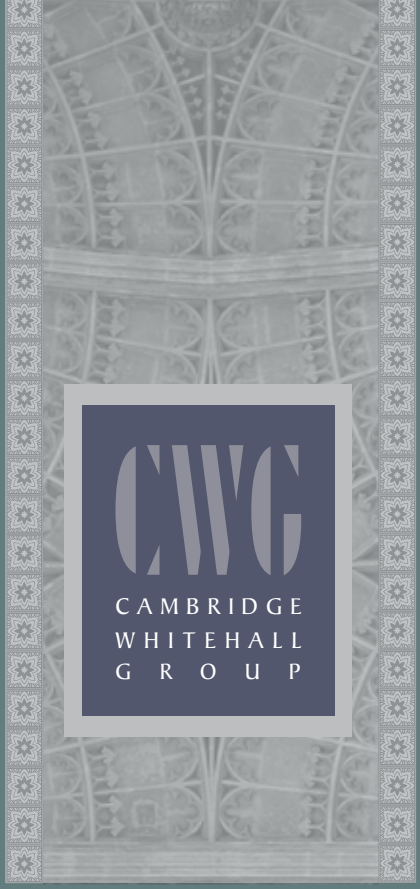

Would Brexit derail the UK's global leadership on energy and the environment?

An Occasional Paper by

Professor Dr. Douglas Crawford-Brown
Senior Member, Robinson College, University of Cambridge

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Cambridge Whitehall Group

The Cambridge Whitehall Group (CWG) is a member of the Cambridge University Land Society (CULS). Established in October 2014 it is a high level influential policy discussion and thought leadership group of well-connected Cambridge alumni, who are mainly members of CULS. It pulls together a previous legacy of high quality events over the last decade which are outside the mainstream of CULS activities, into a special group of individual and corporate members.

The CWG operates through a series of about 25 focused business lunches and dinners in London per year for 20 to 25 attendees per meeting. A restricted membership ensures the group maintains an exclusive, intimate and senior level forum. Meetings are held under the Chatham House Rule.

The CWG also runs the distinguished Whitehall Lecture series on public policy. The series was inaugurated by Professor Sir Malcolm Grant CBE at the Royal Institution of Great Britain in March 2014. The Whitehall Lectures are published as an occasional series. The Group also publishes Occasional Papers originating from its events.

Cambridge Whitehall Group events cover a wide range of macro economic business, social and educational issues of the day – The Economy, Foreign Affairs, Social and Health Policies, Infrastructure, Transport, Energy, Climate Change, Finance and Investment, Environment, Housing, Technology, Real Estate Investment and Finance, Urban Planning, Education and Politics. Membership is by way of an annual subscription.

Forward

Professor Dr. Douglas Crawford-Brown is one of the foremost international experts on the subject of Climate Change. During his tenure as Director of the Cambridge Centre for Climate Change Mitigation Research he has led a strong team of researchers making a major contribution to the statistical analysis of the factors affecting our climate and the environment. His talk comes at a time of much threatened change for the European Union, the consequences of which remain uncertain, whichever way the Referendum in the UK turns.

He addressed a session of the Cambridge Whitehall Group on the 27th April 2016 (a list of those attending is found at the end of this CWG Occasional Paper). This Paper sets out Professor Crawford-Brown's clearly thought out views. It coincides with the publication by the Economic and Social Research Council's has published its Report - "The EU Referendum and the UK Environment: An Expert Review". Together these Papers make a case for why the UK will retain a major influence and role by remaining in the EU and by so doing will help prevent a fragmentation of European leadership in taking measures to improve our environment and reduce the negative effects and growth of pollution.

Whichever way we look at this issue both Professor Crawford-Brown's Paper and the ESRC Report make the case that "The level of uncertainty associated with [a Vote to Leave] is therefore very high".

Douglas Blausten
Chairman
The Cambridge Whitehall Group

Professor Dr. Douglas Crawford-Brown

Senior Member, Robinson College, University of Cambridge

Dr. Professor Douglas Crawford-Brown, Senior Member of Robinson College, University of Cambridge, has just retired as Director of the Cambridge Centre for Climate Change Mitigation Research (4CMR) at the University of Cambridge; He is Emeritus Professor in Environmental Sciences and Policy at the University of North Carolina in the U.S.; and Director of the Cambridge Programme in International Energy Policy and Environmental Assessment. He serves on the European Commission's Panel of Scientific Experts on Risk; and has advised the Environment Agency, the Department of Energy and Climate Change, HM Treasury and the Office of Water Services Regulation Authority (UK Government).

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Senior Member, Robinson College, University of Cambridge

'Would Brexit derail the UK's Global Leadership on Energy and the Environment?'

Let me set out from the start that this is not a discussion about whether Brexit is a good or poor idea. There is much more to the issue than can ever be captured by a discussion of energy and the environment. The focus here is much narrower: How has membership in the EU affected the UK's own energy and environmental performance, and our ability to move the world forward on protection of the environment?

I state at the beginning that 'the facts' do not lead us inevitably towards one answer or the other. There are highs and lows in EU membership with respect to energy and the environment. Those facts may have nudged me personally towards a particular answer (I am on record as believing our EU membership is better for energy and environmental security), but it is a win more by a nose than a mile. The reader can perfectly well view the same facts and come to a different conclusion. As we say in philosophy, 'the facts always underdetermine the truth'.

Framing the issue

I begin with a quick review of the EU environmental agenda, and the conclusions drawn by the UK Environmental Audit Committee on the merits of EU membership. Energy policy is considered here only to the degree it affects the environment. Energy security and energy prices are different matters deserving of their own talk.

First to the EU. The guiding principles of EU environmental legislation (and energy policy as it affects the environment) are laid out in the 7th Environmental Action Programme (you can see we have already had an influence, with the English rather than American spelling of 'programme'!). That programme has three key objectives:

- Protect and enhance natural capital
- Improve resource efficiency and reduce carbon emissions
- Safeguard citizen health and well-being from environmental pressures.

They go further by identifying four 'enablers' of these objectives:

- Better implementation of legislation
- Better information for use in policy decisions
- Better investments for environment and climate
- Full integration of environmental and climate strategies in all areas of policy.

Finally, they call out two specific areas in which they want to excel:

- Making cities more sustainable
- Addressing international environmental and climate challenges

What strikes me about these nine bullet points is that we would be speaking about them in the UK even if we were not in the EU. There is little with which to disagree. But part of that agreement is because they are rather vaguely stated. Of course one wants to 'safeguard citizen health' (as just an example). The question is how that is translated into specific policies, specific strategies, specific legislation and specific projects. And that is where the matter of benefits or not of EU membership comes in. There is often a large gap between the flowery language of EU policy pronouncements and on-the-ground, concrete actions to be taken. However our own Climate Change Act suffers from the same gap, so this tendency towards vague ambitions is not unique to our EU membership.

The UK Environmental Audit Committee took on the challenge of assessing whether our EU membership has on balance been good or bad for the UK environment. Their conclusions are strongly in favour of two statements, backed by the large majority of expert witnesses they brought into the discussion.

First, the EU has led to improved air and water quality, and biodiversity protection, in the UK. This is in part due to 'strength in numbers'. When Parliament wants to pass stringent environmental legislation, it can point to other EU nations doing the same thing. This weakens the argument that our citizens are being asked to be early movers, unilaterally adopting policies that will reduce our competitiveness in EU and global trade.

Second, the EU is a global leader in environmental legislation and creation of lower carbon energy systems. We in the UK have been able to ride on the coattails of these EU initiatives, even as we have provided some of the key intellectual, political, scientific and technological arguments for this leadership role. There are few areas in which EU influence is as strong as that of the US, and so the

EU decided that energy, environment and climate is one of those areas where our region could be at the front of the pack. It is one of our 'brands' if you will. The UK basks in the light from that brand, even if people who cite the EU influence usually point to Germany as the primary success story for balancing energy, environment and economic aims.

Having given these strong points for EU membership, the Committee goes on to mention two issues around which the EU has been less than successful:

- There is poor clarity in directives. This makes it difficult to translate them into national policy and legislation without the risk of running afoul of the original intent of the directive.
- The EU process is in dramatic need of streamlining, and of bolstering by better use of scientific evidence. This is the purpose of the REFIT programme of the EU, aimed at improving these two issues by 2020. I will wait to see whether this improvement takes place, because we heard the same language around the research programme (formerly FP7, now Horizon 2020), and I have yet to see any significant improvement in that process.

Four quick stories

So far, I have only outlined the background of the UK's membership in the EU, and the opportunities and challenges this membership poses. I now give four examples of past energy and environmental issues that illustrate these opportunities and challenges, and provide insights into whether our membership in the EU has improved our own energy and environmental situation.

1. Water legislation comes to the UK

When I first delivered this talk at the CWG, I gave the example of Henry VIII and his royal visit to Cambridge, and the implications for water policy. In preparing this written version, I have come across an earlier example, which I use here because it is an even better indication that the UK had been at the forefront of environmental protection for 800 years before joining the EU.

From its earliest days, Cambridge had been partially surrounded by a town ditch; the River Cam made up the remainder of a circle. The first official reference to its bad influence on health is Henry III's order of 20 February 1268.

The Cambridge ditch, part of which is shown in the 1574 image from Richard Lyne (see the large red arrow on the image).

'That the town be cleansed from dirt and filth; that the watercourse should be opened and kept open as of old so that the filth may run off; and that the great ditch of the town be cleansed.'

We didn't need the EU to propel us to action.

What strikes me about this first bit of legislation is that it is concrete. It is a concrete problem (filth in the water, including human waste and the remains of horses from tanning factories) and a concrete solution (removing waste from the ditch and dredging it so the water can again flow). The UK has always been good at remaining rooted in such concrete problems and solutions. If there is a weakness in the EU, it is a tendency towards increasingly abstract notions such as sustainability and the green economy that can mask more pressing and specific problems.

Having said that, the EU more so than the UK is seen as a global leader in energy, environmental and climate policy. I have been conducting infrastructure and policy projects in the UAE and India over the past several years. In each of those projects, we begin by setting out metrics of performance for the project (energy, carbon, water, cost etc). We then ask the clients to develop a list of 'aspirant nations' whose performance on these metrics is seen as exemplary. The EU generally fares well in this league table, but the UK rarely is one of the identified aspirant nations on any specific metric. So we may have a long history of concrete action that is worthy of emulation, but our performance on key metrics is still not bringing recognition as a global leader outside the context of the EU.

The considerations of Nachhaltigkeit, showing the integration of economic, environmental (ecological) and social interests to be balanced in any decision. The image is produced by the German firm Apetito.

2. Sustainability

When would you guess the idea of sustainability arose? The 1990s? The 1960s? With the Victorians? It is much older, going back to 18th century Germany with the concept of Nachhaltigkeit, translated roughly as 'persistence'.

German industry in the 18th century was powered by burning of wood and using wood for manufacturing. Business leaders began to notice that the wood supply was being depleted, a form of loss of natural capital. And so the idea arose of using the wood only at a rate that could be continuously supplied, which meant either reducing wood use or increasing the rate of growth in forests. Nachhaltigkeit or sustainability was born. Sustainable forestry was born.

The key point about Nachhaltigkeit is that it is not simply an environmental idea. It links the environment directly to economic activity. It recognises that business cannot be reduced to an enemy of the environment, but rather that the environment must be managed to support business. Sustainability begins with supplying human needs, and then asking how this can be done in a way that preserves the environment so crucial in meeting those needs. Environmental protection shorn of the language of sustainability usually leaves out discussion of human needs.

I would argue that the EU, more so than the UK alone, has kept this balance of environment and the economy in mind. Membership in the EU has kept ideas of sustainability and green economy at the forefront of decisions, in part due to the intellectual presence of Germany. Absent EU membership, I believe the UK would be characterised by a deeper gulf between DEFRA and BIS, or DECC

		Infrastructure Metric	Unit	OECD Median	Typical Country	OECD Top Quartile	Typical Country	Current Indian Value
Generic	1	Carbon Intensity of the Economy	tCO_2/million USD	327	USA	206	UK	271
	2	Per capita Emissions	tCO_2/person-year	11	UK	6	France	1.7
Energy	3	Percentage of Renewables	%	15	UK	31	Germany	14
	4	Carbon Intensity of Power Production	$kgCO_2$/MWh	500	USA	79	France	800
Transport	5	Passenger Carbon Intensity ROAD	gCO_2/person-km	133	UK	130	Germany	100
	6	Passenger Transport Carbon Intensity RAIL	gCO_2/person-km	60	UK	25	France	60
	7	Freight Transport Carbon Intensity ROAD	$kgCO_2$/tonne-km	0.2	France	0.15	Sweden	0.24
	8	Freight Transport Carbon Intensity RAIL	$kgCO_2$/tonne-km	0.05	Sweden	0.03	France	0.1
ICT	9	ICT Development Index Score	No units	8.5	UK	8.9	Norway/ Sikorea	2.5
Water	10	Water Consumption	L/person-day	220	Denmark	37 85	China UK BREEAM	142
Waste	11	Waste Generation	kg/person-year	630	Netherlands	450	Japan	390
	12	Waste Recycling/Reuse	%			65	Austria	Not estimated

3. The global list of aspirant nations developed for planning an economic corridor from Delhi to Mumbai in India. Note that the UK is in the top quartile (green column) for two of the metrics, and that the EU generally fares well.

and HM Treasury. While the EU (or the Common Market) did not originally consider environmental issues – only those of trade – it has come over time to link environment and business in ways that are useful in striking the right balance between these two, or even seeing them as two parts of a larger social and natural system to be managed wisely.

3. Environment as the battle ground for other interests

In the US, the states of the Northeast sued the states of the Southeast over pollution from power plants. The Northeast states argued that a major contributor to ozone levels in their cities was emissions from power plants in the Southeast, and so the plants in the Southeast would need to reduce those emissions.

This sounds like a strong environmental argument. It appears to stem from caring about the quality of the environment and the health of citizens. However, there is more to the story. When the Clean Air Act was passed in the US, the older power plants in the Southeast were given partial exemptions (called the 'grandfather clause') from the stringent emissions standards. The power plants of the Northeast however took on the new technologies, significantly reducing emissions. As a result, the cost of power for consumers in the Southeast was half to a third of that in the Northeast.

There was no economic warfare so long as the power grid was confined to one region or the other. With the creation of a national grid, however, consumers in the Northeast would be able to purchase the much less expensive power from the Southeast. How could the Northeastern power plants keep their consumer base? The answer lay in forcing the plants in the Southeast to re-tool with the less polluting but more costly technologies.

The lawsuit was therefore on the surface an environmental one, but it hid an economic or trade battle between the two parts of the country. This is a common feature of environmental legislation, or perhaps more correctly environmental lawsuits. The environment is the ground on which a battle is fought, but often with ulterior motives having nothing to do with the environment. The solution? Common environmental regulations that all parties must meet to be part of the market. Here the link between the EU and UK is obvious. The greater the harmonisation of environmental regulations across the EU, the less opportunity for those regulations to hide ulterior motives directed more towards issues of trade than real concern for the environment or health.

4. Environmental justice

The US has been a global leader in environmental legislation rooted in regulatory risk assessment. Many of the EU regulatory limits are based either on past US assessments or on WHO recommendations (which in turn often draw on US expertise in risk assessment).

When establishing a regulatory limit based on human health, the risk-based approach has been to use scientific studies to identify the concentration of a pollutant (such as concentration of arsenic in water) at which adverse health effects first begin to occur. But then the regulator considers that the scientific evidence is almost always partial (weak studies, poor sample population, wrong species). And so a 'margin of safety' is applied. If the scientific evidence suggests effects are first found at a concentration of 100 ppm (parts per million), the regulator might set the limit of exposure at 10 ppm or 1 ppm, just to be sure people really are being protected in the face of uncertainty. It is a 'no regrets' policy, although it is increasingly clear that over-regulation carries its own regrets.

Regulations are passed one compound at a time (first for arsenic, then mercury, then viruses etc). It was always recognised that people might be exposed to several pollutants at a time, and that the total risk (called the 'cumulative risk') from all

of these acting together might be higher than the regulations suggested. However since each regulation had a margin of safety built in, this cumulative risk (which often could not be calculated) would still be acceptable.

In the 1970s, it became clear that there were some populations – largely poor and minority – that could be exposed to many, many pollutants simultaneously. It was less evident that the cumulative risk to these populations would be acceptable. And so the idea of a 'risk cup' emerged. Each person could be assigned a 'cup'. As they were exposed to different kinds of risk, the cup would fill up and eventually overflow. The task of the regulator was to prevent the cup from overflowing.

That sounds reasonable, and it has a sound scientific basis. However, each person has a different mixture of pollutants to which they are exposed. A particular concentration of arsenic in water might keep one person's cumulative risk cup from overflowing, but push another person's cup over the lip. This led to the possibility that the level of a specific pollutant to which one person should be allowed to be exposed would differ from that of another person, because the two people had different exposures to other pollutants in the cup.

That is the conclusion of the science. But to a regulator, that is deeply problematic because it implies regulatory limits on a specific pollutant might differ from person to person, or from nation to nation, due to differences in the mixture of pollutants. EU legislation does not yet allow for this possibility. Environmental directives are applied across the nations, and across the people within a nation. Outside the EU, the UK might (and I emphasise 'might' because it is not evident that the science is quite ready for this change) be able to adopt environmental standards tailored to the unique mixture of risks in our nation, rather than adopting the 'one size fits all' approach of EU directives.

2. An example of a risk cup. This image is for pesticides. The regulator is asked to control the flow of each of the pesticides into the water supply to ensure the cumulative risk cup does not overflow. Since one person might be exposed to more of pesticide A than another, they would be allowed to be exposed to less of pesticide B.

Conclusions

Where does this leave us in the question of whether Brexit is good or bad for the UK's own energy and environmental health, or our global position? I end where I began: that these facts don't fully resolve the question. They have led me to believe that on balance, remaining in the EU is good if one looks only at energy and environment (and I realise no one would consider only these issues in choosing their vote). I base my position on five short conclusions:

1. The environment of the UK is less polluted than would otherwise be the case if EU regulations were not in place. However, we don't know the counterfactual: what those regulations would have been if we had developed them on our own.
2. Common regulations across the EU trading nations reduces the problem of the environment becoming a convenient ground for fighting a clandestine war really based on trade interests.
3. We are part of the aspirant nations for developing economies more by being thought of as an EU nation than on our own merits.
4. Since so much of the scientific and regulatory framework derives from the US and WHO, it is not evident that we need the extra layer of EU analysis to create good regulations.
5. When it comes to transboundary effects such as pollutants that travel from one nation to another, we must have a common framework of environmental protection. The EU provides that, although one can imagine other, non-EU, arrangements.

So, count me in as a Remain voter on the basis of energy and environmental protection alone. How I will vote more generally on 23 June is determined by much more than these issues, and I am not going to show my hand here.

Those attending the Paper presented by Professor Dr. Douglas Crawford-Brown

Douglas Blausten, Chairman, Cambridge Whitehall Group

Michael Creamer, Head of Enterprise Client Solutions: EMEA

Richard Deakin, Consultant, Private Equity, hi-tech & service industries, Former CEO, NATS

Rupert Dixon, Director - Renewable Energy, PIB Limited

Lauren Fendick, Senior Associate, Taylor Wessing

David Gelling, Development Manager, Defence Infrastucture Organisation

Jillis Herpers, Executive Director, MSCI

Dr Andrew Hilton, Director, Centre for the Study of Financial Innovation

John Hiscock, Partner, Winckworth Sherwood

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