vii) Account for the carbon content of imports to avoid penalising UK based industry needing to continue with fossil fuels pending full transition when overseas producers are using more fossil fuel.

Recommendations to private sector

- (i) Listen to what customers want as well as studying government requirements;
- (ii) Design and launch products that people say they want to buy; and
- (iii) Lobby government over feasible targets and timetables for the transition to limit the damage to existing jobs and factories.

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