

# Monitoring, numbers and empirical governance: lessons from climate and migration monitoring in the UK

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## Abstract

This paper arises from a study of the politics of monitoring in the UK, where we compared monitoring practices, and the links between monitoring and policy, in a variety of policy areas<sup>1</sup>. In the present paper we focus on a contrast between the monitoring of numbers in the climate and migration cases. The key point of interest is that in both policy areas numbers are contentious and both greenhouse gas (GHG) emissions and immigrants/asylum seekers are – on the face of it – countable. People and molecules are, in-principle, numerable. However, the practicalities and the public policies of counting these entities turn out very differently.

In the climate case, though there are high-profile “sceptics”, prominent foot-draggers in key political posts, and a variable amount of public confidence in the mainstream scientific consensus, the actual business of counting and inventorying emissions proceeds rather unproblematically. Emissions counting is bureaucratised (“black-boxed” in the popular STS terminology). There are few efforts to undo the black box and deconstruct the numbers. By and large, counting is monopolised by official agencies and no-one else tries to out-count them. Any critiques of the numbers tend to come from policy experts in lobbying organisations (who argue – for example – that emissions implicated in imports are erroneously omitted from the UK’s emission totals).

Our comparison case is migration into the UK. A key difference here is that the business of counting can be politically contentious and a variety of actors is involved in generating claims about, and assessments of, numbers – ranging from lobbyists to newspaper journalists. Worries are aired about under- or misreporting, whether for supposed tactical reasons or just out of bureaucratic ineptitude.

The paper focuses primarily on the climate case. First we examine the systems for the numeration of the phenomenon. We investigate how the near-monopoly of counting by official bodies has arisen in the climate case. Lastly, we consider the role of counting and enumerating in the constitution of the two respective policy controversies. We conclude by examining more general claims about monitoring and enumeration in contemporary governance.

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<sup>1</sup> ESRC funded project '[The Politics of Monitoring: Information, Indicators and Targets in Climate Change, Defence and Immigration Policy](#)' (ES/K005170/1).

## Introduction: categories, counting and natural kinds

This paper arises from a recent study of the politics of monitoring in the UK, where we compare monitoring practices, and the links between monitoring and policy, in a variety of policy areas. In the present paper we concentrate on a contrast between the monitoring of numbers in the climate case (our principal focus) and in migration. The key point of interest is that both policy areas are contentious while at the same time both greenhouse gas (GHG) emissions and migrants/asylum seekers are – on the face of it – countable entities. People and molecules are, in-principle, numerable. However, the practicalities and the public policies concerning the counting of these entities turn out rather differently.

In the philosophical literature of the 1970s and 1980s there was a great deal of discussion of so-called natural kinds (commonly traced back to Quine's 1969 essay on the topic). This was an attempt to address problems of nominalism and realism by proposing that some collectivities fall into natural types. There can be many 'kinds' (such as objects whose names begin with "B"; things that fly; and so on) but only some kinds are natural kinds. Without meaning to take this philosophical discourse all that far, in this paper we highlight the way in which the entities under consideration do both (despite their differences) appear to the actors involved like 'natural kinds'. There is an assumption that there really are people who are immigrants and there really are climate-altering emissions, both of which can be counted. From the point of view of participants in these fields, these categorisations are to be treated as genuine 'kinds' – even though we appreciate that, from a strictly philosophical point of view, these are not ideal examples of what Quine and others thought of as exemplary natural kinds. In analytical terms, we are interested in the differences in the ways in which counting figures in discussion and disputes around policy, on the one hand, and in practical methods on the other.

In the UK, current immigration politics and policies go back to the post-WWII context. Modern large-scale immigration commenced in the 1950s. More recently the issue has become tied up with the UK's politics in relation to the EU and subsequently to "Brexit" since around half of immigrants to the UK each year post-2000 have come from European Member States. Under the EU's freedom of movement provisions, European citizens have been able to move between EU countries almost without limitation (though there have been some temporary limits set for citizens of newly-acceded states from Eastern Europe). We will return to this later, but the key official concerns have recently been that there may be simply 'too many' people coming to the UK in all, or that local resources at particular locations are inadequate for the large number of incomers.

UK climate policy is, of course, a younger enterprise essentially dating back to the 1990s when the question of assessing the UK's climate-changing emissions began to be taken seriously, notably in the wake of the inaugural Earth Summit in 1992. The idea of greenhouse gas emissions itself has a long history, though there was no particular focus on national emissions in earlier studies. However, in the 1980s environmental NGOs became interested in attaching figures to particular countries in order to shame or incentivise countries into action. Following the setting up of the IPCC (Intergovernmental Panel on Climate Change), more detailed national inventories began to be compiled and the IPCC produced guidelines for inventorying (work started as early as 1991 giving rise to the 1995 *Guidelines for National Greenhouse Inventories*; these have since been updated and

supplemented regularly). Moreover, under the Kyoto Protocol – to date the principal UN treaty in this area – inventories have to be reported to the UN and figures may be inspected.

### Doing counting

Although the ‘countability’ of the two entities is easy to envisage and understand – a power station produces carbon dioxide as gas is burnt, or a Belgian musician moves to Bristol to work – the actual business of performing the counts is less straightforward than one might suppose. There is a strong contrast between how easily numbers are talked about in political and media contexts and how much work is involved in producing the counts. The data on which we draw in this paper comes from a three-year case study in the UK, supported by the ESRC. For the climate case, we draw on the published literature and official documents, and on 22 interviews with officials, policy advisers, politicians, scientists and figures from relevant NGOs; the immigration case (which is referred to in the concluding section) is based on similar materials and interviews.

In our principal case (climate change), there are a number of well-known complications in counting the size of the problem. The language of the problem has shifted from early talk of the ‘greenhouse effect’ to ‘global warming’ and more lately to ‘climate change’. Part of this shift was explained by the fact that the Earth needs its greenhouse effect (or else we would be about as cold as the moon). Accordingly, nobody wants to do away with the greenhouse effect per se. Of course, one could imagine the problem being termed the ‘enhanced greenhouse effect’, but this is an unappealing label for campaigners and politicians to use. Hence, the idea of combating global warming was thought more accurate than fighting the greenhouse effect. Within the last ten years climate change has become the preferred term for the issue since ‘global warming’ might seem to entail that the globe should get warmer everywhere (which is not anticipated to occur) and also to imply that temperature rise is the chief worry when anxieties may instead focus on changed weather patterns or more energetic storms. However, the term ‘greenhouse gas’ is still used because there are various gases that are released into the air and act, in subtly differing ways, to tend to retain more heat energy in the atmosphere. Thus, from the point of view of counting climate-changing gases there is a question about which gases to count and how to treat them.

As is well known, the principal gas that generates concern is carbon dioxide (CO<sub>2</sub>). But other gases also contribute to the problem. Under IPCC rules (Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories and subsequent updates), countries are also concerned about reporting emissions of methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF<sub>6</sub>). These come from different sources. Nitrous oxide is produced spontaneously in farmyards and rice paddies and can be accidentally released from dental practices. Methane comes from decaying wastes and from ruminants’ stomachs and can also escape from natural-gas installations. HFCs and PFCs are manufactured compounds that arise largely from successors to chlorofluorocarbons, while sulphur hexafluoride is used in making electrical insulation and as an inert filling in double-glazing units.

There are several notable issues here that tie in with monitoring. The first is about how these countable entities are in fact ‘counted’. One might assume that emissions are worked out by actually

measuring what is emitted from cars or fields or chimneys, but this is not the case except in occasional experimental set-ups. Emissions are typically worked out from inputs. If one knows how much natural gas a gas-fired electricity generating station uses, one can calculate how much CO<sub>2</sub> it 'must' have emitted once the gas has been burnt. If one knows how much methane an adult sheep emits per year, one only has to count the sheep to know how much any particular farm should emit. As one respondent who worked closely on inventories observed:

I mean there were a number of sources. Most, most of the inventory, most of the UK emissions inventory, was based on published data sources. So, for example, a large bulk of it was based on the DUKES, the Digest of UK Energy Statistics, which was an annual publication by the Department of Energy and Climate Change. And that was a kind of compendium document of statistics about energy in the UK, energy use in the UK. And the bulk of UK emissions came from the energy sector. So essentially a lot of the data was derived from that publication. Separately we used other surveys, for example, the agriculture census which came out every summer time. And that was also the emissions for, say, methane / nitrous oxide ... a lot of the methane / nitrous oxide inventory came from the agriculture census. And there were various other smaller bits of information that were bolted on. So there's kind of two or three big pieces of information. We rely quite heavily on data from the EU emissions trading system which is about installation-based emissions: so for power stations, for example. And we use that, because that information was deemed to be good quality, we used that to just kind of drop it into the inventory on the basis that we believed it had been verified to a very high standard. But I mean nearly all the, what's in the inventory was based on published data sources. So the Department for Transport, road traffic counts, for example. You know, the road traffic information from DfT was a source of most of the road transport data, emissions data. [interview, February 2014].

These emission figures are much more like accounts than counts. Given the ways in which these numbers are tied into organisational and bureaucratic structures, one might suppose that there would be ample scope for determined critics to 'manufacture doubt' (see Oreskes and Conway 2010) about these figures. However, this is not a marked feature of claims by "sceptics" in the UK.

There are other kinds of possible dubiety which influence the counts also. For example, as mentioned above two of the 'big six' gases actually arise from the industrial sector that used to be dominated by chlorofluorocarbons (CFCs). CFCs themselves persist in the atmosphere and still contribute to climate change, as do their immediate successors HCFCs (hydrochlorofluorocarbons). Indeed, until last year these latter gases were still lawful since EC Regulation 2037/2000 requires only that their use in Europe is banned after 2015 (see SEPA <http://apps.sepa.org.uk/spria/Pages/SubstanceInformation.aspx?pid=120>). However, these chemicals do not form part of the emissions-control inventories mentioned by the interviewee above since they are treated under the earlier Montreal Protocol (on ozone-depleting substances, from 1989). Furthermore, water vapour in the atmosphere is itself a greenhouse gas – in fact the majority greenhouse gas – but this is not reportable at all since the amount of water vapour is primarily governed by the temperature of the air and thus by the rate of evaporation from the oceans; emissions from human sources are basically irrelevant to the concentration in the atmosphere.

Thus key greenhouse-gas emissions are not actually counted and some known GHGs do not have to be reported. But there are further complications. One well known example is the exquisitely named LULUCF component of climate-change reporting, standing for land use, land-use change and forestry. Forests and land use play a central role since growing trees may act as 'sinks' for CO<sub>2</sub> and thus counteract climate change. However, other changes in land use may increase the amount of GHGs, for example because forests have been cleared and burnt or because carbon-rich soils have been disturbed or because methane is released. These flows are myriad and hard to track, though potentially important in policy terms since tree-planting (for example) is something governments can do to offset emissions. But such flows are not directly counted either. Instead the relevant figures are derived from an inventory. Completion of the inventory (using the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories mentioned above) again indicates that the values from these changes are estimated from classifying deforestation under various broad headings (e.g. "Tropical Forests, Mountain Moist") and reporting afforestation under 'other'. Our respondents stressed the office-based and, in some senses, bureaucratic nature of these figures:

These [calculations on the greenhouse gas inventory] were done on large spreadsheets by contractors of what was then called Warren Spring Laboratory which was subsequently, well it was privatised or shut down but it was part of the sort of privatisation of government's laboratories. And this work went to... AEA, the Atomic Energy Authority which was also privatised. It became AEA Technology. And they still, they still have the inventory contract<sup>2</sup>. And so...I had a lot of autonomy. First of all it was just me. Then it was me and somebody else. And then gradually the team got larger over time. And our job was...well it was to be able to quantify any emissions mitigation policy. And in order to do that we could communicate with other civil servants. I mean the, what was then the Department of Trade and Industry was very interested in – well, actually, it was the Department for Energy at first. They were very interested in energy. So they had a lot of say in that sort of calculations. They had a lot of economists, of course. Then...policies to do with agriculture. We would communicate with the then Ministry of Agriculture, Fisheries and Food. Some calculations we would do for ourselves or by... getting contractors. So I had three ways to answer questions. Either I knew the answer for myself. Or I could ring somebody up who knew the answer. Or I could let a research contract to sort of find the answer [laughs] [interview February 2014].

The production of figures is clearly the work of officials, apparently operating with a considerable degree of independence. It is not presented, for example, as the output from a broad scientific community, but rather the result of a relatively limited set of government employees and consultants. Even when the figures are cross-checked, this seems to be done largely within governmental bodies.

And then that system developed over time really. We would tend to do... in the energy sector say there's a distinction between so called bottom-up calculations which are technically disaggregated. And top-down calculations which are done usually

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<sup>2</sup> Now under the name of Ricardo Energy and Environment.

econometrically. So the Department of Trade and Industry used to do the econometric calculations. We will do the bottom up calculations. We will try to reconcile the two because you tend to get slightly different answers in the two approaches. So ...the way the government works really is by... I mean if there's more than one department with interest, officials in the different departments will try and reach a consensus on what the way forward is or sort of cost effective abatement potential is. And there will be an inter-departmental process. And then a proposal will go to ministers. And so one hopes that a common proposal will emerge. If not then there will have to be a discussion either with a senior official or the ministerial level until an agreement can be reached. And that was the, the world in which I lived [interview February 2014].

It is evident that the numerical representation of greenhouse gas emissions is central to national and international policy programmes. However, though it might at first appear that emissions are measured as they occur, in fact this is rarely done. Instead, figures for emissions are derived from records of inputs or are extrapolated in other ways. Some respondents stressed that what was important was not the precise figures in any one year, but the reassurance that trends were heading in the correct direction. Emissions recording is thus more a matter of keeping accounts than of counting particular molecules.

#### Counting and the role of background theories

Even if we think of GHG emissions as some coherent entity – something like a natural kind – it is apparent that there are fundamental difficulties in counting them. However, it is clear that further complications arise because of the role of the theoretically informed background assumptions that allow counting to be conducted. For example, there is one acknowledged technical difficulty that arises because the six main Kyoto-regulated GHGs have different warming propensities. Molecule for molecule, carbon dioxide is much the least effective greenhouse gas of them all but, not only is there simply much more of it than the other humanly-released gases, it stays in the atmosphere on average a relatively long time. Gases have to somehow be converted into a 'single currency' so that their relative warming contribution can be established. This is achieved through calculating the 'global warming potential' of each gas and the relevant formula has been spelled out by the IPCC. This formula makes an allowance for their relative longevity and warming capacity, and turns them into carbon-dioxide equivalence units expressed as their GWP (global warming potential).

This matter is commonly treated as a 'merely technical' issue though MacKenzie (2008) has smartly pointed out that there are conditions under which it could readily become unpicked and challenged. He observes that under the Clean Development Mechanism (a part of the Kyoto Protocol which allowed industrialised countries to get 'credits' for reducing greenhouse emissions in other parts of the world<sup>3</sup>) the money associated with the destruction of a key HFC (HFC-23, which has a very high GWP) runs into several billion US dollars. The people who underwrite these payments have an interest in re-examining the calculation through which these very high GWPs are determined:

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<sup>3</sup> Equally conjectural are the forgone emissions from so-called Joint Implementation initiatives.

A global carbon market encompassing more than CO<sub>2</sub> (as the Clean Development Mechanism does) thus rests on black-boxed science: the figures for global warming potential that form the 'exchange rates' between gases. These figures cannot be read directly off nature, as the changing estimate, and large error band, for the global warming potential of HFC-23 reveals. ... It is perfectly possible that this black-boxing may become harder in the future. At the time of the Kyoto Protocol, it is unlikely that anyone imagined that the figure of 11,700 for the global warming potential of HFC-23 would determine a flow of funds of the order of \$3.5 billion. As negotiations begin over a successor to Kyoto, however, the financial consequences of such figures can now be seen. The IPCC may be able to keep the black box shut, but it is not a foregone conclusion (MacKenzie 2008: 8).

The business of establishing GWPs has not been running for long and the estimates of HFC-23's potential relative to CO<sub>2</sub> grew from 11,700 to 14,800 between 1996 and 2007 (MacKenzie 2008: 8). As payments and policies are indexed to the ascribed GWPs, the methods for attributing these figures are clearly financially sensitive. And making the counts of how much different nations are 'contributing' to the problem of climate change equally clearly depends not just on adding up emissions but on underlying theories and background assumptions as well.

This key point has one further significant dimension. In the case of GHG emissions, and particularly for carbon dioxide, there are known to be questions over the attribution of emissions. For example, if a UK manufacturer opts to switch production to Chinese factories and then to re-import the finished goods to the UK, the UK's reportable emissions will fall even though emissions 'morally' attributable to UK consumers do not (see Barrett et al 2013 for attempts to quantify this phenomenon). This is an acknowledged issue and many environmentalist voices are keen to highlight this matter to prevent what they see as premature self-congratulation about 'climate leadership' on the UK's part. Equally, critics of UK and EU climate/energy policy – such as Helm (2012: 68-72) – are inclined to see rapid European de-industrialisation as a strong, unintended consequence of the EU's inflexible approach to climate policy.

### Counting and deconstruction in emissions numbers

With regard to GHG emissions it is clear that there is a strong contrast between the apparent simplicity of counting up the 'natural kind' of climate-altering gases and the many-sided practical issues of actually creating a robust national inventory.<sup>4</sup> Some emissions are inherently uncountable because the releases of gas are too diffuse; even things that appear as though they might be straightforward to count are usually inferred from inputs rather than taken from the measured outputs. There are problems with summing together all sub-types of emissions into a single scale; and there are persistent questions about the correct attribution of emissions. A few critics point to the artificiality of the numbers officially treated as 'UK' (etc) emissions, while MacKenzie suggests that the black-boxing may not prove robust given how much money rides on the outcome of the calculations.

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<sup>4</sup> There is some non-national checking of emissions figures, such as by the Global Carbon Project which has publicised some apparent cases of national under-reporting.

But the contrary puzzle is that, though climate denialism is reasonably strong in the UK, there is little 'denialist' deconstruction of the numbers. A team within DECC, supported by long-standing, formerly government-insider contractors, simply gets on with compiling the figures:

To some extent there is some evidence for this in a way that the Greenhouse Gas Inventory Team operated that you get these kinds of, these kind of top-down measures which are sort of landed in, into departments either from the ministers themselves or from the party sort of hierarchy so to speak more generally. And then it, then it sort of generates a kind of bureaucratic self-sustaining process. So the, the point of the target then becomes the measurement of the kind of reality, in quotes, in order to understand whether you have met the target. And it doesn't become a sort of, a tool for steering the policy. So one of the really interesting things that was quite clear from the greenhouse gas statistics was how disconnected it was from all of the policy-making basically. So, you know, most policy-making would be around energy data and would have very, you know, and they would talk about, you know, reducing carbon emissions but they wouldn't really use the capacity of the greenhouse gas statistics in order to inform either the development or the subsequent monitoring of the policy. Except in some circumstances. (...) You know you'd get sort of targets developing and then you'd get a team set up in order to monitor the target but then it just becomes this kind of hermetically sealed world of measurement that just, that just becomes entirely sort of segregated from the policy development processes [interview, January 2014].

This respondent presents the governance arrangement as possibly problematic because of the separation of monitoring from policy. But this Departmental isolation also appears to shield the claims from deconstructive attention. It becomes a 'boring' administrative task, for which the Department is answerable to the Committee on Climate Change. It is less science than book-keeping.

#### Discussion and comparison

In this final section we make a preliminary comparison between climate inventorying and the role of numbers in the UK migration case.

As has been suggested, in the case of climate the counting is highly bureaucratised and little attention is paid to deconstructing the figures, even though (in principle) there are ways in which they could be challenged. Counting is monopolised by official agencies and no-one else tries to out-count or 'counter-count' them. Furthermore, insofar as the figures are criticised, numbers are attacked by NGOs and informed policy commentators on the grounds of their presuppositions: for example that our manufactured imports have carbon embedded in them which should (ethically) count against the UK but, according to the UNFCCC process, does not. Doubters of climate change are vocal and keen to find a focus for their sceptic activities. But they have chosen to highlight other factors, such as the supposed 'pause' in the warming trend since around 2000 or the alleged partiality of climate scientists.

By contrast, in the immigration and asylum case the numbers themselves are more often referred to. This is partly because politicians have from time to time made statements about their objectives in limiting immigration which has led them to set targets. Commonly these targets have been missed so this failure is inevitably newsworthy. But it is also because perceived numbers of ‘extra’ people in a town or region is something which ordinary people or ordinary journalists are able to observe for themselves – for example through pressure on the housing market or changes to local employment. These non-governmental actors are able to produce authentic looking counts or other forms of data. This ability to counter-quantify is readily linked to worries about official under- or misreporting, whether supposedly for tactical reasons (say, because governments do not wish to face up to failings in their policies) or just out of bureaucratic ineptitude. The possibility that the government’s figures may be wrong or weak or misleading is a prominent feature of public discourse.

Indeed, this possibility was well illustrated in the run up to the Brexit vote when it was suggested that, though official figures placed the number of EU migrants at a relatively steady (though still significant) figure, there were other ways of getting at relevant data that suggested a higher figure. One such approach was through applications for National Insurance numbers, a form of bureaucratic registration that is critical to being able to work in the UK. In the months before the referendum on membership of the EU, the numbers applying for National insurance registrations were far ahead of estimates of migrants derived from observations or registrations of arrivals, and it was proposed by proponents of Brexit that the NI figures were more likely to be indicative of the number of non-UK EU citizens living and aiming to work in the UK.

In this study we have considered two policy areas where, on the face of it, there is a countable matter to be governed. In each case it looks as though governments and agencies are trying to regulate natural kinds. But the countable types are far from straightforward. We have seen however that similarities over ‘countability’ do not lead to the issues being addressed and debated in the same way. The in-principle molecular countability of climate-changing gases does not give rise to simple enumeration. Despite this, government inventories are little challenged; the work of inventorying proceeds rather routinely. Routines in the immigration case are far more easily challenged by journalists, political spokespersons and in popular public discourse. The key difference appears to be Whitehall’s success in keeping the climate inventory ‘boringly’ black-boxed.

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