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Clearing the air after ‘dieselgate’: Time for European regulators to experiment with participatory governance

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Abstract

Since it erupted in 2015, the so-called ‘dieselgate’ scandal has revealed severe shortcomings in car manufacturers’ efforts to reduce the impacts of driving on both global climate change and local air quality. In the European Union (EU) context, this controversy has raised questions about the trustworthiness of carmakers, and about the accuracy of the emissions measurements upon which key regulation is currently based. Just as importantly, however, it has also precipitated growing tensions between regulatory authorities situated in municipalities, national governments, and Brussels itself. Thus, even as European lawmakers have responded to the scandal by seeking to revamp and tighten up official ‘laboratory’ vehicle emissions tests, growing citizen concern about the impact of vehicles on urban air quality is already having significant impacts across a multitude of European cities. Municipal authorities in Germany, for example—including in Stuttgart, the hometown of several major carmakers—have recently been compelled by court rulings to introduce outright bans on many older models of diesel vehicle, following legal challenges brought by environmental groups. That such bans have been upheld in Germany’s highest court despite opposition from both state and federal governments underlines the need to view dieselgate as a knowledge controversy with distinctly geopolitical dimensions. In this commentary, we contend that questions about the accuracy of vehicle emissions measurements cannot be separated from geopolitical and scalar tensions over regulatory authority. Far from seeing such complexity as a barrier to the effective ‘closure’ of the dieselgate scandal, however, we suggest that European regulators stand to gain much from adopting a more open and responsive position towards citizens’ concerns about vehicle emissions, as well as the plurality of forms of knowledge and experience upon which they are based.

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Keys in the ignition: Dieselgate and the sparking into being of new publics

Every new model of passenger car sold in the EU must undergo a standardised, off-the-road emissions test—for greenhouse gases (GHGs) as well as other harmful pollutants like oxides of nitrogen (NO_x). Data collected during these tests suggest that the average quantity of GHG emissions produced by new vehicles has decreased by approximately 30% between 2001 and 2016, from c.170gCO₂km⁻¹ to c.118gCO₂km⁻¹ (EEA, 2017). By this measure, carmakers appear to be well on the way to meeting ambitious targets, under the EU’s ‘Cars and CO₂’ regulation (European Commission, 2009), for new vehicles to emit on average no more than 95gCO₂km⁻¹ by 2021. These claims were thrown into disrepute, however, when the US Environmental Protection Agency announced, in September 2015, that it had acquired evidence of Volkswagen using a so-called ‘defeat device’ to circumvent official tests by artificially reducing emissions in a manner that cannot be achieved on the road. The resulting scandal has since revealed that multiple car manufacturers deliberately exploited “flexibilities” in official emissions testing procedures, severely undermining public trust in the European regulatory process in this area (Skeete, 2017; see also Brand, 2016).

As the dieselgate scandal has deepened and engulfed additional car manufacturers, official test data on new road vehicle emissions have increasingly been challenged by ‘on-the-road’ measurements of vehicle fuel economy and emissions, collected in a diversity of settings. Such data have been assembled by myriad actors, including citizens, environmental campaign groups, independent consultancy firms, and, perhaps belatedly, by national government agencies. The most comprehensive source of this so-called ‘real-world’ data has been assembled by vehicle drivers themselves, who effectively crowd-source self-reported fuel economy measurements, using free-to-access online databases such as *honestjohn.co.uk* and *spritmonitor.de*. Since 2001, around 480,000 registered users have uploaded over 27 million individual pieces of fuel economy data to *spritmonitor*. The data comprise basic information about distances travelled and volumes of fuel consumed during specific journeys, and cover thousands of different models of vehicle across hundreds of manufacturers. Studies based on these crowd-sourced data have suggested that only roughly half of claimed improvements in emissions of GHG since 2001 are being delivered on the road (Tietge *et al.*, 2016; T&E, 2016). For air pollutants such as nitrogen oxides, meanwhile, new diesel vehicles are estimated to exceed official ‘Euro 6’¹ limits by an average of 450%, and in some cases by almost 1,200% (Baldino *et al.*, 2017).

To categorise any motorist who chooses to share their fuel economy data in an online database as a citizen scientist would be misleading; for many the underlying motivation is simply to track changing vehicle performance with an eye to minimising vehicle running costs or making shrewd purchases in the second-hand car market. Yet it is incontestable that dieselgate has galvanised efforts to measure road vehicle emissions *in vivo* rather than *in vitro* (Callon, 2009), and that this practice is being undertaken by diverse groups. Thus, in addition to the thousands of motorists who track and upload their fuel economy data online each year, many independent consultancy firms specialising in the use of Portable Emissions Measurement Systems (PEMS)

¹ European emissions standards for passenger vehicles have undergone six major iterations since 1992. Current, so-called ‘Euro 6’ emissions limits for NO_x are 80mg/km.

will also now supply data on vehicle emissions, collected during tests conducted on real roads, to clients who have lost faith in official EU tests.

Dieselgate's political significance is therefore not simply that it produces negative impacts to be borne by the public, as if that public is a static, prefixed entity. Rather, the scandal has served as a 'generative event' (Whatmore, 2009), effectively calling into being new *kinds* of public which are emerging and mobilising around the issue of air quality and vehicle emissions, often producing their own data, and in many cases already having tangible impacts on public policy in urban contexts (Dewey, 1927; Marres, 2005).

Down a dead end? Searching for the essence of vehicle emissions

For many, the groundswell of new emissions measurement practices represents a valuable potential source of additional data for EU policy-makers seeking to restore credibility to the bloc's regulations following dieselgate. And indeed, at first glance, it appears that some effort is being made to make use of 'real-world' emissions data. Recent amendments to EU legislation dictating standards for the approval of new vehicles for sale (European Commission, 2017a), for example, ensure that data on emissions collected in official, so-called 'laboratory' tests will be complemented by data gathered during an additional 'Real Driving Emissions' (RDE) test, which will make use of PEMS technology, and take place on actual roads. Yet, for now at least, these new 'on-the-road' tests will only gather data for air pollutant emissions, and not for GHGs.

While the significance of these changes should not be underestimated, European regulators have also invested considerable energy since dieselgate in bringing into force a new version of the standardised, off-the-road emissions measurement test which proved so susceptible to manipulation before the scandal broke. This new test, known as the Worldwide Harmonised Light Vehicle Test Procedure (WLTP), already applies to new car models, and will be fully phased in for all vehicles by the end of 2018 (European Commission, 2017a). Vehicle manufacturers claim that it offers a "more accurate basis for measuring a vehicle's fuel consumption and emissions" (ACEA, 2017a: no pagination) than its predecessor, the so-called New European Drive Cycle (NEDC). Like the NEDC test before it, the WLTP comprises a standardised and repeatable procedure, in which all new cars are subjected to an identical 'test cycle'—essentially a predictable sequence of stresses placed on the vehicle's engine under fixed conditions. However, in addition to being longer in duration, the WLTP also takes place at a higher average speed than the NEDC, offers "more dynamic and representative accelerations and decelerations", and a "greater range of driving situations" than the original test (ACEA, 2017b: no pagination).

There are obvious reasons, on the surface, to doubt the capacity of a standardised off-the-road test, even in revamped form, to address citizens' concerns about vehicle emissions in the aftermath of dieselgate effectively.

In respect of transparency, for example, the new regulations provide no mechanism for publics to verify that vehicles which undergo these tests have not been modified specifically for the purpose (whether using computer software in the form of a 'defeat device' or otherwise). But on this count, official tests are no less questionable than any other form of measurement. Emissions estimates derived from crowd-sourced fuel economy databases, for example, could feasibly come from anywhere, and are not currently subject to external verification. Similarly, data derived from on-the-road emissions tests, even when conducted with sophisticated Portable Emissions Measurement Systems equipment, could be deemed inaccurate if those

tests are conducted under unusual or extreme conditions. In fact, it is on precisely this basis that vehicle manufacturers have successfully argued for the application of ‘conformity factors’ when interpreting the results of the new ‘Real Driving Emissions’ test. Legislation thus currently permits new vehicles to exceed legal limits significantly for air pollutant emissions in this test, at least until 2020.²

Beneath the surface, however, a more fundamental difficulty with a revamped off-the-road test can be found in its very pursuit of ‘more accurate’ measurements of vehicle emissions. If accuracy is understood in realist terms as error or “the difference between observation and reality” (MacEachren *et al.*, 2005: 146), then by definition the ability to measure accuracy must itself depend on having prior knowledge of the reality against which observations are to be compared. This problem is a classic instance of ‘experimenters’ regress’ (Collins and Pinch, 1998)—the dilemma that “‘facts’ can only be generated by ‘good’ instruments but ‘good’ instruments can only be recognized as such if they produce ‘facts’” (Godin and Gingras, 2002: 137-138). Experimenters’ regress is particularly salient with unknown variable and indeterminate objects, of which vehicle emissions are certainly one example (Wynne, 1992). Recent research demonstrates that energy consumption during ‘repeat’ car journeys can vary significantly even under ordinary conditions (Hu *et al.*, 2017), and vehicle emissions emerge out of the situated and dynamic relations between, among other things, the competence, emotional state and motivations of the driver, the state of the vehicle itself (including the weight of any passengers, fuel, or other ballast it is carrying), and the myriad encounters with “other cars, traffic lights, fog, rain, speed cameras and policemen” (Barry, 2002: 274).

While a standardised ‘off-the-road’ emissions test can eradicate some of these variables, it cannot prove the existence of an “essence” to the emissions produced by a specific vehicle model—that is, a universally ‘true’ relationship that is independent of the diverse times and spaces within which driving actually takes place. Instead, it can only demonstrate its own ability to produce measurements with high *precision*—that is, “[c]loseness of agreement between indications or measured quantity values obtained by replicate measurements on the same or similar objects under specified conditions” (JCGM, 2012: 22). And, even on those far more restricted terms, claims about the strengths of standardised emissions tests can still be called into question. As philosopher of science Teller (2013: 189) points out, since precision is “sensitive to the details of a particular measurement or measurement system and its use”, the concept of ‘actual precision’ must “always remain an idealization” that is never fully realised or achieved.

Time to change gear? Embracing complexity in road vehicle emissions governance

The key strength of standardised ‘off-the-road’ emissions tests thus lies in their ability to produce (ostensibly) precise measurements of the environmental performance—in terms of fuel economy, GHG emissions, and air pollutant emissions—of new cars going on sale in the EU. It appears that car makers and policy-makers alike are banking on those qualities as key to their attempts to (re)gain consumer trust following dieselgate. They also seem to be supporting those attempts by invoking the ideal of experimental reproducibility and describing the measurement procedures as ‘laboratory tests’.

There has, however, been significant ‘mission creep’ in the use of standardised tests to monitor and regulate the environmental impacts of new road vehicles in the EU. For one, the NEDC

² Under new legislation vehicles will be permitted to emit up to 168mg/km of NO_x in the RDE—more than twice the current ‘Euro 6’ limit—until January 2020, and up to 120mg/km until 2023.

was introduced in 1970, when vehicles were on average considerably lighter and less powerful than they are today (EEA, 2016: 21), in order to generate comparable measurements of only a select range of air pollutant emissions. As emphasised by many interviewees in a research project conducted by one of the authors³, the task of providing precise measurements of fuel economy and GHG emissions was only subsequently ‘bolted on’ to the NEDC test, as vehicle designs evolved and societal concerns about climate change began to intensify. The new WLTP test is therefore now expected to produce precise measurements of a wider range of emissions, as produced by a more diverse range of vehicle types, than its predecessor was upon being introduced in 1970.

More fundamentally, however, this new test is not only supposed to *compare* the environmental performance of different vehicles with high measurement precision, in the same way as its forerunner was. Rather, as a direct consequence of dieselgate, the new test is also supposed to measure more accurately the complexity of vehicle emissions as they are produced in the real world. As highlighted by the previous section, however, empirical observations can be deemed precise without necessarily being accurate—a condition that is more likely to emerge when dealing with indeterminate objects such as real-world vehicle emissions.

That car makers and indeed regulators continue to assert the superiority of standardised, so-called ‘laboratory’ tests over other emissions measurement practices in producing *accurate* knowledge, can therefore be seen as a deeply ‘anti-political’ (Barry, 2002) move that seeks to suppress contestation, debate and confrontation. Protagonists of a more rigorous ‘laboratory’ emissions test here make claims about accuracy, in other words, in order to reduce questions about the morality and politics of road vehicle emissions to their pre-scandal status. That is, they would like to narrow down these questions to ones that publics can understand as having already been pre-empted and resolved through the design of effective calculative tools and regulatory instruments. Yet, even as they are being revamped, these calculative tools and regulatory instruments are clearly struggling to sustain the trust not only of those purchasing new cars in the EU, but also of the diverse new publics which are presently mobilising, in so many European cities, around the emblematic issue of air quality. Rather than endorsing these efforts to enforce top-down ‘closure’ on the scandal (Stengers, 1997), therefore, we argue that what is needed is a more open and participatory approach to apprehending the complexity inherent to vehicle emissions themselves.

At last, the open road? Dieselgate as a watershed for more participatory governance

At the heart of the dieselgate controversy is the question of who gets to ‘enforce closure’ around vehicle emissions, as a contested object of European environmental governance. The scandal has indeed served as a powerful “focusing event” for more deeply-rooted public concerns about the power and accountability of large commercial interests within European regulatory circles (Kingdon, 2011). But it has also raised epistemological questions about how best to measure and apprehend vehicle emissions, and indeed how to determine their influence on local air quality, which have in turn become deeply intertwined with emerging regulatory tensions in Europe between municipal authorities, national governments, and Brussels itself. While we do not purport, in this commentary, to offer a single answer to the question of how best to measure road vehicle emissions—indeed, the idea that there can ever be a single, ‘correct’ approach may itself be a weakness of the existing regulatory culture—we nonetheless contend that the root causes of this scandal will not be addressed without redistributing some of the power to

³ Interviews were conducted with European Commission officials, car manufacturing industry representatives, environmental campaigners, and other independent experts, in a project funded by the John Fell Oxford University Press (OUP) Research Fund (Award No.: 123/822).

‘enforce closure’ around these questions away from industry groups and towards broader publics.

To some extent, such a redistribution of power can be achieved by rendering existing processes of vehicle emissions monitoring much more transparent, in line with recent advice from the EU’s own High Level Group of Scientific Advisers, who call for compulsory publication of “all compliance data and details of the test cycle procedures and [real driving emissions test] data” (European Union Scientific Advice Mechanism, 2016: 43). More fundamentally, however, and particularly given the status of vehicle emissions as a dynamic governance object whose properties always emerge relationally, we contend that there is an urgent need to map more inclusively the strengths and weaknesses of competing forms of measurement and evidence in this domain.

On one level, such an exercise would be useful in rendering more explicit the diverse kinds of uncertainty at play in this case. Bodde *et al.* (2018), for example, identify four categories of uncertainty, including not just conventional scientific uncertainty, but also ‘inherent’ uncertainty (connected to the inherent unpredictability of a particular system), ‘social’ uncertainty (caused by differences in human values or interpretations and leading to disagreements about what information is relevant), and finally ‘legal’ uncertainty (caused by ambiguity over the forms of knowledge that should be used as a basis for decision-making). On another level, a more inclusive process would also helpfully serve to illuminate, and force critical reflection on, competing ‘civic epistemologies’ of vehicle emissions—defined as “understandings of what credible claims should look like and how they ought to be articulated, represented and defended” (Jasanoff, 2005: 249).

Instituting a more inclusive approach to assessing diverse kinds of knowledge and evidence around vehicle emissions—whether derived from ‘laboratory’ settings, ‘on-the-road’ tests, or more informal kinds of monitoring—would build on the principles of ‘post-normal science’ (Funtowicz and Ravetz, 1993) by enabling policy-makers to embrace the insights of an ‘extended peer community’. In practice, it could take a range of forms. Ney and Verweij (2015: 1693), for instance, identify a range of tools—including citizens’ juries, deliberative polling, design thinking, future searches, planning cells, and 21st century town meetings—as potentially promising means of “embracing and mobilizing the plurality of the extended peer community, rather than whittling it down to a monolithic solution”. While we do not advocate a specific approach here, we suggest that experimenting with such deliberative mechanisms at the European level would be valuable not only in enabling regulators to build greater degrees of reflexivity and humility into existing governance frameworks around vehicle emissions, but would also lay the ground for a more explicit ‘ethos of care’ towards European citizens affected by dieselgate (Guimarães Pereira and Saltelli, 2018). Indeed, given the degree of protest and indeed policy change which has already been witnessed in many European cities, fulfilling the latter objective could be the only means left for the EU to avoid losing effective control of the issue of air quality altogether.

As Stirling (2010: 1031) has argued in the context of scientific advice, a move towards “more plural and conditional [knowledge] is not a panacea”. But, unlike conventional approaches based on singular, top-down forms of assessment, such a move does promise to render the influence of uncertainty—of various kinds—and political power in the dieselgate controversy “more rigorously explicit and democratically accountable” (*ibid.*). This would be a significant and positive step forward for the EU as it seeks to begin rebuilding trust in the aftermath of this particularly damaging environmental controversy.

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