

Evidence in energy policy making

What the UK can learn from overseas



About this report

The UK has made some significant gains in the energy sector in recent years. The growth of the offshore wind industry is widely seen as a national success story, and coal has been virtually eliminated from the power sector. However, even greater ambition is needed in the next decade and beyond, particularly in decarbonising the heating and transport systems. Meeting the UK's climate obligations while keeping prices stable, combating fuel poverty and maintaining a secure energy supply will require highly effective policy making.

This report examines the UK's energy policy making process, and focuses on how well policy makers access and use evidence to inform their work. It assesses the UK's strengths and weaknesses, and takes a comparative look at energy policy making in four other countries: Germany, France, the Netherlands and Canada. The report finishes with a series of recommendations on how government can improve its access to and use of evidence when designing energy policies.

 [@instituteforgov](https://twitter.com/instituteforgov)

Find out more
www.instituteforgovernment.org.uk

Contents

Summary	5
Introduction	11
1. Good policy requires effective use of evidence	14
2. Building evidence into government institutions	21
3. Bringing evidence into policy making processes	51
4. Modelling evidence in energy policy making	66
Conclusion	71
References	76
About the authors	83

List of figures, boxes and tables

Figure 1	Timeline of UK energy policy, 2008–20	12
Figure 2	Domestic electricity prices (pence per kWh, in nominal terms) in the UK, Canada, France, the Netherlands and Germany, 2008–19	19
Figure 3	Analyst headcount by profession at BEIS, 2020	22
Figure 4	Non-technological research spending by department	24
Figure 5	Regulator staff in energy-related positions, and the regulators' mandates, in the UK, Germany, France, the Netherlands, Canada and the province of Ontario, 2020	46
Box 1	The energy policy aftermath of the Fukushima disaster shows that public opinion can make evidence less relevant to energy policy choices	16
Box 2	Energy prices in the UK	19
Box 3	The politics of science advice in Canada	32
Box 4	Energiewende shows effective evidence does not need to be politically neutral	39
Box 5	Cost-benefit analysis and climate change	53
Table 1	How Germany, France, the Netherlands and Canada review government impact assessments of new regulations	55

Summary

The UK has made good progress on some major energy objectives in recent years: low-carbon power generation has accelerated, offshore wind has become extremely competitive, and coal has been virtually eliminated from the UK's energy mix. Despite the closure of many legacy power stations and the decline in domestic North Sea gas production, the lights have not gone out. All the while, costs for most consumers have remained stable; though prices have risen, efficiency improvements have reduced demand and spending on energy for the average household has declined over the past decade.

But there have been too many cases of energy policies that have failed to live up to expectations: energy efficiency schemes for buildings have been underwhelming, government oversold an unpopular fracking policy before eventually abandoning it, and the UK's nuclear policy remains controversial. Much less progress than is required if the UK is to meet its climate obligations has been made on decarbonising domestic and commercial heating and transport.

Bold ambition – such as the prime minister's desire to make the UK “the Saudi Arabia of wind power” – can be delivered only with effective policies. As the UK strives to reach its target of net zero carbon emissions in the coming decades, its energy policies will need to become even more ambitious and more complex. Policy making must therefore be set up to achieve the best chance of success.

This report focuses on one element of that process: the use of evidence.

Good use of evidence helps policy makers set goals, design policy interventions, ensure smooth delivery and learn from experience. Using evidence effectively requires that high quality and credible evidence is available to decision makers. Enabling this in government requires institutions that develop and maintain expertise and credibility, whether these sit inside government or at arm's length. We therefore examine the institutions that are meant to ensure that evidence is available.

But effective evidence use is not only reliant on its availability or supply. It also requires that policy makers demand evidence when making decisions. The processes governments use to manage policy making explicitly challenge civil servants to demonstrate that good evidence has been appropriately used. We examine whether these processes do ensure that evidence is used to genuinely inform policy development.

Of course, evidence could never, and should not, drive all decision making in government. Evidence-based policy making is sometimes presented as a preferable alternative to the messy realities of politics. This is too simplistic. Good policy draws on evidence, of course, but also depends on political processes like mobilising support, managing opposition, presenting a vision, and setting strategic objectives.¹ We do not suggest that the root cause of energy policy success or failure must be the quality of evidence use, only that this is one of the factors at play.

The report takes an internationally comparative approach. Throughout, we discuss the institutions and processes that guide the UK's use of evidence in energy policy with reference to the equivalent in Germany, France, the Netherlands and Canada. Viewing the UK's policy making process in an international context allows us to assess its relative strengths and weaknesses and to highlight areas for improvement based on best practice overseas.

Main conclusions

The UK's capacity for producing and using evidence in energy policy is highly centralised

The Department for Business, Energy and Industrial Strategy (BEIS) has a large in-house analytic capacity, strong modelling capability, and its use of engineers and social researchers is improving – more have been hired recently, and those we spoke to said that their status in the department has improved over the last few years. BEIS's formal processes for justifying policy choices in terms of available evidence – impact assessments, ex-post evaluations, and the like – are well established. It also has an unusually strong analytic capacity in its energy regulator, Ofgem. The UK has a widely admired, genuinely world-leading advisory body in the Climate Change Committee (CCC), whose innovative carbon budgets and depth of expertise have proved a model for other countries to follow – France established its own Haut Conseil pour le Climat (HCC) in 2018, chaired by a member of the CCC.*

The UK's model of evidence use puts heavy emphasis on internal analytic capacity and expertise. This is in contrast to the Dutch and German models, which rely more on external advice and analysis, and where civil servants are more likely to view themselves as process managers – though this is not to say that their energy ministries do not have good levels of expertise and analytic capacity. The Canadian system is also largely reliant on internal analysis, but this is dispersed across the federal and provincial governments. The French system is the most obviously similar to the UK's,

* The CCC changed its name to the Climate Change Committee, from the Committee on Climate Change, in November 2020.

although the very dissimilar structure of the French energy market, particularly with regard to the state energy giant EDF, makes a difference.

Neither the primarily internal nor the primarily external 'model' is obviously better than the other, and in each case the government culture and policy making process of each country is derived from their specific constitutional, political and historic circumstances. The point of the comparisons in this report is not to advocate for a German, Dutch, French or Canadian approach – if such a coherent structure even existed, it would not be transplantable. However, key advantages emerge from both the internal and external approaches to evidence generation and use.

By identifying strengths of different models, and considering them alongside the weaknesses that we have identified with the UK policy making process, the important structural gaps in the UK that need to be addressed come into clearer view.

The UK's emphasis on internally produced evidence has some important benefits, but misses out on two strengths that come naturally with the evidence systems in the countries – Germany and the Netherlands – that we identified as being most different from the UK. These are:

- **As in Germany, a diversity of perspectives and active public contesting of evidence can improve policy outcomes.** In the German system, we found that the policy process clearly accepted and articulated the role of multiple parties, acting at different levels of government and across different interest groups. Evidence is much more readily seen as part of the political argument, in that different centres of expertise are more likely to be upfront about their political affiliations and values, and all sides in a policy debate are expected to marshal high-quality evidence – in recognition that very few choices in government involve options with absolutely no merit, or options with absolutely no downsides. This contest makes the trade-offs involved in any policy decision more explicit. Mechanisms like the German Coal Exit Commission bring competing parties to a common view without relying exclusively on internal, technocratic evidence weighting.
- **As in the Netherlands, external and independent bodies help to ensure the evidence used for policy is credible and transparent.** This independence can either be complete legal independence from government (as with university research centres) or be in the form of arm's length government bodies, provided the culture is one of genuine strategic and research independence. The Dutch system is based on evidence produced externally, in the sense that it happens away from government departments, but through government bodies with a specific mandate to produce research and analysis relevant to policy makers' needs. In the Dutch case, part of the credibility of the external institutions is derived from their long-standing emphasis on political neutrality (at least as far as party politics is concerned), and partly from the quality of research and analytical output that is broadly held to academic, scientific standards through peer review and extensive participation in academic projects and publishing.

The UK's centralised system can mean a narrow approach to evidence

The formal evidence process of assessments, business cases, and evaluations described by government appraisal guidance, chiefly the Green Book, does stand up well to international comparison but has important limitations. Indeed, the fact that the UK's processes are so well established sometimes leads to an over-reliance on ways of thinking and measuring policy that do not map on to the messy reality of government action in the energy sector. This is frustrating to people in government and outside, who often feel that the process of gathering evidence described in formal documents is tangential to the reality of how policies are made.

A reliance on internally produced evidence too often leads BEIS and other government bodies to develop a closed 'house view', limiting what evidence is deemed relevant, what policies are considered, and who is consulted. The formal processes discussed above reinforce this narrowness by elevating the value of certain economic metrics over other methods. Production of technical modelling evidence is a strength in the UK, but is not understood well enough by many policy makers, which can lead to mistakes in how modelling results are interpreted and used.

The UK government's routine outreach to external experts is often weak and disorganised. Where good practice exists, it is usually the result of the skills of particular civil servants, and is therefore difficult to scale. All these problems are exacerbated by the perennial problem of high staff turnover, although BEIS is not the worst offender in government, and there is some evidence that energy policy suffers from this less than other areas.*

Aside from the CCC, the UK does have some other valuable advisory bodies – from university research centres to institutes with closer links to government like the Energy Systems Catapult (ESC), the National Infrastructure Commission and the UK Energy Research Centre (UKERC). But our research also found a number of effective international advisory bodies without direct equivalents in the UK, whose functions are therefore potentially being missed. The Council of Canadian Academies (CCA) gives Canada's three major scientific academies a structure through which to comment on strategic, cross-cutting issues related to energy and climate policy. France's ADEME is a national body tasked with helping local energy innovation delivery, and combines strong analytic capacity with detailed, local implementation expertise.

The Netherlands and Germany also have a number of independent and semi-independent advisory institutes, which carry out a mixture of their own research and the kind of bespoke policy analysis that would most likely happen internally (or be contracted to consultants) in the UK. The benefit of expanding the capacities of the ESC, UKERC or the CCC came up several times in our interviews.

* But government workforce data is not sufficiently granular to make that claim robust.

Recommendations

While this report focuses on an assessment of the effectiveness of the use of evidence in the UK system based on learning from international comparators, we have also been able to reach a number of specific recommendations. On the basis of our findings, the government should consider changes in three broad areas:

Building expertise in government

- As part of its civil service reform agenda, government should review pay and progression to consider how it can reward analysts and policy makers for developing expertise in highly technical sectors and complex markets, like energy.
- Following the November 2020 review of the Green Book,² government should develop and publish methodological guidance to ensure climate and emissions impacts are routinely factored into policy appraisal.

Opening up

- Government should publish more of the research evidence it produces or commissions, and should open up more of its energy models to peer scrutiny.
- External engagement should be made more systematic. Passing on a viable network of relevant contacts and experts should be considered a key responsibility for relevant civil servants, so that new starters do not feel they have to start from scratch, and those outside government do not feel they have lost access whenever someone moves roles.
- Appointments to advisory committees should more often be made on the basis of an open recruitment process, rather than direct invitation of trusted and known figures.
- Impact assessments should be independently assessed for how well they use evidence. This should include scrutiny of a broader range of metrics, particularly on emissions and climate impact. The government should consider expanding the Regulatory Policy Committee's remit to encompass this. If the RPC's remit is expanded, it will likely need help to develop specific energy policy expertise. To strengthen external scrutiny of evidence, the RPC should also review impact assessments at the consultation stage, as well as final impact assessments.

Fostering a stronger evidence system

- Government should expand the resource and policy advisory role of both the UK Energy Research Centre and the Energy Systems Catapult. Our work shows that government has at times been too insular, and needs stronger engagement with external sources of evidence and analysis. Rather than creating a new institution – which would take time to become established and build credibility – we recommend building on the strengths of two existing advisory institutions. The Energy Systems Catapult has strong engineering expertise, links to innovating energy companies, and an understanding of energy issues at the local government level, all of which are comparatively weak in BEIS. The UK Energy Research Centre is the key mechanism for engagement with academia. An expansion of its resources explicitly focused on policy would help overcome a weakness in the current institutional arrangements.

Introduction

The UK can be justifiably proud of progress on many energy policy objectives. Over the past decade, low-carbon power generation has soared, yet household spending on electricity and gas has stayed flat.³ Though prices have risen, costs have remained flat for the average household, in part because greater efficiency of appliances and lighting have driven down demand.⁴ Carbon budgets have been met, and the speed of the UK's shift away from coal-fired electricity has been celebrated internationally.

But UK energy policy has also seen a series of abrupt reversals, false starts and failures. On fracking, David Cameron announced that government was “going all out for shale” gas in 2014; six years later, Kwasi Kwarteng, BEIS minister of state for business, energy and clean growth, announced that “fracking is over”. The Green Deal – trailed as the “most ambitious energy-saving plan ever put forward”⁵ – has been intensively studied as a textbook policy failure. In 2015, government abruptly cancelled a fund for demonstrating carbon capture and storage, and dropped a policy for zero carbon homes, only to reinvent both ideas in 2020. The Northern Ireland renewable heat incentive – better known as ‘cash for ash’ – brought down a government and wasted more than £400 million in taxpayer money.

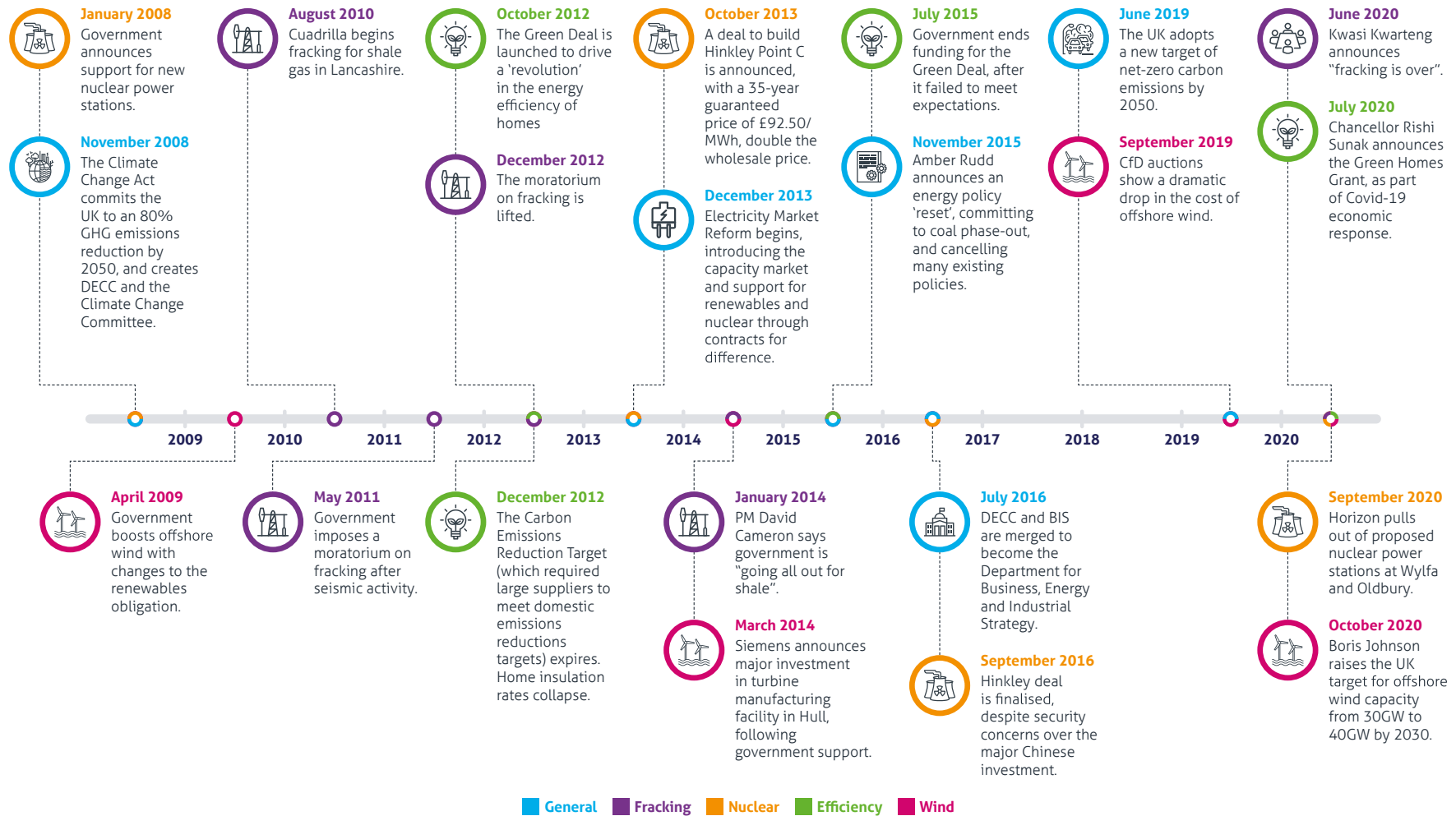
Some policy reversals have happened because of political pressure or public concern. Other policies have failed because they took place in a context that changed far faster than anybody had anticipated. The boom-and-bust of solar subsidies between 2010 and 2015 was the result of a government caught out by falling solar panel prices. Many other countries had exactly the same experience as the UK. It is impossible to future-proof every policy against radical change.

But there have been too many policies that have failed because they were poorly designed, poorly evidenced or had unrealistic goals.

This report compares the UK's system of energy policy making with four international peers, focusing on how each country uses evidence to inform energy policy decisions. We show that while the UK has some real strengths in how it uses evidence for energy policy, there are some weaknesses as well and lessons to be learned from other countries.

Having committed to achieving net zero greenhouse gas emissions by 2050, the stakes for energy policy are higher than ever. The UK has to do better in designing energy policy, and this report helps government identify key ways to do so.

Figure 1 **Timeline of UK energy policy 2008–20**



Source: Institute for Government analysis.

The timeline (Figure 1) illustrates key policy events, highlighting some of the more troubled areas of energy policy over the past decade: shale gas, nuclear power and domestic energy efficiency. The history of shale gas suggests that government did not appreciate the challenges of developing a new onshore extraction gas industry, and was seduced by the example of the United States. On nuclear, government has been challenged by both a gradually weakening commercial case for nuclear investment, and a growing unease about the geopolitical implications of Chinese investment in critical infrastructure. The story of energy efficiency reveals both the vulnerability of policies to the politics of energy prices, and the failure of government to establish a well-evidenced and long-term strategy.

1. Good policy requires effective use of evidence

Evidence-based policy making is, on the face of it, a simple and attractive idea. Of course policy should draw on evidence – to understand both the problems that need to be solved and the likely effectiveness of policies to address them. In practice it is not so simple.

Policy goals are about society's choices – and no amount of number crunching can replace what is essentially a political process. Evidence cannot dictate policy. As the Institute for Government has put it previously: "Good policies emerge from a combination of the political (mobilising support and managing opposition, presenting a vision, setting strategic objectives) and the technocratic (evidence of what works, robust policy design, realistic implementation plans)."⁶

The challenge facing governments is to ensure that high-quality, policy-relevant evidence is available, and that policy makers use evidence to inform their decisions. Evidence is often fragmented, conflicting and partial. Experts frequently disagree about what evidence matters and which policy goals are most important. The ongoing debate about how best to decarbonise heating exemplifies the point: experts who are sceptical about the public's appetite for new heating systems and associated refurbishment advocate hydrogen; those more concerned about energy efficiency advocate heat pumps⁷ and describe hydrogen as a "distraction".⁸

Shifting priorities around energy make the challenge more difficult. Energy policy is often characterised as a 'trilemma' involving trade-offs between three core objectives: government must ensure that energy is affordable, that supplies are reliable, and that energy does not breach environmental limits. The relative priority of each has changed over time. Policy measures following the Climate Change Act focused on decarbonisation, while fears of a looming electricity 'supply crunch' in 2012 and 2013 strongly influenced the decision to push through the nuclear power station at Hinkley Point C through bilateral negotiation with EDF, rather than wait for other suppliers to be ready for an open competition.⁹ In 2013 rising energy prices – in part because of consumer levies used to fund fuel poverty and green programmes – created a political argument that resulted in David Cameron allegedly seeking to "get rid of all the green crap".¹⁰

It is also clear that there is more than the trilemma at stake: concerns about Chinese involvement in Hinkley Point reveal the geopolitical dimension of energy policy, while the government's support for offshore wind manufacturing in Hull shows that industrial strategy goals are often closely intertwined with energy.

At the very least, good use of evidence should mean that:

- Policy goals and options take account of evidence about possible trade-offs, so that decisions about such trade-offs are made explicitly by politicians rather than hidden in unexamined assumptions.
- Policies should not be designed where there is good evidence that they will fail to meet their objectives.

Getting this right is not always easy. It requires that governments think about the structures and processes of policy making, so that policies are informed and tested by evidence as they are developed. And, of course, successful integration of evidence into the policy making process cannot guarantee against policy failure. Policies can fail for a wide range of reasons, including failures in delivery, changes in objectives, or because of surprise events and developments beyond the control of government.

Evidence in a political world: policy making when evidence is sidelined

As we have argued above, policy making is never entirely free from politics. Interest groups develop and promote their own sources of evidence, and argue different perspectives on a problem. Credible, independent institutions and robust policy making processes are important to ensure that policy making is not distorted by a narrow range of interests.

But there are moments when the policy process is powerfully disrupted by political pressures: policy action becomes a political necessity – or a political impossibility. In those moments, the processes for ensuring high-quality evidence may be sidestepped, and evidence-informed policies may be abandoned in favour of politically attractive policies.

The introduction of a cap on residential electricity and gas prices is a good example. The political pressure on the government from an opposition promising cheaper bills meant that the policy was driven through despite concerns it was not based on good evidence, or that it was not the best way to address the underlying policy problem.¹¹ Similarly, the use of a universal benefit (the winter fuel payment) costing £2 billion to address fuel poverty has been criticised as inefficient and ‘unfocused’ since at least 2010,¹² and the Committee on Fuel Poverty has criticised it repeatedly.¹³ Despite these critics, the political costs of cutting a universal benefit for pensioners has clearly been felt to be too high.

The UK is not alone. In the course of our work, we identified many cases elsewhere in which politics trumped the policy process, and evidence became a secondary consideration – if it was considered at all. In Ontario, public outcry over energy bills (which remain very low by European standards) has been met with populist subsidies that are widely considered to be an inefficient approach to the problem. In France, popular support for the *gilets jaunes* protests made the evidence around

carbon taxation irrelevant to the debate. In Japan, the loss of trust in public institutions managing nuclear safety has reduced the scope of politically feasible energy policies (see Box 1).

When the political temperature rises, the institutions and processes that underpin evidence-informed policy still have an important role: dissenting opinions from independent institutions and formal pushback from within structured policy processes can make explicit that these are political choices made by ministers. This might not always improve policy making, but it at least improves political accountability for policy choices.

In assessing how the UK and comparator countries use evidence in energy policy making, we recognise that sometimes the political room to manoeuvre is very limited. In our report, we have largely focused on policy making when the political heat is lower: where governments have the political space to choose policy paths that are supported by evidence.

Box 1 The energy policy aftermath of the Fukushima disaster shows that public opinion can make evidence less relevant to energy policy choices

In March 2011, Japan was struck by a triple disaster: an earthquake, a tsunami and a nuclear meltdown at Fukushima. The events overturned what had been a stable energy policy system, which had been moving steadily towards an expansion of nuclear power. Nuclear power stations were shut down pending confirmation of their safety, and a variety of reforms were initiated by the ruling DPJ, including a policy of complete nuclear phase-out by 2040. There was also major liberalisation of the power sector, weakening powerful utility companies, and the creation of a new Nuclear Regulation Authority (NRA).

Opinions differ on how meaningful these reforms were. There was widespread scepticism about the strength of the new regulator, the NRA, when it was formed, in part because the committee overseeing nuclear policy and the new agency was led by Shunichi Tanaka, who was involved in previous government commissions that had strengthened the position of the nuclear industry.¹⁴

In 2012, the new Abe government reversed the nuclear phase-out, and introduced a strategic energy plan that envisaged 20% of electricity coming from nuclear through the 2030s (up from just over 3% today).¹⁵ However, the NRA process of restarting reactors has been much slower than the Abe government would have liked – fears that the new regulator would be a pushover have proved unfounded. Time is running out for Japan's offline reactors. Each has a lifetime operating window of about 40 years whether or not the plant is actually running. New capital investment in nuclear power looks unlikely. Meanwhile, Japan has become increasingly reliant on imported fossil fuels.

Japan's new energy policy consensus has therefore been arrived at more by default than by choice – the government would prefer to restart nuclear reactors, and feels it has the evidence to justify that position, but lacks the political capital to properly implement it in the face of an uncooperative regulator and mistrustful population.

Evidence is only one factor when it comes to balancing Japan's stated energy priorities of the environment, economic efficiency, and security. Advocates of nuclear power argue that the evidence on the safety of pressured water reactors is strong, and that nuclear power will be essential to guaranteeing Japanese energy security and low prices while also combating climate change. But the external shock of the Fukushima disaster has made this kind of evidence politically redundant – the weight of public and political opinion has shifted too far.

A framework for this report

To compare the UK's energy policy making system with those from some of our international peers, we have sought to understand what features constitute an effective policy advisory system, and how other countries have tried to develop them.

The first question our report addresses is which institutions – inside and outside government – play the most central roles in generating evidence-based policy advice on energy.

A focus on the institutions is mostly about the *supply* of evidence: whether evidence is available within government, or easily accessible from institutions outside. But as previous IfG work has argued, having a good supply of evidence is of little help if there is no *demand* for evidence from policy makers. We therefore also focus on the processes of policy making. We ask what the processes are that ensure policy is informed by – and tested against – available evidence.

Characteristics of evidence-informed policy making in energy policy

All policy areas face challenges in using evidence effectively. Three particular factors make it challenging for energy.

First, the energy system must undergo profound change over the coming decades, as the UK seeks to meet a net zero CO₂ target – and government is expected to steer a complex technological system transition, while still maintaining reliable and cheap energy supplies. Achieving this will involve many policy choices in the face of real uncertainty, where the available evidence does not provide all the answers. The evolution of energy systems means that evidence of what worked in the past may not be helpful for future policy interventions.

Second, energy policy makers must take very different forms of evidence into account: from social science research on the factors that motivate people to insulate their homes, to deep engineering knowledge of specific technologies. This raises challenges for the kinds of evidence institutions government needs in order to be able to draw on different academic disciplines and forms of expertise. The depth of technical knowledge required often means that government is reliant on the private sector, creating risks of excessive influence in areas such as technology innovation support.

Third, the energy system is part of a globalised technological landscape. Many energy system choices and policies must be sensitive to technological and policy developments worldwide. Many of the big questions in UK energy policy today – Should we use hydrogen for heating? What’s the future for carbon capture and storage? – depend partly on the choices that other countries make. Managing evidence from global technological and policy developments is a significant analytic challenge.

Comparator countries

We have compared the UK’s institutions and processes with four comparator countries: Germany, France, Canada and the Netherlands. We chose these countries to provide insight from a range of institutional and cultural contexts.

- Canada’s Westminster parliamentary system is familiar to the UK, but its system of federal provinces, with lots of devolved responsibility for energy, and its very different energy profile, make it a fruitful point of comparison.
- The German system is also federal, and its institutional landscape for energy evidence is very different from the UK’s, with central and state governments drawing on a wide range of dispersed, independent research organisations. Germany is also often highlighted in UK political discussion as an exemplar of a well functioning political system.
- The French government is highly centralised, much like the UK’s, but also has a much more recent history of energy liberalisation and a critical relationship with a state-owned energy giant, EDF, which has no UK equivalent.
- Finally, the Netherlands has a long-established system of policy advisory bodies – in particular the Centraal Planbureau (CPB) – which has been highlighted in previous Institute for Government work as an unusual, and potentially very instructive, model of evidence-informed policy making.

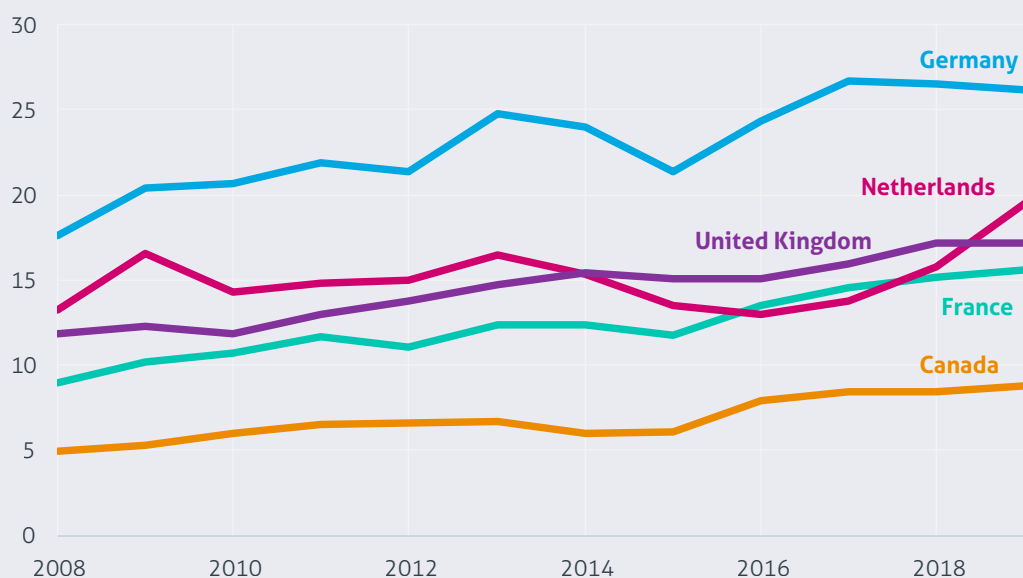
It is not straightforward to assess each country’s success in energy policy outcomes. Each has grappled with distinct challenges, and each has experienced success and failure of specific policy initiatives. Some key metrics for each of the three elements of the energy ‘trilemma’ suggest that the UK does not have noticeably worse energy policy outcomes than these comparator countries. On energy prices, UK consumers face close to the EU average for electricity, and lower prices than most other European countries for gas (though Canadian consumers have lower prices for both).¹⁶ On reliability of supply, one measure is the frequency of power cuts, and here the UK

performs similarly to European comparators and better than Canada.¹⁷ Finally, on environment, the UK's energy-related greenhouse gas emissions have fallen more than in any of these other countries.¹⁸ However, these simple metrics do not provide a clear picture of the quality of the policy making process. In this report we therefore examine the policy making process itself and focus on what the UK can learn from the strengths of these different countries.

Box 2 Energy prices in the UK

In recent years, energy prices have often made headlines. At times, energy policy debates have been all but overwhelmed by the politics of prices. When Ed Miliband in 2013 promised to introduce an energy price cap, David Cameron responded by seeking to 'get rid of all the green crap', and ultimately the Conservatives brought in their own regulated cap on prices.

Figure 2 Domestic electricity prices (pence per kWh, in nominal terms) in the UK, Canada, France, the Netherlands and Germany, 2008–19



Source: BEIS (includes taxes).

That political furore might suggest that the UK has unusually high energy prices, or that they have risen unusually fast. A comparison of the UK with others, including France, Germany, the Netherlands and Canada, shows that this is not right (see Figure 2). In all these countries, electricity prices for households have risen over the past decade, and gas prices have risen in all except Canada. Households in the UK pay close to the EU average for energy. Prices in Canada are lower than those in Europe for a range of reasons, including a strong role for legacy hydro-electricity, and the shale gas boom in the US. While UK prices have risen, energy efficiency improvements have driven down household demand. In spite of rising unit prices, British consumers spend less on electricity and gas than they did a decade ago.

The UK has performed less well when it comes to electricity prices faced by industry, particularly in the most energy-intensive sectors like steel. Here, UK firms have often paid more – sometimes much more – for energy than most of their European competitors. Experts agree, though often for different reasons, that better policy design could have avoided the high prices faced by industry.¹⁹

Like many other countries, the UK also has a problem with fuel poverty. While costs for the average household have fallen, the portion of people that cannot afford to keep their homes warm has changed little over the past decade. In spite of repeated recommendations from its expert Committee on Fuel Poverty, government continues to spend most of the money associated with the fuel poverty strategy on households that are not fuel poor: the winter fuel payment costs around £2bn annually, and is paid to all those over the state pension age.²⁰

2. Building evidence into government institutions

We start our analysis by exploring the institutions that provide evidence for energy policy. In this section, we first examine the evidence and analytic capacity of the government departments responsible for energy policy. We then explore the diverse array of advisory bodies that inform those departments, and finally we look at the role that regulators and delivery bodies play in providing evidence for policy decisions.

Evidence and analytic capacity in energy policy departments

The UK

Energy policy in the UK is managed by the Department for Business, Energy and Industrial Strategy (BEIS), which also covers climate change, business and innovation policy. The department has a headcount of around 4,500,²¹ of which we estimate around 1,600 are dedicated to energy and climate change.*

BEIS is a young department, having been created in 2016 through the merger of the Department for Business, Innovation and Skills (BIS) and the Department of Energy and Climate Change (DECC). At the time, many commentators approved of the merger, arguing that the closer integration of innovation and industrial strategy with energy and climate change was a helpful step in enabling the UK to meet its climate change targets – though some also worried the move implied climate change was being downgraded as a policy priority. The transition is seen as having been fairly smooth. Fears about the relative visibility of climate change in the government's agenda were largely justified, until an upsurge in public interest and the decision by Theresa May's government to commit the UK to carbon neutrality by 2050 combined to return the issue closer to the fore of departmental and government thinking.

BEIS is seen as having a strong capacity for generating and using evidence

People we spoke with generally regarded BEIS as having strong capacity for generating and using evidence,²² and in government we heard that BEIS has a culture of evidence-use that is stronger than in some other departments – though this is difficult to verify independently.²³

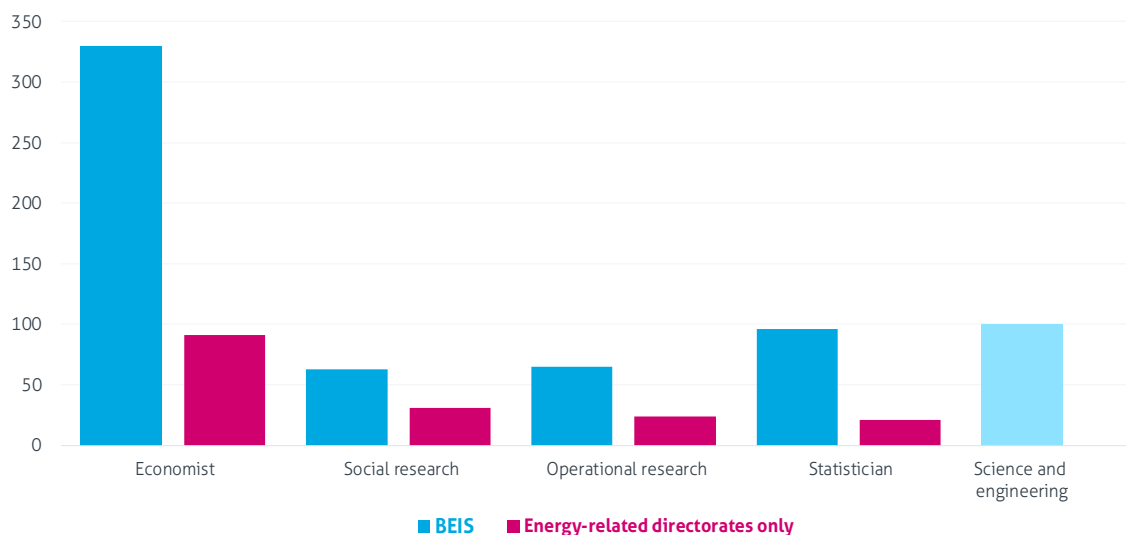
The UK civil service is split into several professional categories (such as policy or operational delivery), some of which are organised into cross-departmental corporate 'functions' (such as commercial, digital, communications, HR or legal). All government analysts – whether employed as economists, statisticians, operational researchers, social researchers, engineers, data scientists, geographers or any other disciplinary signifier – have a distinct professional identity as part of the 'analysis' function of government. This explicit distinction between analyst and policy roles is a specific feature of the UK system, with civil servants in the other countries surveyed not reporting such clear demarcations.

* This is based on the relative size of DECC and BIS when they merged in 2016. Given the strong role for energy within the industrial strategy, this is likely to be an underestimate.

Despite the professional split between analysts and policy makers, with the two following separate career progression tracks and often reporting to different management structures, within BEIS analysts are often embedded in policy teams. This means they are on hand to provide evidence, research support and challenge as policies are developed. There are also central analysis teams, not attached to specific policy teams, dedicated to (among other things) science and innovation (assessing and producing evidence on technologies for decarbonisation), modelling and economic analysis.

Across the whole of BEIS, more than 600 staff are analysts whose job it is to produce, commission or collate evidence to inform policy development.²⁴ Previously unpublished data provided to us by the department shows the breakdown of analysts by profession, showing data both for the department as a whole and for directorates focused on energy and climate change.

Figure 3 **Analyst headcount by profession at BEIS, 2020**



Source: Institute for Government analysis of data provided by BEIS. Note: science and engineering figures were unavailable. This chart shows an estimate by a current senior engineer working at BEIS.

Interviewees told us that the department’s engineering capacity had improved “beyond recognition” over recent years.²⁵ Although the department could not provide precise historic data, one well-placed interviewee told us that when he joined DECC in 2013 there had been between 30 and 40 engineers, compared with more than 100 today. This is a welcome development. The energy system is in a period of intense technological transition that will affect all aspects of energy policy – including security of supply and price – as well as the UK’s climate priorities.

Despite these commendable improvements, the UK government could and should go further. Critical policies in the coming years will rely on government understanding and managing technological uncertainty and complex delivery challenges, as noted in the IfG’s recent report *Net Zero: How government can meet its climate change target*.²⁶ The UK’s roll-out of smart meters is an example of the kind of problem government

is likely to have more and more often, and with which a greater engineering capacity could help. Although elements of the smart meter roll-out – which should allow energy customers to manage their energy use more efficiently and energy suppliers to understand demand and use in much finer detail – have been successful, key technical issues have led to cost overruns and delays.²⁷ In particular, far more first generation smart meters (SMETS1) have been installed than were planned, partly because of ministerial pressure for quicker results, but also because the second generation of meters (SMETS2) had more complex technical specifications than anticipated. The SMETS1 meters may also stop working when customers switch energy suppliers – negating their smart function – which makes the fact that 7 million more have been installed than were intended a potentially very serious problem.²⁸

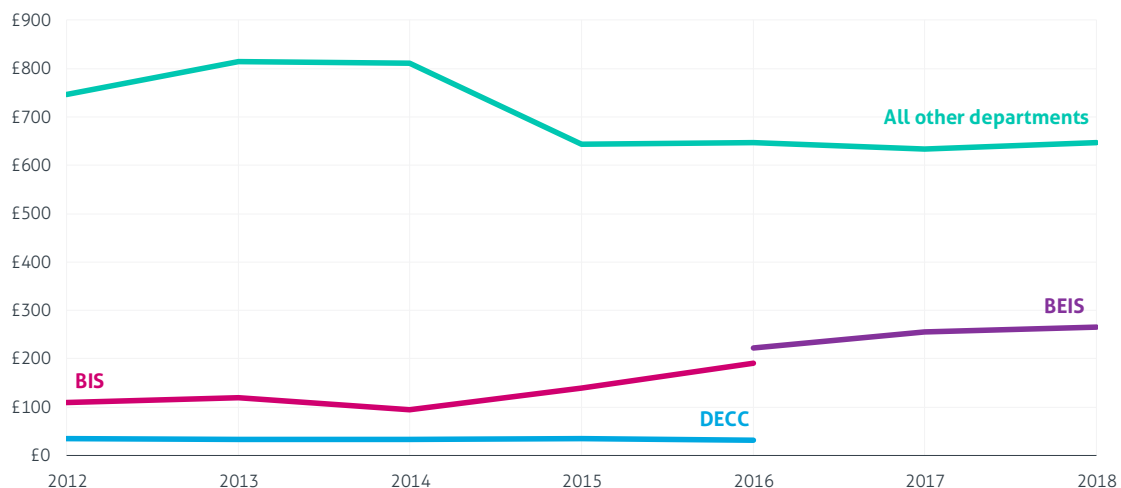
Analysts have also been hired in greater numbers for social science research positions.²⁹ This is largely in response to the experience of the Green Deal, a policy failure often attributed to under-appreciation of extensive social science evidence on what people's motivations for energy efficiency upgrades were likely to be.³⁰ Instead, the policy relied on an unrealistic view of consumers as strictly economically rational, leading to big overestimates of the number of people who would take up the opportunity to finance home energy efficiency measures. Similar failures to understand how and why people make decisions, and therefore how to incentivise them, have arguably also prevented more widespread uptake of switching between retail energy suppliers, dampening effective competition. The Institute for Government's *Net Zero* report has recently emphasised the need for government to better understand how to ensure consumer take-up of key technology – whether energy efficiency measures or electric vehicles – at the appropriate timescales to meet its climate targets.³¹ BEIS's social research capacity is likely to be essential to that task.

BEIS has a track record of investing in research to inform policy. Developing an effective evidence base for policy requires a strategic perspective on emerging issues and research needs. The department has a clear process for identifying longer-term policy research needs, with an annual review for agreeing priorities. This was a key recommendation of the recent cross-government science capability review, and it appears to be standard practice within BEIS.³²

There has been some concern in recent years that research budgets for departments across government suffered during the years of austerity, and that this has undermined the capacity of departments to address strategic areas of research.³³ This has been to some extent offset by the increased emphasis on 'impact' in research council funding – but, as several government science strategies have argued, it is important to maintain enough internal science and research capacity within central government to enable effective use of externally produced evidence.³⁴ Data on research funding in government is reported by department, so it is not possible to identify research specific to energy since 2016, when DECC was merged with BIS to create BEIS. As shown in Figure 4, between 2012 and 2016 the DECC budget for non-technological research (for example, research of direct use to policy development and implementation) was stable, in contrast to many departments that saw research budgets shrink. However, in real terms this stable budget represents a decline in

spending. Since the creation of BEIS, research funding for non-technological research at the department has increased, though it is not clear whether this represents an increase for energy specifically.

Figure 4 **Non-technological research spending by department**



Source: Institute for Government analysis of data from the Office for National Statistics.³⁵

Unlike equivalent departments in many comparator countries, BEIS has a strong internal modelling team. Analysts within BEIS run large energy system models – including TIMES (which is a whole energy system model for planning long-term energy strategy). Responsibility for the models sits with a central modelling team, which then works with policy teams and analysts across the department to produce analysis for specific policy questions. We explore BEIS’s approach to modelling in more detail in a subsequent chapter in this report.

BEIS could still use evidence better

The department is sometimes too insular and risks “groupthink”. There is a tendency to seek out a common departmental view, and then to stick to it. This can have obvious benefits, but in situations where there are considerable uncertainties (such as future costs of particular technologies) a homogenous departmental view risks overconfidence, and prevents consideration of a wide range of options. More generally, the tendency for policy makers not to fully grasp risk and uncertainty came up several times in interviews – in the words of one senior analyst, government’s perennial “failure to put error bars on numbers”.³⁶

Evidence from the experiences of other countries can be particularly valuable in informing policy development. While there are good examples of BEIS looking at international experience,³⁷ several civil servants told us that this does not happen as much as they think it should. Time constraints and the absence of good connections with their equivalents in foreign governments have made it difficult to prioritise international comparative policy research. This is not a difficulty unique to the UK – civil servants in the other countries we surveyed also told us that having

an overview of energy policy practice in peer countries would be valuable, but that they did not have the necessary resources. The only existing forum for this kind of work is the International Energy Agency which, although seen as valuable, tends not to give insight into specific policies detailed enough to serve as credible comparative evidence for policy makers.

Failure to consider a variety of opinions and options can be costly. The National Audit Office's report on the Hinkley Point C (HPC) nuclear power station highlights the sometimes narrow view taken by BEIS. The report found that "the Department did not assess the potential value-for-money implications for bill-payers of using alternative financing models" and "the Department did not sufficiently appraise alternative ways to structure the deal". One consequence of this failure was that "the Department's deal for HPC has locked consumers into a risky and expensive project with uncertain strategic and economic benefits".³⁸

Despite progress in recent years, civil servants with the engineering or technical skills needed to meet the policy making demands of energy transition are not empowered in the same way that other professions are:

"The good engineers that are there tend to be seen as a pain ... The economists are also a pain but they have a set of mechanisms through which to be a pain, through Impact Assessments etc. Ditto the legal team. But while [policy submissions] do go to engineers, there isn't the same level [of oversight], and they're not taken as seriously. This only comes back when there's a big problem – i.e. when the lights go out."³⁹

This reflects a wider critique about civil service policy making – that it elevates economic thinking and metrics over other disciplines. One senior analyst told us that "even when [analysis] purports not to be economic analysis, it ends up as economic analysis".⁴⁰

Too few civil servants have direct expertise and experience of the energy sector to understand and predict the behaviour of commercial actors. Not only is there often a lack of technical expertise, there is also not enough widely diffused knowledge of market structures and financing.

"There is a fear of being outmanoeuvred by company executives, who have seen it all before and been there 20 years ... it's not necessarily that you need a really deep grounding in energy or regulatory economics – although sometimes you do – but often it is more about understanding how the commercial stuff works, understanding why National Grid or British Gas are acting in a certain way."⁴¹

Without practical experience and expertise accrued over time to rely on, civil servants can over-rely on theoretical ideas rather than practical expertise.⁴² There is a danger that commercial naivety, more than a lack of technical knowledge, opens space for policy makers to be swayed by industry.

"The missing link is the how to get stuff done, implementation stuff – Government Science and Engineering feeds into the models well, and [policy makers] take it seriously and the models are good. But there's a big difference between saying nuclear [the correct unit cost of nuclear power] is £70.50 per MWh and building a power station."⁴³

Current and former officials and academic specialists we spoke to were particularly concerned about domestic energy efficiency and the policy of mass retrofit in British homes. Many argue a successful retrofit programme will be essential to meeting our climate targets and ensuring energy is affordable – particularly for the least well off. With retrofit policy, the devil is in the detail – different houses will have very different requirements, and therefore costs and timings will be hugely variable. Many of the interviewees outside government, and some of those inside it, felt that the on-the-ground expertise required for this kind of engineering work was lacking in BEIS.

People in government downplay the importance of personnel churn, but outside observers raise it as a serious problem. The Institute for Government has previously warned of the risks associated with high rates of personnel turnover in government. It saps institutional memory, breaks links with external organisations, and reduces the ability of individual civil servants to acquire deep subject-specific expertise. Several of the people we spoke with highlighted that personnel turnover creates challenges for effective use of evidence in energy policy.

BEIS is not the worst offender in government – in 2017/18 it had the eighth highest turnover rate in government, with 15.7% of its staff leaving, and in 2018/19 this figure went down to 11.7%. Still, the UK civil service has been shown to have internationally high turnover rates in general, particularly among senior staff (the average senior civil servant in the UK remains in post for less than two years).⁴⁴ There can also be high rates of turnover at ministerial level: the UK has had 10 energy ministers in the past 10 years.

Several people we spoke to said that energy policy suffered less than other domains, in part because climate-related policy can attract civil servants who are interested in the specific area rather than in a general career in the civil service. The civil service's turnover figures are not granular enough to verify this, but the department's middling position compared to other departments (11th of 20 departments in terms of percentage of staff leaving) suggests it is plausible. Some people we spoke to said that it would be seen as "weird" for someone to arrive in their team without some background in climate or energy policy, unless they were fast streamers.⁴⁵

Within BEIS, some analysts told us that churn was not a major operational problem – much of what new analysts are required to do is "generic quantitative analysis", and the learning curve of energy-specific knowledge would be a problem only if too many people left at once.⁴⁶ Other senior analysts made the point that there is value in seeding people elsewhere – there are not enough roles for every junior analyst to have a long career in central government, but sending government trained analysts to the private sector or other parts of the public sector could have soft benefits.⁴⁷

Other analysts we spoke to pointed to a problem of institutional memory, particularly among policy makers. We were told this had the effect of recycling ideas, potentially including bad ones: “Policies come round on a five- or six-yearly basis, and corporate memory is slightly less than that – looking back [for evidence] is important, but that knowledge isn’t always to be found in the civil service.”⁴⁸ We also heard that in some analytic roles it can take two years to fully train someone, by which time they are seeking a pay rise, which usually means a different job.

The effects of churn should not be exaggerated, but people outside government are often more concerned than civil servants seem to realise.

The UK’s science advisory structure is built around the network of chief scientific advisers, which means a lot rests on their individual qualities and priorities.

The technical nature of energy policy means that science advice is often part of the evidence base for policy. A key internal structure for ensuring evidence use in the UK government is the network of chief scientific advisers (CSAs), with a CSA in each department. The CSA sits outside the normal civil service career structure – he or she is usually seconded from academia – and this is intended to ensure a more independent perspective.

The CSA has responsibility to oversee the scientific quality of evidence going into policy. The role might include sitting in on meetings discussing a specific policy and highlighting evidence issues, reviewing policy documents, sitting on more formal evidence ‘boards’ that review the evidence going into policies, suggesting people outside government to engage, or having a quiet word with the minister about a policy idea that goes against scientific or engineering evidence. The CSA role also oversees the quality of scientific evidence indirectly, through management of the science and engineering profession in the department. The CSA is also responsible for horizon-scanning and developing the annual publication of ‘areas of research interest’, which aims to facilitate engagement with external evidence providers.

One interviewee familiar with the role told us that it “works largely by influence – you have to become embedded to find out what’s going on ... it’s not so much a formal process.”⁴⁹ This system means that the effectiveness of the system is highly dependent on the individual that takes on the role.

This can have benefits. Some of the interviewees we spoke to highlighted the importance of David MacKay, the first CSA at DECC, in setting the departmental culture around evidence use in energy and climate policy, which has largely survived into BEIS. Several engineers we spoke to credited MacKay with embedding a much improved (though still not perfect) position for engineering within BEIS’s analysis function – and John Loughhead, the BEIS CSA until this year, is also an engineer by background.

Nevertheless, the CSA is not structurally “in the centre of *policy debates*”.⁵⁰ This was described as a problem given the importance of science and engineering evidence in energy.

Germany

Responsibility for energy policy in Germany is less centralised than is the case in the UK. The Ministry for Economic Affairs and Energy (BMWi) is responsible for federal energy policy, but climate change policy (including carbon pricing and emissions regulations on the energy sector) is managed by the Ministry for Environment, Nature Conservation and Nuclear Safety (BMU). Germany's federal structure also leaves much energy policy implementation in the hands of Länder governments. Major energy policy frameworks are determined at the federal level, with considerable involvement of the Länder through their representation in the Bundesrat, the second chamber of Germany's parliament.

It might be expected that the dispersion of responsibility for energy policy would create barriers to effective evidence sharing, but we heard that the multi-layered system could be valuable: the process of policy contestation and consensus-building between the various federal and state ministries creates opportunities for policies to be challenged with a broad range of disciplinary perspectives and forms of expertise. Political scientists have described German policy making as relying on "advice by dialogue [and discourse] ... very far from traditional textbook accounts of policy analysis".⁵¹

The fact that the federal government is reliant on Länder governments to implement many of its policies means federal and Länder institutions have to have strong working relationships and be capable of "a high degree of co-ordination."⁵²

The federal departments (BMWi and BMU) are seen by outsiders as having strong technical competence, but they do not undertake significant technical analysis in-house. Modelling and detailed techno-economic analysis, much of which would be conducted internally within BEIS in the UK, is outsourced to external policy research institutions and consultants. We were told that BMWi relies on others for "number crunching."⁵³ Science advice is also external: there is no analogue to the UK chief science adviser, and instead departments consult science advisory councils.

Most federal civil servants in Germany are recruited as policy generalists, rather than analysts. Traditionally, a large share of federal civil servants in Germany have had legal backgrounds, and we heard that this remains true at BMWi, alongside those with training in macroeconomics.⁵⁴ There is no equivalent to the UK distinction between analysts and policy professionals.

We heard from interviewees that there is relatively little 'churn' in government ministries.⁵⁵ This means that although recruited as generalists, people do acquire deep subject-specific expertise over time. However, in contrast to concerns over excessive churn in the UK, there are some in Germany who believe that civil servants should be encouraged to move more, to avoid a culture of jobs-for-life and to stop staid departmental orthodoxies from becoming too entrenched.

We also heard that long-standing civil servants often become associated with particular political positions on policy questions – they become part of wider advocacy coalitions.⁵⁶ Individual civil servants become known to be sympathetic to particular policy agendas or issues, and are key contacts for advocates outside government. Political party membership among civil servants is widely accepted, and often the party affiliations of civil servants are widely known.⁵⁷ A recent study found that around 10% of senior civil servants in Germany worked previously at a political party.⁵⁸

The long tenure of many civil servants in particular ministries – and the close relationships with those outside government that this can foster – was argued to be a factor in the ‘dieseltgate’ scandal, with government too close to Volkswagen to be an effective regulator of VW’s claims about pollution.

The Netherlands

The Dutch energy department relies on external bodies for evidence and analysis.

Energy policy in the Netherlands, as in the UK, is managed by a department that covers business, energy and climate change. Unlike BEIS, the Ministry for Economic Affairs and Climate (EZK) has relatively few analysts.⁵⁹ Civil servants do conduct some detailed analytic work, but on a much smaller scale than in the UK. Dutch civil servants said that the system had shifted over the years away from internal capacity towards a ‘process management government’, something also noted by other researchers.⁶⁰

The Dutch system thus emphasises external evidence providers: civil servants need to know where get to the right knowledge or expertise, rather than produce it internally. The relative weaknesses of EZK in terms of policy research and analysis capacity is by design. We heard that the Dutch system would view exclusive reliance on internal analysis with suspicion, since this would be less transparent, and not seen as independent.⁶¹ Because they view themselves largely as process managers, the Dutch civil servants we spoke to felt it was important to maintain a clear distinction between themselves and their independent agencies: “We have the agencies because we want them to do the calculations – why would we duplicate the analytic effort?”⁶² This is similar to the German system, in which analysis and evidence are largely external. This system extends to science advice: rather than having an internal chief scientist, the Netherlands relies on external science advisory councils.

A great deal of analytic work is outsourced to a wider set of consultants and government agencies. The most prominent among these external bodies are the planning bureaus, which we cover further below. Private consultants also play a major role. EZK relies on these external actors for the analysis underpinning impact assessments, energy modelling and policy research.

In line with reliance on external analytic capacity, EZK does not have distinct ‘analyst’ roles or a distinct analysis function – it is integrated with policy. We heard that the strategic analysis and energy and climate sections of the department have relatively little engineering expertise, and that economists dominate (though some civil servants come with an explicitly environmental background).

The Dutch civil service has formal guidelines that encourage senior civil servants to stay in post for a minimum of three years to prevent loss of institutional memory. This guidance was introduced for the senior civil service, but increasingly applies to more junior levels. There is also a maximum expected tenure of seven years, to prevent stagnation and to avoid civil servants becoming too closely linked to specific issues or policy positions. The expected average tenure in post is five years.⁶³

Canada

In contrast to the UK, energy policy is not centralised in Canada. Provinces and territories are responsible for managing electricity and heating fuel markets, and they run energy efficiency programmes.* Natural Resources Canada (NRCan), a federal department, is responsible for energy innovation and promoting the development of energy resources, including renewables. NRCan supports provinces and territories to deliver energy efficiency regulatory systems (such as building codes) and programmes.

Climate change policy, including carbon pricing and emissions performance standards on the energy system, is also an area of shared competence between federal and provincial levels. The division of powers has been deeply contentious: a series of court cases has challenged the constitutionality of Canada's Greenhouse Gas Pollution Pricing Act, a centrepiece of federal climate policy. At the federal level, climate change policy is managed by Environment and Climate Change Canada. ECCC also provides support to provinces through the Low Carbon Economy Fund.

We heard from several interviewees that sharing of responsibility for energy between provinces and different federal departments creates barriers to effective evidence sharing. Some from outside government referred to 'turf wars' between federal departments, though this was disputed by federal policy analysts. In some areas, like electricity policy, we heard that there is very little interaction between federal and provincial analysts, or between analysts from different provinces.⁶⁴ However, in areas in which there is greater shared competence, such as climate policy, analytic interaction between analysts at ECCC and those in provincial ministries of the environment is routine.

The contrasts with the other federal government structure in our study – Germany – are interesting. Germany's consensus-oriented governance style, and the role of the Bundesrat in shaping federal government policy, drives what can be a fruitful sharing of different perspectives and evidence between federal and subsidiary levels. This does not happen to the same extent in Canada, where exchange of analysis and evidence between levels of government appears to be patchier. However, this strength of Germany's system comes at a cost – the presence of numerous 'veto players' can result in gridlock, or consensus around lowest common denominator positions.⁶⁵

* In Canada's federal system there are ten provinces and three territories. For brevity, these subsidiary levels of government are referred to as 'provinces' throughout the rest of this report.

The federal government has a strong internal analysis and modelling capacity.

Like in the UK, the Canadian government maintains analyst teams producing impact assessments, ex-post evaluations, and running energy models. The structure is similar to that found in BEIS, with some analysts embedded in policy teams, alongside some central analysis units.

Provincial energy departments generally have weaker analytic capacity, in that they have fewer analysts and less capability for in-house modelling, for example. Historically, the federal government has tended to recruit people with higher levels of training in policy analysis.⁶⁶ There is also significant variation among provinces. Typically, provinces have strong knowledge and expertise in implementing energy efficiency programmes,⁶⁷ and in managing power markets, but weaker capacity than the federal level for strategic long-term policy analysis.⁶⁸ This has sometimes resulted in external consultants playing a significant role in policy discussions – we heard, for example, about a consultant attending a provincial cabinet meeting.

The federal government does sometimes support provinces with policy analysis. We heard about a case in which a province had produced some flawed analysis, and federal government modelling teams then got involved to help the province improve the work. The case exemplifies the weak capacity of some provinces to manage complex analysis effectively. Provincial auditor general offices (equivalents to the National Audit Office) have on occasion highlighted weak use of evidence in provincial policy, as in a recent case in Ontario in which the provincial climate plan was judged to be “not yet supported by sound evidence”.⁶⁹

We also heard that provinces have a weaker capacity to develop new policy ideas internally.⁷⁰ In the provincial energy department we spoke to, new ideas come from the minister’s office or from outside the department: policy analysts are there to assess these ideas from outside, rather than to come up with new policy proposals.

Canada’s system of science advice is broadly similar to the UK, but it has been unstable and in recent years has become deeply political (see Box 3).

Box 3 The politics of science advice in Canada

Canada has followed the UK model in appointing a government chief scientific adviser. While not all government departments have a CSA, both departments relevant for energy policy (NRCan and ECCC) do have one.

Science advice in Canada has been unstable, and not always adequately resourced. The lack of political consensus on climate change in Canadian politics, driven in part by the importance of fossil fuels to some provincial economies, has compromised the perceived neutrality of science advice in energy policy.

First established in 2004, the chief scientific adviser role was abolished in 2008 under conservative Stephen Harper, and then reinstated by the liberal Trudeau administration in 2017. A similar pattern has played out in provinces. In 2017 the Ontario liberal government introduced a chief scientific adviser role that was then abolished by the incoming conservative provincial government after less than a year. A similar churn has occurred with science advisory councils. Harper replaced three science advisory councils, whose deliberations had largely been public, with the Science, Technology and Innovation Council (STIC), whose deliberations were largely confidential. STIC has now been replaced by the Trudeau administration.

Science was a prominent political issue in the 2015 federal election that brought the Trudeau administration to power. Government science budgets had been cut, and the Harper administration had tightened control on the public statements of government scientists. Trudeau's reinstatement of a chief scientific adviser role can be seen as a political statement as much as a substantive change in policy advisory structures.

France

In France, energy is the responsibility of the environment department. The Ministry for the Ecological and Inclusive Transition (MTES) was recently renamed – the emphasis on inclusion a response to the *gilets jaunes* protests sparked by carbon prices on fuel.

MTES is seen as having strong internal technical expertise. MTES is a large department, responsible for energy, environment, transport and housing. Within MTES, the Direction Générale de l'Energie et du Climat takes responsibility for energy and climate policy. The department's technical capacity and understanding of the energy system was judged to be high by the interviewees we spoke to. As in the UK and Canadian systems, MTES conducts significant in-house analysis and research – but unlike them it does not have internal energy modelling capacity.

We also heard the view that MTES has relatively weak social science capacity in comparison to technical expertise: one interviewee argued that if MTES had been more attuned to social issues the *gilets jaunes* reaction to carbon pricing might have been

avoided. In that specific case, there had been little focus on the potential distributive impacts of the carbon tax on road fuels, and the impacts that this might have on different demographics and communities.

Some interviewees said that the analytic strength of MTES is partly a result of the French tradition of sourcing civil servants from elite *grandes écoles*, of which many are technical and engineering schools. Data from LinkedIn, the professional social network service, shows the top 15 universities that MTES employees attended (self-reported). The most frequently listed institution, with 310 alumni, is the Ecole Nationale des Travaux Publics de l'Etat (ENTPE), the National School of Public Works of the State. ENTPE is formally attached to MTES and is intended to train (mostly civil) engineers to work for the state.⁷¹ Three other institutions in the top six are also highly regarded *grandes écoles* specialising in engineering or technical sciences, including the Ecole Polytechnique (with 129 graduates listed among the 4,191 MTES employees on LinkedIn).

In energy policy and in the energy industry, senior positions are often occupied by members of the Corps des Mines – graduates of a specialist technical training programme at the Ecoles Normale Supérieure des Mines de Paris. The influence of Corps des Mines graduates divides opinion in France. Some argued that the school largely trained engineers to manage an energy system that is going out of date: a state-led nuclear near-monopoly. We heard that this conservative tendency in the Corps des Mines had resulted in a bias against renewables, for example.⁷² They also said that the prestige attached to the school and the closeness of its alumni networks meant that senior industry figures and senior government decision makers were too similar, and that it was too easy to move between the two worlds. Others argued that the corps, though elite, was “not a secret society”, and their technical education strengthened civil service capacity.⁷³

The significance of the Corps des Mines is arguably as much about the relationships that sustain the network's importance as the technical education itself. It is regularly argued that state-owned energy company EDF has an overly strong influence on French energy policy making – partly this can be explained by the social and professional ties that bind senior EDF figures and civil servants together.

A traditionally technocratic system is opening up. For many years EDF, the state-owned electricity and nuclear power giant, played a central role in policy development as the monopoly provider of electricity. Energy policy was a technocratic affair, dominated by a strong belief in nuclear power that was widely shared by the public at large as long as energy bills stayed low. This picture has shifted in recent years, in part because of European directives requiring liberalisation of the energy system, and in part because of the need to transform the system further to meet decarbonisation objectives, in part through increased use of electric power in transport and industry. EDF's historic role has weakened substantially, though it is still seen to have a strong influence over French energy policy.

Advisory bodies

Advisory bodies play important roles in the advisory systems of all the countries we examined. While all the countries examined convene ad hoc advisory groups to provide input into specific issues, we have focused on the formal organisations that are part of the permanent policy making architecture.

Advisory bodies differ in function. Some are focused on reactive, short-term advice. This includes input into immediate decisions, which may be significant (for example, emergencies, responses to a crisis or significant event), or more procedural (a decision to commission further evidence). Others provide more detailed analytic input into the development and appraisal of policy options, or evaluation and learning from them. Many are focused on longer-term strategic issues, or guidance on particularly contentious disputes, particularly those with a significant science component.

The diversity of institutional forms of advisory bodies defies simple categorisation. Key dimensions include:

- Degree of government control
- Scale and depth of research activity
- Credibility conferred by research base, or by eminence of a council or panel
- Degree to which non-evidence roles are involved (business groups, unions, etc.).

Previous Institute for Government work⁷⁴ has highlighted some of the 'design features' that may be necessary for such advisory or expert bodies to play an effective role, and these are echoed by work from political scientists:

- Independence and credibility (and resourcing models that enable this)
- Strong institutional reputation
- Transparency
- Access to government information, and capacity to develop a robust evidence base
- Clearly linked into the policy process.

These design features introduce a tension. Proximity to policy makers is likely to mean that the evidence and advice produced is more directly relevant and useful to decision making. But it also means that the perspective of the advisory body is coloured by political concerns, and it is likely to diminish the body's scientific credibility and apparent independence. Advisory bodies that are more independent from government may find it easier to establish the scientific credentials of their evidence, but are

likely to face a greater struggle in making that evidence relevant for policy audiences. Successfully navigating those trade-offs between credibility and relevance is a central challenge for advisory bodies, and can often depend on the skills and influence of their leaders.*

UK

BEIS has a large number of analysts and produces a great deal of relevant evidence internally but it still makes use of external advisory bodies. There has been some churn in arm's length bodies with advisory roles relevant to energy policy in the UK in recent years. However, this can be seen as a productive evolution of institutions rather than change for change's sake.

The Climate Change Committee (CCC) is the most prominent advisory body in the UK's energy policy landscape. It is very widely respected within the UK, and seen as a strong institutional vehicle for rigorous evidence and analysis in UK policy. The basic structure of the CCC is an expert panel (the committee itself, which meets monthly) supported by a secretariat of around 30 staff. It was established through the Climate Change Act 2008, and has statutory responsibilities to advise government on climate change targets and carbon budgets, and on climate mitigation and adaptation policies. Although the government is able to reject the CCC's proposed carbon budgets, in practice it finds it difficult to be seen to be out of step with them (in part because of their statutory role, and in part because of the strong analytical reputation the CCC has established). To date, the government has accepted all the proposed carbon budgets, with only minor divergences.

The CCC has strong connections with government – BEIS representatives sit on steering committees for CCC projects, and sometimes sit in as observers on committee meetings. A memorandum of understanding agreed in the early days of the CCC sets out an expectation that the CCC and government departments and devolved administrations will share analysis, and those we spoke to felt that this works well. Despite this close working relationship, the committee has established a clear record of independence, highlighting where it disagrees with government assumptions or analysis, and pointing out where policy measures are unlikely to deliver intended outcomes.

Like all advisory bodies, the CCC is sometimes used in an attempt to defuse a politically difficult situation. The fraught position on nuclear power within the coalition government is a good example: the Liberal Democrats were strongly anti-nuclear, and were insistent on a 'subsidy-free' approach. The government essentially wanted to ask the CCC how a support scheme for nuclear could be developed that would comply with this 'subsidy-free' approach. Rather than put that question directly, the government put the problem to the CCC in the form of a question on renewables, but it was widely understood that the answer it wanted was about nuclear.

* It is also a widely observed tension in science advice for policy. See Cash D, Clark W, Alcock F and others, 'Knowledge systems for sustainable development', *Proceedings of the National Academy of Sciences*, 2003, vol. 100, no. 14, pp. 8086–8091.

The CCC is envied and emulated overseas as a model institution for effective climate policy governance. It meets the criteria for an effective evidence institution (that is, independence, strong reputation, access to government, capacity to develop robust evidence, transparency). The CCC plays a role in strategic policy issues, and in holding government to account. It plays a smaller role in the detail of policy instrument design, which is largely managed internally.

Despite its strengths, the CCC is a small organisation and has a strict core mandate related to the UK's carbon budgets and overall approach to combating climate change. It therefore cannot be expected to serve as an advisory body in other areas of energy policy. Even within its existing mandate, the CCC's own leadership has acknowledged that it is now entering a new phase in its relationship to government. By December 2020, the CCC will have advised on carbon budgets that take the UK up to the point of its net zero mid-century target. Its leadership now envisages placing more emphasis on scrutiny of government action. The Institute for Government has recently recommended that the CCC's budget and remit be reviewed, and possibly strengthened, to ensure it has the analytical capacity to constructively meet its changing role.⁷⁵

There are other public advisory institutions but none as prominent as the CCC.

The Energy Systems Catapult (ESC) is funded by UK Research and Innovation (UKRI) to "accelerate the transformation of the UK's energy system", and was established in 2015.^{*} It has 170 staff, and much of its activity is focused on supporting companies to develop and commercialise energy-related innovations.^{**} It also has substantial energy policy analysis capabilities, including in-house energy system modelling. We heard that ESC has a stronger engineering perspective than BEIS, and that it has closer connections with the on-the-ground experiences of businesses in the energy sector.

ESC has a close relationship with parts of BEIS – particularly the innovation teams that identify priority areas for support, such as the Science and Innovation for Climate and Energy Directorate (SICE). The mandate for ESC to play a role in policy advice has not always been clear. As one of our interviewees put it:

"The ESC is caught between two stools, in that it has the analytical [capability], but is not a think tank. The Treasury get very cross when it goes off and does think tank stuff, because in their view it is funded to deliver energy innovation outcomes. But [parts of BEIS] do want it to wear both hats ... we drive it to be a think tank because we want an independent analytical viewpoint."⁷⁶

Although its primary funding is to foster innovation, it is clearly regarded as a valuable source of advice and evidence – and its independence is seen as an important part of that.

^{*} UKRI is the UK's national funding agency investing in science and research, and is made up of seven public research councils, Innovate UK and Research England.

^{**} The Energy Systems Catapult is part of a wider 'Catapult Network' of technology centres designed to drive innovation in nine key sectors, including cell and gene therapy, high value manufacturing, medicines discovery and others.

The UK Energy Research Centre (UKERC) also plays an important role as an academic body that engages with policy debates and international energy research. It is independent, with institutions spread across the UK, also funded through UKRI.⁷⁷

The Committee on Fuel Poverty was established as an advisory non-departmental public body in 2016, replacing a long-established fuel poverty advisory group. The committee provides an annual report, along with occasional responses to consultations and strategy documents. It has very limited resources for analysis: there are no analysts directly employed to support it, and it has a small budget for research (£100,000 in 2017/18, the most recent year for which data is available⁷⁸). Instead, the committee works with the fuel poverty team within BEIS, or draws on research by the Climate Change Committee. A recent review found that the committee has not yet made a clear or substantial impact on policy, though the review argued it may be too soon to judge such a recently established body.⁷⁹ It was not highlighted by our interviewees as a key source of evidence for energy policy debates in the UK, though this may reflect that we did not specifically focus on fuel poverty as an issue.

The National Infrastructure Commission (NIC), formed on an interim basis in 2015 and then as an executive agency of the Treasury in 2017, is also a relevant player. The commission consists of a panel of independent experts, supported by a civil service secretariat of about 40 people, who advise government on critical infrastructure issues, submit a National Infrastructure Assessment in each parliament, and scrutinise the government's implementation of its economic infrastructure commitments.* Unlike the Climate Change Committee, however, the NIC is not established by law. The Institute for Government has previously recommended that the NIC be given a statutory footing, to ensure its independence.⁸⁰

The NIC comments on transmission grid infrastructure, interconnection with neighbouring countries, electric vehicle charging infrastructure, new-build nuclear financing, and other energy-related infrastructure challenges. It also reports on the regulators of the sectors it covers. In 2019, it recommended that Ofgem (along with Ofwat and Ofcom) be given new duties to promote the achievement of the government's net zero carbon target.⁸¹

Germany

Germany relies heavily on external organisations for evidence to inform policy, with weaker in-house capacity than BEIS for technical, quantitative or research-intensive analysis. The system of advisory bodies is thus a critical part of Germany's system for using evidence in policy making. The system has been stable: many of the most prominent organisations were founded more than 20 years ago.

* The NIC defines economic infrastructure as energy, transport, water and wastewater, waste, flood risk management, and digital communications.

Independent policy research institutions play a substantial role in the policy debate.

Prominent examples include the Agora Energiewende, Fraunhofer ISI, the Potsdam Institute for Climate Impact Research (PIK), Prognos and the Oeko-Institut. There are a variety of institutional forms, but essentially most of these receive core funding direct from the concerned Ministries, either at Federal or State level. They also then are contracted to produce specific pieces of analysis in support of policy formulation.

These research institutes enjoy a high degree of autonomy from government in day-to-day project selection and research work, with full independence around publication and recommendations. This level of autonomy was recommended in a review in 2007 of these research centres, which argued that independence was essential to ensure the quality of evidence produced.⁸² However, they also work hard to establish and maintain strong relationships with government. In other words, they work to establish a capacity for independent and rigorous (and therefore scientifically credible) advice, while at the same time investing in the relationships that enable this advice to be politically salient.

We heard from some interviewees that the institutes are often seen as ‘belonging’ to a particular ministerial perspective, or wider advocacy coalition, with clear positions on environmental and energy questions.⁸³ These institutions also participate in academic research projects, and are often involved in European energy policy debates as well as those within Germany.

Permanent advisory councils are used by ministries for reactive advice and for addressing long-term strategic issues. Germany has a long-established system of science advisory councils. The most relevant, from the perspective of the energy policy, are the SRU (the science council on the environment) and the Wissenschaftlicher Beirat (the economic council). The SRU is attached to the federal Ministry of Environment (BMU), and appointees have to be approved by cabinet. These councils have small secretariats, so while they do get involved in ongoing policy debates (through consultations or parliamentary hearings), they are typically focused on strategic questions about policy direction and policy goals.

Political parties play a more prominent role in developing evidence than in the UK.

This is largely through their affiliated (and state-supported) think tanks.⁸⁴ Parties play an important role in enabling the flow of evidence and expertise among federal states, since parties operate across states and are often in government in one more states (the Greens, for example, are in governing coalitions in 11 states, and so share analytic capacity and policy ideas around this network).⁸⁵ Unlike the UK, there is generally a small role for independent think tanks,⁸⁶ which are seen as being an ‘Anglo-Saxon’ phenomenon.⁸⁷ The Agora Energiewende is an interesting new think tank that plays an important role facilitating dialogue between senior political, business, labour and civil society interests. It hosts a quarterly meeting of its council, which is attended by federal and state ministers, MPs, CEOs and trade union leaders.

Advisory bodies have clearer policy positions than is the case in the UK. We heard from interviewees that many of the research institutes and advisory councils are seen as associated with a particular ministerial perspective, or wider advocacy coalition, with clear positions on environmental and energy questions, often influenced by their disciplinary or professional outlook.⁸⁸ For example, the SRU is widely seen as 'belonging' to the BMU, and in general to a pro-environment advocacy coalition – despite the best efforts of the SRU itself to build broader political relationships.

Box 4 Energiewende shows effective evidence does not need to be politically neutral

Under its Energiewende, or energy transition, Germany has committed to end all nuclear energy production by 2022, and all coal production by 2038. Both phase-out policies were the result of decades-long political contestation, with formal evidence institutions like research centres and universities key actors in competing advocacy coalitions made up of parties and interest groups.

Nuclear and coal have been divisive issues in German politics since at least the 1970s – opposition to nuclear power was the founding cause of the Green Party, and coal is central to the politics and identity of several important German states, and to the Social Democratic Party, one of Germany's two main parties and the historic representatives of the German working class. Over time, nuclear power in particular became a totemic issue in the Germany research community, a matter of values that signalled where one stood on a whole range of other issues.

Research evidence played a key role in demonstrating the feasibility of a German energy future without nuclear (and, later, coal) – for example, Oeko-Institut modelling for a 1980s Enquete inquiry helped bring the idea of a non-nuclear pathway from the margins into public debate.

In both cases, stakeholder commissions played an important role in synthesising difficult politics and conflicting evidence. In 2002, after several years of negotiation with industry groups, the SPD-Green government fixed the limits of existing nuclear plant operations at 32 years. Although this decision was briefly reversed in 2010, public reaction to the 2011 Fukushima disaster (and bad results for the ruling CDU in an election in Baden-Württemberg) prompted Angela Merkel to appoint an ethics committee on safe energy supply, comprised of representatives from industry, research and politics, to report on the future of nuclear power in Germany. Within six weeks, the committee recommended nuclear phase-out within 10 years, and stricter emissions reduction targets.

In 2018, the SPD-CDU grand coalition established a multi-stakeholder Coal Exit Commission to decide the future of coal. The function of this committee was to overcome the political impasse that cut across parliament, regions and the government. It also served, in the words of one participant, as a "painful process of societal learning for the regional policy and energy policy siloes".⁸⁹ Eventually,

the committee reached a near unanimous (27 of 28 members) verdict, calling for an end to coal-fired power generation by 2038 at the latest.

Participants in these stakeholder commissions we spoke to said they were about taking existing, evidenced positions and finding a consensus policy position that government could safely sign up to. They were extensions of debates, and processes of evidence generation, that long preceded them.*

The German layered, multi-party federal system elevates the importance and visibility of competing parties arriving at consensus, but any major strategic policy choice will involve a version of this process. The long process of political contestation around nuclear and coal involved a battle of ideas and evidence alongside party politics and interest groups. At a strategic level, how evidence is enrolled into advocacy coalitions, and how government brings conflicting coalitions to a joint position, is even more vital.

The Netherlands

The Netherlands has a long history of external advisory bodies, a result of the country's consensual approach to policy making. The Dutch ministry for economic affairs and climate (EZK) relies on these arm's length institutions for analytic support. This includes both longer-term strategic questions, as well as analysis in support of current policy, such as cost-benefit analysis for policy appraisal.⁹⁰ Like in Germany, the Netherlands has seen stability of these institutional arrangements over many years.

The planning bureaus play a central role. The CPB (Central Planning Bureau) provides research and advisory support on economic issues, including those related to energy. It conducts policy appraisal for government departments, including detailed cost benefit analysis, economic forecasts, and labour market analysis. For its impact on the Dutch policy landscape it is small, with only 135 employees.⁹¹ A similar organisation dedicated to environmental and infrastructure issues, including energy modelling, is PBL (the Environmental Assessment Agency).** PBL has a strong research capacity, with 253 employees, and plays a leading role in international energy modelling efforts that inform the Intergovernmental Panel on Climate Change (IPCC), the UN body responsible for providing scientific, technical and socio-economic information and analysis on climate change.⁹²

These planning bureaus are involved in long-term strategic analysis, reactive expert advice, and detailed policy analysis that informs policy design. This means that impact assessments and cost-benefit analysis for specific policies is often assessed by the planning bureaus and published independently.

* The Ethics Committee was, in fact, led by a veteran of the nuclear debate, one of the first ministers of the BMU when it was established in 1986 after the Chernobyl disaster, Klaus Töpfer.

** Although the structures differ, most major government departments in the Netherlands have an equivalent advisory body attached to their work. The only other 'planning agency' like the CPB and PBL is the Institute for Social Research (SCP), but there are advisory councils for international affairs, education, culture, public administration, environment and infrastructure, rural areas, transport and public works, migration, and health.

Planning bureaus are formally part of central government, but they are operationally independent. Despite being a part of the civil service (the CPB director sometimes attends cabinet), the planning bureaus maintain operational independence. They consult closely with government in establishing their work programme, but they can and often do turn down requests from EZK to perform analytic work, and they have complete independence to publish their research without oversight from the minister.⁹³ They have a strong reputation for independence and high-quality research and analysis, which places them (usually) outside the political fray.

The Netherlands also has an extensive system of advisory councils. There are two basic types: science advisory councils, for which the focus is impartial expert and science advice; and stakeholder councils, which provide deliberative forums for building consensus across business, labour and other interests. The science advisory councils tend to be oriented towards long-term strategic issues, or those that are scientifically or ethically contentious, rather than detailed policy design or reactive policy advice. These advisory councils are less intimately connected with policy than the planning agencies, even though they are organisationally part of ministries and are asked to comment on specific topics. In practice, we heard that their reputation and influence is weaker than the planning agencies, and that they sometimes “struggle for attention”.⁹⁴

The Dutch system bears some similarities with the German one: the energy ministry looks externally to arm’s length bodies much more than seems to be the case in the UK. Unlike in Germany, the Dutch system emphasises the political neutrality of evidence for policy. The planning bureaus and science advisory councils aim to limit themselves to technical or scientific issues, while the stakeholder-based advisory councils aim to produce consensus advice based on negotiation and compromise between interest groups.

Canada

Canada’s energy policy advisory system is closer to the UK than those seen in Germany or the Netherlands. Canada relies on internal government analysis or directly commissioned private consultants, rather than external bodies. Canada’s recent history of energy policy advisory bodies has been more turbulent than in the UK or other countries.

Canada lacks long-established arm’s length advisory bodies on energy policy. From 1988–2012, the National Round Table on the Environment and the Economy (NRTEE) was an arm’s length policy advisory body that advised government on energy-related issues. It was abolished in 2012, and a minister at the time, John Baird, explained the decision: “Why should taxpayers have to pay for more than 10 reports promoting a carbon tax, something that the people of Canada have repeatedly rejected? ... It should agree with Canadians. It should agree with the government.”⁹⁵

Since the demise of the NRTEE, there has been no permanent advisory institution in a comparable role. Recently, the federal liberal government has funded the creation of a new independent body, the Canadian Institute for Climate Choices. This is more

independent than the round table had been, with no government role in appointing members. However, it has been funded for only five years, and has a less institutionally durable form than the NRTEE, which was established by statute. Several interviewees we spoke to in Canada, inside government and in academia, felt that the absence of an advisory institution with any staying power made their energy policy system weaker – although this absence is more a symptom, rather than cause, of the deeply contested political space energy issues occupy in Canada.

Advisory bodies on energy policy have also been vulnerable at the provincial government level, illustrated by Ontario. An arm's length advisory body, the Environmental Commissioner of Ontario (ECO), was abolished by the incoming provincial conservative government in 2019. The ECO consisted of a single commissioner, with a secretariat of around 30 staff, whose role was established by statute (the Environmental Bill of Rights). Institutionally, ECO was an office of the auditor general of Ontario, which reports to the provincial legislature. There were close relationships with the civil service, with the commissioner briefing senior civil servants on reports, and drawing on civil servant expertise in developing the analysis. Even so, interviewees we spoke to stressed the independence of ECO (in both institutional terms but also how it was perceived), and some felt it had acted as much like an advocacy organisation as a part of government. The influence on policy was largely either indirect (supporting a broader advocacy coalition of pro-environmental actors) or informal, and through a focus on broader strategic issues rather than the nitty-gritty of policy design.

The Council of Canadian Academies (CCA) helps develop evidence on long-term or contentious scientific issues including on energy policy. The CCA is a partnership of three scientific academies: the Royal Society of Canada, the Canadian Academy of Engineering, and the Canadian Academy of Health Sciences. The only mode through which the CCA engages with policy is through a process of conducting in-depth reviews on specific policy-relevant issues. The CCA is funded by the federal government, and federal departments suggest review topics. The CCA chooses which topics it thinks are most worthwhile, and then assembles a panel and conducts the review. CCA reviews tend to be on strategic and contested issues, or those that are emerging on the policy agenda but not yet a major policy issue. It thus plays a role in clarifying scientifically contentious issues, but it does not directly feed into specific policy decisions or processes. Opinions varied as to the degree of influence that CCA has in setting or influencing the policy agenda. Its demonstrable impact has been limited, at least in part due to the same stymieing influence felt by other scientific bodies under the Harper administration.⁹⁶ However, this is not to say that the institutional model it represents could not be effective in a different political context, where external advice and expertise was more valued and actively sought.

France

Like the UK, France has a strongly centralised governance structure for energy policy. The role of independent advisory bodies is correspondingly weak, with the major exception being ADEME (Agence de la Transition Ecologique).^{*} ADEME houses a significant research capability, including policy advisory research activities. This includes energy modelling expertise, and the development of long-term energy scenarios. It has some similarities with the Energy Systems Catapult in the UK, as an entity that supports innovation projects but also provides evidence on policy issues. The energy ministry relies on ADEME's expertise in scenario design and research to inform impact assessments and, in some cases, policy design. We heard that ADEME was particularly influential in shaping the roadmap for smart grids in France, and that its 100% renewable energy scenario in 2016 had a major influence on the French decarbonisation debate. Key to ADEME's usefulness for policy makers, according to multiple interviewees, is its closeness to local implementation and innovation, particularly on renewables and energy efficiency schemes.

France recently established a new advisory body modelled on the UK's Climate Change Committee. The Haut Conseil pour le Climat (HCC) was established in 2019. Its role is to issue advice and recommendations to government on policies in line with the 2015 Paris Agreement and, more recently, the commitment to carbon neutrality by 2050. It publishes annual emissions reports and judges whether or not France is on track to meet its targets, and will publish five-yearly reports to support the development of the national low carbon strategy. It is closely modelled on the UK's CCC – to the extent that its founding chair is a member of the UK committee.

A central government think tank, France Stratégie, provides some strategic input on energy policy, but the role appears to be small. France Stratégie has two core roles in shaping evidence for energy policy. The first is indirect: France Stratégie is responsible for the French equivalent of the UK Green Book. The second is direct, but less influential: France Stratégie has a small energy team (3–4 people), which produces analysis and strategic advice on energy policy questions. It lacks the capacity to commission detailed evidence or analysis on energy.

Evidence from regulators and delivery bodies

The governments we examined have all developed various dedicated advisory bodies that have a role in providing evidence for policy development. Governments also make use of evidence provided by regulators and bodies whose primary role is policy delivery.

Electricity and gas networks are natural monopolies. They require careful management to ensure that supply is not interrupted, that investment is sufficient to ensure future supply, and that consumers are protected from pricing that exploits the monopoly position. The institutions established to manage these systems (the 'system operators') and to protect consumers (the regulators) also contribute to energy policy debates.

^{*} Formerly known as Agence de l'Environnement et de la Maîtrise de l'Energie, the Agency of the Environment and Energy Management.

In the UK, the energy regulator Ofgem plays a significant role in shaping the energy system. The most visible of these roles is through its price regulation framework, which seeks to balance the interests of consumers and investors. The price control process determines the scale of investment into new electricity and gas infrastructure, and consequently plays a key role in shaping the development of the system. When they were first established, Ofgem's predecessors (Ofgas and OFFER – offices of gas and electricity regulation respectively) were focused solely on price regulation to protect consumers through the price control process. Over the years, Ofgem's role has become more active, seeking to encourage competition through promoting consumer switching for example, or restricting companies' ability to charge more to customers that fail to shop around for cheaper tariffs. Ofgem's remit has also broadened from its early narrow focus on price for consumers. Since 2004, it has had a duty to take account of sustainable development, and since 2010 the 'interests of consumers' is to include "their interests in the reduction of greenhouse gases [and] in the security of the supply of gas and electricity to them".⁹⁷

In addition to its regulatory role, Ofgem also administers a wide range of government policy programmes: the Renewable Heat Incentive (a financial incentive for homes and businesses to switch heating systems), feed-in tariffs (payments made to people or businesses with renewable generation capacity exporting energy to the national grid), the Energy Company Obligation (energy supplier efficiency requirements) and many others. Ofgem also administers a large innovation programme funded by energy networks: the network innovation competitions.

To manage these various responsibilities, Ofgem is big. It employs 880 people, including at least 70 economists and 10 social/behavioural researchers. Ofgem analysts have been proactive in developing evidence: a good example is a randomised controlled trial of methods to prompt customers to switch to a cheaper tariff.⁹⁸ Despite a smaller analytic team, Ofgem staff have contributed to academic journal articles, providing evidence on energy issues more than their counterparts at BEIS.*

In some areas, Ofgem plays a direct role in providing evidence for policy development. A concrete recent example is that Ofgem has been supporting the Treasury (HMT) and BEIS in considering new models for financing nuclear power and renewables. One possible option is to treat these generation sources as infrastructure, much like the energy networks that Ofgem oversees, through a 'regulated asset base' model. Ofgem's practical experience of running such a system has been in demand from both BEIS and HMT, both of which lack direct experience in administering this kind of model.

National Grid ESO, as the system operator, is also a source of evidence, drawing on its expertise in managing the energy system and demand forecasting (using complex modelling of long-term energy scenarios), and through its work planning long-term future infrastructure requirements.** As in other countries, the system operator plays a

* IfG analysis using data from the Scopus database of academic journal articles: Ofgem has produced around 10 energy-related journal articles in the past decade, compared to five from BEIS. Note that during this time staff at Defra and DfID have contributed to several hundred journal articles, illustrating different cultures of civil service engagement with academia.

** France, Germany and the Netherlands all operate a similar system, with a private system operator overseen by a regulator. In Ontario, Canada, the system operator is a non-profit established by statute.

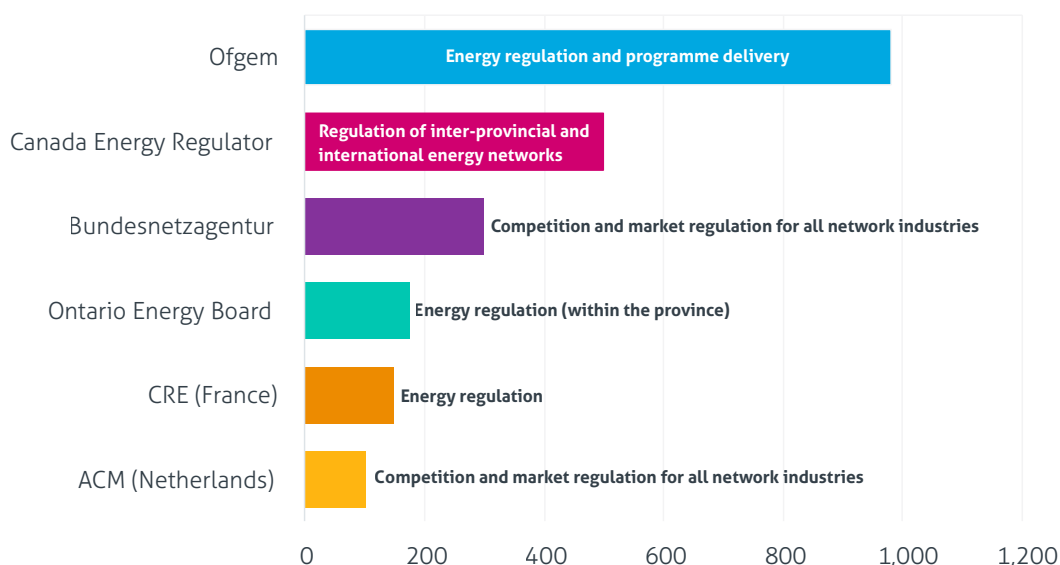
central role in ensuring that the electricity system is reliable, and provides government with advice on whether investment levels in new generation capacity and grid infrastructure are adequate to meet future demands. As the electricity system grows more complex, the responsibilities of the system operator have been growing.⁹⁹ There have been calls for the system operator to be made fully independent from national grid. Whether this happens or not, government needs to ensure it is able to access the expertise and knowledge of the system operator, which will be increasingly important as the energy system becomes more dynamic and decentralised.

Collaboration between Ofgem and BEIS tends to be organisation-to-organisation, rather than through joint teams. The relationship has been less straightforward since DECC and BIS merged to form BEIS. Whereas previously there were direct role equivalents in Ofgem and DECC – for example, a chief economist in Ofgem and a chief economist for energy in BEIS – the business portfolio of senior BEIS officials means they are less focused on energy and therefore have less cause to interact regularly with their Ofgem counterparts.¹⁰⁰ Some interviewees observed that this made close analytical collaboration somewhat harder, with the risk that BEIS loses opportunities to learn from Ofgem’s expertise, although interviewees in both organisations described the relationship as productive nevertheless.

Interviewees also noted that the relationship between Ofgem and BEIS needs careful management – BEIS has more resources and power, and Ofgem is an independent regulator. It is therefore important that it is not seen to be inappropriately close to government.

Regulators in the other countries we examined have narrower remits and fewer employees – and a smaller role in providing evidence and expertise on energy policy. None has Ofgem’s responsibility for running a wide range of policy programmes like the Renewable Heat Incentive. Energy regulators with a remit strictly limited to price regulation and investment approval, such as the Ontario Energy Board, have limited expertise beyond immediate market design issues – and play a smaller role in generating evidence for policy as a result. The exception is the federal Canada Energy Regulator (CER), which provides an annual energy outlook report based on internal modelling and analysis. However, the mandate of the CER is very different to that of Ofgem, since it largely deals with oil and gas pipelines, leaving the regulation of electricity and natural gas distribution to provincial regulators.

Figure 5 **Regulator staff in energy-related positions, and the regulators' mandates, in the UK, Germany, France, the Netherlands, Canada and the province of Ontario, 2020**



Source: Institute for Government analysis of data provided by the regulators.¹⁰¹

Ofgem's unusually high analytic capacity and its de facto strategic role managing capital programmes and policy delivery in a number of key areas are an important UK strength. As the energy transition accelerates, government should ensure that it makes good use of the operational and delivery expertise, and commercial insight, found in Ofgem. While acknowledging the importance of regulatory independence, Ofgem could contribute more formally and regularly to policy development.

The institutional gap in the UK energy policy advisory landscape

Our work has suggested that the UK has strong internal capacity, but needs to do better at drawing on a wider range of external perspectives. In contrast, the Dutch and German systems rely more heavily on evidence from external advisory bodies, which helps to ensure that policy ideas are tested against a wider range of opinion. Clearly, neither the German system nor the Dutch system could be directly transplanted to the UK. Both are the product of many decades of institutional and political evolution. Nor would a direct transplant be desirable: too much reliance on external sources of evidence at the expense of internal analysts would undermine the close collaboration between analysts and policy officials that is a strength of the UK system. The question is whether the UK needs a new institution – or the expansion of existing institutions – to gain some of the benefits of the German and Dutch models.

Several of the functions performed by external advisory bodies in our four comparator countries are already well served by the UK system. The CCC provides strong strategic advice, focused on decarbonisation but also to some extent encompassing energy prices and security concerns. Ofgem helps to ensure that government learns from policy delivery. In both the Netherlands and Germany, external advisory bodies play a greater role in the details of policy design, not just in questions of strategic direction, and we argue that the UK could benefit from greater external input into policy design.

We identified two further specific functions performed by advisory bodies elsewhere that appear weaker in the UK's system:

1. The bridge between academia and government
2. The link between government and local implementation and policy delivery.

Advisory bodies can act as a bridge between government and academia

Previous Institute for Government work has found that government often struggles to draw on policy-relevant academic evidence and expertise in its work.¹⁰² Part of the problem is structural – academics and policy makers work at very different timescales, and government officials often feel that academics do not produce policy-relevant material in a timely enough way, while academics often do not know where to start when it comes to reaching relevant people within government.

In some UK government departments (particularly the Department for Environment, Food and Rural Affairs and the Department for International Development) it has been part of the departmental culture to participate in academic research projects, and contribute to academic journal articles.* This is also common within the Canadian departments with responsibility for energy policy. Our analysis shows that BEIS (and previously DECC) has rarely been involved in contributing to academic publications.**

The recent push for departments to publish areas of research interest (ARIs), to inform academia in advance what their evidence needs are and engage with the wider research system is a welcome first step. The most recent ARIs for BEIS have been more detailed than in previous years – in 2018, its ARI document was six pages long (compared to more than 30 pages from the Department for Transport), whereas the 2020 interim ARI publication in February ran to 49 pages.¹⁰³

One advantage that the German system of specific research-intensive policy institutes and of the Dutch system of prominent, well-respected independent scientific advisory councils is that they operate as natural mediators between academia and government. Interviewees we spoke to at these institutes told us that they considered part of their job to be “translating” academic evidence into policy-relevant analysis that is comprehensible and useful to civil servants.¹⁰⁴

While there are clearly benefits to direct contact between academics and civil servants, the timescales and priorities of each create structural barriers to sustained effective interaction. Intermediary bodies, with a foot in both camps, can help ensure that government analysis is informed by academic perspectives.

The UK does not have equivalent institutions, and UKERC or the Energy Systems Catapult currently lack the resources to fulfil the role played by bodies like the SRU or Fraunhofer Institutes in Germany, or the PBL in the Netherlands. Those organisations

* The Department for International Development was merged with the Foreign Office in September 2020, to create the Foreign, Commonwealth and Development Office.

** Based on the affiliation of authors in articles within the Scopus database of academic journals. It should be noted that BEIS analysts co-created the UK TIMES model in close collaboration with a modelling team at UCL.

see communicating up-to-date academic research and turning it into relevant evidence for policy makers as an explicit and core part of their work. Some interviewees we spoke to felt that this was an area that the think tank or NGO sector should fill, and that too much potentially useful information went unheeded because no one with sufficient expertise to translate 'techie gobbledegook' into usable evidence was doing so.¹⁰⁵ In the countries that do it well, the link that independent advisory bodies provide between government and academia is reinforced by the important role that those bodies play in the government's day-to-day analytical work.

Learning from policy delivery: a model from France

Experience and expertise acquired through delivering policy can be an important source of evidence for policy development. In the UK, energy policies are largely delivered either directly through BEIS, or through Ofgem as discussed above.

France offers an alternative institutional model of a policy delivery body that plays an important role in generating evidence for policy development. ADEME is a key player in the French energy policy landscape, and it has no direct equivalent in the UK system. ADEME has policy delivery responsibilities similar to those of Ofgem, but it also manages a large innovation support portfolio, which includes energy system analysis (rather like the role of the Energy Systems Catapult).

Interviewees described ADEME as a centre of energy expertise within government, particularly on the technical implementation aspects of energy tender processes, and scenario design. MTES relies on ADEME's expertise in scenario design and research to inform impact assessments and, in some cases, policy design – we heard that ADEME was particularly influential in helping formulate the roadmap for smart grids in France, and that its 100% renewable energy scenario in 2016 had a major influence on the French decarbonisation debate.¹⁰⁶

Key to ADEME's usefulness for policy makers, according to multiple interviewees, is its closeness to local implementation and innovation, particularly on renewables and energy efficiency schemes. Local municipalities currently play a fairly small role in energy transition policy, because the key levers of network planning, energy taxation and resource control are not in their hands. However, where real experimentation does occur at the local level, it can in theory be fed up through the system through ADEME (although a lack of harmonised systems and data between municipalities sometimes makes best practice sharing difficult in reality).¹⁰⁷

ADEME is unusual, and potentially instructive, for two reasons. First, it plays a more active role in policy advice than Ofgem does, and is therefore perhaps better able to translate its experience in policy delivery into lessons for policy design. Second, the way that ADEME acts as an intermediary between national and local government is particularly interesting as this national-local intermediation is weak in the UK's energy governance structure. Local authorities in the UK have the potential to play a more engaged role in two areas of energy policy: heat decarbonisation and energy efficiency in buildings. Through the planning system, and through their capacity to deliver local services and engage with local communities, local authorities are

potentially well placed to facilitate progress in these areas.^{108,109} Local authorities also have a central role in the development of heat networks.¹¹⁰ However, it is widely agreed that local authorities lack capacity in this area. The Energy Systems Catapult has been working with a small number of local authorities on local area energy planning, but there is no direct equivalent to the cross-country intermediary role played by ADEME.

There is a strong case for strengthening the policy advisory roles of the ESC and UKERC

We asked civil servants within BEIS whether they felt that the UK has an institutional gap in advisory bodies. There was consensus that the CCC provides effective long-term strategic advice, but there were differing views about whether a gap exists to provide more detailed policy design advice, a bridge between academia and government, or a link to local and policy implementation experience. Some felt that there would be value in an intermediary organisation, perhaps built on the Energy Systems Catapult or the UK Energy Research Centre, that could provide independent advice and analysis, mediate between policy makers, academia and the media, and serve as a recognised source of energy expertise in public debate, independent of both government and industry. One senior analyst we spoke to told us that: “Our job as internal analysts would be a lot easier if whenever the [industry interest group] people popped up, there could be a [recognised and respected] energy figure ready to comment.”¹¹¹ This could be achieved through ‘amplifying’ the resources and mandate of an existing organisation like UKERC or the ESC.

Others argued that it was good to be able to ‘shop around’ among the academic institutions, consultants and other organisations able to perform energy policy advisory services – though it was recognised that this creates additional burdens: knowing who to contact, and the transactional complications associated with commissioning funded work.

We heard a sense of frustration from policy makers and analysts within BEIS that they don’t always know where to look. We also heard the view that existing institutions like the ESC and UKERC could already fulfil those evidence support roles, but there is a lack of demand and outreach from BEIS. These contrasting views suggest a disconnect between internal teams and external organisations.

Clearly there are costs to establishing new institutions, and any new institution would need time to establish a reputation, and a resourcing model that would ensure it could develop the credibility and longevity required to play a valuable role. We therefore recommend that the government expands the resources and roles of two existing institutions.

The Energy Systems Catapult draws on strong engineering capacity, and has practical experience with both innovating energy companies and local authorities. The ESC could play a bigger role in providing advice to government, and could be supported to expand policy advisory capacity.

Explicitly giving the ESC an advisory role could help civil servants overcome some of the difficulties they have in understanding, predicting and responding to the behaviour and needs of commercial actors, particularly as the ESC's links are strongest with some of the most innovative and rapidly developing areas of the UK's increasingly complex energy landscape.

A recent Institute for Government report, *Net Zero: How government can meet its climate change target*, highlighted the importance of planning for net zero with as clear a view as possible of the feasibility of deploying new technologies, and of the available policy measures to create the right consumer and business incentives to scale them up. The ESC is already well-placed at the interface of government policy, technological innovation and on-the-ground commercial experience. It should be empowered to develop a stronger advisory capacity, and BEIS should use it to bring more commercial, engineering and local perspectives on energy policy into central government. This echoes the recommendation of government's recent science capability review,¹¹² which highlighted the potential for government to draw more effectively on the expertise of public sector research establishments.

The UK Energy Research Centre provides an obvious route for linking government with academia and other relevant sources of expertise. Civil servants sometimes struggle to maintain strong, productive relationships with external experts – something we discuss in more detail in the next section of this report – because they are time-poor and often move roles frequently. In particular, most of the civil servants in BEIS we spoke to said they would like to monitor in more detail how other governments around the world are tackling energy policy problems, but felt they could not devote the necessary resources, and did not have the relationships, to make the exercise worthwhile. UKERC, principally an academic centre, would be less likely to suffer from the same turnover and 'bandwidth' issues, if given a strengthened policy advisory and international monitoring function.

However, the value of efforts to increase the supply of evidence to government is limited if policy makers are not demanding evidence when they make decisions. In the next section, we turn to the processes government uses to ensure that evidence is used in the policy making process.

3. Bringing evidence into policy making processes

The institutions discussed in the preceding chapter provide the settings and, by supplying evidence, define the terms for energy policy making. This chapter examines some of the mechanisms that attempt to ensure that policy makers use evidence in their work. We begin with the formal steps that accompany the standard policy process, and then discuss the informal working practices that influence how policy is conceived and designed.

Evidence in the formal policy cycle

The policy making process is sometimes presented as a cycle with discrete, linear stages of development, implementation and evaluation. The Green Book, the UK government's guide to policy appraisal and evaluation, uses the acronym ROAMEF – rationale, objectives, appraisal, monitoring, evaluation, feedback.¹¹³ Evidence, generated for and by a policy intervention, is relevant at every stage of this process.

The Green Book says of the policy development cycle that “monitoring and evaluation play a role before, during and after implementation, with the aim of improving implementation and building the evidence for future interventions”.¹¹⁴

The policy cycle can be a useful abstraction but of course, by definition, it simplifies an altogether messier reality. When interviewed, most policy makers agree that ROAMEF and similar cycles are “divorced from reality”, and in 1999 the Cabinet Office rejected the use of policy cycles on this basis.¹¹⁵ Although the ROAMEF process survived, previous Institute for Government work found that people in government mostly felt that the process failed to correspond to the reality of policy making, and that delivery and the political context progresses in parallel with developing an evidence base.¹¹⁶ Nevertheless, the acronym's continued presence in key government documents suggests that the Treasury feels it still has some use.

Policy cycles have value because they highlight key moments that should be present in all policy making, and provide a structure and checklist for policy professionals. It is important to pay attention to formal processes like business cases, impact assessments, and post-implementation evaluations when thinking about how evidence gets used in policy making. However, these formal processes need to be viewed in connection with the less visible informal processes that permeate the ‘cycle’ and defy neat categorisation. These are often as, if not more, important than the processes which leave a clear paper trail.

Policy makers set out their evidence base formally

The key documents produced when a policy is being developed are the business case and regulatory impact assessment (also referred to simply as an impact assessment, or IA).

Business cases are prepared to make the case for government spending according to five connected but distinct 'dimensions' – strategic, economic, commercial, financial and management. There needs to be a robust case for change, the proposal should represent value for money, be commercially viable, affordable, and deliverable.¹¹⁷ Business cases are also used as a reference point for monitoring and post-implementation evaluation.

Impact assessments support policy appraisal by analysing the costs, benefits and risks of a range of options, setting out the evidence and assumptions that led to the development of the policy, and the analysis suggesting that the policy will be successful. Impact assessments detail the evidence base for an intervention, give agreed indicators of success, and set out a plan for monitoring and evaluation.¹¹⁸ Along with Green Book guidance, the Better Regulation Framework sets out the methodologies for establishing measures such as net present social value (NPSV), net present value to business, and other standard impact assessment metrics.*

Evaluation and monitoring are supposed to be seen as integral parts of the policy making process, and should inform thinking before, during and after an intervention. The Treasury's advice and guidance on evaluation methods are collected in the Magenta Book. It sets out three types of evaluation. The first is a process evaluation, whether an intervention is working as intended, what is working less well and why, often relying on monitoring data. Impact evaluations, the second category, is a form of ex-post assessment that aims to give an "objective test of what changes have occurred, the scale of those changes, and an assessment of the extent to which they can be attributed to the intervention".¹¹⁹ These evaluations tend to be substantiated "through theory-based, experiment, and/or quasi-experimental approaches".¹²⁰ The third type is a value-for-money evaluation, which typically takes the form of a cost-benefit analysis.

* The Green Book issues guidance on valuing opportunity costs, employment and productivity effects, economic transfers, environmental, social and health effects.

Box 5 **Cost-benefit analysis and climate change**

Business cases and impact assessments allow the Treasury to make difficult decisions between policy proposals from very different areas. It is generally understood within government that measures like the benefit-cost ratio (BCR), net present value, and other cost effectiveness metrics are what the Treasury values most highly.

Common complaints by critics of cost-benefit analysis are that it is too narrow, that important policy effects can be hard to monetise, and that it is arguably an inappropriate tool when dealing with significant uncertainty or non-marginal change. Defenders of the current system argue that the Green Book advice – which is to monetise what you can and explain what you cannot – is a flexible enough system to allow for a wide consideration of factors while also forcing policy makers to articulate all their assumptions and defend them in an intellectually robust way.¹²¹ In a recent review of the Green Book, Treasury officials wrote that “the core methodology [does not] skew outcomes” but conceded that “current appraisal practice” risks undermining government’s achievement of strategic objectives.¹²²

Many of the decisions government will have to make over the next several years in energy policy will have to be taken under conditions of real uncertainty – whether to invest in hydrogen for heating, for example, or whether and when carbon capture and storage will become viable at scale. The apparent precision provided by a quantitative estimate may therefore not be the best basis for deciding between two policy options – non-monetised evidence might be more relevant.

Cost-benefit analysis starts from the usually sensible premise that a project or policy under review is marginal “in the sense that it will not significantly change relative prices” or the underlying growth rate of an economy. However, this assumption does not hold for all policies, particularly those related to climate change.

As the government pursues its net zero agenda, policies will need to deal with effects that are far from marginal, derived from very disparate projects. There are also serious questions to be asked about how to appropriately price the various do-nothing, or perhaps more importantly, the do-not-very-much, options. As one very senior analyst in BEIS put it: “Is the Green Book approach correct when the counterfactual is the destruction of the planet?”¹²³

An updated Green Book is due in spring 2021. The 2020 review gives an indication that the Treasury intends to put more emphasis on considering a proposal’s “specific contribution to the delivery of the government’s intended strategic goals”, including net zero.¹²⁴

The Regulatory Policy Committee scrutinises government impact assessments, but its influence has waned

Where policy proposals suggest regulatory changes affecting business, impact assessments are reviewed by the Regulatory Policy Committee (RPC), an independent advisory body that scrutinises the evidence and analysis in impact assessments supporting such decisions.* The RPC provides an opinion on the validity and accuracy of evidence and analysis cited, and judges policies against the provisions set out in the Better Regulation Framework (particularly against the principle that new regulation has to be demonstrably more appropriate than non-regulatory options).¹²⁵ Although its formal role is limited to assessing the impacts of a regulatory proposal on business, the RPC has stated that it has “a wider interest in ensuring high-quality IAs and encouraging departments to improve the quality of the evidence and analysis underpinning policy measures”.¹²⁶

The RPC was established in 2009, and in its first years of operation was associated with a wider focus on cutting ‘red tape’ and reducing the regulatory burden on business. The coalition government introduced a ‘one in, two out’ rule for regulations, which meant departments had to scrap twice as many regulations as they introduced.

The other countries we examine in this report also have processes in place to review government impact assessments of new regulations, summarised in the table below. As in the UK, the German, French, Dutch and Canadian models of scrutinising impact assessments are primarily concerned with reducing the regulatory ‘burden’ on business.

* The RPC does not review IAs related to tax or spending decisions, and only scrutinises IAs which relate to the regulation or deregulation of business or civil society organisations, rather than individuals or public bodies.

Table 1 **How Germany, France, the Netherlands and Canada review government impact assessments of new regulations**

<p>Germany</p> <ul style="list-style-type: none"> • National Regulatory Control Council (NKR), an arm's length body, reviews regulatory impact assessments and is responsible for 'burden reduction'. • The Federal Audit Office and Parliamentary Advisory Council on Sustainable Development evaluate regulatory policy and suggest improvements. • The Better Regulation Unit, in the Federal Chancellery, co-ordinates 'bureaucracy reduction'. • A 'one in, one out' rule was introduced in 2015. 	<p>France</p> <ul style="list-style-type: none"> • S�cretariat G�n�ral du Gouvernement (SGG), a unit in the PM's office responsible for co-ordinating government administrative work, reviews regularity impact assessments and gives advice on drafting legislation. • 'Administrative simplification' has been a top-five priority for all ministries since 2017, and a 'one in, two out' rule has been in place since then.
<p>The Netherlands</p> <ul style="list-style-type: none"> • The Unit for Regulatory Reform and ICT-policy in the Ministry of Economic Affairs co-ordinates work on reducing regulation and oversees regulatory burden assessments. • The Adviescollege Toetsing Regeldruk (ATR), an arm's length body, reviews the quality of ex-ante 'burden assessments' and can recommend improvements during development. 	<p>Canada</p> <ul style="list-style-type: none"> • The Treasury Board, a cabinet committee, considers and approves regulations. It is supported by the Treasury Board of Canada Secretariat (TSB), which provides a 'review and challenge' function to ensure quality in regulatory impact assessments and consultations.

Source: OECD, *OECD Regulatory Policy Outlook 2018*, OECD Publishing, 2018.

However, a senior civil servant we spoke to said that because of this association with a political project, they were seen as somewhat ideologically freighted and less neutral or credible than other independent bodies. Some of the interviewees we spoke to also suggested that as political priorities had changed over time, the RPC's significance had diminished.

This has been particularly the case since 2018, when the Better Regulation Framework was changed such that submitting pre-consultation IAs to the RPC is no longer mandatory. The RPC has recommended that this decision be reversed, or at least that departments submit more early-stage IAs voluntarily, as the change has reduced the effectiveness of its working relationship with departments.

The RPC's current oversight of evidence-use in energy policy is too limited to be useful

The RPC could still be a useful body. In theory, external scrutiny of departmental evidence and reasoning in impact assessments can have a positive effect. In a review of the proposed third iteration of the Energy Company Obligation (ECO3), the RPC reports that “the department has responded positively to the comments made” at the initial review, by monetising costs to Ofgem, providing more information on their modelling for the Affordable Warmth component, including a sensitivity analysis, and quantifying the impact of other previously unquantified elements of the proposal.¹²⁷ The RPC opinion also gives an insight into the positive effects of other parts of the process – it notes that “the IA appears to have been strengthened significantly by the consultation”, which led to sharp downward revisions to some cost estimates (and a doubling of others) in response to supply chain feedback.¹²⁸

But the RPC's red-green rating system for IAs is not always a good guide as to the quality of a department's evidence use. It has never issued a red rating on a final stage IA from BEIS, and last issued one for DECC in 2011.¹²⁹ Rather than immediately issuing red ratings for poorly evidenced IAs, the RPC issues an initial review notice (IRN), setting out issues with the quality of evidence and analysis for the department to address.

Even green-rated opinions can contain serious criticisms which departments are under no formal obligation to address. In its review of the assessment produced in support of the 2018 Domestic Gas and Electricity (Tariff Cap) Bill – the electricity price cap – the RPC wrote that “the evidence the department presents in support of its rationale and selected option is weak, and even confused, moving from an approach grounded in efficiency to one based in equity without clear argument”.¹³⁰

The opinion highlights several instances of what the RPC argues is illogical or unclear thinking, and highlights a lack of monetised assessments and cost estimates that “fall short of the standard expected”.¹³¹

The energy price cap examples shows the potential but also the flaws of the RPC. It is positive that there is an independent body able to raise this kind of evidence challenge. But that a policy whose evidence base it finds so inadequate is given a green rating suggests the RPC's actual oversight is fairly weak.

The RPC's remit should be expanded to include emissions impacts

For the RPC to provide useful external challenge, not just on energy-related policy but on policy making more broadly, it would need an expanded remit and greater expertise.

It would be valuable for the RPC to be able to take a view on evidence use in policy proposals from a broader perspective. In particular, the RPC could play a role in scrutinising the likely impact of regulatory proposals on the government's emissions and environmental targets. This is something the RPC itself has recently suggested in a discussion paper. In it, the committee writes that:

"[A] potential area for further consideration is whether the RPC should have a role in scrutinising impacts beyond those on business ... given the government's commitment to net-zero emissions by 2050, understanding the consequences of new regulatory policies on emissions and the environment should be an integral part of the policy making process and might benefit from the same independent scrutiny that the RPC offers on impacts on business."¹³²

This is a sensible suggestion, and would give the RPC new purpose and a clearer mandate to act as an independent check on departmental use of evidence. The recent Treasury-led review of the Green Book concluded that departments needed to consider their proposals in the context of the government's strategic objectives, capture environmental or carbon emissions impacts in the economic case, and consider whether policies are a constraint on progressing the net zero target "even where [the target] is not the primary objective of a proposal".¹³³

The impact of regulation on business was a particular priority for the coalition government of 2010–15 that all government departments were expected to contribute to. The current government lists net zero as among its top priorities. It would therefore be appropriate to have an independent body review the evidence used to justify policies from across government, to make sure that departmental proposals are in line with this overarching, long-term goal. Rather than create a new body, the government should make expanded use of the resources it already has.

To make this work effectively, the RPC would need more specialist expertise on energy and climate analysis – in the secretariat and on the committee itself. The committee takes a view on a wide range of government policy areas, and its members tend to have business, legal or economic backgrounds, rather than policy specialisms. Its small (23 people) civil service secretariat is primarily made up of economists and generalists.

The RPC has indicated it would be open to this expansion, but as its work is guided by the Better Regulation Framework (BRF), it cannot make this change itself. The Better Regulation Executive, within BEIS, is due to publish a green paper in late 2020 or early 2021 setting out changes to the BRF, in conjunction with a planned government review of the Business Impact Target. It should include an expanded remit for the RPC in this green paper. The government is also currently reviewing carbon valuation across

government. As the Institute's *Net Zero* report recently argued, it should take this opportunity to establish more systematic evaluations of policies' emissions impacts, with a more robust and realistic methodology for factoring in long-term carbon costs. Tasking the RPC with scrutinising how effectively departments use any new methodology would help to embed it in the policy making process, in energy policy and beyond.¹³⁴

However, the RPC also needs the space to acknowledge that evidence gaps might be politically legitimate or justified. The energy price cap was a well-trailed, major piece of legislation with widespread public approval, supported in some form by both parties at the 2017 general election. It is clearly within the rights of an elected government to push through a popular policy even if it has been shown to not be the most efficient means of achieving its stated goals.

The position of senior analysts in policy teams helps make evidence a priority

In BEIS, senior analysts are 'bedded out' into policy making teams at deputy director level, which means they are considered part of senior management. In other departments, the most senior analysts working directly with policy makers are generally more likely to be G6 or G7 grades (though this does vary).

Senior analysts we spoke to said this was an important feature of quality assurance. Evidence sign-off (the point at which a piece of evidence ceases to be a work in progress and becomes usable as something to base a decision on) is the responsibility of deputy directors, members of the senior civil service (SCS), the upper management tier of government. This gives them considerably more weight in the department, and sufficient authority and 'heft' to feel confident challenging sloppy thinking and insisting on high standards.¹³⁵

Most evidence sign-off, for analysis and evidence used in policy design, business cases and impact assessments, happens within the bedded-out system. Only the most novel or contentious issues go to the central analysis team, where they would be seen by the chief economist, director of analysis, or other similarly senior figure.*

Another formal internal evidence challenge process happens through evidence boards. These formally look at the evidence base for a policy or group of policies, ask whether the evidence process was resource constrained and why, and then propose measures to address uncertainties in the evidence. Their purpose is to "articulate and manage uncertainty, rather than eliminate it", to give ministers a full picture when it comes to approval.¹³⁶

Our interviewees agreed that evidence boards are most useful on complex, cross-cutting issues. The current highest-level relevant evidence board in BEIS is the energy analysis board, which includes all deputy directors working on energy and heads of

* There is no formal definition of what spending qualifies as "novel and contentious", but HMT's Managing Public Money document gives a guide. In general, a proposal is novel if it cannot be easily compared to an existing activity, and is contentious if its value for money, feasibility, or other accounting officer standards are in doubt. See HM Treasury, *Managing Public Money*, July 2013, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/742188/Managing_Public_Money__MPM__2018.pdf

professions, and is chaired by the director of analysis. At a lower level, programme or policy boards are also often established to review and monitor evidence generated during a policy's design, and to monitor its delivery after implementation.

Evaluations should come sooner and be more focused on learning

Our interviewees felt that in general post-implementation evaluations were stronger at BEIS than in other departments. An analyst at deputy director level we spoke to reflected that in their personal experience, BEIS mostly seemed willing to allocate proper funding for evaluation and to plan ahead. They cited current extensive evaluation programmes of the ECO, RHI, and private rented sector energy regulation policies.¹³⁷ Around 27 people within the department are dedicated to evaluation, though this includes those evaluating policies that are not energy-related.

The statutory requirement for post-implementation reviews for projects above a certain value was cited as something that might make an impact long-term, but the interviewees we spoke to said that the first policies that had been developed with that statutory requirement were only now reaching their five-year evaluation stage, so it was too early to tell.¹³⁸ In-depth impact evaluations are complex and costly to run, so tend to be conducted only with policies that are high profile, expensive, or particularly innovative.

Standalone policies with clear end-points lend themselves more obviously to evaluation, but many energy policies do not fit that mould. As one analyst we spoke to said regarding the ECO programme, now on its third iteration (ECO3): "We're never actually *post* it – so do we do a light touch review, or do we artificially cordon part of it off and just evaluate that?"¹³⁹

We also heard several times that demonstrating to the National Audit Office that a programme has delivered value for money was often framed as the primary purpose of evaluations, at the expense of opportunities to learn from the policy mix as a whole.

Financial accountability of public services is an important function of evaluations, but there is scope for evaluations to be far timelier, and more oriented around lessons for policy makers. The Green Book specifically cites "lessons learned from previous interventions" as one of the key sources of evidence for creating a long list of policy options at the beginning of the policy making process, so government should make generating those lessons as easy as possible.¹⁴⁰

The UK has a more systematic appraisal and evaluation process than others

The UK's formal system of impact assessments, business cases and evaluations does not have a direct equivalent in the German and French civil services, although functional variations of each do exist.

We heard from a civil servant who had worked in both BEIS and BMWi that the German system has much more dispersed input and evidence challenge on official submissions (any advice, analysis or other formal document sent to a relevant minister). Submissions in Germany tended to be sent around multiple departments, and require

many more layers of sign-offs, which meant that many more different versions of the same document, with a wider array of authors, existed than in the UK system. Partly this is because different ministries are often controlled by different parties in government in Germany, and so political compromise and challenge is an accepted function of the policy making bureaucracy.

The French system is more directly comparable to the UK's, because the French state is similarly centralised, and coalitions are not the norm. Analysis of appraisal and evaluation within French government has found that they are currently experiencing a 'delayed boom' in the kind of formal ex-post and ex-ante policy assessments common in the UK, US, Canada, Sweden and Germany.¹⁴¹ Evaluation committees, the first of their kind, have recently been established to evaluate and monitor new tax reform, innovation, poverty reduction, and labour policies enacted by the Macron government.

Most of the detailed assessment of energy and climate policy instruments in the Netherlands takes place in the CPB or PBL, or in private consultancies – very little analytical work is done in-house. The exception to this is the regular IBOs (interministerial policy reviews),* conducted by the finance ministry. Unlike spending reviews, which are focused on identifying savings, IBOs are about developing new policy options, and consulting and refining the analytical work departments need their independent advisory bodies to conduct throughout the year. The process provides a mechanism by which the centre of government can challenge policy development at the ministerial level. Every year, several IBO reviews are carried out on a wide range of fairly specific topics. A recent example in energy looked at how best to balance growing demand for land from renewable energy projects (particularly solar farms) with other land uses.¹⁴²

Canada's system of impact assessment and evaluation is the most comparable to the UK's. Every federal department has a dedicated audit and evaluation branch, although we heard similar scepticism in Canada about the extent to which evaluation leads to genuine learning.¹⁴³

Formal processes force policy makers to reflect on and defend their evidence, but are not the main way that analysis makes a difference

One senior official we spoke to in BEIS described impact assessments as "slalom markers – they guide where you're going, without fully directing it".¹⁴⁴ We heard from our interviewees that impact assessments in particular were very unlikely to reshape the overall thrust of a policy, but could help finesse the design of specific policy instruments. This is particularly true when technical details are of real importance – for example when designing the energy price cap.¹⁴⁵

Many of our interviewees felt that forcing reflection, rather than rooting out bad evidence or fundamentally reshaping policy, is ultimately what the analysis that goes into business cases and impact assessments is supposed to do.

* Interdepartementaal Beleidsonderzoek in Dutch.

On the basis of formalised processes alone, the UK compares well to the international comparator countries we are interested in for this report. Other studies have attempted systematic comparisons of different countries' approaches to evaluation and appraisal. The Bertelsmann Stiftung Sustainable Governance Indicators (SGI) model is well-established, and generates a series of scores based on a combination of qualitative assessments, questionnaires and cross-national data. Its category "evidence-based instruments" assesses countries according to their application of regulatory impact assessments and ex-post evaluations. The UK scores highly by this metric, with a score of 8.5 out of 10, compared to 8.0 for Germany and the Netherlands, 6.8 for Canada, and 4.8 for France.¹⁴⁶

However, these formal instruments cannot give a full picture of how evidence is actually used in policy making, and reducing the system to these instruments would be a mistake and could breed complacency. Although the UK civil service does many things well, nothing we have seen in our research, and no 'real-world' outcome metric, would suggest that the UK merits a 'score' almost twice that of France.

Several analysts we spoke to said that most of the work that goes into making sure that policies are well evidenced does not end up in any final document – the modelling and analysis conducted by government analysts happens at the same time as policy makers are working on policy development, so the work is by its nature iterative, with different versions written and re-written as the policy makers adapted to different evidence and calculations.¹⁴⁷ Although the processes laid out in the Green Book policy cycle are important, good analysts, we were told, make their mark before formal evidence checks.

Informal evidence processes and external engagement

Less structured working practices, the organic and unseen processes that permeate civil servants' work, are vital to understanding how evidence is in practice used in policy. It is also at this more informal level that we have found most meaningful external engagement is done – although that informality risks restricting the type of people government speaks to and leaves too much up to individual civil servants' priorities and contact books.

Day-to-day collaboration between policy makers and embedded analysts is key

According to the formal ROAMEF process, policy makers first decide that there is a strong rationale for intervention, and then develop a long-list of options to choose between. Again, the Green Book provides general guidance on how to generate a list of potential interventions, but it is not overly prescriptive. It says that previous evaluations, consultations, stakeholder engagement, international best practice and "the wider evidence base" should all inform the options process to ensure that a full range of possibilities are considered.¹⁴⁸ This range might include ideas coming 'top-down' from the minister's or prime minister's office, from political advisers in the department or Number 10, or from outside the department.

Our interviews echo previous IfG research: options are not only generated at a discrete phase of a neat policy cycle, but are constantly being suggested, reviewed and considered. This process is ongoing work rather than a discrete phase, and informal interactions between analysts and policy professionals play an important role in developing and curating that “wider evidence base”, alongside more formal processes.

As discussed in the previous chapter, analysts within BEIS are mostly ‘bedded out’ to policy teams, so work side-by-side with their policy colleagues. Teams within BEIS differ, but we heard typical practice might see G6 or G7 level analysts working with relatively large policy teams (up to an approximate maximum of around 15 people).^{*} These teams hold weekly meetings to assess their evidence needs for the week or fortnight ahead (with smaller sub-teams or five or six policy professionals often meeting separately with the same analyst or analysts to discuss their evidence needs in more detail).¹⁴⁹ Department-wide evidence needs, and internal and external capacity to deliver them, are also formally assessed annually through the technical evidence and analysis needs review.¹⁵⁰

Whether analysts are grouped together or distributed among policy teams is flexible, and dependent on the demands of specific projects. One of the engineers we spoke to felt that it was more important to be able to draw on the skills of more technical colleagues for most of the short-term work they did, but that the advantage of being in daily contact with policy teams was that it “allows them to ask you a question early on, and avoid going down a completely unworkable line of reasoning”.¹⁵¹

The interviewees we spoke to told us that much of the analysts’ work was “stress-testing” policy makers’ evidence and assumptions as they worked through policy options and before documents left the department, or perhaps guiding commissioned work from consultants, rather than conducting new analysis day-to-day. This, we heard, was where most analytical influence happens. It is far more common for analysts to be working with their policy making colleagues on shorter products such as ministerial submissions, or slide-decks for presentations, than on business cases or impact assessments.¹⁵²

Responsibility for external relationship-building is too often left up to individuals

In contrast to many of the evidence processes outlined above, very little about the way government engages with institutions and individuals outside government is systematic.

Several interviewees felt that the structure for building relationships with outside sources of expertise in BEIS was far too improvised. Usually, we heard, the responsibility for building and maintaining relationships with relevant experts or sectoral groups falls to individual G6 and G7 level policy professionals and

^{*} Civil service jobs are organised according to grades that describe the nature of the role and its level of seniority. The lowest grades for policy and analytical officials are SEOs and HEOs (senior executive officers or higher executive officers). G6 and G7 civil servants are directly above SEOs and HEOs, and one level below the senior civil service (SCS) of upper management. G6s and G7s tend to be experienced officials with significant policy responsibilities.

analysts. Both inside and outside government, interviewees told us that this makes external engagement with BEIS too arbitrary, and reliant on the personal interests, experience and capabilities of individual mid-ranking civil servants. Given their other responsibilities, many of these civil servants are likely to feel that building relationships with outside experts is their lowest priority responsibility given the many other demands on their time.

The problem is exacerbated by rapid staff turnover.¹⁵³ Relevant professional networks outside government are a form of expertise that civil servants are not systematically incentivised to put the time into creating and maintaining. Building useful networks with relevant policy teams is therefore made more difficult by the speed with which staff move around government.

Ensuring government has regular and varied access to outside expertise is valuable for a number of reasons. It is one easy safeguard against groupthink. It helps government stay on top of the commercial realities of the complex markets in which it operates. It also gives the civil service access to technical expertise that it would be impractical to develop in-house. The UK looks particularly weak on this front when compared to the more inherently consultative models provided by Germany and the Netherlands.

Senior officials we spoke to in BEIS acknowledged the issue, and said that a recruitment drive at deputy-director level to reduce team size and time spent on management would improve things. Tying relationships with outside experts more closely to a position rather than to individuals would help – officials should see maintaining a useful network of experts and key stakeholders and passing it on to their successors as a key part of their job.

Relying on personal contacts can sometimes help access expertise quickly, but government is too reliant on a small pool of 'usual suspects'

Early in the policy development process, policy teams will try to canvass views from interested parties and experts. Ad hoc advisory bodies can be formed to give slightly more structure to this otherwise highly informal process, to facilitate high-level policy discussion with invited guests before decisions are made.

We spoke to people who had participated in these advisory bodies, like the Heat Policy Roadmap Advisory Group, and we heard mostly positive feedback – BEIS officials were seen to be receptive to their ideas, and interested in discussing a wide range of options – though participants noted that it was impossible to tell whether they had had any impact until long after the event.

These groups are also largely perceived to work well within government. Some do become more formalised – the Hydrogen for Heat Innovation Programme technical board was cited as a particularly useful body, established quickly, to get technical expertise on a difficult and relatively novel technology into government.

Although their flexibility is seen as a strength, they are by their nature not very transparent processes. In theory, having more informal advisory groups instead of standing advisory committees could diversify the range of people BEIS engages with, but we heard that this is not how it works in practice. More often than not, when putting together an advisory group, policy officials reach for the same few experts they know, likely those who had come to previous meetings and had not been unhelpfully negative, and invite them again and again. It is difficult to put hard evidence to this claim, because of the opacity of this kind of external engagement, but it was a problem that came up unprompted several times in different interviews.¹⁵⁴

We also heard from one senior analyst that all too often “people turn up with the right answer in their minds, [and their] main objective is to convince you”.¹⁵⁵ This can make external engagement uncomfortably close to lobbying, particularly when policy makers are prone to ‘consult industry’ by talking to a few large businesses with long-standing and institutionalised relationships with government.¹⁵⁶

This problem is exacerbated by the level of technical knowledge often needed in energy policy making. The need for strong action on climate change has driven an increasingly interventionist policy approach, which places greater burdens on government to properly understand the sector, particularly when it comes to innovation support. This puts government in the difficult position of having to rely on outside knowledge from parties who, by definition, have a prior interest.

The UK’s formal policy processes stand up to international comparison, but more needs to be done to bring in evidence from outside government

Taken together, the UK’s processes for bringing evidence into energy policy making seem reasonably sound. Tools like the Green Book are not perfect, but none of the other countries we surveyed has a notably more comprehensive or usable handbook of appraisal methodology to guide its policy making process. In this area, and in evaluations, the UK is generally regarded as a leader – though this should not be a reason for complacency. Our earlier findings that the UK system is often too insular suggest that strong internal processes cannot always compensate for a narrowness of perspective.

Despite scoring highly on comparative indications like the Bertelsmann Stiftung SGI, evaluation is too infrequently seen as a source of genuine insight for future policy making, a point Michael Gove, chancellor of the Duchy of Lancaster, recently made in a speech on civil service reform.¹⁵⁷ Greater efforts need to be made in this area, although we also need to recognise that energy is a fast-moving sector, and that past policy performance may not be the best indicator of future success.

Business cases and impact assessments are not the be-all and end-all of the evidence process, but they do provide opportunities to challenge bad evidence, and are broadly seen to work well. There is scope for greater independent assessment than is currently provided by the RPC, but again, the UK is not ignoring an obviously superior alternative international model.

The practice of embedding analysts within policy teams in BEIS seems, from our sample of interviewees in energy policy, successful. Policy makers generally feel that they have good access to analysts, albeit with the usual caveats about 'bandwidth', with whom they are able to discuss and test their ideas as they generate them. The presence of SCS analysts in policy teams means that the evidence sign-off process is seen as serious.

It is difficult to compare this system with our international comparisons, because the functional and professional distinctions between analysts and policy makers do not exist, or exist in very different ways, in the countries we surveyed – and in the Netherlands and Germany in particular, much of the work that BEIS considers internal analysis is done externally. That said, the fact that so much analytic capacity is retained in-house by BEIS is one potential strength when it comes to informal collaboration between policy officials and analysts. We did not hear of similarly close day-to-day working relationships in the countries that keep significant parts of their analysis at an arm's length from the department.

However, the UK's informal processes for developing and maintaining relationships with experts outside government are a weakness. They partly derive from failings in the professional culture and incentive structure of the civil service – overly high staff turnover, and low prioritisation of building and maintaining networks to pass on to successors in the role. There are also arguably institutional differences at play. Our international comparative work suggests that in the Netherlands and Germany, regular engagement between the academic community and other experts and government comes about in part because so much of the analytical work that the UK would do in-house is done by independent or semi-independent organisations with deeper links to the wider research community and sector.

Recognition that the UK has a gap to make up as a result of its institutional set-up should spur senior civil servants to put much more effort into incentivising their teams to build longer lasting, more systematic relationships with experts outside government.

4. Modelling evidence in energy policy making

Policy makers often lack the skills to use modelling evidence appropriately

Large computer models play a major role in energy policy. They are used to inform both the strategic 'big picture' of energy policy, and to assess the costs and benefits of policy options in impact assessments. The models are complex, and relatively few people understand how they work. This makes them difficult forms of evidence for the policy process – since those developing policies need support to understand what conclusions the models can and cannot provide.

The central modelling team within BEIS develops and runs a variety of energy models

Modelling is run centrally in BEIS, with one analytical team responsible for a set of cross-cutting models such as TIMES,^{*} the national household model, the dynamic dispatch model (DDM), and the non-domestic buildings model.^{**} DDM, which is used to analyse the impacts of policies on the power sector, was cited as particularly influential.¹⁵⁸ Analysts (mostly Government Operational Researchers) operate and annually update these models (sometimes with support from outside consultants), and use them to run policy scenarios. The CCC also has access to key energy policy models, and has the capacity both to run models and to commission and interrogate external modelling.

Quality assurance of models is taken seriously

Since the west coast rail franchise fiasco,¹⁵⁹ and the Macpherson Review that followed, government has worked hard to create quality assurance processes for models. The Aqua Book, produced by the Treasury, sets out standards and best practices for the use of analytic modelling in government. The BEIS central modelling team applies the Aqua Book guidance, and all models are routinely assessed to ensure that they are 'Aqua Book compliant'.

There are concerns about the capacity of policy officials to interpret the models appropriately

Those raising concerns about modelling did not suggest that the models used by BEIS are themselves flawed – indeed, by the general standards of energy and macro-economic modelling, they are highly regarded. The problem that several interviewees inside and outside of government, and in Ofgem, identified was that the results produced were treated like “gospel” emerging from a “black-box”.¹⁶⁰ That is, the work going into the modelling is so complex, that too few policy makers and other analysts

* The TIMES model is a detailed techno-economic model of the whole energy system of the UK, and it is used to explore the most cost-effective ways of delivering energy for heat, power and transport between now and 2050. The UK TIMES model was initially developed at UCL, and is now co-developed by UCL and BEIS. It is one of a family of TIMES models used globally.

** The national household model and non-domestic buildings models are used to understand how energy demand from buildings might change, and how policies can influence this.

are able to critically evaluate the results, meaning they either apply the models' insights incorrectly or with insufficient scepticism, or they are unable to translate their scepticism into a meaningful challenge of the modellers' assumptions.

In many ways, this criticism of policy makers' understanding of modelling evidence is a reflection of wider criticisms of government's understanding of risk and uncertainty. Picking the cheapest of three very slightly differently priced modelled options when "in reality the error bar on each might be 50%" makes very little sense.¹⁶¹

Sensitivity analysis can help with this problem, by demonstrating what happens to model outputs with even small changes to assumptions – and as models have to be auditable, analysts do perform this analysis regularly. However, the need for policy professionals to better understand how to use and understand the insights produced by models, understanding their constraints and how to deal with uncertainties, was a theme our interviewees returned to repeatedly. In part, this is also about modellers being able to explain their work in a way that is accessible to policy makers without losing its nuance.

Transparency of models is a concern

Several of our interviewees told us that the energy models used within BEIS are insufficiently transparent, reducing the extent to which external scrutiny can hold government decisions to account. Making complex models transparent, though, is not necessarily straightforward. Publishing code and data is valuable in opening up the range of scrutiny and participation in modelling, but it facilitates effective scrutiny only if there are enough people that understand the modelling paradigm. This is a perennial problem of computer modelling: it is not always clear *how* to make complex models meaningfully transparent.

A more effective strategy than simply publishing data and code may be to facilitate a broad group of users, which can then provide an independent perspective. This does happen in the UK with some models. A particularly good example is the UK TIMES model, which is shared between BEIS and more than 20 other institutions, including the Climate Change Committee, National Grid and the Scottish government. BEIS works closely on model development with UCL, where UK TIMES is used extensively in academic research projects. TIMES is also based on an internationally widespread modelling approach, with dozens of research teams around the world using similar models. This wide group of users ensures that there is a community of experts able to intelligently critique government use of models, and the models themselves.

Other models, notably the dynamic dispatch model, are much less widely used, and transparency is correspondingly a greater concern. In some cases, as with the ESME model that has been used to inform energy innovation policy, commercial confidentiality has prevented widespread use. BEIS does carry out periodic peer reviews of these models, as part of Aqua Book quality assurance processes.*

* See for example, www.gov.uk/government/publications/dynamic-dispatch-model-ddm

It is also important to recognise that there are incentives to prevent model transparency: external providers of models want to protect the value of their intellectual property; governments may be concerned that wider access to models creates scope for decisions being challenged in the courts on the basis that they were informed by flawed modelling. In light of these incentives, it is important that government develops a culture that embraces the external validation of models, and follows the Aqua Book processes that back up that culture.

International perspectives on model use

Of the countries we compared, only Canada follows the UK in running its own models within central government. The strategic policy branch within Environment and Climate Change Canada (ECCC) hosts modelling teams in much the same way as BEIS's central analysis function. In contrast to the modelling teams at BEIS, the ECCC teams publish some of their research as peer reviewed journal articles¹⁶² and take part in the prestigious Stanford Energy Modelling Forum.¹⁶³ They see these academic engagement activities as an important way of keeping their modellers up to date with methods, and ensuring that models are exposed to international peer scrutiny.

The Canadian system does not have a direct equivalent for the quality assurance management system embodied by the Aqua Book. Civil servants have relied on participation in academic modelling and peer review as a source of quality assurance. There have also been external pressures on the department to ensure that the modelling is adequate. Canada's auditor general required the ECCC had its main Energy 2020 model peer reviewed by international academics, and it is implementing the recommendations it received.¹⁶⁴ Between 2007 and 2012, under the Kyoto Protocol Implementation Act, the forecasts and modelling of the federal government was independently assessed on an annual basis by an arm's length body, the National Round Table on the Environment and the Economy – a process of external scrutiny that did result in improvements to the modelling according to our interviewees.¹⁶⁵ The energy ministries in France, Germany and the Netherlands do not carry out modelling internally. Instead, they rely on external or arm's length bodies.

The German government has access to high-quality modelling through the country's numerous independent research institutes. However, many of the models used are not made easily available to others, and the models themselves are consequently not transparent in their data or assumptions.

The French ministry MTES has access to some government-run models through ADEME, but is reliant on the transmission system operator RTE for much of its energy systems modelling. As with Germany, these are proprietary models that are not open to widespread scrutiny.

Officials in the Dutch EZK ministry referred to their role as organising processes around assessment and quality assurance, rather than understanding and critiquing models themselves – they felt replicating modelling capacity would be inefficient given the strength of the expertise within the planning bureaus. This expertise is deep. PBL –

the planning bureau that provides analysis of energy scenarios and decarbonisation pathways – is a globally leading energy modelling institution, at the forefront of academic energy modelling.

The potential disadvantage of these approaches, in which modelling takes place outside the department, is the separation of policy teams from analysts. Close collaborative working with policy teams helps modellers to understand what the most pressing policy questions are, and this can inform future model development. In the Netherlands, there are protocols for when policy makers can suggest changes to CPB and PBL models, partly clarified by the Theeuwes Commission, which set out standards for policy evaluation and modelling in the Netherlands. However, one interviewee described this issue as “murky terrain that still hasn’t been resolved”.¹⁶⁶

There is a further disadvantage to separating modelling analysis from policy teams. The process of modelling provides qualitative insights for modellers into the system being studied, and these insights may be just as valuable as the direct ‘results’ in a modelling report. ‘Model behaviour’ observations can help highlight important new issues or knowledge gaps that might be considered too tangential for the report. Creating institutional barriers between modellers and policy teams prevents that tacit expertise from playing a role in policy development.

Conclusions on modelling

International experience suggests that the UK is not alone in facing challenges in the appropriate use of modelling to inform energy policy. Large complex models, by their nature, can be difficult forms of evidence to manage appropriately.

A good system of modelling for policy needs four things:

- 1. Good quality assurance processes.** Relative to its peers, the UK has strong processes in place for peer review and quality assurance of energy policy models, building on the Aqua Book. These must continue. However, it is troubling that, five years on from the publication of the Aqua Book, and after considerable effort by the BEIS central modelling team to implement Aqua Book guidelines, there is still a perception that modelling is not always used effectively. Our interviews and comparative work suggest that it is not so much a problem of quality assurance, but that the wider structures in which the models operate need improvement, as outlined below.
- 2. Transparency, external engagement and peer review.** The UK picture here is mixed. The UK TIMES model, though it falls short of being fully open access, is widely shared across an expert user group, which includes academics and other government bodies and private companies – enabling some scrutiny of government modelling practice, and keeping government modellers abreast of developments using that model framework. The national household model is fully open source. Other models are much less transparent, held only within government and subject to periodic peer review (like DDM). In the Netherlands and Germany, models are held by arms’ length or independent bodies. These bodies are heavily engaged

in academic research, and so the models are continually compared against global best practices. But the models themselves are rarely transparent, and we heard real concerns, particularly in Germany, about the transparency of the models. In Canada, government models are not made widely transparent (that is, no open access), but government modellers do engage widely with policy communities. **The UK could do more to ensure all models are open access, and could consider ensuring that government modellers are more closely engaged, via secondments or direct participation, in academic or industry modelling projects.**

- 3. Resources for maintaining and updating models.** Core funding for model maintenance and development is important for maintaining high-quality models. In Germany and the Netherlands, some of the main modelling teams are external to government or energy policy departments but receive core funding to maintain their models. Some significant models used by BEIS are partially maintained externally: for example, the UK TIMES model held at UCL. Models largely maintained by universities suffer from a different problem. Models within universities are run on the basis of intermittently funded research projects. University modelling teams are rarely able to win funding for maintaining, upgrading and documenting a model – research funders prefer to see innovative new model applications. Those important tasks tend to suffer as a result. **Government needs to ensure that business-critical models are adequately and correctly resourced.**
- 4. Close collaboration and relationships between modellers and those drawing on models to inform policy.** One issue is the rate of turnover of staff, particularly among policy professionals (analysts reportedly tend to stay in post for longer). This makes it harder for policy professionals to develop the deeper understanding of models that helps to ensure they are used appropriately. **BEIS could do more to ensure that policy professionals understand the models, through training and slower turnover of staff.**

Conclusion

The 2020s will be a critical decade in the UK's response to climate change, and in making progress towards the net zero target. At the same time, the UK's domestic oil and gas resources continue to decline, while many existing nuclear power stations and all coal power stations will close. Energy policy will need to be underpinned by well-sourced, valid evidence to meet these challenges.

Good evidence is not the sum total of policy making, but good policy cannot be made without it. This report has surveyed the evidence structure of the UK's energy policy system, and compared it to some international examples, in order to establish what is working and what is not.

Strengths and weaknesses in the UK's use of evidence in energy policy making

Several features of the UK's institutions and processes which guide evidence use in energy policy stood out as strengths:

- **BEIS's internal analytic capacity has improved in recent years, and is widely seen as a departmental strength.** Analysts working in BEIS are highly regarded, and most of our interviewees inside and outside government spoke highly of the much-improved engineering function, and of the operational researchers in charge of modelling. The impression that the sometimes neglected analyst professions other than economists have increased in stature in recent years is borne out by workforce data.
- **The UK's formal processes that guide evidence use are well-established, and more visible than in the other systems we examined.** The UK has long been seen as a leader in systematising evidence-informed policy making. The system of analytic professions, clear lines of accountability for the quality of evidence, and a well-established impact assessment and business case process are all features that give useful structure to the messy reality of policy making.
- The CCC is seen as a world-leading independent source of evidence for policy. All our interviewees in the UK, and many of our interviewees overseas, highlighted the CCC as a very successful and valuable body that had improved the evidence base for energy policy.

Our research found several weaknesses in the UK's use of evidence in energy policy:

- **Routine external engagement is too shallow.** External engagement, with academia, business, and other sources of expertise, in BEIS is often ad hoc and loosely structured. It is therefore largely dependent on the individual interests and talents of the civil servants tasked with it. This means that where good practice does exist, it is not scalable. We heard that deputy directors, juggling large teams and multiple responsibilities, often view external consultation, formal or informal, as the lowest of their priorities, a 'nice-to-have' rather than an essential part of their job. This is a mistake, and contributes to the fact that when civil servants do look outside the department, it is often to a small coterie of usual suspects. Without engaging with external challenges to evidence, the tendency to fall back on the house-view of an issue can be overwhelming.
- **Rapid turnover saps institutional memory, which makes deep expertise harder to achieve.** High staff turnover comes up as a perennial problem associated with the UK civil service. Not all turnover is bad – some of our German interviewees complained their civil servants do not move enough – but the UK is still an extreme case, even though BEIS is not the worst offender. The causes of rapid turnover in the UK civil service are fairly well-established. The professional incentives that promote moving roles quickly are the same professional incentives that push people away from developing deep, sectoral expertise. This problem is also connected to the problem of shallow external engagement – less expert civil servants are less likely to know where to look, and more likely to be swayed by interested parties.
- **The evidence base can be too narrow.** The role of the Treasury, and the structure of the impact assessment, business case and evaluation process elevate the importance of cost-benefit evidence, despite concerns that this may not always be sufficient, particularly in non-marginal policy choices – which may become more frequent in energy policy in the coming years. Some of the interviewees we spoke to felt that engineering and social science evidence is sometimes neglected as a result.
- **There is not enough expert independent review of government policy making.** The main independent review of government evidence use comes through RPC scrutiny – but this does not involve subject-specific expertise, and has a narrow remit. At a strategic level, the CCC reviews government policy, but there is no suitable body at the level of policy detail. Internal review, in the form of evaluations, is often too narrowly focused on accountability, instead of learning.
- **Energy modelling is sometimes seen as a black box.** Following the Macpherson Review and the development of the Aqua Book, the UK appears to have relatively good practice in terms of model transparency and use compared to some peers, but improvements could still be made. The importance placed on modelling means both transparency and training for policy makers are key, if modelling evidence is to be used most effectively – as neither delivering unchallengeable truth, nor impenetrable jargon.

Key lessons from abroad

Our comparative assessment suggests lessons for the UK from other countries. The UK, partly as a result of its centralised political system, is particularly reliant on internal analysis, something it shares with France (and to an extent, though with important caveats derived from its federal system, with Canada). By contrast, we found the German and Dutch systems much more structured around the use of externally produced evidence, filtered through a more dispersed, consultative political structure.

A key benefit of the focus on externally produced evidence seen in Germany and the Netherlands is its greater diversity of perspectives and explicit willingness to see evidence as part of normal political contestation. This pushes the policy making process to bring competing parties to a common view, after marshalling the best available evidence for each position, rather than leaving the weighing of evidence as a purely technocratic exercise.

For that to work, however, externally produced evidence needs to be seen as credible. The expert and advisory bodies we examined in Germany and the Netherlands were empowered and independent, and thus widely respected. Independence can either be complete legal independence from government (as with university research centres), or can come in the form of arm's length government bodies, provided the culture is one of genuine strategic and research autonomy.

These observations are not intended to suggest that the UK's system has none of these features – in the CCC, the UK has a widely admired body of independent external experts. However, the CCC is relatively small, and it is focused on strategic questions rather than the detailed design of specific policy interventions. Its remit is also focused on climate change, rather than affordability or security.

Recommendations

This report was intended as an overview of the strength of UK evidence use in energy policy making relative to its international peers, in part to identify the best features in other countries which the UK might adopt in some form, and to highlight areas of weakness that the UK should address. On the basis of our findings, and in light of the government's own stated aims for civil service reform, we recommend that government consider action in the following areas:

Building expertise in government

- Civil service reform is high on the government's agenda, and is likely to involve a review of pay and progression.¹⁶⁷ We urge the government to consider how it can reward analysts and policy makers for developing expertise in highly technical sectors, and in complex markets like energy.
- The broad-based appraisal guidance contained in the Green Book remains useful and important, but often it has been applied too narrowly. Following the Treasury's Green Book review published in November 2020, the guidance should be updated to reflect the government's net zero ambitions. Factoring in the emissions and climate impacts of policy proposals rigorously should become routine, and government should develop and publish methodological guidance to help departments do this.

Opening up

- The UK's policy making system would benefit from greater transparency with regard to its use of evidence. Government should publish more of the research evidence it produces, and should build on its considerable strength in technical energy modelling by opening up more of its models to peer scrutiny.
- Government needs to be more systematic in how it consults external experts. Knowing who to speak to, and passing on a viable network of relevant contacts and experts, should be considered a key responsibility for relevant civil servants. New starters in a role should not have to start from scratch, and those outside government should not feel that they have lost access whenever someone moves role.
- Appointments to advisory committees should more often be made on the basis of an open recruitment process, rather than direct invitation of trusted and known figures.
- Impact assessments should be independently assessed for how well they use evidence across a broader range of metrics, particularly on emissions and climate impact. The government should consider expanding the RPC's remit to encompass this, or consider establishing a new body. If the RPC's remit is expanded, it will likely need help to develop specific energy policy expertise. The RPC should review impact assessments at the consultation stage, as well as final impact assessments.

Fostering a strong evidence system

- Our analysis suggests that government is sometimes too reliant on internally generated evidence for policy design. Some of the other countries we examined have a richer system of external advisory organisations. Instead of recommending the creation of yet another body, we suggest that government should expand the remit and resources of two existing institutions: UKERC and the Energy Systems Catapult. Each brings different strengths, and each could do more to help government design policies more effectively, drawing on a wider evidence base. This is particularly relevant in light of the government's commitment to double spending on R&D. However, efforts to increase the supply of high-quality evidence from outside government need to be matched with efforts to ensure that there is demand for it.

The UK's recent record of energy policy making shows too many mistakes: policies that were ill-designed; that were based on overconfident predictions that turned out to be wrong; or that failed to take account of alternative – and better – options. Energy policy is going to get harder, not easier, as the global energy transition unfolds. The UK must do better.

Our assessment of the UK's use of evidence in energy policy making has highlighted strengths as well as weaknesses in comparison with other countries. As the government considers how to respond to the new net zero target, it is a critical moment to strengthen the evidence system, and ensure that the right institutions and processes are in place to improve energy policy.

References

- 1 Hallsworth M, Parker S and Rutter J, *Policy making in the real world*, Institute for Government, 18 April 2011, www.instituteforgovernment.org.uk/publications/policy-making-real-world
- 2 HM Treasury, *Green Book Review 2020: Findings and response*, CP331, November 2020, retrieved 26 November 2020, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/937700/Green_Book_Review_final_report_241120v2.pdf
- 3 Department for Business, Energy and Industrial Strategy, 'Annual domestic energy bills', 25 June 2020, retrieved 12 October 2020, www.gov.uk/government/statistical-data-sets/annual-domestic-energy-price-statistics
- 4 Ofgem, *State of the Energy Market 2019*, Ofgem, 3 October 2019, www.ofgem.gov.uk/publications-and-updates/state-energy-market-2019
- 5 Huhne C, Speech at the Liberal Democrat party conference, 20 September 2011.
- 6 Hallsworth M, Parker S and Rutter J, *Policy making in the real world*, Institute for Government, 18 April 2011, www.instituteforgovernment.org.uk/publications/policy-making-real-world
- 7 Clark S, 'Is hydrogen the solution to net-zero home heating?', *The Guardian*, 21 March 2020, retrieved 12 October 2020, www.theguardian.com/science/2020/mar/21/is-hydrogen-the-solution-to-net-zero-home-heating
- 8 University of Exeter Energy Policy Group, 'Written evidence submitted to the Business, Energy and Industrial Strategy Select Committee', House of Commons Business, Energy and Industrial Strategy Select Committee, (no date) retrieved 12 October 2020, www.committees.parliament.uk/writtenevidence/8157/html
- 9 Comptroller and Auditor General, *Hinkley Point C*, Session 2017-18, HC 40, National Audit Office, 23 June 2017.
- 10 Mason R, 'David Cameron at centre of 'get rid of all the green crap' storm', *The Guardian*, 21 November 2013, retrieved 12 October 2020, www.theguardian.com/environment/2013/nov/21/david-cameron-green-crap-comments-storm
- 11 Regulatory Policy Committee, *Domestic Gas and Electricity (Tariff Cap) Bill*, RPC 4214(2) – BEIS, Regulatory Policy Committee, 22 February 2018.
- 12 House of Commons Energy and Climate Change Committee, *Fuel Poverty: Fifth report of session 2009-10* (HC424-I), The Stationery Office, 24 March 2010.
- 13 See: Committee on Fuel Poverty, *A report on initial positions*, September 2016; *Annual Report 2017*, October 2017; *Third Annual Report*, November 2018; *Fourth Annual Report*, June 2020.
- 14 Hiroko Tabuchi, 'Japan sets policy to phase out nuclear power plants by 2040', *The New York Times*, 14 September 2012, retrieved 12 October 2020, www.nytimes.com/2012/09/15/world/asia/japan-will-try-to-halt-nuclear-power-by-the-end-of-the-2030s.html
- 15 Ministry of Economy, Trade and Industry, *Strategic Energy Plan* (Provisional Translation), April 2014, www.enecho.meti.go.jp/en/category/others/basic_plan/pdf/4th_strategic_energy_plan.pdf
- 16 Department for Business, Energy and Industrial Strategy, 'International energy price comparison statistics', 24 September 2020, retrieved 12 October 2020, www.gov.uk/government/collections/international-energy-price-comparisons
- 17 The World Bank, 'Getting electricity: system average interruption frequency index (SAIFI)', World Bank DataBank Doing Business, 2020, retrieved 14 October 2020, <https://databank.worldbank.org/reports.aspx?source=3001&series=IC.ELC.SAIF.XD.DB1619>
- 18 OECD, 'Greenhouse Gas Emissions by Source', OECD Statistics, 2020, retrieved 14 October 2020, https://stats.oecd.org/Index.aspx?DataSetCode=AIR_GHG
- 19 Helm D, *Cost of Energy Review*, Department for Business, Energy and Industrial Strategy, 25 October 2017, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/654902/Cost_of_Energy_Review.pdf; Grubb M and Drummond P, UK Industrial Electricity Prices: Competitiveness in a low carbon world, Aldersgate Group and University College London, Institute for Sustainable Resources, February 2008, www.aldersgategroup.org.uk/asset/993
- 20 Thurley D, McInnes R and Kennedy S, 'Briefing paper: Winter Fuel Payments update', CBP-6019 House of Commons Library, 5 November 2019.

-
- 21 Department for Business, Energy and Industrial Strategy, 'Workforce management information, May 2020', 25 June 2020, retrieved 12 October 2020, www.gov.uk/government/publications/beis-workforce-management-information-may-2020
 - 22 Institute for Government interview.
 - 23 Institute for Government interview.
 - 24 *Ibid.*
 - 25 *Ibid.*
 - 26 Sasse T, Rutter J, Shepherd M, and Norris E, *Net Zero: How government can meet its climate change target*, Institute for Government, 7 September 2020, www.instituteforgovernment.org.uk/publications/net-zero
 - 27 Comptroller and Auditor General, *Rolling out smart meters*, Session 2017-19, HC 1680, National Audit Office, 2018.
 - 28 *Ibid.*
 - 29 Institute for Government interview, data provided by BEIS.
 - 30 Kattirtzi M, 'Providing a "challenge function": Government social researchers in the UK's Department of Energy and Climate Change (2010–2015)', Palgrave Communications, 2016, vol. 2, pp. 1-9.
 - 31 Sasse T, Rutter J, Shepherd M, and Norris E, *Net Zero: How government can meet its climate change target*, Institute for Government, 7 September 2020, www.instituteforgovernment.org.uk/publications/net-zero
 - 32 Government Office for Science, *Realising our ambition through science: a review of government science capability*, November 2019, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/844502/a_review_of_government_science_capability_2019.pdf
 - 33 Panjwani A, 'Trends and changes in departmental spend on R&D and KT', Campaign for Science and Engineering, 8 November 2016, retrieved 16 November 2020, www.sciencecampaign.org.uk/news-media/case-comment/departmental-r-d-2016.html
 - 34 Sainsbury, D (Lord Sainsbury of Turville), *The Race to the Top: A review of government's science and innovation policies*, Her Majesty's Stationery Office, October 2007.
 - 35 Office for National Statistics, 'Research and development expenditure by the UK government', ONS, (no date), retrieved 16 November 2020, [www.ons.gov.uk/economy/governmentpublicsectorandtaxes/researchanddevelopmentexpenditure#:~:text=Research%20and%20development%20\(R%26D\)%20expenditure,largest%20annual%20rise%20since%202013](http://www.ons.gov.uk/economy/governmentpublicsectorandtaxes/researchanddevelopmentexpenditure#:~:text=Research%20and%20development%20(R%26D)%20expenditure,largest%20annual%20rise%20since%202013)
 - 36 Institute for Government interview.
 - 37 Department for Business, Energy and Industrial Strategy, *International review of heat network market frameworks*, BEIS Research Paper Number 2019/032, February 2020, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/863937/international-review-of-heat-network-market-frameworks.pdf
 - 38 Comptroller and Auditor General, *Hinkley Point C*, Session 2017-18, HC 40, National Audit Office, 23 June 2017.
 - 39 Institute for Government interview.
 - 40 *Ibid.*
 - 41 *Ibid.*
 - 42 *Ibid.*
 - 43 *Ibid.*
 - 44 Sasse T and Norris E, *Moving On: The costs of high staff turnover in the civil service*, Institute for Government, 16 January 2019, www.instituteforgovernment.org.uk/publications/moving-on-staff-turnover-civil-service
 - 45 Institute for Government interview.
 - 46 *Ibid.*
 - 47 *Ibid.*
 - 48 *Ibid.*
 - 49 *Ibid.*

-
- 50 *Ibid.*
- 51 Vesely A, 'Policy analysis in the Central Government', in Brans M, Geva-May I and Howlett M eds, *Routledge Handbook of Comparative Policy Analysis*, Routledge, 2017, pp. 100-115.
- 52 *Ibid.*
- 53 Institute for Government interview.
- 54 Veit S, Hustedt T and Bach T, 'Dynamics of change in internal policy advisory systems: the hybridization of advisory capacities in Germany', *Policy Sciences*, 2017, vol. 50, no. 1, pp. 85-103; Vesely A, 'Policy analysis in the Central Government', in Brans M, Geva-May I and Howlett M eds, *Routledge Handbook of Comparative Policy Analysis*, Routledge, 2017, pp. 100-115.
- 55 Jann W and Veit S, 'Germany', in Van Wart M, Hondeghem A, Schwella E and Suino P eds, *Leadership and culture: Comparative models of top civil servant training*, Palgrave Macmillan, 2015, pp. 183-198.
- 56 Institute for Government interview.
- 57 Jann W and Veit S, 'Germany', in Van Wart M, Hondeghem A, Schwella E and Suino P eds, *Leadership and culture: Comparative models of top civil servant training*, Palgrave Macmillan, 2015, pp. 183-198.
- 58 Veit S, Hustedt T and Bach T, 'Dynamics of change in internal policy advisory systems: the hybridization of advisory capacities in Germany', *Policy Sciences*, 2017, vol. 50, no. 1, pp. 85-103.
- 59 Institute for Government interview.
- 60 Vesely A, 'Policy analysis in the Central Government', in Brans M, Geva-May I and Howlett M eds, *Routledge Handbook of Comparative Policy Analysis*, Routledge, 2017, pp. 100-115.
- 61 Institute for Government interview.
- 62 *Ibid.*
- 63 *Ibid.*
- 64 This picture echoes the findings of previous work on the Canadian public service, which found that about half of provincial policy analysts have very little contact with the federal government or other provinces. See Howlett M and Newman J, 'Policy analysis and policy work in federal systems: Policy advice and its contribution to evidence-based policy-making in multi-level governance systems', *Policy and Society*, 2010, vol. 29, issue 2, pp. 123-136.
- 65 Vesely A, 'Policy analysis in the Central Government', in Brans M, Geva-May I and Howlett M eds, *Routledge Handbook of Comparative Policy Analysis*, Routledge, 2017, pp. 100-115.
- 66 Howlett M and Newman J, 'Policy analysis and policy work in federal systems: Policy advice and its contribution to evidence-based policy-making in multi-level governance systems', *Policy and Society*, 2010, vol. 29, issue 2, pp. 123-136.
- 67 Institute for Government interview.
- 68 We heard this from our interviewees, and it reflects findings of previous research (see Howlett M, 'Policy analytical capacity and evidence-based policy-making: lessons from Canada', *Canadian Public Administration*, 2009, vol. 52, no. 2).
- 69 Nick Boisvert, 'Auditor general's report finds Ontario not using "sound evidence" in climate change plan', CBC News, 4 December 2019, retrieved 13 October 2020, www.cbc.ca/news/canada/toronto/auditor-general-report-2019-1.5383961
- 70 This finding reflects existing research: a survey published in 2010 found that provincial policy analysts are much less likely to be involved in longer term strategic policy development than those in the federal government. See Howlett M and Newman J, 'Policy analysis and policy work in federal systems: Policy advice and its contribution to evidence-based policy-making in multi-level governance systems', *Policy and Society*, 2010, vol. 29, issue 2, pp. 123-136.
- 71 LinkedIn, 'Ministère de l'Environnement', LinkedIn, (no date), retrieved 13 October 2020, www.linkedin.com/company/ministere-de-la-transition-ecologique/people/?facetSchool=12350, (n.b., LinkedIn data is self-reported and self-selecting, so should be treated cautiously).
- 72 Institute for Government interview.
- 73 *Ibid.*
- 74 Rutter J, *Evidence and evaluation in policy making: a problem of supply or demand?*, Institute for Government, 28 September 2012, www.instituteforgovernment.org.uk/publications/evidence-and-evaluation-policy-making

-
- 75 Sasse T, Rutter J, Shephard M, and Norris E, *Net Zero: How government can meet its climate change target*, Institute for Government, 7 September 2020, www.instituteforgovernment.org.uk/publications/net-zero
- 76 Institute for Government interview.
- 77 UK Energy Research Centre, 'About', (no date), retrieved 13 October 2020, <https://ukerc.ac.uk/about>
- 78 Committee on Fuel Poverty, 'Tailored Review Report 2019', Department for Business, Energy and Industrial Strategy, January 2020, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/859307/committee-fuel-poverty-tailored-review.pdf
- 79 *Ibid.*
- 80 Davies N, Atkins G and Slade D, *How to transform infrastructure decision making in the UK*, Institute for Government, 6 February 2018, www.instituteforgovernment.org.uk/publications/how-transform-infrastructure-decision-making-uk
- 81 National Infrastructure Commission, *Strategic Investment and Public Confidence*, October 2019, <https://nic.org.uk/app/uploads/NIC-Strategic-Investment-Public-Confidence-October-2019.pdf>
- 82 Veit S, Hustedt T and Bach T, 'Dynamics of change in internal policy advisory systems: the hybridization of advisory capacities in Germany', *Policy Sciences*, 2017, vol. 50, no. 1, pp. 85-103.
- 83 Institute for Government interview.
- 84 Pattyn V, Pittoors G and Van Hecke S, 'Who are the political parties' ideas factories? On policy analysis by political party think tanks', in Brans M, Geva-May I and Howlett M, *Routledge Handbook of Comparative Policy Analysis*, Routledge, 2017.
- 85 Institute for Government interview.
- 86 *Ibid.*
- 87 Stone D and Ladi S, 'Policy analysis and think tanks in comparative perspective', in Brans M, Geva-May I and Howlett M, *Routledge Handbook of Comparative Policy Analysis*, Routledge, 2017.
- 88 Veit S, Hustedt T and Bach T, 'Dynamics of change in internal policy advisory systems: the hybridization of advisory capacities in Germany', *Policy Sciences*, 2017, vol. 50, no. 1, pp. 85-103.
- 89 Institute for Government interview.
- 90 *Ibid.*
- 91 Data provided to the Institute for Government by EZK.
- 92 Data provided to the Institute for Government by EZK.
- 93 Institute for Government interview.
- 94 Institute for Government interview. See also den Hoed P and Keizer AG, 'The scientific council for policy: between science, policy and more', in Lentsch J and Weingart P eds, *Scientific Advice to Policy Making: International comparison*, Verlag Barbara Budrich, 2009.
- 95 Parliament of Canada, House of Commons Debates, 41st Parliament, 1st Session, vol. 146, no. 123, 14 May 2012.
- 96 Institute for Government interview.
- 97 HM Government, 'Energy Act 2010, Section 16, Amendments of Section 4AA of the Gas Act 1986', legislation.gov.uk, 2010, retrieved 13 October 2020, www.legislation.gov.uk/ukpga/2010/27/section/16
- 98 Tyers R, Sweeney M and Moon B, 'Harnessing behavioural insights to encourage consumer engagement in the British energy market: results from a field trial', *Journal of Behavioral and Experimental Economics*, 2019, vol. 80, pp. 162-176.
- 99 Ofgem, 'Future arrangements for the electricity system operator: its role and structure', 12 January 2017, www.ofgem.gov.uk/system/files/docs/2017/01/future_arrangements_for_the_electricity_system_operator.pdf
- 100 Institute for Government interview.
- 101 Cabinet Office, 'Civil Service Statistics 2020', August 2020, www.gov.uk/government/statistics/civil-service-statistics-2020; Commission de Régulation de l'Énergie, 'Who are we?', (no date) retrieved 15 October 2020, www.cre.fr/en/CRE/who-are-we; Canada Energy Regulator, 'Our People', (no date) retrieved 15 October 2020, www.cer-rec.gc.ca/en/about/who-we-are-what-we-do/people.html; other data provided directly to the Institute for Government by the regulators.

-
- 102 Haddon C and Sasse T, *How government can work with academia*, Institute for Government, 5 June 2018, www.instituteforgovernment.org.uk/publications/how-government-can-work-academia
- 103 Department for Business, Energy & Industrial Strategy, 'BEIS Areas of Research Interest: Interim Update 2020', February 2020, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/862777/beis-areas-research-interest-interim-update-2020.pdf
- 104 Institute for Government interview.
- 105 *Ibid.*
- 106 *Ibid.*
- 107 *Ibid.*
- 108 Department for Business, Energy & Industrial Strategy, 'Clean Growth – Transforming Heating: Overview of current evidence', December 2018, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/766109/decarbonising-heating.pdf
- 109 Confederation of British industry and the University of Birmingham, 'Net-zero: the road to low-carbon heat', University of Birmingham, July 2020, www.birmingham.ac.uk/Documents/college-eps/energy/Publications/heat-policy-commission-final-report.pdf; MacLean K, Sansom R, Watson T and Gross R, 'Managing heat system decarbonisation: Comparing the impacts and costs of transitions in heat infrastructure', Imperial College London, April 2016, www.imperial.ac.uk/media/imperial-college/research-centres-and-groups/icept/Heat-infrastructure-paper.pdf
- 110 Ofgem, 'The Decarbonisation of Heat', November 2016, www.ofgem.gov.uk/system/files/docs/2016/11/ofgem_future_insights_programme_-_the_decarbonisation_of_heat.pdf
- 111 Institute for Government interview.
- 112 Government Office for Science, 'Realising our ambition through science: a review of government science capability', 2019, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/844502/a_review_of_government_science_capability_2019.pdf
- 113 HM Treasury, *The Green Book: Central government guidance on appraisal and evaluation*, 2018, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/685903/The_Green_Book.pdf
- 114 *Ibid.*
- 115 Hallsworth M, Parker S and Rutter J, *Policy making in the real world*, Institute for Government, 18 April 2011, www.instituteforgovernment.org.uk/publications/policy-making-real-world
- 116 *Ibid.*
- 117 HM Treasury, 'Assessing business cases: a short plain English guide', (no date), https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/190609/Green_Book_guidance_short_plain_English_guide_to_assessing_business_cases.pdf
- 118 Department for Business, Energy & Industrial Strategy, 'Regulatory impact assessment template for government policies', (no date) retrieved 13 October 2020, <https://www.gov.uk/government/publications/impact-assessment-template-for-government-policies>
- 119 HM Treasury, *Magenta Book: Central Government Guidance on Evaluation*, March 2020, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/879438/HMT_Magenta_Book.pdf
- 120 *Ibid.*
- 121 Institute for Government interview.
- 122 HM Treasury, *Green Book Review 2020: Findings and response*, CP331, November 2020, retrieved 26 November 2020, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/937700/Green_Book_Review_final_report_241120v2.pdf
- 123 Institute for Government interview.
- 124 HM Treasury, *Green Book Review 2020: Findings and response*, CP331, November 2020, retrieved 26 November 2020, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/937700/Green_Book_Review_final_report_241120v2.pdf
- 125 Regulatory Policy Committee, 'About Us', (no date) retrieved 13 October 2020, www.gov.uk/government/organisations/regulatory-policy-committee/about#what-we-do

-
- 126 Regulatory Policy Committee, 'Impact Assessments: Room for improvement?', August 2020, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/906260/RPC_Impact_Assessments_Room_for_Improvement.pdf
- 127 Regulatory Policy Committee, 'Opinion: final stage impact assessment, The Electricity and Gas (Energy Company Obligation) Order 2018', 5 October 2018, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/767584/RPC-4226_2_-BEIS-The_Electricity_and_Gas__Energy_Company_Obligation__Order_2018_-_IA__-_opinion.pdf
- 128 *Ibid.*
- 129 Regulatory Policy Committee, 'RPC Opinions for BEIS', (no date) retrieved 13 October 2020, www.gov.uk/government/collections/rpc-opinions-for-beis
- 130 Regulatory Policy Committee, 'Opinion: final stage impact assessment, Domestic Gas and Electricity (tariff Cap) Bill', 22 February 2018, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/683951/tariff-cap-bill-rpc-opinion.pdf
- 131 *Ibid.*
- 132 Regulatory Policy Committee, 'Impact Assessments: Room for improvement?', August 2020, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/906260/RPC_Impact_Assessments_Room_for_Improvement.pdf
- 133 HM Treasury, *Green Book Review 2020: Findings and response*, CP331, November 2020, retrieved 26 November 2020, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/937700/Green_Book_Review_final_report_241120v2.pdf
- 134 Sasse T, Rutter J, Shephard M, and Norris E, *Net Zero: How government can meet its climate change target*, Institute for Government, 7 September 2020, www.instituteforgovernment.org.uk/publications/net-zero
- 135 Institute for Government interview.
- 136 *Ibid.*
- 137 *Ibid.*
- 138 *Ibid.*
- 139 *Ibid.*
- 140 HM Treasury, *The Green Book: Central government guidance on appraisal and evaluation*, 2018, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/685903/The_Green_Book.pdf
- 141 Baiz A, Debu S, Desplatz R and others, 'Public policy impact assessment: what can France learn from the most advanced countries?', France Stratégie, December 2019, www.strategie.gouv.fr/sites/strategie.gouv.fr/files/atoms/files/fs-ns-benchmark-decembre-2019-anglais.pdf
- 142 Rijksoverheid, 'IBO Land Reimbursement Energy Facilities', (no date) retrieved 14 October 2020, www.rijksoverheid.nl/documenten/rapporten/2018/11/26/ibo-grondvergoeding-energievoorzieningen
- 143 Institute for Government interview.
- 144 *Ibid.*
- 145 *Ibid.*
- 146 Sustainable Governance Indicators, 'Evidence-based instruments', (no date) retrieved 14 October 2020, www.sgi-network.org/2019/Governance/Executive_Capacity/Evidence-based_Instruments
- 147 Institute for Government interview.
- 148 HM Treasury, *The Green Book: Central government guidance on appraisal and evaluation*, 2018, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/685903/The_Green_Book.pdf
- 149 Institute for Government interview.
- 150 *Ibid.*
- 151 *Ibid.*
- 152 *Ibid.*

-
- 153 Sasse T and Norris E, *Moving On: The costs of high staff turnover in the civil service*, Institute for Government, 16 January 2019, www.instituteforgovernment.org.uk/publications/moving-on-staff-turnover-civil-service
- 154 Institute for Government interview.
- 155 *Ibid.*
- 156 *Ibid.*
- 157 Gove M, 'The privilege of public service', speech given as the Ditchley Annual Lecture, 27 June 2020, retrieved 13 October 2020, www.gov.uk/government/speeches/the-privilege-of-public-service-given-as-the-ditchleyannual-lecture
- 158 Institute for Government interview.
- 159 Laidlaw S, *Report of the Laidlaw Inquiry: Inquiry into the lessons learned for the Department for Transport from the InterCity West Coast Competition*, HC 809, The Stationery Office, 6 December 2012.
- 160 Institute for Government interview.
- 161 *Ibid.*
- 162 For example, see Zhu Y, Ghosh M, Luo D and others, 'Revenue recycling and cost effective GHG abatement: an exploratory analysis using a global multi-sector multi-region CGE model', *Climate Change Economics*, 2018, vol. 9, no. 1.
- 163 Institute for Government interview.
- 164 *Ibid.*
- 165 *Ibid.*
- 166 *Ibid.*
- 167 Gove M, 'The privilege of public service', speech given as the Ditchley Annual Lecture, 27 June 2020, retrieved 13 October 2020, www.gov.uk/government/speeches/the-privilege-of-public-service-given-as-the-ditchleyannual-lecture

About the authors

Will McDowall

Dr Will McDowall is a senior researcher at the Institute for Government, and he leads the Institute's work on energy policy. He has a background in energy and environmental policy, and is an associate professor at UCL's Institute for Sustainable Resources.

Colm Britchfield

Colm Britchfield is a research assistant at the Institute for Government, working on energy policy. He has previously contributed to reports on procurement and outsourcing, data policy, and the use of evidence in government and parliament.

Acknowledgements

This report is based on around 40 interviews, with current and former government officials, energy experts and academics in the UK and in all the other countries we surveyed. We are grateful to everyone who spoke to us, and to those who reviewed early drafts and provided helpful feedback.

At the Institute, we would like to thank Alex Thomas, Gemma Tetlow, Emma Norris, Hannah White, Alistair Baldwin and Kelly Shuttleworth for their advice and ideas throughout the research, and Will Driscoll, David Edwards, Melissa Ittoo and Sam Macrory for managing the publication and launch.

The Institute for Government is the leading think tank working to make government more effective.

We provide rigorous research and analysis, topical commentary and public events to explore the key challenges facing government.

We offer a space for discussion and fresh thinking to help senior politicians and civil servants think differently and bring about change.



 instituteforgovernment.org.uk

 enquiries@instituteforgovernment.org.uk

 +44 (0) 20 7747 0400  +44 (0) 20 7766 0700

 [@instituteforgov](https://twitter.com/instituteforgov)

**Institute for Government, 2 Carlton Gardens
London SW1Y 5AA, United Kingdom**

© Institute for Government 2020

The Institute for Government is a registered charity in England and Wales (No.1123926) with cross-party governance. Our main funder is the Gatsby Charitable Foundation, one of the Sainsbury Family Charitable Trusts.