



Economic Affairs Committee

Corrected oral evidence: The Economics of UK Energy Policy

Wednesday 14 September 2016

3.30 pm

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Members present: Lord Hollick (The Chairman); Baroness Bowles of Berkhamsted; Lord Burns; Lord Darling of Roulanish; Lord Forsyth of Drumlean; Lord Sharkey; Lord Tugendhat; Lord Turnbull; Baroness Wheatcroft

Evidence Session No. 2

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Questions 16 - 26

Witnesses

The Rt Hon Lord Lawson of Blaby, Founding Chairman, Global Warming Policy Foundation, and Lord Turner of Ecchinswell, Chairman of the Governing Body, Institute for New Economic Thinking.



Examination of witnesses

The Rt Hon Lord Lawson of Blaby and Lord Turner of Ecchinswell.

Q16 **The Chairman:** Before we start today, can I welcome four Senators from Jamaica who are joining us? I hope they find it an instructive afternoon. Can I also welcome two highly regarded former members of this Committee, Lord Lawson and Lord Turner? This is the second hearing in our inquiry into the economics of UK energy policy. I should make clear that it is not an inquiry into climate change, so we do not need to spend time on that. I would like to invite both of you to make an opening statement outlining your thoughts on the UK Government's energy policy.

Lord Lawson of Blaby: Thank you, Chairman. I will make a very brief opening statement. First, let me say how pleased I am to be giving evidence for the first time to this excellent Committee, of which I was for many years a member. I do have a relevant interest, which is to be seen on the register if anybody is interested. It is non-commercial and unremunerated.

UK energy policy today has two declared objectives: to ensure a supply of cheap and reliable energy to British industry and households, and to decarbonise the UK energy mix. Unfortunately, these two objectives are in conflict, since the economic consequence of decarbonisation is to ensure that UK energy is expensive and unreliable. Faced with this conflict, it is in practice the second objective that has prevailed. This has happened because, while the first, cheap and reliable energy, is merely an aspiration, the second, decarbonisation, is enshrined in law in the form of Mr Miliband's Climate Change Act. There are also some EU obligations in this area, as the Committee will be well aware.

Another undesirable consequence is that to enforce this prioritisation, which is not what the market, left to its own devices, would produce, the Government have inherited from their predecessors, and maintained, an energy policy aptly described by Mr Malcolm Keay of the Oxford Institute for Energy Studies as "a massive and unprecedented degree of centralisation and detailed decision-making by the Government", or, more succinctly, in the words of Professor Dieter Helm, probably this country's leading energy economist, "the Gosplan approach". Most absurdly of all, by driving UK energy-intensive industry abroad—as we have seen, for example, in the steel industry—the policy damages the British economy without doing anything at all to reduce global carbon dioxide emissions.

In my judgment, we need to reverse the current priorities and make the decarbonisation agenda subordinate to the objective of supplying the British economy and households with cheap and reliable energy.

Lord Turner of Ecchinswell: Chairman, thank you very much for inviting me to talk to this Committee, of which I was once a member. I should start by declaring an interest. I am chair of the Energy Transitions



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Commission, which is focused on how to build a low-carbon economy across the world. I am also an affiliate partner of Systemic, which provides analytical support to that commission and is a consulting and investment company focused on energy transition to a low-carbon economy.

The membership of the ETC—the Energy Transitions Commission—is a matter of public record on the website. It includes fossil fuel companies such as Shell and BHP Billiton, solar energy providers, some environmentally focused NGOs and technology providers such as GE Oil & Gas and Schneider Electric. That membership is sufficiently wide to suggest that the commission attaches no particular attachment to any one route to a decarbonised economy, but I think it is appropriate to put it on the record. I also add that what I say today will in no way represent the collective point of view of that commission, far less the point of view of any one corporate member of it.

The ETC is, however, a group of institutions committed to the Paris objective of keeping global warming to well below 2 degrees, and in my remarks and answers I will assume that that is our objective; and it implies that the UK must achieve the 80% reduction in emissions by 2050 enshrined in the Climate Change Act while doing so in as cost-effective a fashion as possible and with as much benefit as possible to the UK economy.

Those were the statutory objectives of the Committee on Climate Change, which I chaired from 2008 to 2012. That committee then believed, and I believe now even more strongly, that the decarbonisation of electricity supply and the application of electricity to a wider set of economic activities, while certainly not the sole policy required to reach an 80% reduction, is absolutely essential.

In the climate change committee's initial work in 2008, we believed it important to be completely open-minded and neutral on whether the best way to achieve that decarbonisation was via renewables, nuclear, carbon capture and storage or, most probably, via some mix of all three. I still believe that that neutral and mixed approach is appropriate.

Since 2008 there have been two key developments that we did not anticipate in the work of the climate change committee at that time. The first is the dramatic cost reductions achieved in renewables and increasingly in battery technologies. Solar photovoltaic costs have fallen between about 70% to 80%, and we are now seeing power auctions, admittedly in favourable geographies such as Dubai or Chile, where profit-making companies commit to delivering unsubsidised power for as little as 3 US cents per kilowatt hour, or \$30 per megawatt hour. Wind costs have fallen around 40% to 50%, with auction bids for onshore wind as low as 4 cents per kilowatt hour, and recently, just offshore of the Netherlands, only 7 euro cents per kilowatt hour, or €70 per megawatt hour.



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I believe the crucial point is that, even if these incredibly low costs, which are now well below the costs of fossil fuel delivery, are being achieved only in favourable geographies, this global industry will become ever larger, with learning curve effects inevitably driving down costs lower even in less favourable geographies.

All this is good news, and it must suggest that the renewable element of the decarbonisation strategy will prove less expensive and therefore presumably should be somewhat larger than we envisaged in 2008.

Conversely, the other major development since 2008 is that progress on carbon capture and storage has been far slower than we then assumed, with limited large-scale implementations and flat or rising estimates of likely cost. That should make us very wary of assuming that we can continue with large-scale fossil fuel generation and then fix the emission problem by applying CCS at a later date.

CCS is still a vital technology, which should be given public support, because eventually we will need to decarbonise several industrial processes that are close to impossible or very costly to electrify, but, compared with eight years ago, it is less certain across the world that CCS will now play a major role in the power decarbonisation story as against the decarbonisation of industrial processes.

Finally, I make a comment on the policies we have used to encourage renewables generation and drive down the costs. Renewables now account for 25% of UK electricity supply, up from very close to zero—just a few per cent—in 2005, of which 8% is biomass and the rest predominantly wind, solar and hydro. That rapid growth has been driven by subsidies, initially via the ROCs and various categories of small-scale feed-in tariff, and subsequently by contracts for difference. As a result, a significant level of total subsidy has arisen, now capped at a maximum of £7.9 billion by the levy control framework for 2020.

In retrospect, it is clear that the open-ended nature of the ROC regime and the fact that it was simply an add-on revenue to the wholesale price that the generators received was probably not an optimal policy, and the move we have made subsequently to auctioned CFDs, which the climate change committee strongly supported, will give us simply more bang for our subsidy buck, or more gigawatt hours of low-carbon generation for any given level of subsidy. I think it is a better regime, but we must use that regime effectively to ensure that we get maximum benefit from the development of the renewables industry that has already occurred.

For onshore wind and solar, this will increasingly be possible with no subsidy, but we do need to conduct CFD auctions, even if there is no expected subsidy. For offshore wind, as the Government envisage, some further subsidy is still required and appropriate, but at a falling cost per kilowatt hour and appropriately subject to already defined maximum bid price caps.



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The crucial issue here is the quantity of the CFDs made available for auction within those price caps, informed by a clear vision of the scale of deployment that will be needed to meet the climate change committee's target of getting the average carbon intensity of electricity down to 100 grams per kilowatt hour by 2030.

In summary, I think we should recognise that Britain's decarbonisation strategy is in many ways a success and on track, with a renewables sector growing in line with, or indeed a little bit faster than, the original plan; a commitment to a maintained element of nuclear; and a good chance of meeting the 2030 target of 100 grams per kilowatt hour at a reasonable cost, provided we reinforce existing policy approaches.

Q17 The Chairman: Can I thank you both for those remarks? You have raised a lot of topics. I know members will want to dive deeper into some of the issues. Can I talk about the challenge of balancing decarbonisation with security and with cost-effective energy? Lord Lawson, I think you see a reset between some of these objectives. Could you describe that in a little more detail?

Lord Lawson of Blaby: I think energy policy should be dedicated to the first leg of the Government's policy: that is to say, the provision of cheap and reliable energy. Incidentally, I do not accept Lord Turner's assessment of the cheapness of renewables. I wish that were true, but it is not. I do not think it fully takes into account the costs of intermittency, back-up or the very considerable system costs over and above the generating costs. But we can put it to the test and abolish the subsidies; that is the way to test it out.

There is another reason why we should put cheap and reliable energy first. I do not question for a moment that carbon dioxide is a greenhouse gas and that, other things being equal, this will lead to a warming of the atmosphere. It is true that scientists differ greatly on how big the effect is, but there is huge agreement that there is some effect. We account for less than 2% of global carbon emissions. We cannot do anything on our own. It is quite clear that the rest of the world is not going to go down this route, so they are going for cheaper energy and we are still going for expensive energy. As it is, European energy is considerably more expensive than it is in the United States, and we now probably have the most expensive energy in Europe. That is not very clever and is not doing any good.

I know you do not want to discuss climate change, but it is an economic issue. What is the most cost-effective way of dealing with it? My judgment is that the most cost-effective way of dealing with it is through adaptation. I believe that is perfectly doable. Anyhow, let us also do R&D to see if we can find some great breakthrough in this area. Nothing of any substance has happened yet, despite what Lord Turner has said. He is absolutely right when he says that carbon capture and storage is still extremely doubtful on any large scale. So let us not try to go ahead faster than the rest of the world and cripple our own economy as a result



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to no benefit. Even if your objective is to reduce global emissions, you are not.

The Chairman: Lord Turner, how will you reconcile these apparently competing objectives?

Lord Turner of Ecchinswell: We have to decide whether in the discussion this afternoon we are revisiting the Climate Change Act, which I think my noble friend Lord Lawson is essentially doing. Let me say very quickly why I do not think we should. I think climate change is an undoubted fact and it will do severe harm unless mitigated. We cannot stop it occurring on a significant scale now. It will do severe harm to human welfare throughout the world, and I think that, in line with Lord Nicholas Stern's report, it is quite possible for us to build low-carbon economies at a cost. We have to accept that there is a cost—Nick Stern never said it would be zero cost—which is likely to be, by the time we get to 2050, more like an order of magnitude of 1% to 2% of GDP foregone than anything bigger.

Everything we have seen over the 10 years since Lord Stern's report has confirmed that order of magnitude. Indeed, the fall in the cost of renewables, which is an absolute fact, has been tested in free market, competitive auctions by private suppliers. This is nothing to do with estimates or subsidies; it is private profit-making companies choosing to bid in to a Chilean auction to provide wind at 4 cents per kilowatt hour and solar at 3 cents per kilowatt hour.

The Chairman: You think the cost will be lower.

Lord Turner of Ecchinswell: The cost will be lower. That was the background to the Climate Change Act as part of a world commitment to this. You have to decide whether you take the free-rider argument or not, but, broadly speaking, we accepted in the Climate Change Act that there was a possibility of getting everybody else in the world to make that commitment. That led to the Climate Change Act. We can go over it again, but I believe that the Climate Change Act is based on a robust piece of economics. We are quite capable of building a low-carbon economy with emissions by 2050 of just over 2 tonnes per capita, as against the 11 tonnes or so as it was in 1990—an 80% reduction—and I think we can do it at relatively little cost. The charge then given to the climate change committee was to work out the lowest-cost way to get to that reduction.

As I said to begin with, I believe we should stick to it. I do not deny that there will be some cost. The impact of that on the competitiveness of British industry is basically trivial, and we can come back to that later. I see that Lord Forsyth is very worried by that. I would make the prediction that, although Germany is totally committed to driving renewables to 60% or 70% of its electricity mix by 2035, when it does that it will still be a stunningly successful manufacturing centre. I do not think there is anything about the rise of electricity prices as an element of that that will



stop it being so. Issues of competitiveness are important, but they are restricted to a very small part of the total economy. We need to do something about iron and steel. I do not accept the “competitiveness” argument as compelling. I think we can build a successful low-carbon economy at relatively low cost, and it is essential to start by decarbonising electricity and to extend electrification to a wider set of areas. I would not rebalance between those objectives. The objectives are quite rightly set. We have confidence that we can decarbonise at relatively small cost, and then we have to try to minimise that cost.

Q18 Lord Forsyth of Drumlean: I am sorry I reacted, but in my mind when you said it was not affecting competitiveness I was thinking of the second Forth crossing. That was a £1 billion project in which 95% of the steel came from China and some was shipped back to China to be finished. Our steel producers are at a huge competitive disadvantage because of the levies imposed upon them. How can we justify effectively importing carbon from China while putting our own people out of work, because that is the reality, which is Lord Lawson’s point? That is happening on the ground. As to your remarks about Germany, I may be wrong, but I thought it was becoming more reliant on coal at a time when we are closing down our coal-fired power stations.

Lord Turner of Ecchinswell: Germany is temporarily becoming more reliant on coal because it made a completely absurd and unnecessary decision to close down its nuclear power industry. If you look at where it will get to by 2035, I am confident that by then it will have got rid of coal and built a system that is something like 70% or 80% renewable. That is the strategy they are set on. My comment was about that.

To turn to the effect of competitiveness on the economy, I said it was trivial because, although it is important to deal with the problems, it relates to a very small percentage of GDP and an even smaller percentage of employment. If we look at the whole of the service sector of the economy—financial services, tourism, insurance or any service like that—I have never heard anybody suggest that an increase in the price of energy in general or electricity in particular is going to harm the competitiveness of any service industry, because as a percentage of the total input costs of production it is sufficiently small that movements in the price of that are relatively trivial, and the service sector is the majority of the economy.

If you move from that to industry, a large slice of it might be called general electro-mechanical: engineering-based, making cars, factories that deal with food processing and so on. They are heavy users of electricity, but you still find that the total importance of electricity in their cost base is not large enough to make a difference to the location of manufacturing industry. There is no argument across the world that the location of manufacturing industry is being driven by energy costs rather than relative wage costs, trade access, the structure of existing supply chains and so on.



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The issue comes down to very specific subsets of the economy where the input of energy cost is a large enough percentage of the total cost of production to make a difference. We know what those sectors are: the chemicals industry; pulp and paper; cement; and iron and steel. That is the absolute core of the issue. Within that, cement is such a heavy material that it is not really internationally traded. You cannot import cement from China, so big differences in the energy input cost of cement do not produce a relocation of industry across the world.

The most important of those industries and the one most likely to shift is iron and steel. It is important to realise that, at least on the basis of most iron and steel production in the UK at the moment, the predominant issue is not electricity cost but other costs. When you run a blast furnace, the total cost of electricity is only about 5% of the cost of production. However, the cost of the coal used for direct heat and as part of the essential chemical processes can be 22%. It is a bit different with electric arc furnaces. That is important, because in the future it would be good to decarbonise iron and steel production through electric arc furnaces maximising the use of recycled steel, but we do have a series of mechanisms at the moment already in place. For the iron and steel industry at the moment in the UK, the crucial issue is not the price of electricity but the price of other inputs that are affected by carbon levies and taxes. However, we do have a set of special measures in place to make sure they are largely exempted from the impact of those carbon taxes.

The estimates I have seen suggest that the total impact of all the measures we have taken to drive a low-carbon economy has probably increased the net cost of energy to the iron and steel industry by somewhat less than 1%. This could get higher in future, in particular if we move away from blast furnaces to electric arc furnaces with a greater degree of recycling. That is why it is important to get some degree of international agreement or co-operation about how to deal with these very specific areas of the economy where there can be competitive reallocation effects and where, as you rightly stress, we have no particular interest in things leaving south Wales and re-emerging in China and emitting the carbon there.

We may eventually have to consider tools such as what are called border tax adjustments to allow for the carbon intensity of imports at the border. That has been a taboo subject in the WTO in the past, but I think it should be allowed. I go back to my point that, if you work out which sectors of the UK economy are affected by this and by how much, this is a very small effect overall. It is an absolutely minute percentage of GDP and total employment, albeit an important issue in locations where those particular industries are concentrated.

Lord Lawson of Blaby: May I make two or three very quick comments on what Lord Turner has said? Incidentally, on his last point I would be very reluctant to give the green light, as indeed the WTO is at the



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present time, to protectionist measures introduced on the excuse that these countries are cheating by using carbon-based energy. It is right that we should talk not just about Germany but about China, which is the biggest emitter, with the United States second and India third. Both China and India have made it absolutely clear that they have not the slightest intention in reality of being obliged to decarbonise, quite rightly, because they both have a lot of poor people in their countries. They want to give them the cheapest available source of energy, and that is now and will be for the foreseeable future, no doubt not for ever, carbon-based, fossil fuel-based energy. Since they are not going to decarbonise, it is doubtful what good our decarbonisation is doing.

As for the harm, it is considerable. I mentioned in my opening statement not merely industry but households. It is all very well for Lord Turner to pooh-pooh the cost of fuel and the cost of electricity to the economy, but for poor households it is a very serious matter. Indeed, fuel poverty is being increasingly talked about. I do not think it is an acceptable policy to tell the poor that they should have more expensive energy.

The Chairman: Lord Turner, you will have an opportunity to come back on that.

Q19 **Lord Tugendhat:** Thank you for the views you have given us, but what do you believe the current Government should do to achieve their stated objectives in the energy market?

Lord Turner of Ecchinswell: We need a variety of interventions by the Government. I think they are legitimate. We face a situation where an entirely free market approach without any subsidies and taxes will not produce a move to a low-carbon economy, which I think is possible at a low cost. One of the most important things is certainty of framework. Certainty and continuity of policy is very important. There is a role for a subsidy of initial technologies in their early stages of deployment, and across the world these have been stunningly successful. Broadly speaking, Germany has given a gift to the rest of the world by the sheer scale of the subsidies it put into the early development of solar photovoltaics, which were much larger than we put in. It helped to pump-prime and get going a revolution in solar PV, which is now going so fast that I think it is pretty likely that by mid-century by far the cheapest source of energy across the world will be solar. I think there is a role for that.

The climate change committee argued, I think quite correctly, back in 2008 that if solar PV was going to develop rapidly it would be unlikely to develop first in Britain, so broadly speaking we have been a free rider on other people's subsidies for the solar industry in terms of technological development. I think that is a sensible thing to have done, but we are a natural place for wind power, in particular offshore wind. Wind power, both onshore and offshore, is now coming down in price rapidly as a result of the initial pump-priming subsidies. As I suggested, we probably could have got more bang for the buck earlier, particularly by a slightly



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different design of those subsidies, but there is a role for Governments to identify broad categories of technology that are likely to develop and give them subsidies up front, which then ought to taper down over time as they are presently doing.

There is also a role for research and development. It is difficult to be specific about what the UK particularly should do, because a lot of developments in R&D are inherently global. Until recently, I would probably have said that one of the most important things to put public R&D into is batteries, but I have now become so convinced that the sheer scale of private money going into them as a result of Tesla and the development of electric vehicles is probably such that we have enough weight of private money going into that across the world. But we do need to keep thinking about which particular technologies the private sector is perhaps not putting enough focus on.

Carbon capture and storage is important. It has not come down in price in the way we need it to. We still need it as one of the available technologies, and that is probably an area where there is a role for global public money and our contribution to that.

Finally, it is important in the whole area of what Governments can do not to ignore the demand side. A lot of the costs of an electricity system are driven by the peak capacity requirement—the fact that we all switch on the lights or heating at the same time—but a huge amount of electricity demand does not need to occur at peak capacity. We do not all need to put on a washing machine or dishwasher at a particular time. Hot water heating and space heating can be moved to other parts of the day pretty much limitlessly, provided you have adequate insulation. At the moment we are probably looking, in an era that people call the internet of things—it is a buzzword but there is a reality behind it—at a huge set of opportunities to reduce the cost of the total electricity system by developing more smart demand management systems. There are areas of focus for public policy that are required to encourage feasible developments in that area.

Lord Lawson of Blaby: A lot of wishful thinking goes on. The cost of offshore wind, for example, is absolutely massive and totally uneconomic when you take full account of not just the wind turbines but intermittency and back-up. One of the troubles with a back-up for when the wind is not blowing, which would almost certainly be gas-fired electricity generation, is that that is uneconomic too because you have to turn it on and off again all the time.

As for batteries, good luck to the investors who are putting money into Tesla. So far it is a complete disaster story, with one disaster following another. One thing Lord Turner said is correct, which is that, as far as R&D is concerned, it is what is happening globally that matters. It may be sensible for us to do a bit, but if there is a breakthrough in research and development anywhere in the world—it is most likely to happen in the United States—it will be available everywhere, just as, for example, the



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technological revolution of fracking, which we may come to. That happened in the United States, but it is available to us and anybody in the world to do.

I was particularly concerned when he said he did not think a market approach was the right one in the energy sector. We do not have a market approach now. We have what Dieter Helm referred to as a Gosplan approach, and it is disastrous. There is so much arbitrary intervention. Nobody knows where they are. Arbitrary intervention by government can lead to quasi-corruption, but economically it is totally inefficient.

When I was Energy Secretary some 35 years ago I introduced a market-based energy policy, and it worked extremely well. Of course, in those days nobody was concerned about carbon emissions, so it was only the first objective, namely the provision of cheap and reliable energy, which was at issue. The market approach clearly proved itself as being highly effective. Incidentally, referring again to Dieter Helm, if you read his book about British energy policy since the war you will see he concedes that. It was hugely successful, and it is only the decarbonisation agenda that has muddied the waters.

The fact of the matter is that as a result of this hugely capricious interventionist policy—which, incidentally, makes old-style nationalisation seem respectable, logical and coherent by comparison—there is a serious risk, as everybody is well aware, of our not having the generating capacity that we need in this country, or else, as with Hinkley Point, having to pay an extortionate amount to achieve it.

Lord Turner of Ecchinswell: Lord Lawson has twice mentioned intermittency and the hidden costs. You have to be careful when you look at the use of auctions around the world. Some include grid connection costs and some do not. If you take the case of the Netherlands that I cited, the 7 euro cents per kilowatt hour, or 6p per kilowatt hour, is based on grid connection already paid. So you probably have to add an element for grid connection. When we do CFD auctions in the UK, the grid connection costs are paid by the provider who is bidding into that, but that increases it only a bit.

A separate element is the back-up costs for intermittency. This is incredibly important to analyse. The way you do that is to look very carefully at how the intermittencies develop through the year; what typical variation there is by day; if, for example, you have an element of solar in the system; how variable the wind is; and what variations there are over minutes and days, and with seasonal flows. When you work out how you will deal with it, you find that, although there is a cost, it is not an enormous one. The calculation by the climate change committee, which I think is robust, is that if we were running with variable renewables—that leaves aside biomass, which is equally dispatchable as gas or coal—as 50% to 55% of the mix, the cost of the back-up required



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by one technology or another might be of the order of 1.5p per kilowatt hour, but you do need to add that in.

The analysis I have seen recently suggests that by 2035, even with a system that is about 90% variable renewable, as long as it has developed with an optimal mix of solar and wind that makes sense for the local geography—Norway is different from California—the cost of the back-up, which is the intermittency cost, would be as low as 2 US cents per kilowatt hour. Yes, you do need to take this into account, but you must not say, “These are enormous and we do not know them”. They are susceptible to detailed analysis.

That analysis depends on two things to establish the maximum cost. The maximum cost is basically determined by two technologies that we know are available. One is batteries for shorter-term developments where what matters is the dollars or pounds per kilowatt hours stored and the number of cycles the battery can do. When you run that through, you find that by 2035, and even much earlier, batteries will become an increasingly cost-effective way to deal with very short-term and daily intermittency.

At the moment, in a country like the UK, though less so than in a place like California—it has a summer electrical peak, whereas we have a winter energy peak—we also need a way of shifting energy seasonally. There, you probably have to rely on CCGTs as back-up. You need gas as back-up. Eventually, you should try to decarbonise that either by adding CCS or by turning it to biogas, but you do need that. That means that at the moment what we describe as an entirely renewable system would probably be, in generation terms, still a 5% to 10% gas system. There is nothing wrong with that. It would still be a radically less carbon-intensive system than at the moment. It is wrong to say that the cost of that underutilised gas occurs twice—that it is the cost of intermittency and the underutilised gas. They are the same thing. The cost of dealing with intermittency is the cost of the underutilised gas turbine and is in the calculations that the climate change committee has put forward and which I quoted earlier.

Q20 Lord Darling of Roulanish: I want to ask you both about the market mechanism, but before I do so may I refer the Committee to my entry in the register of members’ interests? I am a director of Morgan Stanley.

Can I ask you a question separately? I am sure that in your replies you will have ample time to have a go at each other along the way. I want to start with you, Lord Turner. Do you think that the market, in the sense in which people understand a market for buying cars or soap, can possibly apply in this area? We have a complete dog’s breakfast in subsidy arrangements for renewables. By the way, I am on the side of increasing our renewable capacity. Nobody can possibly argue that nuclear is economic. Although many of us might think it is a good thing to have, frankly you can get it only if the state—therefore taxpayers or consumers—pays for it. There are now real concerns about security of



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supply, which perhaps were not around 35 years ago.

Do you think that the market as we have it at the moment is the right one, or do you think it needs change to recognise the reality that government can decide on sources of electricity? It needs to ensure there is enough of the stuff and whatever else it might want to do, but, whatever else that is, it is not a normal market.

Lord Turner of Ecchinswell: I am not convinced that it has to change radically from the situation to which we have evolved. Lord Lawson referred to the market that he played a role in putting in place back in the 1980s. That was a market essentially in the delivery, half-hour by half-hour, of generated electricity. That market worked very well to achieve one of its major objectives: to move away from coal to gas in a way that would have been more difficult politically to engineer if one had just told the CEGB to do it. There was an element of designing a system to produce an objective, but it was a market that worked well in a system where the majority of costs were variable, but it is the fundamental nature of most of the low-carbon economies, whether it be nuclear, hydro, offshore wind or solar, that they have enormous up-front capital costs and close to zero or very low marginal costs. It is quite easy to show that. If you try to run a system where post facto you remunerate people only for energy delivered and it is also a system in which all the technologies have 100% up-front capital costs and zero marginal costs, the system would never work. The wholesale price would continually collapse to zero, and nobody would ever build anything because they would know it was not a sensible thing to do.

Once you are dealing with a system of up-front capital costs and very low marginal costs, you have to evolve your market structure in some way or another. That is why most of the world has moved, as we have realised the capacity of these renewable technologies, to a system where essentially we say to a producer, "What will you bid me for producing electricity at a given price for the next 15, 20 or 35 years, and I stand ready to guarantee that price?" There are two ways to do that. You can call it a feed-in tariff or a contract for difference versus a fluctuating wholesale price, but either way essentially, seen from the supplier, they bid in, and once they have bid in they have a fixed price for everything in the future. It is very difficult to escape that in an environment where the costs are all up front rather than marginal.

The complication is that some people would say, "That is the nature of the contract that the market will have to have, but can it not be a completely free market in those contracts? Can it not be that we ask everybody to bid in for those contracts?" That is what is now happening in these Chilean auctions.

I think there is still a small role for deliberately choosing a variety of different technologies in the system rather than saying, "I am simply going to take whatever is the single technology that is the lowest CFD bidder at any time".



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Lord Darling of Roulanish: You are saying it would be open to the Government to say, "We want such and such volume of electricity. We may or may not specify where it comes from, whether it should be renewable or whatever". Essentially, you ask people to bid the cost of that, which means ultimately consumers pay a tax rather than a price because it is the same rate.

Lord Turner of Ecchinswell: They pay a price for that delivery. I am saying that you have to go through two steps of the argument. Do we have to change the market structure from compensation with a variable half-hour by half-hour wholesale price to something that, as it were, gives people promises of a price of electricity delivered in advance? You have to go in that direction once you have technologies that are close to 100% up-front capital cost and zero marginal cost. You cannot maintain the market that Lord Lawson designed. The separate question is whether you should treat that completely technologically neutral and say, "In that market can I have a bid from my gas guys?" and so on.

Lord Darling of Roulanish: I understand that.

Lord Turner of Ecchinswell: I am arguing that in a sense there can be a role even within that for having a point of view of the mix of technologies you want. Essentially, we are heading to a contract for difference in a fixed price market for offshore wind and another one for nuclear. That is the way we have ended up.

Lord Darling of Roulanish: Lord Lawson, I am sure you will respond to what Lord Turner said, if you wish. Dieter Helm in giving evidence to us suggested that 35 years ago the business of having adequate supply was not a major policy consideration. The thought that one day we might find there was not enough electricity in the system was not at the forefront of your mind. I would like you to comment on that. How do we ensure there is always more supply than we need so we do not run out? I appreciate the point you will no doubt make about intermittency, but you yourself have mentioned Hinkley Point. Although you and I may be in favour of building additional nuclear capacity, the fact is that we have not built any of this stuff for decades, and Hinkley Point, for very good reason, is under review at the moment. How do you think we can ensure that we always have a situation where we have more electricity in the system than we need?

Lord Lawson of Blaby: You raise a number of points. I am not at all against nuclear as such. Indeed, the last nuclear power station built in this country, Sizewell B, was one that I authorised as Energy Secretary all those years ago.

Lord Darling of Roulanish: The one before that was authorised by Tony Benn, I think.

Lord Lawson of Blaby: I think it was. The problem now is not nuclear as such. I think it is possible that small modular reactors could produce



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nuclear energy economically, but the ridiculous white elephant of Hinkley Point, about which the previous Government signed an appalling agreement because they were so desperate about running out of electricity capacity in this country, is a complete disaster. I am not confident that the review will end with it being aborted, but that is certainly what should happen. It is extremely uncertain technically anyhow. EDF has had only two stations of this kind, one at Flamanville in France and the other in Finland. Both of them have taken far longer than they were meant to take, and it is very doubtful whether they will ever be completed in a satisfactory way. The terms of the contract are that EDF should get double the market price for the electricity, which seems a bit crazy.

It is not true to say that when I was Energy Secretary there was no concern about energy security. There have always been concerns about energy security in the sense that, first, the Middle East has always been unreliable, and, secondly, we were told that we will run out of oil. I have never believed that, but that is what we were told. Oil and gas are in abundance, so in a sense we have much greater energy security than we have ever had before. The world is awash with oil and gas and there is a glut of coal as a result, because the market is a single competitive one. This is a traded good. We might have to import more than we wish to, but I think the energy security position is simple. In terms of basic economic sense and especially energy security, the Government ought to implement the recommendations this Committee made on the development of Britain's shale resources. That is the single biggest thing that can be done to help energy security.

Experience tells us that, even if you have incredibly clever people like Lord Turner in charge, the further you go away from a market system, the more inefficiencies creep in. The test of experience is that you want to have something that is as close to a market system as you can.

Q21 **Baroness Wheatcroft:** Before we leave the subject of Hinkley Point, I would like to ask both of you whether you think the Government themselves should go ahead and build it and fund it rather than passing on what appear to be massive margins potentially to those who will be building it and funding it.

Lord Lawson of Blaby: I do not think the reactor design is a sensible project at all, whether it is the Government or EDF. I agree with you that the deal with EDF is particularly nonsensical. People have pointed out what a nonsense it is. I do not know whether Peter Atherton is giving evidence to the Committee, but he has been very eloquent and knowledgeable on this. As I recall, there was a surprisingly good article and devastating critique on page 18 of Monday's *Financial Times*. It is well worth reading, if you have not already read it.

This is a massively expensive symptom of what happens when you go down this crazy path in energy policy. I would like to have a more



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rational energy policy in which we put first the cheapest way of getting reliable energy for the people and economy of this country.

Baroness Wheatcroft: I would like to pursue that, but first could I ask Lord Turner to respond?

Lord Turner of Ecchinswell: I too read the article in Monday's *FT* and I disagreed with it. There is a school of thought that basically says, "We are all in favour of markets. There is one market instrument; it is a carbon price, so I have found the magic way that drives me to the lowest cost solution". Although that is appealing, I do not think it is correct. If you try to pull through new investments in an environment, and I repeat the crucial point, where the cost is all up front and the marginal cost is very low thereafter, by generating an expectation of future profitability that is dependent on a future carbon price, a future gas price and, therefore, a future wholesale price of electricity, none of which you can perfectly predict—I absolutely agree with Lord Lawson that we should make it as close to the market as possible—you will end up with a cost of capital and required rate of return that is much higher than if you construct a market essentially with a contract for difference or feed-in tariff, i.e. you are getting an auction for people to deliver in.

I do not want to express a clear point of view on Hinkley because there are many things I do not know. Unlike Lord Lawson, I am not willing to express a point of view on whether or not this technology is the best or a workable one because I am not a nuclear engineer. Other people have to make the detailed assessment of that case. I think there is a role for an element of nuclear in the overall system. I know many people will disagree with me for saying that because they now think that the fall in renewables is so dramatic that we should move to an entirely renewable system. That is not an absurd case, but I still do not agree with it. The problems of intermittency and balancing demand and supply are probably made easier if we have a long-term system that is primarily renewables but has a baseload of nuclear. There will always be difficulty in deciding which technology to use and there will be a first-of-type problem with the development of new nuclear technologies, given that everybody has become unwilling simply to pick up the old French designs, which have been working for 40 years, and replicate them, because they do not think they have good enough safety, even though quite clearly they are capable of producing electricity at a cost that is well knowable. So I think there is a role for it.

On the specific question about the role of the Government, I think you raise an important point in relation not just to nuclear power but to other aspects of infrastructure at the moment. We live in a world where the markets are screaming at Governments to borrow money from them at an incredibly low rate. The real rate of return on UK 20-year index-linked bonds is now about minus 1%. That is a pretty strong price signal from the market to say it is queuing up to lend Governments money at minus 1%. They give us the money and 20 years later we give them less in real



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terms. That creates an environment where we should consider a little further whether one is willing to use the public balance sheet in crucial areas of incredibly capital-intensive infrastructure. If you do, clearly you still want to shift the whole of the construction overrun risk to the private sector. That is a risk the Government should not take on. They should be finding some private sector provider to take the construction overrun risk.

The Chairman: That was indeed what the Chancellor told us last week.

Baroness Wheatcroft: Therefore, should we be using that money, snapping it up to build a whole new generation of gas-fired power stations, which is what Dieter Helm said we would end up doing, so we might as well get doing it quickly?

Lord Turner of Ecchinswell: I do not think we should be using it to build a whole load of gas-fired power stations. If you look at the climate change committee forecast for a reasonable energy mix in 2030, compatible with getting to 100 grams per kilowatt hour, at that stage it probably should have in it about 25% gas, but that is not far off. We have the capacity for that already and that capacity lasts, so it is not clear to me that in terms of a sensible mix of our generation in 2030 we necessarily need a bigger role for gas generation than is occurring.

To go back to the point about keeping the lights on and intermittency, there is a role in a current system to have a market not merely for the delivery of energy but for capacity, which may not be used much of the time. That is what the capacity market is. That might well be gas turbines. Bluntly, there is nothing wrong within a total system in having some gas capacity, which is essentially back-up, running for only a small percentage of the year. That is a perfectly coherent part of an overall lowest-possible cost route to having a low-carbon electricity system. The costs of that are not prohibitive, because the capital costs of gas turbines are sufficiently low that, even if you are using them only for a relatively small part of the year, the addition of that to the pence per kilowatt hour of energy across the system is not huge.

Lord Lawson of Blaby: Dieter Helm is absolutely right. I am sure he has made the case very thoroughly, so there is no need for me to repeat it.

Lord Forsyth of Drumlean: I was going to pick up Lord Turner's point about the market signalling by very low interest rates that it wants people to invest. Surely, the market has been grossly distorted by the policy of QE. To argue that this is a market response when the market is being deliberately distorted by the Bank of England and Treasury is something of a circular argument.

Lord Turner of Ecchinswell: In the late 1980s the long-term yield to maturity on 10-year UK index-linked bonds—we introduced 20-year ones a bit later—was about 4% real. It is now minus 1%, and about 65% of that fall had already occurred by 2007 and therefore cannot be attributed



to post-crisis QE. There is, as you probably know, quite a wide-ranging debate among economists about why steadily, five-year by five-year, in what looks like a relentless secular process, we are seeing a fall in the equilibrium real interest rate, only the last twist of which could possibly be to do with the QE programme, since it has existed for only the past five years. In that respect I would strongly commend to you a Bank of England paper produced in December last year about the secular drivers of the global real interest rate. They see most of that fall in the rate as being due to secular structural reasons with only a small element—it can be only a small element—being due to QE programmes.

The Chairman: Let us come back to energy policy.

Q22 **Baroness Bowles of Berkhamsted:** If I understand you aright, from what you have touched on already, Lord Turner says we do not need to have any new gas-fired power stations built to supply intermittent need, and Lord Lawson said he probably liked them because he wanted the shale gas. Maybe you could clarify that. If we are going to build new gas stations, is the capacity market auction the way to do it? Once you have them, how do you keep them dealing with just the intermittent solution rather than crowding out other renewables? I have portmanteaued that all together because you have already strayed into bits of it.

Lord Turner of Ecchinswell: I think we will build some gas-fired power stations, and a reasonable way to do that is through the capacity market. The national grid as the operator will have bids for capacity provision to make sure that the capacity is there to meet the forecast demand. That is a market mechanism. Once they are in there, I do not think they necessarily will crowd out the renewables because renewables have a close to zero marginal cost, whereas those gas operators have a marginal cost that is the cost of gas. Therefore, the natural evolution of the market means that, if the market is oversupplied, the wholesale price will fall to a level at which the gas operator logically turns off the gas turbine, whereas the windmills or solar panels keep going.

So I do not think there is a danger, once you had bid in from a capacity market in order to have spare capacity in extremis and fluctuations, that that necessarily crowds out renewables.

However, on the capacity market, we need to look very carefully at ensuring that enough opportunities are created to bring forward innovative demand management as well as supply ideas. Clearly, the easy default in terms of spare capacity and dealing with intermittency is to say, "Let us build a gas turbine". Everybody tends to think in that form. You need only a certain number of them across the country. You bid them in and then the civil servants, grid and everybody can sleep easy at night because the capacity is there. But there is a danger, unless we are careful, that that might be at the expense of some things that might be still lower cost and are demand management ideas, facing consumers with prices or forms of managing their demand that enable price signals to go through so that they switch off their fridges when



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electricity is at peak. That is either encouraged or it is done directly through smart meters and control systems to help them manage in both the industrial and residential areas. There are at least some people active in that space who argue that the way the capacity market is set up at the moment is favourable to those who can come along with big, chunky ideas of capacity, which will tend to be one new gas turbine, and is less favourable to those who have multiple small ideas, which, however, might be cheaper on the demand management side.

I think it is highly likely that the existing capacity market will enable us to have enough capacity to keep the lights on. It is probable that any way forward in capacity will have a significant role for gas turbines, but it is worth looking at whether the precise structure of that market ends up with the solution being 98% gas turbines and only 2% demand management, whereby with a slightly different design it might have ended up with 70% gas turbines and 30% some innovative and potentially cheaper demand management systems.

Lord Lawson of Blaby: I am glad that we now agree that between 70% and 98% should be gas.

Perhaps I may gently correct Baroness Bowles, who said that I was keen on gas turbine-generated electricity because I am in favour of shale. That is not the case. The connection is a different one. I am in favour of using gas turbines, as I suspect Dieter Helm is also, because it is far and away the cheapest way of producing electricity. It has the added advantage, incidentally, that carbon emissions from gas-fired power stations are roughly half those, for the same amount of electricity, from coal-fired stations, and it is a cheap and economic way of producing reliable, dispatchable electricity.

The link with shale is this. The only problem with gas is that, unlike all other fossil fuels, transport costs are high. The transport costs for coal and oil are very low, but gas first has to be liquefied and then transported across the sea. Once it arrives, it has to be gasified. The liquefying and gasifying add to the cost of transport quite considerably, so it helps economically, in addition to energy security, if you have an indigenous supply. Geologists tell us that we have some of the richest seams of shale in the world. We will not know how costly or cheap they are to develop unless we do the exploration and see how it goes. It is appalling that we are not doing that, and that is what we need to get on with. If I remember rightly, that was a strong recommendation of this Committee when it looked into shale resources, and it made very sensible and precise proposals about what needed to be done to get on with it, including the reorganisation to some extent of Whitehall and the Cabinet committee system. Even if we did not have shale, gas would be the sensible route to go down, but the fact that we do have shale adds to it.

One of the problems with electricity is that it is not remotely economic to store it on a large scale. You can do it small scale through batteries, but you cannot do it economically on a large scale. When I was Energy



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Secretary a lot of research went into this. I think we had an arrangement in Trawsfynydd in Wales whereby one tried artificially to replicate hydro power by using electricity during the period when it was cheap to send water up to the top of a hill. One waited and, when it came down, it generated electricity at a time when it might otherwise be more expensive. It was found that that could not be developed beyond a limited extent and it really did not help.

You have to accept that you need dispatchable electricity and energy; you cannot rely on storage. Again, there may be technological developments in the future that will change that, but we ain't there yet or anywhere near it.

Lord Turner of Ecchinswell: In Los Angeles, southern California, Edison has just decided to use batteries rather than the previous technology of dispatchable gas turbines for its daily overnight back-up. That reflects the very rapidly falling price of batteries, which I think will increasingly become the solution for what is called short-term ramping. You have to meet an immediate need when the sun goes down and overnight, and for very short periods. I would agree that, when you end up with the wind not blowing for an entire week and you have to shift demand across an entire week or season, it is unlikely in the foreseeable future that we will use batteries for that, but for shorter-term intermittencies it is already the case that the falling cost of batteries is beginning to make them economic, and we can anticipate that that trend will continue to develop over time.

Q23 **Lord Burns:** Lord Turner, you mentioned that there had been two prices, in a sense: one was the more rapid cost reduction of renewables and the second was the slow progress of carbon capture. Has there not been a third change, which is the very sharp fall in the price of oil relative to what had been expected? It was put to us by some of our advisers that much of the Government's previous policy was based upon the fact that the oil price was going to rise in the future and that would itself reduce the cost of some of the interventions. You have not mentioned it today, but does this in any way change your view as to how the mechanisms should operate and we should conduct the choice of capacity?

Lord Turner of Ecchinswell: The answer is no. The price of oil is clearly down from where it was when the CCC first worked. We were working in an extraordinary period. You may remember that in the first six months of 2008, when we began our work, there was a ramp-up of the oil price to a peak of \$140 a barrel, if I remember rightly, by about June that year. It fell dramatically after the financial crisis and then came back and went down again. To be clear, I think it is more likely than not that we are going to head into a period of lower oil and gas prices, in part because of the very success of renewables in bringing down the price. There is an interesting process here where each individual technology achieving cost reductions brings down the price of the other. If renewables become so cheap that electrical vehicles become economic, that will cut the cost of oil, and there are reasonable scenarios in which



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the demand for oil may continue to grow for the next 10 years but will fall thereafter. If that is the case, a reasonable shot would suggest a lower likely equilibrium price of oil, because there are supplies of oil in the world spread out along a cost curve, and, if you need less of it, more of total oil demand is likely to be met by the relatively low-cost sources, located primarily in the Middle East, and there is less need for high-cost oil production.

This is why a lot of people in the financial markets who are huge technological bulls on renewables are arguing about the consequences for the stranded assets, as they call them, of the major oil and coal companies that are going to be uneconomic. I do not think it is as simple as that, because what happens is that, as the price of renewables comes down, so does even the cost of production of some of the previously high-cost oil and gas. One of the quite remarkable things over the past two years is the pace at which American shale providers can take cost out of the production processes of shale oil and gas in the US.

However, to go right back to the beginning, if you accept that what we are trying to build is a low-carbon economy, this does not change the decisions you made. We were looking at three sets of relevant prices three years ago: what we thought the gas price would be, what we thought the renewables price would be, and what the price of CCS would be. Those three prices together would determine the relative attractiveness of going the renewables route or a gas-plus-CCS route. Overall, the change of prices has pushed you towards renewables, because the fall in the price of renewables has been even bigger than the fall in the price of gas, and the price of CCS has gone up. If you look at all the changes in price together and focus not on the absolute amount but the relative shifts, you will say that the relative price as between a gas-plus CCS route and a renewables route has shifted towards renewables. I do not think you can really say that the desire to go down the renewables route was predicated on a set of prices that has now changed in a way that has undermined it, because, if you think of all the three prices that are relevant, if anything, it would reinforce it.

The fundamental point is that you have to start with whether or not you want a low-carbon economy. If we did not have the Climate Change Act and did not believe climate change, or we believed we should just be a free rider and China and India would never do anything, we would probably have just gone on with coal and gas, and that would be a cheap way forward. Once, however, you have decided that you do want to deal with climate change, the simple fact is that we will have to leave two-thirds of all known fossil fuel reserves in the ground. If you are serious about the Paris commitments, to which our Government have signed up, of well below 2 degrees, the clear implication is that two-thirds of all known fossil fuel reserves are staying in the ground. You cannot escape that arithmetic. Lord Lawson does not want to accept that; I do, but you have to go back to the first question: is this Committee challenging the Climate Change Act or not?



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Lord Burns: What is concerning some of us is the fact that what appears to have happened in this process, where renewables have been given a prominent position, is that we have had the elimination of anything that could be described as a market for energy. The worry is about the method for making decisions and how one gets the right kind of competition in place. I think we heard earlier from Lord Lawson about his view of the market. I would like to hear from him on the subject of how he would operate it, given there is a requirement for a degree of renewables, but what is your own view of how far we can, in a sense, re-energise or get back to something that is closer to market processes within our own system, rather than a system where almost every decision seems to be taken by the Government?

Lord Turner of Ecchinswell: I think we are heading back towards a form of market with decreasing subsidies. Let us take onshore wind and solar. I do not think that the limitations are any longer to do with the cost of those, nor indeed with the structure of the market. If one was now to do an open competition for CFDs for solar or onshore wind, it is quite possible we would get bids in at 6p per kilowatt hour or £60 per megawatt hour. The block there is not to do with the cost or market structure but the Conservative manifesto commitment that they do not like the aesthetic impact of that. I love landscape and I completely accept the arguments for aesthetic and landscape impact, but, to be clear, you have to accept the consequences of that. If we stick to the decision that we do not want onshore wind and the objectives of the Climate Change Act, we will end up paying about 2p per kilowatt hour more than we otherwise would, because we are excluding ourselves from something that is becoming increasingly the lowest cost solution.

That is an intervention in the market. I am not necessarily against that, at least in the more crowded bits of the country where people most object to it, but I think we should recognise it for what it is. It is a statement that because we care about landscape we are going to buy electricity at a higher price. If you accept that we have moved from a system of ROCs to a better system of contract for difference, you can have auctions of contracts for difference. At the moment, those would tend to be won by onshore wind and solar, and the Government are intending not to have those for aesthetic and landscape reasons but, instead, to have ones that are limited entirely to offshore. On the offshore side, they have said that the maximum price they will accept will come down slowly over time and will end up at £85 per megawatt hour by 2025. I think that is a reasonable balance between creating a market—because there are alternative competitive bidders coming in, and some will win and some will lose—and setting an absolute price that you would be willing to have. Lots of auctions in the free market have reserve prices.

Lord Burns: Lord Lawson, if one takes the position that there is a requirement for some kind of renewables target, even if it is not one that you would choose yourself, do you have any views as to how to get some



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more market mechanisms back into this industry?

Lord Lawson of Blaby: It is a great puzzle. I will come to that, and if I do not remind me. The question began with a query about the policy being based on the assumption that fossil fuel prices would rise, and in fact they have not. That is absolutely true. Fossil fuel prices have come down dramatically. This should have been foreseen. The main reason is not, as Lord Turner said, competition from renewables, but, at a time when global demand has not been rising as fast as most people expected, there has been a huge increase in global supply as a result of the shale revolution in the United States.

I am puzzled by what happened in the late and unlamented DECC during the coalition Government when it generated huge forward price increases in oil and gas to justify the policy it was pursuing. The Americans had already cracked the policy of the development of shale in the United States. This is not a new thing; it is not something that has happened very recently. It has been going on for 20 or 30 years. It was quite clear that prices were much more likely to fall than rise, but they went on saying, "We assume they are going to rise". Whether that was pure stupidity or it fiddled the forecasts in order to make renewables look less uneconomic by comparison, I do not know, but it can only have been one or the other. Anyhow, we now know.

The IEA—the International Energy Agency—has said it thinks that these very low prices for gas, oil and coal will persist for as long as they can possibly foresee. That is what we need to go for in my judgment. That is the sensible thing; that is what the market would go for; and that is what it is right for us as a country to go for. I prefer, as I say, a market-based policy. It is very difficult to fit renewables into a market-based policy. The costs of renewables, if you take everything into account, are far greater than the former Chairman of the climate change committee asked you to believe, but we can put it to the test. Let us announce that in five years' time there will be no subsidies for renewable energy any more and see what happens to the industry. They will say it is killing them and they are finished if you do that.

Lord Turner of Ecchinswell: Can I make one point about the purported conspiracy theory that DECC overstated the gas and oil price forecasts for a particular reason? They did overstate their forecasts of renewable costs by an even bigger amount. I return to the fact that the bigger fall has been the unanticipated, unexpected fall in renewables. If they were conspirators, they were not very competent ones.

Q24 **Lord Turnbull:** I share Lord Burns's dissatisfaction with the account you have given of what has changed. You have waxed very eloquent about the fall in cost of renewables. I have not seen much evidence of that in the field of offshore wind, which is a pretty standard technology. I do not see the big whizzy developments that we may have seen in batteries. The late and much-lamented Professor Dave Murray produced a number of scenarios. The one I remember is that he thought low-carbon objectives



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could be met with a number of assumptions. One of them was that there would be a significant contribution from nuclear. I do not think that is going to happen, not because Hinkley is in any way unsafe. It is precisely the opposite. It has been so overengineered that they cannot actually build it. We should drop it and tell them to come back when they have solved the problem. CCS has made no progress in this area. Two of the key things that he said were needed seem to be missing. I think we need a more balanced account, somewhat less intoxicated by the wonders of what is going on in California. We should look at all the things that have changed in the past decade and have a balanced account of the true relative prices, the cost per tonne of CO₂ avoided and the merit order. I do not think you have really given us that.

Lord Turner of Ecchinswell: Let us go back to offshore wind. The difficulty of tracking the scale of offshore wind price reductions is that the offshore wind industry across the world is not as big as the onshore wind industry, but they are fundamentally the same technology; they are wind turbine technologies. We know that the cost of wind turbines, through a process of learning curve effects, is going down and the efficiencies are going up. The technologies are getting better, not in the same way that an electronic thing like solar PV does but in a relentless process.

So, across America, we do have lots and lots of evidence that onshore wind is going to be available for 5 cents per kilowatt hour, even with all available connection costs. That is down 50% from where it was before. That is not just, "I think it. I am asserting it on paper". This is the ultimate way we should gather information. There is a market test. Private people who want to make money and have investors are bidding in to deliver it at that cost. That must drive down the price of offshore wind as well. Offshore wind is onshore wind with the extra difficulties of dealing in a deep sea or shallow sea environment. But even there we are seeing reductions. I referred to 7 euro cents per kilowatt hour in the case of the Netherlands. That is not a levelised cost calculation someone has made; that is a bid that has been accepted in an auction.

The crucial thing is that we should use the power of the market here and we should now be calling for auctions of CFDs over the next few years. I still think they should have an element of subsidy. I do not think they will yet be able to compete but they will over time. I am absolutely confident that, by 2025, people will be bidding below the maximum administrative price cap of £85 per megawatt hour that is set within CFD auctions. That will be down from the stuff that we did on the first CFDs at £130 and £140 per megawatt hours. I simply do not accept that we lack evidence or reasons to believe that offshore wind is coming down. It is not subject to fundamental technological breakthroughs in the way that generations of solar PV are. We know it is not an integrated circuit, but it is subject to remarkable cost reductions.

Indeed, in some ways in the offshore space we may see some very significant further cost reductions. For instance, people are increasingly creating very big turbines of 10 to 12 megawatts, which you can do in



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the offshore space without the landscape impact that limits the maximum height in the onshore space. I think you are wrong to doubt that there is a trend here, but why do we not use a market test and have some auctions for CFD and see whether they are on that relentless downward trend, which I think they are?

Lord Turnbull: Let us agree that your advocacy simply is not enough and we need to have some tests as to the real costs here.

Lord Turner of Ecchinswell: Not the real costs. I suggest that the most important thing is to look at real prices. I would look at what has happened in Chile, in Nevada and in real wind farms bid in. Surely, that must be better than somebody's calculated cost.

Lord Turnbull: This is not out in the North Sea in the depth of winter. You always have to relate these things to the true environment.

I turn to the slightly different subject of your rather Marie Antoinette view about the impact on poorer people. One of the reasons people loathe onshore wind, and in some sense solar power, is that electricity is being sold to ordinary people at about 11p or 12p per kilowatt hour, and 2p per kilowatt hour is a 20% surcharge. That is significant. If you live in a tower block in Kennington, you do not have a chance to put up solar panels or wind farms. I was amazed that the Liberal Government—I am sorry about this, Baroness Bowles—which were supposed to be the advocates of poverty-proofing government measures, turned a blind eye to this regressive transfer. Wealthy friends of mine are being paid 40p per kilowatt hour and that is resold at 11p, but with the extra cost being spread over everyone. I think that is socially unfair.

Lord Turner of Ecchinswell: I would agree with that. The CCC did not call for a 40p fit. I think the residential fit was not a very successful way of driving the development. The costs of solar will come down across the world somewhat independent of what happened in this only intermittently solar country. Our logical strategy should have been to ride on a set of global developments, as it were. I think that was a fairly costly form of subsidy.

However, I believe that the Climate Change Act contains a set of objectives that we should meet. Those objectives are capable of being met at a cost that is not enormous, does not have an adverse effect on the competitiveness of our economy and might be a couple of pence per kilowatt hour on residential bills. I think we should fundamentally redistribute money to poorer people to make sure that that is not regressive. That is my answer to it. We should be willing as a country to pay a certain cost to get to a low-carbon economy, and we should then take the measures that are required by redistribution to make sure the costs of that are borne primarily by you and me, not by others.

Let me also stress that it is important to realise that some of the biggest energy users in our country in the residential space are people with big



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houses. On the whole, energy bills are not all that highly correlated. They are sometimes, because you have people with badly insulated houses, which is why we have policies to help with insulation, but, broadly speaking, I do not think we do enough to offset the distributive impact of that. But that is a separate issue from whether as a country we should accept a relatively small cost of 1% to 2% of GDP, which Nick Stern set out, to get to a low-carbon economy. I think we should, and we should have the policy measures to make sure the cost of that does not fall on the poorest.

Lord Turnbull: I think we need to revisit this. It has certain flaws in it. The two elements of the discount rate have completely distorted policy. We tell poor people in South Africa that they cannot have a coal-fired power station because they must improve the welfare of people who will be much richer than they are. We need to revisit the whole area and see whether all these pieces still hang together in the way we thought they did a decade ago.

Lord Turner of Ecchinswell: I have never heard anybody who supports the climate change objectives say that we should be telling Africa not to have coal-fired power stations. The idea that that is an argument against us setting targets on ourselves is wrong.

Lord Turnbull: You are totally uninformed on that, because the British and American Governments tried to twist the arm of the World Bank not to support a coal-fired power station on the grounds that it was [INAUDIBLE].

Lord Lawson of Blaby: That is absolutely correct. I am astonished, listening to Lord Turner. I know he is a great enthusiast, but everything he says is so much wishful thinking. To rely on Stern now is ridiculous. Stern's economics have already been criticised to the point of destruction. I give an example that he does not mention at all. One major country in Europe that has gone furthest with this is Germany with its Energiewende and the switch to renewable energy, particularly wind power. This has been enormously costly and is causing great unhappiness in Germany. Because it is a wealthy country it felt it could afford it, but it is a practical example of what we do not want to do.

The other point is that Lord Turner talks about offshore wind. We do not know how much that costs. As he rightly pointed out, one of the characteristics of renewables is the very high capital cost, which depends on the lifetime of the installation. There are many people who feel understandably that the lifetime of these offshore wind turbines, buffeted by the winds and waves in the North Sea, will not be anything like the lifetime of wind turbines onshore. They will have to be replaced much more frequently, and the cost goes up substantially. It is easy to indulge in wishful thinking, but there is no evidence at all to support the proposition that this energy will be competitive with gas-fired power stations.



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Q25 **Baroness Wheatcroft:** I have a question related to something Lord Turner said. All the discussion this afternoon has been about meeting demand. Lord Turner said that some houses may not be as energy efficient as they should be. What do both of you think would be the capacity to cut demand if we were a more energy-efficient country?

Lord Lawson of Blaby: Demand can be cut in all sorts of ways. You can have a recession and that will cut demand considerably, but on the whole we do not want that. There is clearly some scope, more for households than businesses. Most businesses do take the trouble to be as efficient as they can be and need to be; maybe for households it is a little bit less. Therefore, there is some scope for that and let us do it, but the idea that this can make a fundamental difference is mistaken, because you cannot run a factory or a home on cutting demand. You will need the electricity anyway, so it will only be a marginal effect.

Baroness Wheatcroft: I suspect it will be a significant margin. I look around at the number of office buildings where the lights are blazing all night.

Lord Lawson of Blaby: I used to say that I always knew whether I was in a public sector or private sector building. A public sector building was overheated because it was not concerned about cutting fuel costs, whereas in the private sector it would be. You could tell blindfold where you were. I think there is scope particularly in the public sector.

Lord Turner of Ecchinswell: I have to say that most private sector buildings I have been in today have fairly effective air-conditioning and this particular public sector building does not, so that is a counterargument.

If I can respond, it is very important to talk about two elements of managing demand. One is reducing demand by energy efficiency; the other is shifting demand by time of day to move it away from the peak. There are very significant opportunities to continue to increase the efficiency with which we use electricity, but, even if we take those, we will probably end up using more electricity in future than we do at the moment, because we will apply electricity to a wider set of activities in the economy. If we simply applied them to what we do at the moment—space heating, lighting, cooking and industrial processes—I think we would see a gradual decline, continuing the 1% per annum fall that we have seen over the past few years.

I think we are going to see a significant take-off of electric vehicles. They have such enormous local environmental benefits that, even if they were more expensive, you will see them increasingly required in central cities, but increasingly they will look economic based on a straight, full, through-the-life cycle cost in any case. We will probably also see an increasing role of electrification in some categories of heating, particularly with heating pumps.



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Although there are opportunities to improve energy efficiency, they are primarily in residential businesses and smaller and medium businesses, or those where electricity is not even a material cost of production; it is just there. I would agree with Lord Lawson that, where it is at all significant as a cost of production, it is being professionally managed already. There are opportunities and it is very important to grasp all of them. There is a whole agenda of energy efficiency that derives from that, which, by the way, is also one of the answers to the problem of fuel poverty to improve the efficiency of insulation of houses and so on.

I think we will see a long-term rise in the total terawatt hours of electricity demand. There are huge opportunities to shift it by time of day. Broadly speaking, for the vast majority of residential electricity today there is no time-of-day shifting. People just switch on the hot water system whenever they want it, but with a well-insulated cylinder there is absolutely no reason why that should not be turned on by a piece of software whenever the electricity is cheapest and most available. There is a huge set of opportunities, not to reduce the overall level of demand but to move it away from the peak.

Q26 Lord Sharkey: Can I return to the question of domestic energy bills? Dieter Helm told us that wholesale prices had fallen by about 35% since Ed Miliband's 2013 speech. He also said that retail electricity prices had gone down not one iota to reflect that massive fall in cost. Does that seem to you to be a reasonable outcome? If not, what is wrong with the system that produces it?

Lord Turner of Ecchinswell: I do not know the answer to that. Clearly, there is an element within the retail electricity price that does reflect the recovery of the subsidies, and we have to be honest about that. When the CCC has looked at that as part of its statutory remit to look at the impact on overall energy bills and fuel poverty, it has found that this is not a very large impact, albeit, as I said in my reply to Lord Turnbull, I think we should have done more to compensate people for whom that was a significant cost. Even when you separate that out, you are left with something that I honestly do not understand; that is, why with the sustained fall in wholesale prices there has not been a greater fall in retail prices. Obviously, retail prices have to recover the fixed cost of the national grid and local distribution system. We have a slightly falling level of demand, and, therefore, those costs are spread across a smaller amount, but that is not much. I must apologise. Although I now spend quite a lot of time on issues relating to climate change and energy across the world, I cannot give you an answer as to why the specific characteristics of UK retail prices are what they are and have not come down in line with wholesale prices.

Lord Lawson of Blaby: Lord Sharkey, you are certainly right to point to this. I think the only plausible candidate is that the wholesale price does not fully reflect the cost of climate change policies, the subsidies for renewables and all that, whereas the retail price does.



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Lord Sharkey: Do you think that accounts for most of the difference?

Lord Lawson of Blaby: I do.

Lord Sharkey: Lord Turner, does that seem plausible to you?

Lord Turner of Ecchinswell: No, it does not seem plausible, because we can work out what the subsidy effect is by taking the subsidy, which is now limited by the levy control mechanism, dividing it by the kilowatt hours and working out how big that is. That is a checkable fact. We know what the subsidies are. They are controlled in a fairly effective and, I think, justifiable regime called the levy control system, so that is an empirical fact that it would be quite possible for the secretariat of this Committee to work out.

Lord Sharkey: Does not the fact that the retail price has fallen not at all and the wholesale price has fallen by 35% suggest to you that there is some fundamental failure within the system?

Lord Turner of Ecchinswell: We clearly have competition at wholesale level. I am not an expert on the details of how this works at retail level. I literally do not understand it, because the amount of divergence is bigger than the total cost of the climate change costs, which can be worked out. I do not have the answer, but I believe it is a matter on which you should do some detailed analysis. It is capable of being done, but I repeat: I do not know the answer to that. There are probably some structural things going on where that might well be occurring, even if we had an entirely fossil fuel system in the first place.

The Chairman: When the Competition and Markets Authority looked into the retail energy market, it found that 70% of domestic customers of the six largest companies were still on the most expensive default tariffs. It would appear that the default tariff has not reflected the fall in wholesale and that people, for reasons of loyalty or otherwise, simply stick with the deal they have.

Lord Turner of Ecchinswell: It may just be more to do with retail customer inertia, or a failure to search, rather than anything else.

Lord Sharkey: That is another way of saying there is a failure in the market mechanism.

Lord Turner of Ecchinswell: Yes; there may well be.

The Chairman: Thank you very much, gentlemen. It brings this session to an end. Thank you for an informative and occasionally rather spirited session.