Consultation on proposed best available techniques (BAT) implementation guidance for mid-merit gas generators

November 2025

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Foreword

This document sets out our proposals for amendments to techniques for flexible gas generation in England using Article 14(6) of the Industrial Emissions Directive (IED) as the framework where no best available techniques (BAT) conclusions are published.

We have been limiting operation of open cycle combustion plant to 1,500hrs/year as BAT. We are seeking your views on a proposal for a new category of flexible gas generators called mid-merit which would have longer operating hours and should incentivise the deployment of low oxides of nitrogen (NO_x) flexible gas generation.

Our intention is to encourage operators to reduce their emissions and increase their efficiency by offering them more running hours. This is providing they meet with certain criteria, which could be taken forward as BAT implementation guidance.

This public consultation is for England only. However, please note that other regulators have been engaged during the preparation of the consultation and we intend to continue working closely with them in developing the proposals further. We will do this in line with the approach agreed through the Integrated Pollution Prevention and Control: The Developing and Setting of Best Available Techniques (BAT) Common Framework, developing UK-wide approaches to industrial emissions where possible.

Background

The electricity market is increasingly reliant on flexible gas-powered thermal generation as the proportion of renewables (wind and solar) grows. The technology for this combustion plant is generally fast start, meaning it can initiate power generation and reach full load quickly in response to rapid changes in demand on the National Grid and is therefore single cycle with no heat recovery. These combustion plants are either open cycle gas turbines (OCGTs) or reciprocating engines of various capacity, megawatt thermal (MWth).

Individual gas turbine units can be greater than 50MWth and as such are Large Combustion Plant (LCP) which fall under Chapter III of the IED and the Large Combustion Plant BAT Reference Document (LCP BRef). Gas engines are generally less than 15 MWth but some of the newer engines are 20 - 25MWth.

Chapter III, Annex V of the IED and the LCP BRef define Emission Limit Values (ELVs) and BAT for combustion plant of 15MWth and over (if they exhaust collectively via a single stack of greater than 50MWth). The Medium Combustion Plant Directive (MCPD) defines ELVs for units between 1 and 50MWth. Meeting these requirements are the minimum for combustion plant on IED installations. Since 2015 we have been limiting the operation of such combustion plant to 1,500hrs/year. To increase flexibility and to align with annex V of

the IED, this has been applied on a rolling average of 5 years with a maximum of 2250 hours within any given year. We have reviewed this position following changes in the electricity market and as more data has become available.

During this period, two medium-speed, open cycle gas reciprocating engine permits have been issued which were permitted to operate 3,500hr/year. These open cycle plants, which have selective catalytic reduction (SCR) fitted, had high energy efficiency values, were capable of fast starts and met all the appropriate LCP BRef BAT conclusions (BATC).

We have been advising operators of combustion plant who do not have comparable performance not to apply for an EPR permit.

What we are consulting on

The IED and the LCP BRef recognise three modes of operation for large combustion plant – 500hr/year, 1,500hr/year and unlimited hr/year. We normally refer to these as emergency (or back up), peaking and baseload respectively. The UK Shadow Technical Working Group (formed of Regulator, Trade Association, and Industry representatives) recommended, during development of the LCP BRef, a mid-merit category of up to 4,000hrs/year but this was not adopted. However, we continue to recognise this category of combustion plant within the UK electricity market.

After informal consultation with the Trade Associations and Industry representatives over the past few years, we are now proposing that open cycle combustion plants permitted under Chapter II and Chapter III of the IED can operate up to 4,000hrs/year. Our intention is to encourage operators to reduce their emissions and increase their efficiency by offering them more running hours, provided they meet with certain criteria as set out in Table 1 below.

Table 1:

Parameter	Criteria
Energy Efficiency	> 40% Lower Heating Value (LHV)
Oxides of nitrogen (NO_x) emissions (concentration)	$\leq$ 30mg/Nm^3 @15% O_2 as a daily average
Methane emissions	$\leq$ 215mg/Nm^3 as Carbon ($\leq$ 297mg/Nm^3 as Methane) @ 15% O_2 over the sampling period.
Ammonia emissions	$\leq$ 5mg/Nm^3 @15% O_2 over the sampling period
Number of start-ups / shutdowns	Technically capable of 2 or more per 24 hr period

Information on how the ‘criteria’ listed in Table 1 were derived can be found in Annex 1.

We propose that we could introduce this option for new permit applications or when a variation is made to an existing permit. To determine an application the operator would need to demonstrate that the criteria in Table 1 can be met.

Energy Efficiency Directive

All Chapter II and Chapter III IED installations that operate for more than 1,500hrs/year will be required to provide a Combined Heat and Power (CHP) cost benefit analysis report as part of the permit application or variation under Article 14 of the Energy Efficiency Directive. For Chapter II installations, any appliance with a thermal input of less than 3 MWth is excluded from the aggregation.

Responding to this consultation

Important dates

The consultation will run for 12 weeks from 03 November 2025 until 25 January 2026.

How to respond

The consultation will close at 11:59 on 25 January 2026. We will use your responses to help shape the guidance on mid merit gas generators. We will consider all responses received by this date before finalising our proposals.

A copy of this consultation will be available on Citizen Space, which is the Environment Agency's consultation website.

You can view the consultation document and questions online on Citizen Space.

Respond online

Please submit your response using the Citizen Space consultation website, as it helps us to:

- gather all responses in one place
- summarise responses quickly and accurately
- reduce the costs of the consultations by avoiding unnecessary printing

Respond by email

If you prefer, you can submit your response by email using the Response form, which you will find under the 'Related' section of the consultation on Citizen Space.

Please email your completed Response form to combustion@environment-agency.gov.uk with the subject header of 'Consultation response: Mid Merit'.

Ask for a printed version

Please contact our National Customer Contact Centre if you would like a printed version of the consultation document sent to you.

You can do this by contacting:

National Customer Contact Centre

Telephone: 03708 506 506

Minicom for the hard of hearing: 03702 422 549

Monday to Friday, 8am to 6pm

Scope of comments

We will consider comments that are related to the changes specified in this consultation, and related issues as outlined in the questions. For other concerns outside of this consultation, please email the National Customer Contact Centre at enquiries@environment-agency.gov.uk and they will forward these to the appropriate team.

Privacy notice

The Environment Agency would like to keep you informed about the outcomes of the consultation. If you would like to receive an email acknowledging your response and to let you know that the consultation response document has been published, please provide your email address with your response.

By giving us your email address, you consent for us to email you about the consultation. We will keep your details until we have notified you of the consultation response document publication.

We will not share your details with any other third party without your clear and full consent, unless required to do so by law.

You can withdraw your consent to receive these emails at any time by contacting us at combustion@environment-agency.gov.uk

The Environment Agency is the data controller for the personal data you provide. For more information on how we deal with your personal data please see our personal information charter on GOV.UK.

Please contact the Data Protection team at dataprotection@environment-agency.gov.uk for more information.

Data Protection

How we will use your information

The Environment Agency will make all responses publicly available after the consultation closes, unless you have specifically requested that we keep your response confidential. This includes comments received online and by email.

We will not publish names of individuals or personal data. But we will publish the name of the organisation for those responses made on behalf of organisations.

We will not respond individually to responses. After the consultation closes, we will publish the consultation response document on GOV.UK and contact you to let you know when this is available.

In accordance with the Freedom of Information Act 2000, we may be required to publish your response to this consultation but will not include any personal information. If you have requested your response to be kept confidential, we may still be required to provide a summary of it.

Consultation principles

We are running this consultation in accordance with the guidance set out in the government's Consultation principles.

If you believe the consultation has not been run in accordance with the principles, please email consultation.enquiries@environment-agency.gov.uk.

Otherwise, for all other queries relating to this consultation, please email combustion@environment-agency.gov.uk

What happens next

Once the consultation closes, we will publish a consultation response document on GOV.UK within 12 weeks of the consultation closing date.

Annex 1: Table 1 Criteria

When making a determination under Article 14(6) of IED we must give special consideration to the criteria listed in Annex III of the Directive. The key parameters for flexible gas peaking plant are NOx emissions to air, methane release to air, ammonia where SCR NOx abatement is used and energy efficiency.

As part of our informal consultations with operators it was proposed that we should use damage costs for Carbon Dioxide (CO_2) and NO_x. Industrial emission Directive EPR guidance on part A installations states we should not regulate CO_2 for processes covered by UK Emissions Trading Scheme (UKETS) but rather that energy efficiency should be maximised. IED combustion processes require UKETS permits. We have considered NO_x mass emission per kWh generated for open cycle technologies base load operation, see Chart 1 below. Unabated diesel engines have the worst performance and medium speed engines with SCR abatement are the best – the range is from 1.45 to 0.13kg of NO_x/kWh.

Flexible generation requires fast start and several periods of operations a day. This type of operation can adversely impact energy efficiency and emissions. In Chart 2 (below) we have considered NOx kg/kWh and Chart 3 (below) CO_2 kg/kWh (including methane slip as CO_2) for selected flexible gas technologies and compared their performance. Table 2 below sets out those generating scenarios. This sensitivity analysis illustrates that all fast start technologies are generally impacted in a similar way for the different scenarios.

Table 2:

Scenario	Max hours per annum
Scenario 1 - Baseload operation	8,760
Scenario 2 - Peaking (2 shift)	2,920
Scenario 2a - Peaking (2 shift)	1,500
Scenario 3 - Super peaking (12-hour run)	4,380
Scenario 4 - 3 x 2 hour runs	2,190

In Chart 4 below we have also considered the NO_x kg/kWh for the different peaking technologies and applied a factor for energy efficiency and for methane slip emissions. We have converted these to total annual hours of operation. Methane slip happens on gas engines but is not regulated under UKETS, so it is appropriate to consider it. One of the techniques used to abate NO_x emissions is SCR which has an inherent risk of some ammonia release to air via ammonia slip. We have included the BRef requirements for ammonia slip in the proposed minimum criteria in Table 1 to meet National Emissions Ceiling Directive (NECD) targets for ammonia emissions.

As can be seen from Chart 2, large medium speed and small fast speed gas engines with SCR NO_x abatement have significantly better environmental performance than the unabated gas engines and turbines. At present, BAT for peaking operation treats all technologies equally by capping their operational hours to 1,500hr/year. However, there is a case for allowing open cycle plant with lower emissions to operate for more hours.

By way of comparison in Chart 4 below we have assumed that a medium speed engine with SCR is the best available technology for mid merit. We have assumed two shifting is the appropriate operational mode, this would result in mass of 917kg of NO_x/MWe. We then applied this pro-rata across the various technologies and calculated the number of

hours this would allow them to operate. For example, when applying this mass as a limit to high-speed engines with SCR this would enable them to operate mid merit plant for 3,709hrs/year.

Chart 1: NO_x intensity at base load operation.

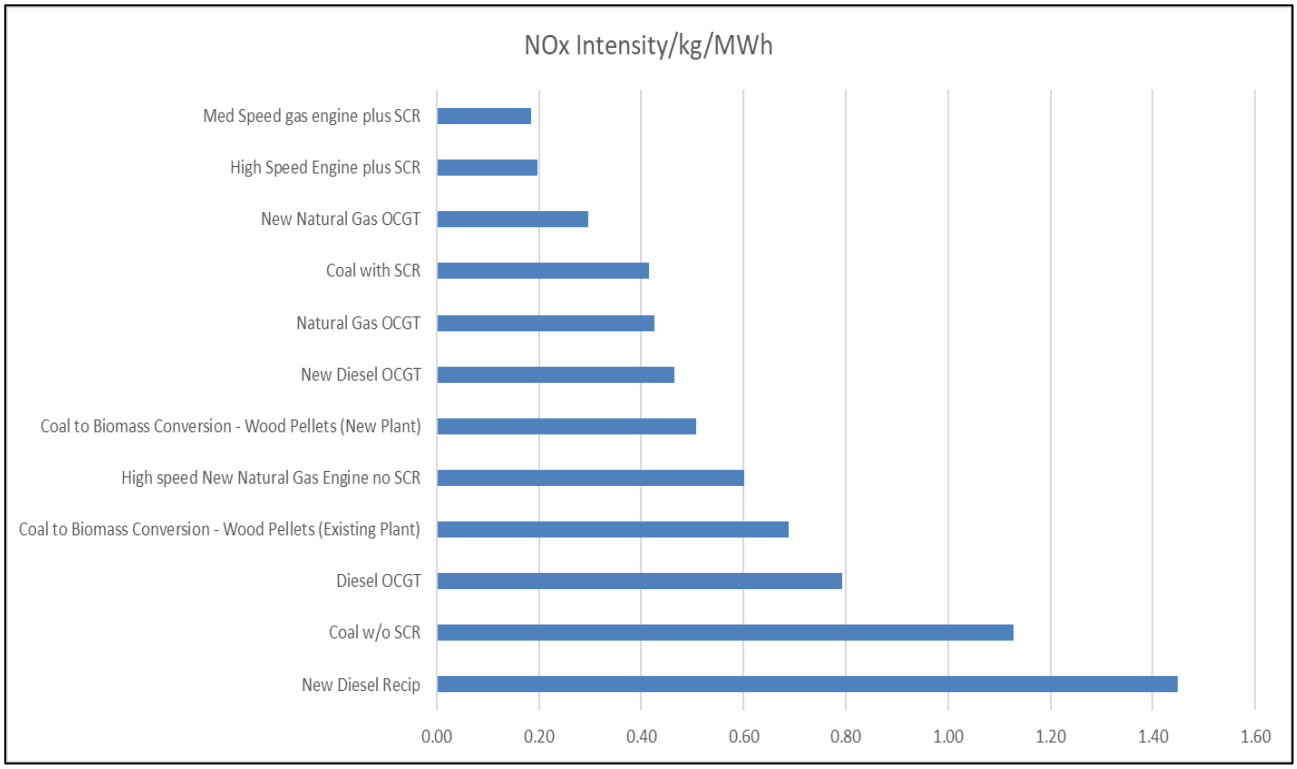


Chart 2: NO_x emissions by energy produced for flexible generation and different operation patterns.

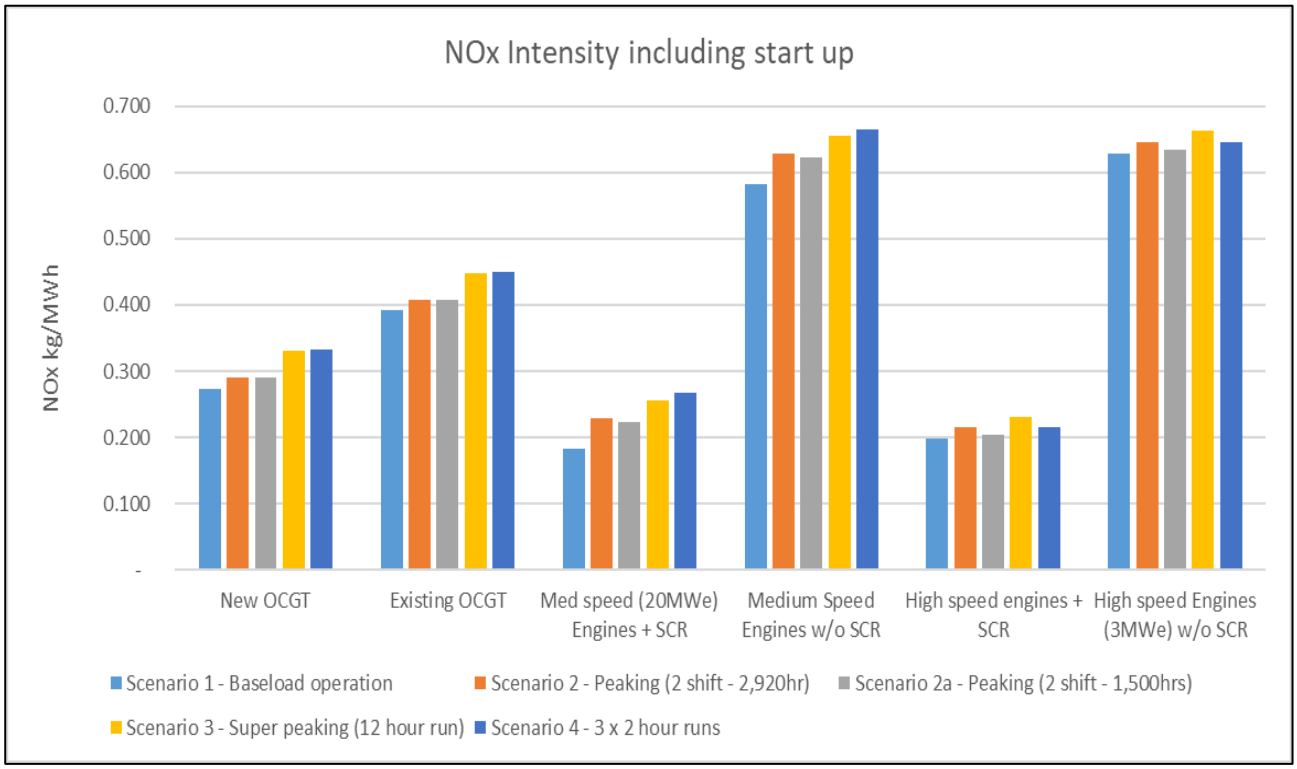


Chart 3: CO_2 emissions by energy produced for flexible generation and different operation patterns.

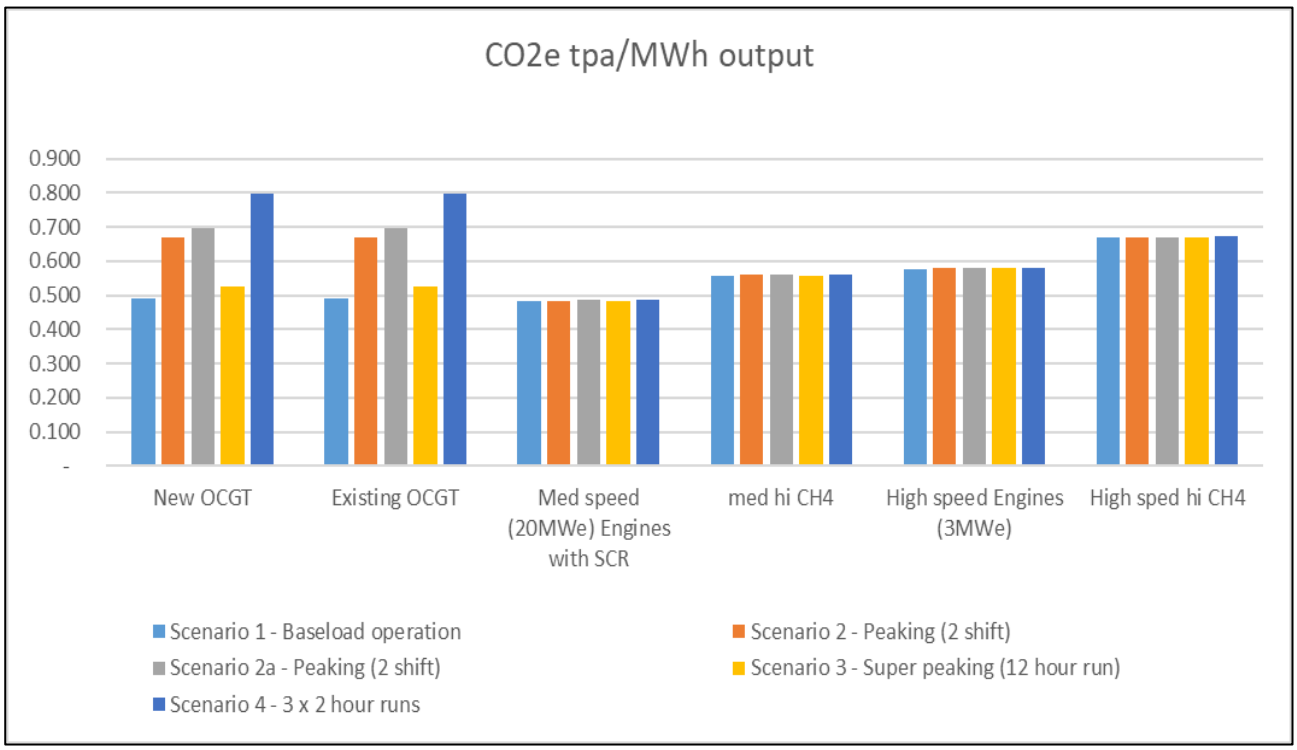
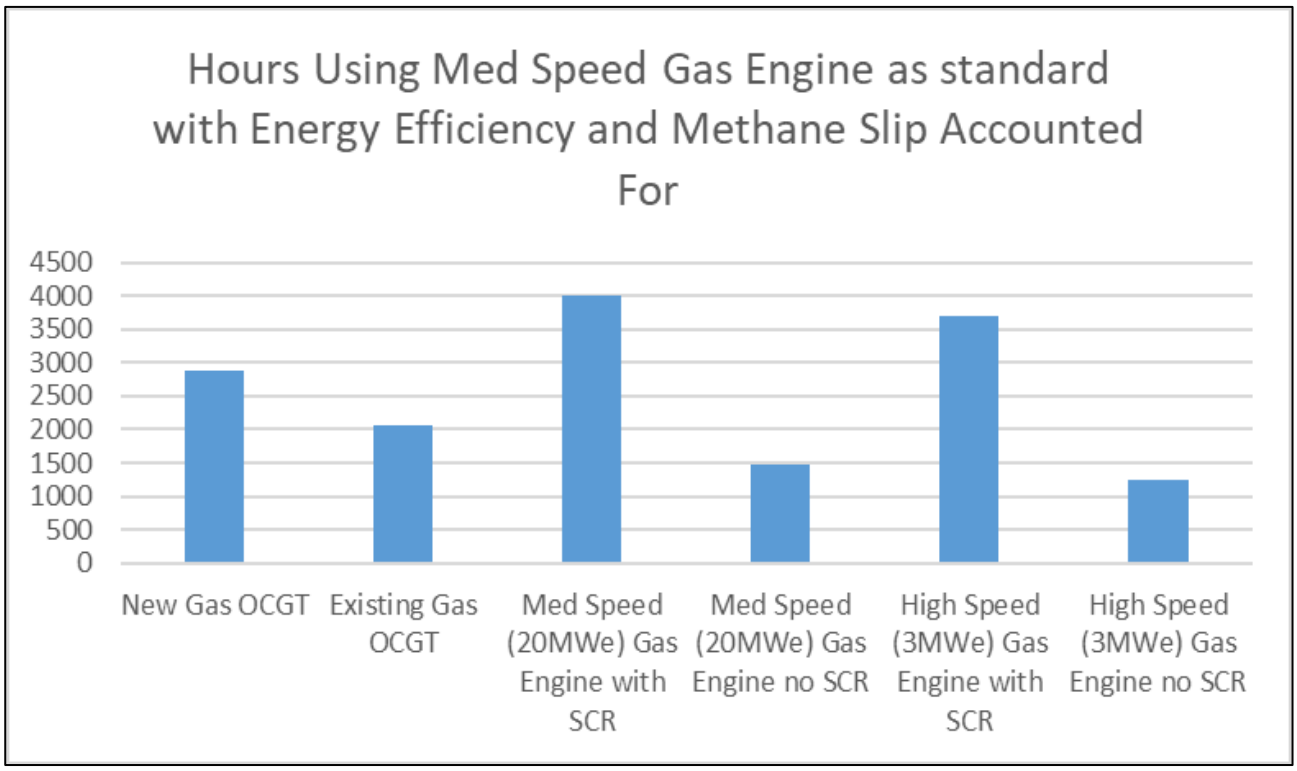


Chart 4: Hours using Medium Speed gas engines with SCR and two shifting as the standard for mid merit at 4,000 hrs pa.



Consultation questions

Please refer to Table 1 and Annex 1 (above) for more details of how the values were derived when answering the questions below.

Question 1: Do you agree with the proposed criteria listed in table 1 for the energy efficiency parameter?

Yes/No/Don't know

Please provide details to explain your answer

Question 2: Do you agree with the proposed criteria listed in table 1 for the oxides of nitrogen (NO_x) emissions (concentration) parameter

Yes/No/Don't know

Please provide details to explain your answer

Question 3: Do you agree with the proposed criteria listed in table 1 for the methane emissions parameter?

Yes/No/Don't know

Please provide details to explain your answer

Question 4: Do you agree with the proposed criteria listed in table 1 for the ammonia emissions parameter?

Yes/No/Don't know

Please provide details to explain your answer

Question 5: Do you agree with the proposed criteria listed in table 1 for the number of start-ups/shutdowns parameter? You should refer to Table 1 and Annex 1 for more details.

Yes/No/Don't know

Please provide details to explain your answer

Question 6: Should the criteria listed in Table 1 apply equally across all open cycle combustion technologies e.g. reciprocating engines and open cycle gas turbines?

Yes/No/Don't know

Please provide an explanation for your response including any alternative proposals

Question 7: Do you agree that open cycle combustion plants permitted under Chapter II and Chapter III of the IED should be able to operate up to limit of 4,000hr in a calendar year subject to meeting with the criteria is Table 1?

Yes/No/Don't know

Please provide details to explain your answer

Question 8: Where a Chapter II or Chapter III installation is comprised of more than one combustion plant should the hourly limit, up to 4000hr in a calendar year, apply to:

a. the installation as a whole,

b. to each individual combustion plant within the installation.

c. other arrangements, please specify.

You can only select one of the above options.

Please provide details to explain your answer

To Note: A combination formed by two or more new medium combustion plants shall be deemed to be a single medium combustion plant and therefore the hourly limit, up to 4000hr/year, shall apply to the common stack (windshield) through which the individual appliances vent and not the individual appliances themselves. Considering technical and economic factors, BAT is to combine waste gases through a common windshield.

Question 9: Will this measure have unintended consequences for future power generation scenarios, in particular changes to operating patterns and technology mixes?

Yes/No/Don't know

Please provide details to explain your answer

Financial Implications

We want to understand the financial impacts of the proposed changes on individual businesses, industries, and sectors.

We appreciate that the proposed changes for existing LCPs may result in you incurring either one-off or recurring costs. If so, we would like to know details of either your one-off, recurring costs or both.

Question 10: Please provide an estimate of the financial costs of the proposed changes on your sectors operations, supported by cost data:

Other Comments

Question 11: Please tell us if you have any further comments on any of the information presented in our consultation and provide as much information as possible to support them:

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