

DAERA Discussion Document on a Clean Air Strategy for N

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comments by

Northern Ireland Environment Link

15th February 2021

Northern Ireland Environment Link (NIEL) is the networking and forum body for non-statutory organisations concerned with the natural and built environment of Northern Ireland. Its 60 Full Members represent 190,000 individuals, 262 subsidiary groups, have an annual turnover of £70 million and manage over 314,000 acres of land. Members are involved in environmental issues of all types and at all levels from the local community to the global environment. NIEL brings together a wide range of knowledge, experience and expertise which can be used to help develop policy, practice and implementation across a wide range of environmental fields. These comments are made on behalf of Members, but some members may be providing independent comments as well.

If you would like to discuss these comments further, we would be happy to do so.

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NEIL response to DAERA Clean Air Strategy discussion document

Background

NIEL welcomes this consultation and the opportunity to respond to it. This consultation is comprehensive, informative and very well written and NIEL would like to complement and thank the department and in particular those who produced it for what is a very good piece of work.

As the consultation document says, clean air is vital for human health and our natural environment so this is a very important consultation.

NIEL believes that there is a growing sense of the need to reduce levels of air pollution amongst the general public. For example, in a YouGov survey¹ of young adults in 21 cities across six European countries in relation to mobility and air pollution,

- 69% of those surveyed in the UK do not want to go back to pre-pandemic pollution levels as they experienced good clean air.
- 79% of those surveyed in the UK agreed that cities must take effective measures to protect citizens from air pollution, even if it means preventing cars from entering the city e.g. through Zero Emissions Zones.
- 81% of those surveyed in the UK agreed that cities must take effective measures to protect citizens from air pollution, even if it means reallocating public space to walking, cycling and public transport.

Similarly, according to a UK Department for Transport survey² in 2020, 61% of respondents said they were in favour of Low Emission Zones (LEZs) and 67% said that LEZs are helping to improve people's health. In addition, 74% agreed that we should be reducing the amount we use motor vehicles for the sake of improving our health and 55% of respondents were concerned about the effect of exhaust fumes on their health.

NIEL also believes that there should be a much greater role for natural capital and the use of ecosystem services in dealing with air quality issues. For example, there is good evidence that trees help reduce noise pollution and pollution as well as providing shade and oxygen. As outlined in DEFRA's "Impacts of vegetation on urban air pollution" report³, research has suggested that the total existing UK vegetation reduces the average annual surface concentration by about 10% for PM_{2.5}, 6%



for PM₁₀, 13% for O₃, 24% for NH₃ and 30% for SO₂, but did not markedly change NO₂ concentrations. NIEL believes that much greater levels of tree cover will help contribute to better air quality and so must be a part of the solution, though the most effective step is reducing the emissions at source notably from transport and industry and so this must be the top priority for action.

A 2016 WHO report⁴ summarizing evidence on the health effects of green space in urban areas shows that green spaces offer numerous public health benefits, including psychological relaxation and stress reduction, enhanced physical activity and a potential reduction in exposure to – among other harmful urban factors – air pollution, noise and excessive heat. The report concludes that there is a need for both small, local green spaces situated very close to where people live and spend their day, and large green spaces that provide formal recreational facilities (such as playing fields) and opportunities to interact with nature.

Given the many negative effects of air pollution, NIEL would urge the department, in conjunction with other government departments to reduce air pollution levels as much as possible, as quickly as possible.



Consultation questions

Chapter 1 - Sources and Effects of Air Pollution

1. Should there be legally binding targets for particulate matter, which are based on WHO guidelines?

NIEL response

Yes, as a minimum NIEL would like to see NI adopt legally binding targets for particulate matter based on WHO guidelines for both PM₁₀ and PM_{2.5}. Based on the fact that, as the discussion document says, research is increasingly pointing to the conclusion that for exposure to particulate matter PM_{2.5} at least, there is 'no safe level' of air pollution, and that exposure to incremental levels of PM_{2.5} even below objectives can be associated effects on mortality, then NI needs to aim for the lowest levels of PM_{2.5} and PM₁₀ possible and so should match the Scottish target for PM_{2.5} of 10 micrograms per cubic metre or less, when expressed as an annual mean.

2. Should all automatic monitoring sites measure at least NOx and PM?

NIEL response

As a minimum, yes and if possible more pollutants should be measured so as to give as full a picture as possible of the pollution levels across NI.

3. Should the current urban air quality monitoring network be expanded?

NIEL response

Yes, NIEL would support the expansion of the air quality monitoring network



4. Should a targeted approach to exposure, based on population, be used to expand the current monitoring network.

NIEL response

Yes, NIEL would support the idea of a targeted approach based on the population threshold proposed so that for example, air quality monitoring is required to be carried out in any settlement with a greater population than 10,000 people.

5. What are your views on using a population figure of 10,000 as a threshold that triggers the requirement to monitor air quality?

NIEL response

If a population threshold is to be used to determine where air quality monitoring will be required then a threshold of 10,000 appears reasonable.

6. Should biomass heating be discouraged in urban areas or in areas with poor air quality?

NIEL response

There is a balance to be struck between the need to eliminate the use of fossil fuels for heating and electricity and the potential impact of biomass heating, which is generally very low or zero carbon. Ideally, all sources of air pollution should be reduced as much as possible but given that the causes of poor air quality in those areas that currently suffer from it will be primarily due to burning fossil fuels, transport, industrial processes and the other sources as outlined by the discussion document then if those sources were reduced or preferably eliminated then biomass heating could be facilitated where necessary or where there is no other option, as might be the case in the drive to reach net zero carbon.



7. Should the connectivity between air quality and noise issues be improved through requiring consideration of each in Noise and Air Quality Action Plans?

The discussion document proposes that efforts to reduce air pollution should be consistent with plans to also tackle noise pollution in Northern Ireland and the potential synergies and benefits to the wellbeing of the population as a whole should be borne in mind by authorities with responsibility for drawing up and implementing action plans. This sounds reasonable and NIEL would support this integrated approach such as that referred to in the EU Air Quality Directive, as NIEL would like to see greater use of options that link to multiple outcomes thereby offering cross sectoral and cross departmental benefits such as health benefits.

8: Given that air pollution, carbon emissions, and noise often share the same sources, what are your views on including noise and carbon emissions as a consideration in Low Emissions Zones?

NIEL is not in a position to give a definitive position on this issue as the primary purpose of LEZs is to reduce emissions and improve air quality, but as referred to above, in principle, NIEL would like to see the greater implementation of policies and actions that link to multiple outcomes and produce multiple benefits, for example, policies and actions that reduce the levels of air pollutants which also reduce the levels of noise pollution.



Chapter 2 - Transport Emissions

9: Are there any potential measures not included here that you believe could help encourage a shift away from private car use to walking, cycling, and public transport?

NIEL believes that the department should do more than encourage a shift away from private car use to active transport and public transport, and should actually facilitate or enable active travel and public transport through the provision of more and better infrastructure and services. For example,

According to the Department of Infrastructure, there were 3.7 million passenger journeys on Glider services since they were introduced on 3 September 2018 up to 31 March 2019⁵ and the use of the Comber Greenway has risen by 75% between April and November 2020⁶.

The importance of providing the appropriate infrastructure was illustrated in the 2015 cycling strategy for NI 'Changing Gear'⁷, has a three pillar approach to getting more people to cycle and the first of these was 'Build'. 'Promote' and 'Support' were the other of the three pillars so there is clearly a need for and benefit to encouraging greater bicycle use and active travel but the infrastructure has to be in place to enable an expansion in active travel. The most recent Travel Survey for Northern Ireland shows that for the period 2017-19, cycling accounts for 1% of all journeys⁸.

Any active travel infrastructure must be safe. As the discussion document says, the safety of cycling infrastructure is a key issue. As outlined in Sustrans 2019 report 'Bike Life', concerns about safety was the top reason why people do not cycle or cycle less often. Furthermore, 80% of those surveyed said that more traffic free cycle routes away from roads would be useful to help them cycle more and 77% of those surveyed said more cycle tracks along roads physically separated from traffic and pedestrians would be useful to help them cycle more⁹. The provision of safe, active travel infrastructure, i.e. separate from roads, which is much more extensive should also be integrated with public transport networks e.g. greenways to bus and train stations, and the provision of bike racks at public transport stations to further encourage this shift to active travel. Also, increasing mileage allowances for travel to work by bicycle should also be applied.

Active travel also offers opportunities for increasing mental and physical wellbeing, reductions in pollution, improving air quality and economic benefits. For example, according to Cycling UK¹⁰, the average economic benefit-to-cost ratio of investing in cycling and walking schemes (active travel) is 13:1 while research for the UK Department of Transport found that cycling schemes can have benefit-to-cost ratios in the range of 5:1 to 19:1, with some returns as high as 35.5:1. This research



also found that a typical “cycling city” could be worth £377 million to the NHS in healthcare cost savings, in 2011 prices¹¹. By comparison, according to UK Department for Transport Road Investment Strategy: Economic analysis of the investment plan¹² the benefit-to-cost ratio for bypasses and link roads is 2:1. So clearly, investing in active travel offers a very positive return on investment, generally much better than road building and on top of that, greenways can also offer opportunities for enhancing biodiversity.

Greater levels of investment in broadband should also help encourage a shift away from private car hopefully to avoid the need for a lot of work based travel. As Edmund King from the AA said in 2020¹³

“in future, we should invest more in broadband because what this current crisis has shown is that the majority of companies can continue working from home, and it can be more efficient.” ¹⁴

There are other legislative and policy measures that could be adopted to encourage greater use of active travel and use of public transport including the introduction of an Active Travel Bill and increase in investment in active travel and public transport. The private car continues to dominate day-to-day travel in Northern Ireland, with 70% of our journeys made by car and this is also reflected in the disproportionate spending on roads compared to public transport in Northern Ireland, as compared to England, Scotland and Wales. This is only likely to change in NI if the investment in transport changes. According to the National Audit Office¹⁵, in 2017-18, 59% of the NI transport budget was spent on roads with 18% spent on railways, 11% on local public transport and 12% on other transport. The situation in England was almost the complete reverse of that in NI, with 31% of the transport budget spent on roads, 59% on railways and 8% on local public transport. In Scotland 42% of the transport budget was spent on roads and 47% on public transport (39% on railways and 8% on local public transport). In Wales 45% of the transport budget was spent on roads and 51% on public transport (46% on railways and 5% on local public transport). NIEL would like to see a significant shift in spending so that so that the overall transport spend has at least a 50/50 split between roads and public transport, similar to the spending pattern in other UK administrations. The promotion of public transport and active travel is also crucial to delivering sustainable, low carbon solutions for connected infrastructure across Northern Ireland and can create significant economic, social and environmental benefits, and should receive greater support from the NI Executive.

10: What would encourage you to consider buying an electric vehicle as your next car?

N/A



11: Do you think that DAERA should develop a Low Emissions Zone Framework for dealing specifically with transport emissions in Northern Ireland?

Or

Would you be in favour of Low Emissions Zones for urban areas also covering other sources of pollution, for example those from household heating?

NIEL response

Since, as previously referred to, research is increasingly pointing to the conclusion that for exposure to particulate matter PM_{2.5} at least, there is 'no safe level' of air pollution, NIEL would support the development of Low Emission Zones (LEZs) specifically for transport emissions but would prefer that LEZs if and when established in urban areas would cover other sources of pollution including those from household heating. NIEL would like the department to explore the possibility of establishing LEZs to cover areas where there are high and excess levels of ammonia, given that, as the discussion document says, ammonia emissions are a significant source of PM, as ammonia reacts with other air pollutants to form PM.

12: What are your views on vehicle charging cordons for entry to the most polluted parts of urban areas in Northern Ireland?

Vehicle charging is one means of potentially reducing the levels of traffic in city centre areas. NIEL would support that option on the basis that the money generated was ring fenced for reinvestment back in to the provision of low or zero carbon travel options including active travel. For example, in 2006, Transport for London (TfL) reported that the congestion charge reduced traffic by 15% and congestion – that is, the extra time a trip would take because of traffic – by 30%¹⁶. The UK government has proposed a ban on the sale of new diesel and petrol cars by 2030¹⁷, and so by 2050, or before, there should be no petrol or diesel cars on the road, by which time the UK will also be at or near net zero carbon. Considering these factors, NIEL believes that while policy options like vehicle charging could help reduce pollution in some urban areas, the long term goal has to be for the elimination of vehicles powered by the internal combustion engine. While some particulates are generated by brake and tyre wear, electric and/or hydrogen powered forms of public transport should be allowed in urban areas after 2030.



Chapter 3 - Household Emissions

13: Should urban areas, in their entirety, be designated as Smoke Control Areas?

NIEL response

Yes. On the basis that fossil fuels should be eliminated as fuel sources before 2050 then designating Smoke Control Areas should also help push the elimination of fossil fuels.

14: Should the law should be changed so that non-smokeless fuels may not under any circumstances be sold in Smoke Control Areas?

NIEL response

Possibly. While the issue is the burning of non smokeless fuels in Smoke Control Areas, if those fuels were not for sale in those areas, then one would expect that to reduce the amount of those fuels that are burned, though in theory non smokeless fuels could be bought in an area which is not designated as a Smoke Control Area and brought in to and burned within a Smoke Control area.

15: Should government ban the sale to the general public of smoky/bituminous/household coal in Northern Ireland?

NIEL response

Yes, though NIEL believes that this ban should go beyond the general public and there should be a complete ban on the sale and use (combustion) of coal in Northern Ireland. On the basis that NI, like the rest of the UK, will need to achieve net zero carbon by no later than 2050, based upon the 2019 legislation (The Climate Change Act 2008 (2050 Target Amendment) Order 2019)¹⁸, though this target date may be brought forward, then NIEL would support a ban on the sale and importation of all forms of coal in to Northern Ireland, so that coal is completely phased out as a fuel source.



According to the Department for the Economy¹⁹, 3.7% of NI's energy use comes from coal, of which 74% is in the industrial and commercial sector, though this varies from the Mid Ulster council area (which accounts for almost one third (32.1%) of all coal consumption in NI) where 92% of coal use is by the industrial and commercial sector to the Belfast council area where 1% of coal use is by the industrial and commercial sector²⁰. It seems clear therefore that the main use of coal for domestic heating is in the Belfast council area.

The question is when should this ban start? NIEL believes that this ban should be implemented as soon as possible, potentially from 2021. In order to reduce the potential for a ban on household coal having a disproportionate impact on those on lowest incomes, it would be important for appropriate financial support to be provided to enable households to move to the use of cleaner, non fossil/low carbon fuels.

16: Should government ban the import, into Northern Ireland, of high-sulphur coal?

NIEL response

Yes, as outlined in response to Q15. Above, NIEL would support a ban on the importation and use (combustion) of high sulphur coal into NI. The question is when should this ban start? NIEL believes that this ban should be implemented as soon as possible, potentially from 2021.

17: Should government ban the sale to the general public of unseasoned wood in Northern Ireland at retail outlets?

NIEL response

Yes, although that may not completely eliminate the burning of unseasoned wood as anyone could burn unseasoned wood that has not been purchased.

18: Are there any further things you think that central and local government could be doing to address air pollution from burning solid fuels?

Yes. Central and local government should be developing and implementing polices and legislation to which they also contribute financially which will lead to the complete elimination of fossil fuels



throughout NI and the achievement of net zero carbon no later than 2050. A clear commitment to the complete elimination of fossil fuel use in NI would be the most significant step towards the decarbonisation of our energy supplies. This would require cooperation with the Department for the Economy, for example, in the course of the development of the new Strategic Energy Framework which is due in 2021 which must plan for a net zero carbon economy as a contribution to the reduction of air pollution levels in NI. Integration and collaboration between DAERA and other departments and the clean air strategy and other strategies will be essential if air quality is to be improved to the extent we would wish for. For example, there is also the issue of building regulations and the need for much higher levels of insulation in buildings as this could help reduce the overall energy consumption levels in NI and the issue of transport and the need to reduce the levels of private transport and the particulates that result from transport.

Chapter 4 - Agricultural Emissions

19: Do you think that the process in place to address ammonia emissions in Northern Ireland is appropriate?

NIEL response

No. There is a significant problem with ammonia emissions in NI, 96% of which come from agriculture and this needs to be tackled, with a new approach. The high levels of ammonia emissions in NI is indicative of a failure of policies up to this point in time. Indeed, we are the only part of the UK to see a rise in Ammonia emissions levels since 2005. It has been estimated that the cost of ammonia emissions on health and biodiversity in the UK will reach over £700m p.a. by 2020²¹. While a conservative estimated has placed the figure for Northern Ireland at around £107m p.a. by 2020²².

As such, any future ammonia and/or clean air and/or environment strategy should focus on the level of ammonia to which emissions are to be reduced and then devise policies to achieve that level rather than making arguments as to why NI should be allowed higher levels of ammonia pollution because NI 'is different'.

Furthermore, feedback on this issue from members has highlighted how the Expert Working Groups and Ammonia Stakeholder Groups were viewed as not representative as they did not engage with certain groups especially environmental NGOs and public health NGOs and consequently the recommendations of those groups did not adequately reflect the views of the environment and public health sector and those who wish to reduce ammonia levels but merely reflected the views of the Agri-business sector.



There are a number of aspects to the problems with ammonia most notably the way in which the problem with ammonia is defined and regulated. In relation to the definition of the problem with ammonia, defining ammonia emission by agricultural sector suggests that dairy cattle are the primary problem. However, the rapid expansion of non-land-based sectors of pig and poultry and anaerobic digestion (AD) plants have not been properly accounted for in terms of ammonia emissions. Related to that is the issue of pollution prevention and control permitting not applying to all farms which produce ammonia emissions. The majority of pig and poultry farms operate below the thresholds of animal numbers which currently require permitting and therefore their ammonia emissions are unregulated. The derogation which resulted in reared pigs not being accounted for within the animal number threshold of a pig breeding unit requiring a Pollution Prevention & Control Permit was a recommendation of the Going for Growth²³ plan and its implementation by DAERA circumvents the regulations designed to control ammonia emissions. This derogation for a Slurry Controller Agreement for Contract Rearing of pigs needs to be rescinded with immediate effect.

The DAERA Anaerobic Digester Quality Protocol exempts AD Operators from waste regulations and permits self-regulation and thereby risks incomplete assessment of ammonia and other polluting emissions. AD plants should not be exempted from waste regulations as they accounted for 22% of the increase in NI's Ammonia Emissions from 2010 to 2016²⁴ with poultry contributing to 18.8% of the increase and pigs contributing to 14.5% of the increase in that time.

The lack of enforcement in relation to exceedance of ammonia emissions is also an issue and NIEL believes that the Polluter Pays principle must be applied.

Chapter 5 - Industrial Emissions

20: Are there any industrial sectors or air pollutants that require new or further investigation?

Potentially there could be new or further investigation in to how those sectors that use coal and other fossil fuels, especially the industrial and commercial sectors, will move to low and ultimately zero carbon energy sources, to ensure NI can achieve net zero carbon by 2050, or earlier.



Chapter 6 - Local Air Quality Management

21: Should councils more widely adopt low-cost air quality monitoring systems, for screening purposes?

NIEL would support more councils buying and installing low-cost monitors, as this would, as the discussion document says, enable them to undertake screening assessments for air quality. NIEL recognises the limitations of those low cost monitoring systems as outlined in the discussion document but agrees with the argument made in the discussion document that those screening assessments could help councils decide whether or not more detailed assessments of air quality are needed and whether certified automatic monitoring equipment should be installed.

22: Should AQMAs should be discontinued and replaced instead with Low Emissions Zones, which cover all aspects of air quality, including Smoke Control?

NIEL response

On the basis that unlike AQMAs, the impetus would not be to revoke a LEZ, but rather to keep it in place to continue to safeguard air quality then NIEL would be prepared to support replacing AQMAs with LEZs.

23: Where applicable, should the entirety of urban districts should be declared as AQMAs (or Low Emissions Zones)?

NIEL response

NIEL's focus would be on the outcome and so if the decision was made to declare entire urban districts as AQMAs or LEZs and that resulted in even lower levels of air pollution and hopefully the elimination of air pollution, then NIEL would support that.



24: What are your views on having a traffic-light system for councils to report on?

NIEL response

The traffic light system of reporting on air pollution seems like a clear and simple option which should be readily understood and such NIEL would be supportive of that choice.

25: What are your views on the proposals to change the LAQM process, in particular to grant funding for outcome-based measures as opposed to monitoring?

NIEL response

NIEL supports an outcomes-based approach whereby funding will be allocated to projects which demonstrate potential for measurable improvements in air quality. However, as the department will appreciate when coming up with actions to reduce air pollution, it is essential to have the best available most up to date data to hand and as such financial support to increase and/or improve the air quality monitoring should continue to be made available.

26: Are there any further measures you would suggest to help achieve a significant reduction or revocation of all AQMAs by 2021?

NIEL response

Not at this stage

Chapter 7 – Communication

27: Do you have any suggestions for the membership of the Air Quality Forum?

NIEL response



NIEL welcomes the suggestion in the discussion document to establish an Air Quality Forum. NIEL believes that any such Air Quality Forum must also include stakeholders from outside government/the public sector who have the appropriate levels of relevant skills and experience in air quality issues. For example, representatives from the third sector, in particular those organisations with a health focus such as Asthma UK, Chest, Heart and Stroke, or the British Heart Foundation and those with a rights and justice focus, those with a focus on transport such as Sustrans and Translink as well as those stakeholders with an appropriate environmental, scientific and/or medical background. The role of this potential forum needs to be clear and the independence of this forum and of its members is of fundamental importance to the successful operation of this forum. The forum and its members must be free to comment on air pollution and quality issues as they see fit without any possible interference from government, to ensure that any such body would be free to criticise government policy if and when appropriate. After all, the most important issue here is how to improve the quality of the air we all breathe and this must not be subject to limitation due to political interference.

28: Is increasing awareness of air quality impacts at a local level is the best way of promoting behaviour change by individuals to reduce air pollution?

NIEL response

NIEL is not in a position to say if increasing awareness of air quality impacts at a local level is the best way of promoting behaviour change by individuals to reduce air pollution but NIEL would support efforts by the department to increase awareness of air quality impacts at a local level and the provision of advice as to how to reduce those negative impacts, as NIEL believes both aspects should be provided in order to better tackle the problem.

29: Do you have any further comments or suggestions on how the impacts of policy interventions can be tracked in Northern Ireland.

NIEL response

Not at this stage



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- ¹ <https://www.transportenvironment.org/sites/te/files/publications/Briefing%20-%20polling%20Covid-19%20%26%20mobility.pdf>
- ² National Travel Attitudes Survey Wave 2 January 2020
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/858253/national-travel-attitudes-study-wave-2.pdf
- ³ DEFRA Impacts of vegetation on urban air pollution https://uk-air.defra.gov.uk/assets/documents/reports/cat09/1807251306_180509_Effects_of_vegetation_on_urban_air_pollution_v12_final.pdf (page 29)
- ⁴ http://www.euro.who.int/_data/assets/pdf_file/0005/321971/Urban-green-spaces-and-health-review-evidence.pdf?ua=1
- ⁵ Department of Infrastructure Transport Statistics 2018-19 <https://www.infrastructure-ni.gov.uk/system/files/publications/infrastructure/northern-ireland-transport-statistics-2018-2019-publication.pdf>
- ⁶ <https://twitter.com/deptinfra/status/1336613844190437378?lang=en-gb>
- ⁷ <https://www.infrastructure-ni.gov.uk/sites/default/files/publications/drd/a-bicycle-strategy-for-northern-ireland.pdf>
- ⁸ <https://www.infrastructure-ni.gov.uk/system/files/publications/infrastructure/tsni-headline-report-2017-2019.pdf>
- ⁹ https://www.sustrans.org.uk/media/5943/200228-bikelife19_belfast_v58_web.pdf (p4)
- ¹⁰ <https://www.cyclinguk.org/campaigning/views-and-briefings/cycling-and-economy>
- ¹¹ The value of cycling
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/509587/value-of-cycling.pdf
- ¹² UK Department for Transport Road Investment Strategy: Economic analysis of the investment plan
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/411417/ris-economic-analysis.pdf
- ¹³ <https://www.bbc.co.uk/news/science-environment-52137968>
- ¹⁴ <https://www.ispreview.co.uk/index.php/2020/04/gov-climate-advisor-says-switch-uk-road-funding-to-broadband.html>
- ¹⁵ National Audit Office Investigation into devolved funding <https://www.nao.org.uk/wp-content/uploads/2019/02/Investigation-into-devolved-funding.pdf>
- ¹⁶ <https://www.londonreconnections.com/2018/congestion-charge-one-londons-great-successes-conversation/>
- ¹⁷ <https://www.gov.uk/government/news/government-takes-historic-step-towards-net-zero-with-end-of-sale-of-new-petrol-and-diesel-cars-by-2030>
- ¹⁸ <https://www.legislation.gov.uk/ukxi/2019/1056/contents/made>
- ¹⁹ Department for the Economy Energy in Northern Ireland 2020 <https://www.economy-ni.gov.uk/sites/default/files/publications/economy/Energy-In-Northern-Ireland-2020.pdf> (p93)
- ²⁰ Ibid page 82
- ²¹ <https://www.rand.org/randeurope/research/projects/impact-of-ammonia-emissions-on-biodiversity.html>
- ²² <https://www.nienvironmentlink.org/cmsfiles/NIEL-AMMONIA-Impacts-Workshop-Proceedings--Recommendations-Final.pdf>
- ²³ <https://www.daera-ni.gov.uk/sites/default/files/publications/dard/going-for-growth.pdf>
- ²⁴ Personal communication

