Institution: University of Bath

Unit of Assessment: C16 Economics and Econometrics

Title of case study: Strengthening national vehicle pollution standards

Period when the underpinning research was undertaken: 2006-2018

Details of staff conducting the underpinning research from the submitting unit:

Name(s):	Role(s) (e.g. job title):	Period(s) employed by submitting HEI:
Alistair Hunt	Senior Lecturer in Economics, previously Lecturer, Research Fellow and Research Associate	September 2000 - present

Period when the claimed impact occurred: 2015 - December 2020

Is this case study continued from a case study submitted in 2014? N

1. Summary of the impact

Dr Alistair Hunt of the University of Bath has developed methods for calculating the economic costs of air pollution, allowing him to quantify for the first time the negative costs of vehicle emissions, particularly from diesel vehicles, on health in the UK. This led to the establishment of the Clean Van Commitment, with 30 signatories to date, including Tesco and Engie, who have committed to replace their total UK fleet of over 18,000 vans with zero-emissions vans by 2028 and to replace over 2,000 vans by the end of 2020. Hunt's research was also cited as evidence supporting the announcement of an extension of London's Ultra-Low Emission Zone to cover an area bounded by the north and south circular roads, which will mean 100,000 people no longer live in areas exceeding legal air quality.

2. Underpinning research

Hunt has an ongoing research programme at University of Bath that quantifies the risks of climate change and air pollution at the local, national and European level, and the costs and benefits of adapting to these risks. His research has examined the real-world practicalities of translating academic research on environmental damage to policy changes. In a transdisciplinary case study, he and colleagues linked the environmental quality of an urban habitat to health and the associated economic costs and explored where and how health features in decision-making (**Ref 1**).

Hunt's research addresses the limitations of existing willingness-to-pay calculations in the context of air pollution and adapts these to make them more appropriate. With colleagues, Hunt has developed and applied a way of valuing people's preferences in relation to the risk of premature mortality. This elicits people's values for avoiding reductions in the length of lifetime and thereby derives the value of a life-year (VOLY). In a 2011 article, this method was used to derive a VOLY for the EU for the first time (**Ref 2**). As part of this, a survey was conducted in six European countries. Hunt's contributions to the survey design focused on the effectiveness of the means of communicating the change in risk and length of lifetime to the survey respondent and the role of context in determining the elicited values. Adapting the approach taken in this publication, Hunt was also able to quantify the costs to human health of climate change from heat and flooding. His results and methodology were presented in a 2011 publication (**Ref 3**).

In 2018, Hunt and Christian Brand (University of Oxford) were commissioned by the charity Global Action Plan to conduct research into the health costs associated with pollution from conventionally-fuelled cars (**Ref 4**). This built on their work on air pollution and used the VOLY measures developed by Hunt in his 2011 article (**Ref 2**). Hunt was primarily responsible for the

economic valuation of the health impacts. The key insights from this research showed that the health damage associated with diesel vehicle emissions is around 20 times greater than that associated with electric vehicles and at least five times greater than that associated with petrol vehicles. Annual exposure to the air pollutants $PM_{2.5}$ and NO_x is linked to an estimated 40,000 early deaths in the UK each year. Health costs are significantly higher for diesel cars and vans compared to petrol, hybrid or electric vehicles over their 14 and 9-year lifetimes. Key findings relating to inner city areas such as central London include:

- The average cost to the NHS and society of a car is GBP7,714;
- The health damage cost from each diesel car is GBP16,424 and each van is GBP24,555;
- Health damage from older diesel vans costs GBP2,200,000,000,000 per annum to the NHS and society.

The report also highlighted that nearly 90% of the total GBP6,000,000,000,000 bill to the NHS and wider society caused by emissions is attributable to diesel emissions. This study illustrated for the first time the individual cost that each car and van has on the NHS and wider society.

3. References to the research

1. Black, D, Scally, G, Orme, J, Hunt, A, Pilkington, P, Lawrence, R & Ebi, K 2019, 'Moving Health Upstream in Urban Development: Reflections on the Operationalization of a Transdisciplinary Case Study', *Global Challenges*, vol. 3, no. 4, 1700103. https://doi.org/10.1002/gch2.201700103

2. Desaigues, B, Ami, D, Bartczak, A, Braun-Kohlova, M, Chilton, S, Czajkowski, M, Farreras, V, **Hunt, A,** Hutchinson, M, Jeanrenaud, C, Kaderjak, P, Maca, V, Markiewicz, O, Markowska, A, Metcalf, H, Navrud, S, Nielsen, JS, Ortiz, R, Pellegrini, S, Rabl, A, Riera, R, Scasny, M, Stoeckel, M-E, Szanto, R & Urban, J 2011, 'Economic valuation of air pollution mortality: A 9-country contingent valuation survey of value of a life year (VOLY)', *Ecological Indicators*, vol. 11, no. 3, pp. 902-910. https://doi.org/10.1016/j.ecolind.2010.12.006

3. Ciscar, JC, Iglesias, A, Feyen, L, Szabo, L, Van Regemorter, D, Amelung, B, Nicholls, R, Watkiss, P, Christensen, OB, Dankers, R, Garrote, L, Goodess, CM, **Hunt, A**, Moreno, A, Richards, J & Soria, A 2011, 'Physical and economic consequences of climate change in Europe', *Proceedings of the National Academy of Sciences of the United States of America*, vol. 108, no. 7, pp. 2678-2683. https://doi.org/10.1073/pnas.1011612108

4. Brand, C & **Hunt, A** 2018, *The health costs of air pollution from cars and vans*. Global Action Plan. https://www.cleanairday.org.uk/news-stories/the-health-costs-of-air-pollution-from-cars-and-vans

4. Details of the impact

Hunt and Brand's research (**Ref 4**), using the VOLY measures developed by Hunt (**Ref 2**), demonstrated the significant health costs of diesel-fuelled cars and vans. These insights were used in 2018 to inform Global Action Plan's annual Clean Air Day and were launched via press release on 6 June 2018 [**Source a**]. The research was disseminated in over 300 online and print news reports - local (more than 168 reports), national (including the *Times, Guardian, Daily Express, Daily Mail* and *Sun*) and international (Italian, Egyptian, Dutch, Polish and Chinese-language). More than 40 national radio broadcasts reported on the findings, with Hunt undertaking 4 interviews with national and local radio stations (Heart FM, Radio 5 Live, Radio Bristol, Swindon FM).

Sadiq Khan, the Mayor of London, announced on 8 June 2018 that the Ultra-Low Emission Zone, originally announced in 2017 and implemented in central London from 8 April 2019, would be extended across a wider area of London from 25 October 2021. The initial zone coincided with the Congestion Charge area, while the extension encompasses an area bounded by the

north and south circular roads. The accompanying press release referred exclusively to Hunt's co-authored report (**Ref 4**) [**Source b**]. Most vehicles, including the cars and vans Hunt found to be so damaging to air quality, will need to meet new, tighter exhaust emission standards or their drivers will be liable for a daily charge to drive within the covered area. These measures mean that 100,000 people will no longer live in areas exceeding legal air quality [**Source b**].

Hunt's research (**Ref 4**) also led to Global Action Plan, in partnership with utility company Engie and with the backing of the Department for Transport, launching the Clean Van Commitment (CVC) in September 2018. This encourages organisations to pledge to replace diesel vans with clean electric alternatives, with clear commitments to be met by the end of 2020 and by 2028. A statement of intent by Engie and Global Action Plan cited Hunt's work, stating that "*research by academics at the Universities of Oxford and Bath has revealed that the overall health damage from cars and vans costs the NHS and society £6 trillion per year*" [**Source c,** p.9].

16 of the UK's largest van fleet operators, collectively operating 18,169 vans, signed the CVC upon its launch, including Tesco, Anglian Water and Network Rail [**Source c**]. The group committed to finding zero-emissions replacements for 2,389 vans by the end of 2020 and to replace their entire fleets with zero-emissions vans by 2028 [**Source d**]. The CVC allows van fleet operators collectively to show the level of market demand and, in turn, accelerate the transition to electrifying the UK's 4,000,000 diesel vans [**Source e**]. CEO of Engie UK and Ireland, highlighted how "*It is only by continuing to raise awareness of the importance of solving the air quality crisis and from collective action by all stakeholders in society that we can make change happen*" [**Source c,** p.2], while Climate Change Manager at Tesco, stated that "*We support the CVC and view such initiatives as an integral part of climate change agenda*" [**Source c**, p.8].

There are now over 30 signatories to the CVC, across sectors including utilities, retail, the NHS and local government [**Source f**]. Fleet manager of Gateshead Council described how "*Gateshead Council's Fleet department continues to review operations with the aim to make Council driving both safer and greener. Practices and procedures aim to reduce fleet mileage, fuel consumption and CO_2 emissions. Becoming one of the first Clean Van Commitment signatories is an important part of this*" [**Source c,** p.5]. 75,000,000,000,000 miles are driven each year in vans and vans are the fastest growing vehicle type in the country. They contribute 30% of the UK's road transport NO_x emissions, costing 3 times more per vehicle to the UK's health than cars. The commitment is therefore of great significance in reducing emissions [**Sources d, e, g**]. As the Senior Partner at Global Action Plan, puts it "*The Clean Van Commitment (CVC) provides momentum and much needed clarity for the fledgling electric van industry*" [**Source h**].

A comment by the UK Roads Minister, refers directly to Hunt's co-authored report and stresses the importance of the CVC: "*This latest research further highlights the very serious potential impacts of nitrous oxide pollution, and underlines the importance of the transition to greener transport. That is why the Clean Van Commitment is important, encouraging some of the biggest van fleet operators in the UK to switch to cleaner vehicles*" [**Source d**].

5. Sources to corroborate the impact

a) Global Action Plan press release. 'New research – Health damage from cars and vans costs £6 billion per annum to NHS and society' (6 June 2018).

b) Press release by Mayor of London. 'Mayor: Ultra-Low Emission Zone to expand up to North & South Circular' (8 June 2018). https://www.london.gov.uk/press-releases/mayoral/ultra-low-emission-zone-to-expand

c) Engie and Global Action Plan. Clean Van Commitment: Leading the Way to Zero Emission Vans, 2018. https://www.engie.co.uk/wp-content/uploads/2018/09/clean_van_commitment_collective_statement_of_intent.pdf

d) My Green Pod website, Clean Van Commitment (11 September 2018). https://www.mygreenpod.com/articles/clean-van-commitment

e) London Borough of Tower Hamlets website (accessed December 2020). The Clean Van Commitment. https://www.towerhamlets.gov.uk/lgnl/environment_and_waste/environmental_health/pollution/air_quality/Air_quality_information_and_campaigns/What_are_we_doing/The_Clean_Van_Commitment.aspx

f) Clean Van Commitment Signatories. Global Action Plan 2020. https://www.globalactionplan.org.uk/clean-van-commitment-signatories

g) Intelligent Transport website, The Clean Van Commitment sees 16 UK van operators switch to electric vehicles (6 September 2018). https://www.intelligenttransport.com/transport-news/71107/clean-van-commitment

h) Lilly, C. Fleets commit to electric vans. Zap Map (7 September 2018). https://www.zap-map.com/fleets-commit-to-electric-vans