Meeting notes

Data Centres Programme
Workshop on IED/EPR with the Environment Agency and affected operators
Friday 5th May 2017

Present:
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1  Context

1.1  General observations
Combustion is one of several scheduled activities that include chemicals and food processing. These have to be permitted over a certain threshold – in this case 50MWthermal input aggregated capacity. IED, transposed as EPR in the UK, covers 50MWth input and above and applies to about 150 sites. MCPD covers combustion between 1-50MWth input. A unilateral UK EPR scheme covers 20-50MWth.

Most sectors with scheduled facilities run continuous / baseload activity. The data centre sector is unusual in that capacity is high but activity is low. A single generator reflects a £1m investment per unit 3MW / 9-10MWth. The main air quality issue is during start stop. From a lifecycle perspective, embedded impacts are more significant than in use impacts.

A handful of data centres in the UK have EPR (IED) permits. A “Task and Finish Group” is in place to ensure that the sector is fully compliant. Around 20 sites have been identified as potentially in need of permits. This number might increase if sites owned and operated by single entities are co-located close enough to enable aggregated capacity to present a local air quality issue in the event of a power outage (see below).

Permitting requires a description of the plant and the process. Emissions relate primarily to air for data centres (water, land and waste are concerns for other sectors). IED permitting is bespoke. While factors like ambient air quality issues and Demand Side Response (DSR) will complicate permitting, each application is dealt with on a case by case basis. For this reason hard and fast rules
are not always useful. The willingness and competence of the operator to mitigate impacts within operational constraints, the quality of planning and evidence of implementation of mitigation measures may be of primary importance.

Most emergency standby plant are not required to meet Emission Limit Values (ELVs) if operating for fewer than 500 hours: for technical reasons it is difficult to monitor emissions from a stack operating intermittently and it is not always possible to predict when it will be operated. The objective is to minimise impacts on air quality by selecting the right plant, implementing dispersions, etc.

1.2 Quick update on MCPD
The EA looks set to be DEFRA’s appointed regulator for IED and MCPD, both of which would come under EPR. techUK welcomes this and had supported the EA in preference to local authorities (on the basis of consistency, technical competence and the opportunity to hold sector level discussions with a single entity on problematic issues.)
MCPD permits will be required by 2019. EA therefore expecting applications by summer 2018. It is anticipated that applications will be made via a simple online registration system.

MCPD proposals seem straightforward. The only unresolved issue is disclosure of generator location. This could be problematic for some operators and be an issue for CNI sites and other critical facilities.

**ACTION:** Emma to extract relevant wording from the consultation and send to the EA

1.3 Quick update on domestic EPR
Local authorities currently regulate EPR below 50MWth and above 20MWth (single plant). This might be discontinued because plant under 50MWth would now be picked up under MCPD. This should not affect any UK data centres because of the high threshold - single units tend to be smaller.

1.4 Moving from MCPD to EPR and vice versa (site growth, decommissioning etc)
Transitioning arrangements should be straightforward. There is a case for operators to approach permitting in the same way as they approach power provisioning and obtain permits for their maximum projected activity. This would cost more but be more future-proof, so the costs and benefits have to be balanced.

2 IED/EPR discussion

2.1 Clustering and aggregating sites

2.1.1 Corporate clusters
There is a case for aggregating separate sites if they are adjacent or closely located and there is a “technical connection” between them. Sites aggregated in this way could be obliged under IED by breaching the threshold collectively, even if individual sites are below. “Technical connection” essentially means that they are operated or controlled by the same entity, share the same power...
supply, operational management, network connectivity etc. Rules are not hard and fast. Sites will be handled on a case by case basis and factors like substation connectivity can be taken into account (if served by different substations the likelihood of a simultaneous outage is reduced). This could be an important consideration for acquisitions. (Refer to EA’s Regulatory Guidance Note on Defining Facility.)

**ACTION:** techUK to alert members to this potential provision and amend “IED IN or OUT?” to reflect the potential impact of clustering.

### 2.1.2 Sector clusters

Data centres tend to be clustered and, while it is not practical to aggregate sites under different operators, there are further issues to resolve regarding the impacts of outages in areas with a high density of data centres.

**ACTIO**n: Emma and Howard to consider what follow up is needed here.

### 2.2 Predictive Permitting

#### 2.2.1 Predictive Permitting as opposed to Pay-As-You-Grow

The onus is on operators to apply for permitting and decide what level of activity they want to permit. The cost of permitting is in steps relating to the MWth capacity (50-99MWth costs less than >100MWth). Operators have to balance the additional cost of permitting for future capacity (which has the benefit of certainty) against permitting as they grow. In the latter case there is the possibility that additional permitting may be problematic so this has to be factored in as a business risk. Permitting requirements should not limit sustainable growth. However, there will be more sensitivity where air quality is already an issue – eg in AQMZ – air quality management zones.

#### 2.2.2 Variations

Data centre businesses tend to be modular and add generating capacity as sites fill. Usual practice would be to inform the EA and a variation to the permit may be necessary. For immaterial changes an administrative change to the permit is free. Other variations may incur charges if they require work to assess their impact.

### 2.3 Planning and modelling

#### 2.3.1 Modelling [sorry I will need some help here as I don’t think I captured all the discussion as I have clearly mixed up modelling and planning]

Modelling should be based on what will actually happen in a worst case scenario. If the configuration is N+1 and there is interlock, so not all the machines can physically work at the same time, then operators should model for the maximum number that can work together, not the total number on site.
Modelling should relate to a worst case but a realistic worst case. So models should include peaks that coincide with local ambient air quality peaks. There is a difference between modelling on a day to day basis and on an emergency basis because one envisages more control than the other. Modelling must include impacts on local sensitive receptors (e.g., schools, hospitals, residents, staff etc.), the nature and location of those receptors and the wind conditions likely to put them at risk and cumulative impacts if running time is extended or coincides with rush hours or other local impacts on air quality. The operator decides at what level to model but must bear in mind that this will be what they are permitted for. If an incident occurs that is more severe than any models then this would result in a non-compliance with the conditions of the environmental permit.

2.3.2 Air Quality Management Plan
For IED/EPR, facilities have to be permitted individually. The important thing is the development of a robust air quality management plan and evidence that the plan is being implemented and acted on. Plans must be local as the impacts will be local – hence the bespoke approach.

Plans should indicate how and when plant will be used and how long it will be running for. They should demonstrate that the operator is aware of and understands the risks and how they might change. Plans need to show what steps are being taken to mitigate impacts. The plans are not required to support the permit applications but expected to be developed following permit issue. Expect discussion with other contributors to air pollution and EA and local authority in production.

2.3.3 Emergency Running Air Quality Management Plan
This plan should include both impacts and likelihood, and include information on how reliable the data is. It must cover issues and actions required as an incident proceeds hour on hour – consultation with local stakeholders, local authority and EA for example. It should accommodate the cumulative impacts and what pre-emptive actions can be taken. Priorities are keeping the regulator informed of outages and providing information on the expected duration of those outages. It will include actions to be taken in conjunction with regulator and local authority regarding receptors. The plan has to be agreed with relevant authorities, implemented, and reviewed periodically. After an incident its effectiveness would be reviewed.

2.3.4 Assessment of Best Available Techniques (BAT)
EA have not discussed how to assess BAT but want to set up a technical committee. Anticipate it will include as assessment of size, start up, performance technical aspects, emissions (low NOx), efficiency, maintenance and fuel requirements.

3 Opportunities for mitigation

3.1 Testing routines: Opportunities for minimising the impact of test runs

3.1.1 Scheduling: The important thing is that you can demonstrate that you have chosen the best times to do maintenance and have scheduled it accordingly. It is one way of demonstrating good practice within operational constraints (which may include Service Level Agreements (SLAs), other commercial constraints, change freezes, out of hours noise levels, other impacts on neighbours, etc).
For data centres the primary concerns relate to short term emissions with local impact rather than long term baseload emissions. This should be reflected in the plan.
   a) Choose times to minimise overall air quality impact taking into account the additive effect of other sources and existing level of breaches: test firing could be scheduled to avoid sensitive times (rush hour). 5 year air quality trends will inform. In some areas with existing air quality issues test firing may lead to breaches. In this case the priority is to avoid the peaks and seek the least worst option.
   b) Scope for splitting test runs so that not all generators fire at once – test firing in batches.
   c) Scope for coordinating test firing between adjacent sites

3.1.2 Fuel: gas to liquid fuels are considered to have lower NOx and particulates and to store better. They have been refined rather than distilled. They may be more costly so this would have to be factored in within the decision making process.

3.1.3 Dispersion: combine stacks to increase uplift (?) or investigate scope for increasing stack height.

3.1.4 Abatement
   a) Calibration: generators can usually be calibrated to minimise NOX and other particulates but there is usually a trade off, for instance between efficiency and emissions.
   b) NOx Box
   c) SCR: Selective Catalytic Reduction – this is really designed for baseload application and is probably unsuitable for short term.

3.1.5 Load: Adjusting load during testing to minimise emissions. Testing routines vary: some operators test at 100% load, some on no load, some do both. As a broad rule of thumb the higher the load the lower the emissions, so this can be taken into account.
   ACTION: Emma to explore opportunity for tech cttee to produce best practice relating to load and emissions “Best Practice in Testing Routines”.

3.1.6 Maintenance: well maintained generators will perform better (?)

3.1.7 Rolling replacement: as generators are replaced and new ones purchased selection criteria for new machines should include air quality. There are issues with consistency in performance data reporting among generator suppliers. Operators may need help to define what is a good generator in this context and there may be scope to develop BAT to differentiate better performing makes or models. Operators should buy the machines that best fit business needs.
   ACTION: Explore scope at sector level to request generator suppliers to test consistently regarding emissions data. Investigate existing LUFT stuff.

3.2 Emergency running: Opportunities for mitigating air quality impacts
3.2.1 Fuel – as above

3.2.2 Rolling replacement – as above
3.2.3 **Selective / preferential running:** in many cases an emergency scenario results in all generators firing up and then load is reduced across the board to reflect demand. If some generators were turned off and the load increased on the rest this would reduce impacts. There is scope for trialling generators and selecting worst performing for early switch off / replacement.

4 **Other discussion points**

4.1 **DSR**
The fact that a site engages in DSR does not mean that it cannot be permitted, but it does make things more complex because there are two activities to permit, not one, so inevitably it is more difficult. There are known benefits to DSR in terms of enabling a flexible smart grid and increased renewable generation but the middle of an AQMA may not be the optimum place to run this additional capacity from, and it should not provide a back door for a lot of DSR with negative consequences on receptors. That said, it may be justifiable in cases where DSR can be shown to have minimal impact on running hours.

In all cases, the important thing is that a robust plan is in place that identifies the risks and that mitigation is implemented within operational constraints.

4.2 **Evidence**
Other useful evidence to explore at sector level or include in risk planning might include:
- Sector contribution to NOX, especially in London.
- Potential contribution of clusters
- National grid outages
- Distribution network outages
- Availability standards

**ACTION:** techUK to explore scope for sector level evidence gathering that can be used to support individual risk assessments

4.3 **FAQ**
The EA has over time developed an FAQ relating to EPR for data centre facilities that was used as internal guidance. It might be feasible to share this with operators to help them understand EA priorities and objectives. Operators confirmed that they would find this very useful indeed.

**ACTION:** Emma to liaise with Howard regarding re-purposing the document for an external audience of DC operators.

4.4 **Industry briefings**
It was clear that there was scope for further briefings to socialise the sector with scheme requirements. The Cones of Pain roadmap had been invaluable and techUK was very grateful for the time that Howard had put into reviewing the document and ensuring that the content was correct.

**ACTION:** Emma to review the meeting content and consider scope for further explanatory material.
4.5 Decision tree
[I have a note about Howard’s decision tree. I like the sound of this but am not sure what it is.]

4.6 Information sources
DEFRA modelling of air quality impacts. It demonstrated that under 50 hours running the impacts were marginal. https://consult.defra.gov.uk/airquality/medium-combustion-plant-and-controls-on-generators/supporting_documents/Generator%20EA%20air%20dispersion%20modelling%20report.pdf


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