

Committee on the Medical Effects of Air Pollutants (COMEAP)

Defra – COMEAP engagement meeting 6 July 2020 on PM_{2.5} targets under the Environment Bill 2020

This short document provides some early feedback from the Committee on the Medical Effects of Air Pollutants (COMEAP) on the information, presented by Defra during a workshop on 6 July 2020, regarding setting targets for PM_{2.5} in ambient air under the Environment Bill 2020. It summarises some of the key elements captured during real-time on-line feedback sessions (via Mentimeter), short discussions during the meeting and subsequent feedback (by correspondence) from individual members. These are initial views from Members from a first, short consultation rather than being a considered position statement from the Committee. The response is structured around the questions (reproduced below) that were posed to Members by Defra during the meeting or in the post-meeting feedback form.¹

However, it was noted during the meeting that these are difficult questions which require detailed discussions by Members. It is therefore likely that additional information will be needed to enable useful answers to be provided. A format which allows a more iterative approach to discussion – and an exchange and development of views – would be better suited to obtaining considered coherent expert advice and opinion from the Committee.

1a) Views on COMEAP's role in target development

- Where do you think COMEAP can contribute? Which WPs?
- What is the best way for COMEAP to engage? For example, regular agenda item on meetings, sub-group, separate meetings or workshops
- What should be included in the COMEAP terms of reference?
- What role should COMEAP play in target development? How can it contribute to the WPs? What is the best way to engage?
- What role do you think COMEAP should play in target development? What role should other external experts play in target development?

COMEAP can contribute to work packages 2 to 6². It can both respond to specific questions posed to it (for example, by Defra) and provide expert or critical assessment of work commissioned by Defra. COMEAP can provide expertise, challenge, scrutiny and independence.

¹ The initial bullet points listed in each section were included in Defra's presentation; the middle bullet points were those posed for members to answer in Mentimeter, and the final bullet points are the questions asked in the post-meeting feedback form. Some of the responses have been included in different sections from which they were submitted, in order to collate comments on the same topic together.

²

- WP2 – role of AQ targets (lessons learnt from others)
- WP3 – target form (location, type of target, local implications)
- WP4 – assessing progress towards the target (monitoring/modelling)
- WP5 – achievability, level of ambition (data, modelling)
- WP6 – impact assessment (economic, health)

COMEAP should assist with target development. It is suggested that the main roles for COMEAP should be in helping to design targets that maximise health benefits and in evaluating those benefits. AQEG is well placed to advise on much of the other aspects. Nonetheless, although COMEAP's main role would be on health impact assessment, it need not be constrained to this.

It is important that there is a visible independent health advice input. In the past, the process of establishing Air Quality Objectives or Limit Values started with the health input. COMEAP can provide this visible health-based first step. COMEAP's role is to advise on the scientific evidence. It should not be asked to endorse or support specific government proposals or choices.

In response to a question, Defra confirmed that the numerical value of the targets would largely be based on cost-benefit analyses. If the targets will be informed by cost-benefits analyses, COMEAP can advise on concentration-response functions (CRFs) for use in these analyses. If any new or revised CRFs are needed, then the Committee needs to be made aware of this at the very beginning of the process – because considering the evidence needed to make such recommendations takes time, and the benefit side of the cost-benefit analysis cannot be completed without these inputs. The planned process leading to the numerical value of the targets should be laid out in the forthcoming policy paper. This process would need to show that there will be a visible independent health advice input. This visible input would need to be more substantial than just a reassurance that COMEAP will be consulted through the process. Instead, specifying what advice COMEAP will provide (for example, 'COMEAP will advise us on the latest concentration-response functions to use' – with the advice being made publicly available) is desirable.

Consideration should be given to potential additional complications of how cost-benefit works with several concentration-response functions, whether national or regional concentrations are used, whether absolute concentrations or population-weighted concentrations are used, whether an assumption that the concentration-response function is linear is appropriate etc.

Mention was made of three major recent and on-going studies on health effects in cohorts exposed to relatively low concentrations of PM_{2.5}, funded by the Health Effects Institute³ and of systematic reviews commissioned by the World Health Organization to support the revision of their Air Quality Guidelines. These will be useful to inform thinking about health-based target values. They are expected to be available in a timescale that would allow them to be taken into account in developing targets under the Environment Bill.

COMEAP could potentially help with aspects such as:

- Identification of effects
- Identification of harmful pollutants (potentially including harm of specific fractions of particulate matter)
- Identification of sensitive groups
- Recommending concentration-response functions for modelling impacts

³ [New Studies on Health Effects at Low Air Pollution Concentrations](#)

- Consideration of the consequences of meeting limits over different timescales
- Identification of target values through quantitative data analysis, including the health impacts of different scenarios
- Bounding uncertainty (as far as possible)
- Evaluating and commenting upon forthcoming recommendations from the World Health Organization for revised Air Quality Guidelines for PM_{2.5}
- Consideration of the link between epidemiological evidence and target development; this is not as straightforward as it might seem, as correlations of PM_{2.5} with other pollutants need to be considered
- Increasing the understanding of the roles of indoor and outdoor pollution on health

Workshops are a possible way to engage, particularly if timescales mean that obtaining views at regular COMEAP meetings would not be sufficiently timely. Given the shortness of timescales, the sooner the process can start the better, with clarity regarding at which points COMEAP will be involved.

Early agreement of the Terms of Reference is requested, so that everyone has clarity on timescales, roles and processes as soon as possible.

In order to plan and develop COMEAP's contributions, it would be helpful to have more clarity on:

- The specific questions relating to the available health evidence which would be useful to Defra when considering developing targets
- The timings of when different aspects of this advice would be needed
- At what stage in the process the 'Impact Assessment' will be undertaken – this would appear to be something that is integral to setting the targets, if they are to be cost-benefit based
- The intention of the limit value or "threshold" target: for example, is this intended to be a 'backstop' as in the 2007 National Air Quality Strategy to ensure no unacceptable concentrations even in "problem" locations (such as a particularly intense source or particularly bad dispersion conditions)? Or is it intended to be a main lever on population exposure more generally?
- The use of the term "target" which, in the EU Directive, is aspirational rather than legally binding – the potential for misinterpretation or misunderstanding if this term is used differently in the Environment Bill should be recognised and addressed

Other expertise that could be provided by external experts includes:

- Demand modelling, technology modelling to understand how future emissions are likely to evolve as a result of business as usual and other policies
- Monitoring and modelling to understand what current conditions are and how they are forecast to develop in line with the demand and technology modelling. This requires attention to transboundary effects and liaison with people outside the UK, post-Brexit via the UNECE Convention on Long Range Transboundary Air Pollution
- Health impact assessment (although COMEAP Members have the required skills, the assessment of policies is outside COMEAP's remit)

- Economic input to understand the costs of actions, and the trade-offs involved in setting different timescales for compliance
- Ecologists to provide feedback on the extent to which targets for human health provide protection for ecosystems (that is, is it necessary to have a separate set of targets for ecological protection)
- Integrated assessment modellers to pull data together

For a properly efficient solution it is important to look beyond air quality and to other policies – most notably, for outdoor air, in relation to climate and transport, for indoor air in relation to housing and chemicals policies. Therefore, advice could be requested from:

- Integrated policy analysts to understand how policies in different areas work together

1b) Questions on principles

- Is a two target approach focused on long term exposure sensible and are the two approaches proposed complementary?
- Can they be defined so that they are scientifically robust and clear for reporting and legal compliance?
- Can you envisage the two targets working together coherently to drive collective action and reduce health risk or harm?
- What do you think of the two target approach? Will they work together coherently? Is the focus on long-term exposure sensible?
- What are your views on setting two PM_{2.5} targets as proposed in the meeting? Will they work together as envisaged to reduce the risk to health from air pollution? Can they be defined to be both scientifically robust and clear for reporting and determining legal compliance? Is the focus on long-term health impacts sensible?

The two types of targets proposed are complementary and can work together coherently. Having a two target approach could provide flexibility. But it may also present challenges in both risk management and in communication. However, it is likely that a two metric system will be understood, if communication makes it clear that it is designed to improve protection of everyone, but with special consideration given to those in highest exposure areas. It can be explained that the protection of everyone, through population wide exposure improvements, includes the disadvantaged by default (that is, those in the areas with highest exposures benefit from a two-pronged approach). There is a complex link between outdoor concentrations and personal exposures (both outdoors and indoors). However, given that targets should be simple to understand and measure, they should be based on ambient concentrations only – it is not practical to incorporate any form of assessment of indoor or personal exposure for compliance purposes.

The Limit Value is more easily understood by the public and prevents “hot spots” where concentrations are really high. Exposure reduction yields the greatest health benefit and is therefore an appropriate basis for a metric to reflect health benefits of reductions in long-term exposure. It will be essential to strike a balance between efficient improvement of air quality for the population as a whole, recognising the lack of any meaningful threshold for effect at a population level, and the protection of

communities which are subject to the worst air quality – who tend to be the more socially disadvantaged

Modelling should be undertaken to understand the way that targets could work together – there is likely to be sufficient data available to undertake this. The two targets might not work entirely coherently in terms of driving a consistent policy focus – but that might not matter: it would be expected that reducing concentrations of secondary particles would dominate approaches to exposure reduction, while primary particles might be more important for hotspots, for example, industrial sites. With too much emphasis on one target over the other, they will not work together in the way intended, and efficiency will be lost. A loss of efficiency leads to worse health outcomes or a waste of money or both. This links to questions of regionalisation: what is very efficient in one location may be inefficient elsewhere (for example, urban vs rural areas, Inner London vs Outer London, London Borough of Hillingdon (containing Heathrow and the traffic it generates) with other Outer London Boroughs. Linked to this, Defra might want to consider whether there is value in developing different targets depending on who has the levers to intervene (eg action by local authorities vs action by national government vs action resulting from international agreements). It will be important for Defra to have a clear idea of the extent to which these various “agencies” have the burden of delivery of the targets.

It is also noted that, for the two targets to lead to complementary – rather than similar – actions, the population exposure reduction target (PERT) must not use the same “threshold” as the limit value otherwise actions to reduce the PERT will focus on the same populations to the exclusion of populations below the “threshold”. In addition, the use of a threshold in both metrics might lead to the (mistaken) belief that it doesn’t matter to public health if PM_{2.5} increases in some areas as long it remains below the threshold.

Defra might also want to consider whether or how it might develop an exposure reduction target which also addresses inequalities in exposure, or health inequalities. It was suggested that it might be possible to pool data from areas based on socio-economic indicators, for example, from deprived areas that are not geographically adjacent. It is possible that there may be more similarities between deprived areas in different places than between deprived and affluent areas in the same geographical area.

If the metric involves averaging over more than one year then this should be an annual rolling 3-year average (over calendar years), not a daily rolling 3-year average, that is, calculate the rolling average only on 31 December each year for the year just passed and the preceding two years, not a calculation of rolling 3-year average every day.

Restricting the need for compliance with a Limit Value to only monitoring sites which are not addressing specific sources (that is, not “industrial” or “roadside” sites) might not be appropriate. Classification of sites as background, traffic or industrial might not be straightforward in all cases. Adopting an approach to assessment that focuses on the highest background sites but excludes traffic or industrial sites could place a heavy burden on selecting the exact locations of sites, and the decisions made could be subject to challenge. To address inequalities, there could perhaps be

a requirement that a proportion of sampling stations are located in areas of deprivation.

It may be difficult to set an exposure reduction target before monitoring has been established, as the values for the base year won't be known until monitoring for that year is completed. Techniques for "de-weathering" data could be considered, to ensure that any changes reported are the result of interventions, not due to the meteorological conditions experienced. Given the relatively limited number of monitoring sites at "population background" locations, it might be necessary to include modelling of population exposures (calibrated to monitoring sites).

It is suggested that much of the question regarding scientific robustness relates to pollutant monitoring (for example, factors such as measurement uncertainty) which falls within AQEG's remit, rather than COMEAP's. However, the phrase 'scientifically robust' in this context is, itself, problematic: drawing on the expertise that is available it is possible to produce 'scientifically robust' targets, but the ultimate stage in decision making is necessarily political (for example, in relation to how much budget will be made available, whether politicians are willing to take on potentially unpopular measures and what time scales they consider to be appropriate for action).

The impact assessment of proposed policies should include effects of other pollutants, even if the target is exclusively for PM_{2.5}. This is because the policies will affect emissions and concentrations of other pollutants, in addition to particulate matter. Consideration should also be given as to whether it is appropriate to focus only on PM_{2.5} rather than other pollutants. The current evidence base suggests that it is appropriate for PM_{2.5} to be the main focus. Nonetheless it is difficult, in epidemiological studies, to separate the effects of different pollutants. This means that it is perhaps more appropriate to regard targets for specific pollutants as indicators for the effects of mixtures of pollutants. So, consideration should be given as to whether PM_{2.5} is the best indicator. There is an argument for including a better indicator of traffic sources as at least one arm of the regulatory approach. Whether or not the limit value addresses this aspect sufficiently should be investigated. It might also be the case that the justification for focusing on long-term exposure may not be the case for other pollutants.

In order to inform future advice, it would be helpful to have more clarity on:

- How the two targets would operate together in concert.
- The rationale for proposing a 3-year (rolling) mean average. Although it might be appropriate from a scientific perspective, it might have implications for both clarity of reporting and public understanding.
- Whether the short-term (that is, 24-hour average) Air Quality Objectives (AQOs) for particulate matter will be retained.
- Confirmation as to whether existing Air Quality Objectives for all other pollutants will remain as in current legislation (as indicated during the meeting in response to a question)
- Whether or how meteorology, and pollution arising from outside the UK, will be taken into account

2a) Views on metrics

- Are these the right two metrics, for example, using the annual mean rather than daily?
- Should a threshold or limit value approach be absolute or should we consider more complex options? That is, number of people over the threshold, Accumulated exceedance over the threshold, percentile achievability (daily values) within the year
- Is the ambition to develop a regional population exposure target a viable one? At what level of region should it be? Can regions have different levels of target?
- Are these the right metrics? Should more complex options be considered for the limit value? Is a regional population exposure target viable?
- What are your views on the two proposed metrics? Are they the right metrics? Should the concentration threshold include more complex options such as number of people over the threshold, accumulated exceedance over the threshold? Is a regional population exposure target viable? Can regions have different levels of targets?

It is suggested that use of the word 'threshold' is avoided in this context. Threshold has a precise meaning in the context of air pollution and health, that is, a level below which adverse health effects would not be expected. For most pollutants, the existence of a threshold – at the level of the population – has not been established, and may not exist in practical terms. A term such as 'Limit value' would be better.

It was noted that the answers to some of these questions will be determined by the epidemiological evidence which provides the basis for setting the numerical value of the targets. So, it would seem that this stage of the evaluation would need to be undertaken before addressing some of these dependent aspects.

Although long-term exposure is most important for public health, the effects of short-term exposure also need to be included in the consideration of targets in some way: the potential for some sensitive groups (for example, asthmatic children) to be affected by short term peaks needs to be factored in. Nonetheless, there might not be a need for a separate short-term target or standard, as frequency distributions of daily average concentrations are fairly stable, suggesting that policies to reduce long-term exposure would also be sufficient to protect against short-term exposure. However, this is likely to be dependent on the air quality climate and the policies being pursued at the time, and changes in these can presumably change this relationship. This should be evaluated.

If it is intended to retain current short-term Air Quality Objectives (AQOs), it will be important to consider whether PM₁₀ monitoring will continue at its current extent or whether there will be pressure to reduce PM₁₀ measurements, while increasing those for PM_{2.5}. Given that the current short-term exposure limit value is for PM₁₀, this could be a problem for protection against short-term exposure effects. So, the strategy going forward for protecting against short-term effects may need thinking through in parallel. If on-going or future evidence on exposure relates to PM_{2.5}, rather than PM₁₀, it might be preferable to replace the short-term AQO which relates to PM₁₀ with one for PM_{2.5}.

Other metrics such as the number of people exposed over the limit value and accumulated exceedance are useful indicators, but would make the system more complex, which could be a barrier to action. They may be best used to assess how the legislation is working, or is projected to work. A metric such as “number of people over the threshold” does not capture the full population health gain because people’s exposure may have reduced, but still be above the threshold. A metric including information such as population-weighted concentration above the threshold would capture more of the public health benefit. This is important because the public need to be aware that more health gains may have, in fact, been made than implied by changes in numbers of people above threshold. This might be particularly important when considering cost-benefit analyses for actions and if the public are being exhorted to take actions for the public good. So, if the intention is to go beyond a simple concentration threshold by bringing in population data to derive a metric of number of people above a threshold, then it would be better to go the next step as well and use the population data to derive an accumulated exceedance metric.

If targets are made locally specific, this might maximise the potential to improve health and address inequalities, taking into account local circumstances. However, it might be preferable to set regional population exposure targets by reference to the predicted impact of ambitious but realistic action, rather than a simple percentage reduction. The granularity of a regionally-derived target should also take into account the practicalities of risk management and control measures. Regional population targets will only be viable if there are clear routes by which different regions have control over delivery of the reduction set for their region and the need for regions to have different targets may be dependent on how targets are measured. Delivery of reductions will essentially distil down to local actions for reducing very local primary contributions and national and international actions for reducing secondary contributions. Some modelling will be needed to discern how the primary and secondary split does or does not vary as a function of location in England and with absolute level of PM_{2.5}. Therefore, a requirement for the same reduction in PM_{2.5} exposure across the population could be problematic if set from a London perspective (lower percentage of natural background, so larger percentage reductions may appear plausible in London than for other areas) or from a rural perspective (higher proportion of regional background will limit the potential overall percentage reduction achieved by local action). In addition, consideration should be given to the possible consequences of opening up an inter-regional “blame game” if regionally-different PERT targets are adopted – that is, the assertion that one region’s failure to deliver was caused by another region’s emissions.

Nonetheless, whilst there is some broad truth in the perception that dealing with primary PM_{2.5} is for local action and dealing with secondary PM_{2.5} is for national and international action, it is important that the message is not lost that reductions in primary and secondary precursor emissions are both driven by individual choices, for example, food choices determine agricultural ammonia (and NO_x) emissions and food-transport emissions elsewhere that can impact the consumer’s own PM_{2.5}; likewise, choices on consumption and use of transport have impacts on emissions elsewhere that also influence the consumer’s PM_{2.5}. The flipside is also true, that actions by the consumer that impacts emissions local to them also impact on other people’s PM_{2.5} elsewhere.

For the limit value, it was thought preferable to keep the target simple.

The concept of “X% response in Y% of the population with Z% uncertainty”, as proposed in the WHO’s Uncertainty Framework – possibly adapted – might provide a useful basis for consideration of targets.

In order to inform future advice, it would be helpful to have more clarity on:

- How would a region be defined? Would this be based on, for example, availability and location of current monitors, or population, or other practicalities?

2b) Views on assessment

- What are your views on using only monitoring to determine progress or legal compliance for both targets?
- What changes do you think are required to existing monitoring in order to assess the two targets?
- Should there be a separate roadside target?
- What are your views on using monitoring for assessing compliance? What changes need to be made? Should there be a separate roadside target?
- What do you think of using only monitoring to determine legal compliance for both targets? What changes in monitoring would this require? Which monitoring site environments should be used? Should there be a separate roadside target?

A number of Members agreed that monitoring is preferable to modelling for assessing legal compliance. Modelling of PM_{2.5} is very complex and very uncertain, and variable between models. Modelling is subject to more uncertainty than uncertainty in measurements, so it is preferable that the legal basis of the metric is based on measurements. The need to select one preferred model, if the metrics were based on modelling, would be problematic in terms of defensibility and transparency.

The monitoring used to assess compliance should reflect the epidemiological evidence on which the target is based – that is, it should, as far as possible, replicate the exposure metric that has been used in the epidemiological evidence as a proxy for personal exposure. The monitoring should be designed to represent that proxy as well as possible. Legislating for some monitors to be in areas of deprivation is an option that might help address inequalities. Although personal exposure measurements before and after interventions might be informative, total personal exposure is not an appropriate metric for addressing outdoor air pollution, as it can be dominated by indoor sources.

Some modelling is, however, essential. For example, to simulate the achievability of certain targets, the likely health gain of certain targets, the cost-benefits associated with the achievability and gains, and, more pragmatically, to simulate the optimum numbers and locations of PM_{2.5} monitors. (Extension of the monitoring network in the way that some have proposed could be a massive waste of money, as the monitoring would then not be targeted on problem locations.) Modelling could also help enable quantification of exposure accurately and cost effectively.

The target should use knowledge about how monitoring and modelling relate to each other. This should include the perspectives of epidemiologists and statisticians as

well as atmospheric scientists. This is because measurement error or exposure misclassification is an important issue in epidemiological studies and can relate to the differences between monitoring and modelling.

Monitoring sites should reflect the range of locations that people live and work in. Little support was expressed for a separate roadside target, which was not regarded as being the most relevant to public health (as this is not where the majority of people spend most of their time), and difficult to interpret from a public health perspective (as roadside exposure is not a main focus of the available epidemiological studies). Emissions from traffic sources would likely need to be reduced in order to comply with other targets, in any case, meaning that a roadside target may not be necessary. From a communication point of view, separating off a roadside target would likely be seen as weakening the legislation unless the rationale was clearly explained and it was demonstrated that it permitted legislation to be closely targeted on impact.

Whether there is a roadside target, and therefore roadside measurements, might depend on whether roadside locations are deemed to constitute a significant component of population exposure. Roadside exposure is unlikely to make a significant contribution to PM_{2.5} exposure, both in terms of the proportion of population whose residence would be designated as roadside, or time spent on average by the population in a roadside location during a year. Nonetheless, there are people who spend considerable amounts of their working life at roadsides – and some who live there. Although roadsides represent small areas within any specific local authority area, this equates to a large area across the country as a whole.

The question of a separate roadside target might also depend upon on the evidence used to develop the target. For example, if the target was set on the basis of human volunteer studies using defined absolute concentrations, then there would be no need for a separate roadside target. Where modelling or monitoring has been used in the original epidemiological studies, then the relationship between those metrics and roadside concentrations would need to be understood. This might depend upon the scale of the modelling used in the study.

If the metric remains PM_{2.5} (total mass), then source monitoring might not be relevant: monitoring to establish population exposure would be the priority. The question of relative toxicity of different components of PM remains important, and consideration should be given as to whether the potentially most toxic components will be addressed in achieving the targets. It was noted that roadside monitors would largely reflect non-exhaust particulate matter.

In order to inform future advice, it would be helpful to have more clarity on:

- What the basis for a roadside target might be. For example: might it be to reflect the extent to which roadside concentrations might contribute to overall exposure?
- Would data from existing monitors in the network would be used? Or might additional monitors be added if there is a notable lack of a representative monitor?
- To what extent might it be possible to differentiate sites according to whether they represent locations where people are likely to be exposed (for significant

amounts of time) to pollution, rather than whether they are classified as “roadside” or “industrial”?

3a) Views on calculation

- What are your views on reporting regions?
- How can population be accounted for if we use monitoring to assess legal compliance?
- How should targets take account of spatial and temporal differences in natural and transboundary contributions?
- How should the reporting regions be defined? How should population be included? How should spatial and temporal differences be accounted for?
- How should we calculate the metrics? How should we define reporting regions? How do we take population into account if we use monitoring? How should spatial and temporal differences in natural and transboundary contributions be taken into account?

Assuming no threshold for effects, the health evidence alone is not sufficient to define the concentration at which metrics should be set. Metrics could be defined in terms of the costs and benefits of achieving them to ensure confidence that meeting the AQ limits will not compromise investments to address other problems. A first step could be to calculate the forward projection of emissions including information on climate and other actions and model to see anticipated air quality year by year to 2050. The costs and benefits of additional actions to improve air quality can then be evaluated. The timescales on which metrics have to be met is also important: the cost of inaction needs to be recognised: cramming a lot of effort in the period just before compliance is mandated will ignore the fact that the effects of air quality on health are an urgent problem requiring immediate as well as long-term action.

The use of health impact calculations can be used to inform the setting of the nature of the target and the ambition of the target but should not be part of the legislation because its calculation introduces too many additional uncertainties, such as changing population densities and changing underlying health rates. There are also additional complexities associated with choice of what health outcomes to use (for example, all-cause mortality, cause-specific mortality, morbidities, and so on), uncertainty in CRF values, and assumption of linearity (or not) in the CRFs.

Any reduction target requires a baseline against which to measure change. For a population reduction target the baseline involves not only baseline concentration spatial fields but baseline population density fields. It may be necessary to base a PERT on the same population field as used for the baseline concentration year(s). Even once a monitor network has been installed it will then take up to another 3 complete calendar years to establish the baseline for the PERT. Monitoring locations are probably best determined on the basis of dividing the population into certain spatial domains i and then assigning X_i monitors in total or Y_i monitors per P population in that domain to best represent the $PM_{2.5}$ in that domain. Nonetheless, this still leaves open the question of how to combine or average the data from all the monitors in that domain.

Views on possible approaches to defining regions included: keep regions quite large (for example, more than 5 million population) as spatial averaging will be more

meaningful in these cases. For directness of accountability, there might be a case for specifying targets for individual major cities with the majority of the population, rather than whole regions. However the concept of reporting regions is problematic. This is because regions contain a variety of different situations some of which are currently being overlooked – for example small towns and villages where there are narrow streets with a lot of traffic, some of which have current AQ problems in excess of limits and which have seen minimal action to address this over the last 20 years.

It will likely be quite difficult to measure PM_{2.5} mass concentrations with sufficient precision to evaluate compliance with targets. Attempting to remove transboundary or “natural” components would introduce additional uncertainties. Nonetheless, the legislation should recognise that achieving the target is reliant on other countries delivering anticipated reductions in emissions, as well as action within the UK. However, it needs to do this in a way that does not allow too much wriggle room to “blame” other countries for England not being able to meet its targets.

The highest daily average concentrations experienced in the UK are driven by transboundary events which the UK cannot control, therefore making this potentially unsuitable for a standard. Regional targets would be subject to similar transboundary issues, suggesting that a national target might be most appropriate.

Temporal differences would be averaged well by using a 3-year rolling average

4. Other comments

Timelines for devising metrics are very short and it will need to be decided upon before there is any chance of implementing a revamped monitor network. This means modelling is essential, even though the legal aspects will likely be based on monitoring only; but even though modelling is essential, it needs to be understood that different models will likely give different answers.

The whole exercise is contingent on PM_{2.5} remaining the measure for quantifying exposure and health impacts from particles.

In communication to public and policy-makers, it will be important also to emphasise that reductions in PM_{2.5} will lead to other environmental benefits, such as reduced N and acid deposition and resultant adverse ecosystem effects from reduced deposition from particles and from the reduced levels of particle precursor gases (NH₃, NO_x, SO₂).

If cost-benefit analysis is used to derive targets, the full impact pathway approach should be used. Using damage costs is not suitable. Damage costs are an approximation that is not intended to be used where air pollution is the main target of the policy (as here), and where the policy is long rather than short term (as here). In particular, as many policies may be focused on reducing secondary particles, thus including changes in nitrate, the fact that damage costs do not take non-linearities in the NO_x to NO₂ conversion into account is a serious drawback.

5. Next steps

Future actions mentioned included that Defra would be drafting a policy paper intended for publication around the end of July 2020 and would continue to develop the metric and assessment approaches in more detail. Terms of reference for COMEAP's engagement would be proposed.

COMEAP
30 July 2020