I note that the Examiner has asked for my evidence based support to my relevant representation that I have submitted to their web page with regard to my concerns about the potential emissions from the proposed Wrexham Energy Centre.

I note that the written questions refers to CO_2. My concerns are over potential high emissions during start up and shutdown are around CO.

Firstly I Would like to state that my representation is a personal one based on knowledge and experience gained and is in not that of my employer.

Secondly, I would like to state that my background is that I have 28 years experience in the measurement of industrial emissions from a wide variety of Plant across the UK and to a small extent Ireland and India.

During my 28 years In this field I initially worked at a research facility and was part of a small team that assess emissions from the entire UK heavy clay industry via field tests of an in-house method for the measurement of fluoride emissions. That in-house method went on to form the basis of the BS ISO 15713 Measurement of Fluorides, which the Environment Agency regard as their Standard Reference Method.

I have also been part of a small team that helped to gain accreditation to BS EN 14181 QAL2 which is the European Standard for the calibration of Continuous Emission Monitoring Systems (CEMS), by comparative measurements. This Standard and method of testing is routinely used on Plant that are Regulated under one of two European Directives, namely the Large Combustion Plant Directive (LCPD) and the Waste Incineration Directive (WID). I believe these European Directives are now covered by the Industrial Emissions Directive (IED).

I have also sat on a technical committee that helped the Environment Agency formulate and write M22, which is an EA approved method for the continuous measurement of multi component emissions by Fourier Transform Infra Red (FTIR).

Thirdly, in my rush to get involved in the process / debate over the proposed Wrexham Energy Centre and my eagerness to pass on my experience, I have perhaps been naive in not realising that I would be expected to back up my comments with data / evidence. In my working environment I'm used to putting ideas into a pot, discussing them and then formulating a way forward. I assumed that the NRW would look at my comments and add any relevant knowledge. With the benefit of hindsight my written representation should perhaps have been more a series of open questions.

Fourthly, I attended both meetings at Redwither Tower on the 19th July 2016 and took note that the Examiner warned against unreasonable behaviour and that either side could apply for an award of costs. I believe I expressed my concerns about award of costs at the time.

So whilst I have 28 years of emissions knowledge and experience in my head, I don't actually own the data.

So then as I see it, this leaves me with a dilemma to which I can take one of the following three options:

1 Submit no evidence and simply allow the comments to lapse / be withdrawn.

2 Obtain the evidence / from my employer. However, I have to assume that such data gathered is a contractual matter between my employer and their clients and that it is not, as previously stated, my personal property. I further have to assume that to remove it and put it in the public domain, would effectively be theft from my employer and make my employment position untenable. This I simply aren't prepared to do.

3 Obtain the evidence from an alternative source. Therefore today I have made a freedom of information request for such data from the Environment Agency and Natural Resources Wales. In doing so I'm assuming that there is a Plant in the England or Wales that is currently operational in a "peaking / short duration " mode and is in the configuration mentioned in the Environmental Statement.

I feel that option 3 is the best way forward, mainly because it simply means that all parties can assess existing data and no additional cost would be encountered by Wrexham Power Limited.

I've stated that I'm happy for the data to be anonymised for discussion purposes.

In my freedom of information request I have asked for the following:

One week of data on a minute by minute basis of raw CEMS data for carbon monoxide, oxides of nitrogen, (or nitrogen monoxide and nitrogen dioxide if they are measured separately), water vapour if needed for wet to dry gas correction, dry gas oxygen, (and if required, oxygen on a wet gas basis, in case water vapour concentrations are derived by difference), stack gas velocity, temperature and pressure, to enable mass emission to be calculated. I have also asked for relevant measurement units to be noted, i.e. ppm, mg/m^3 or %. I have also asked for a note of the instrument ranges and if the data is output via a 4 to 20 milliamp loop then what the extremes of the loop are. Finally I have asked for the data to be provided in excel format to aid graphing and ongoing calculations.

It is my understanding that when natural gas, which is mainly methane (CH_4) is combusted / oxidised it forms Carbon Dioxide (CO_2) and Water Vapour (H_2O).

$CH_4 + 2O_2 = CO_2 + 2H_20$.

However, when combustion isn't accurately controlled, oxidation very often isn't complete. Under these circumstances the carbon in the fuel can be partially oxidised and it forms Carbon Monoxide (CO).

Over the years I have had clients ask if the fuel (CH_4) could equally be partially oxidised to formaldehyde (CH_2O). Internet searches would suggest that this is possible, especially during lower temperature combustion or start up conditions. However, I have never personally measured formaldehyde emissions from a gas turbine Plant and so have no direct evidence to offer. As stated at the beginning I'm more used to putting ideas on the table to discuss, rather than having to present physical evidence. Therefore I am prepared to withdraw my comments from my relevant representation, as knowing what emissions monitoring costs I aren't prepared to risk an award of costs based on an Internet paper and a few client

enquiries. Again I naively assumed that Natural Resources Wales would input into my representation.

If you wish to discuss CO_2 then I'm more than willing to do so, but to be able to do so can WPL please supply the following information:

Potential / expected CO_2 concentration and state the basis of these measurements,
Potential / expected stack gas volumetric flow rate at 273k & 101.3 kPa.

It would be preferable for both results to be expressed at the same measurement conditions, might I suggest dry gas basis.

Then the mass emission of CO_2 can be easily calculated. Alternatively they could just simply provide the mass emission figure. If it is quoted as g/s, then can they also supply proposed operating hours and days so that an annual return type figure can be calculated. I'm interested in how many tonnes of CO_2 that this proposed Plant could emit.

Currently I cannot find the $\%CO_2$ level and I note that in Section 6.2.8 of the Environmental Statement that the stack gas volumetric flow rate is quoted at 11% oxygen.

Whilst I haven't sat and read through the Industrial Emissions Directive (IED) and so aren't fully aware of its contents, It is my understanding that under LCPD it is normal to reference flow rates and emissions for gas turbines to 15% oxygen. It is also my understanding that 11% is the oxygen referencing level for Plants regulated under WID.

Are WPL suggesting that this Plant will be Regulated at 11% oxygen? If so, then I am more than willing to accept that.

I further note that carbon dioxide is becoming more of a gas of interest as it is linked with global warming. It would appear that the World's major Governments are coming round to this idea and that emissions of this gas have to be curbed.

I note that the UK has signed the Paris Agreement in 2015. This is a global initiative to try and limit global temperatures and by definition climate change by reducing the use of fossil fuels.

http://www.bbc.co.uk/news/science-environment-35092127

The BBC News also reported in August 2016, that scientists have confirmed that global temperatures have risen for 14 straight months.

http://www.bbc.co.uk/news/science-environment-36841072

I note that Wales has targets to reduce CO2 emissions under The Environment (Wales) Act 2016 by 2020, 2030 and 2040.

http://gov.wales/topics/environmentcountryside/climatechange/emissions/?lang=en

I note that locally Wrexham County Borough Council (WCBC) are currently promoting via their web page that they are doing to reduce carbon dioxide emissions.

http://www.wrexham.gov.uk/english/env_services/carbon_reduction/what_we_are_doing.htm

I believe they are actively recruiting someone to drive this forward.

Therefore it would appear that there is focus and agreement on this matter on an international, national and local basis.

To finish off about emissions

I also note that in one of the Wrexham Industrial Estate Operators Environmental Permit that three European designated sites within a 10km radius are mentioned by name.

They are as follows:

Johnstown Newt Site,
Midlands Meres and Mosses
The River Dee,

The permit explains that the Meres and Mosses site is only 4km away and is a RAMSAR site. It further explains that this site is sensitive to acid deposition from oxides of sulphur and nitrogen. Given that table 8.4 in section 6.2.8 of WPL's Environmental Statement suggests that under normal operating conditions that the main mass emission from the proposed Plant is oxides of nitrogen. Whilst the Permit suggests that these gases are having a combined effect and that each individual contribution is slight, then can I ask of NRW in particular how this proposed Plant would rank in relation to existing Operators on WIE.

Can I also ask what effect, if any, would this Plant have on the dispersion of current emissions from WIE?

COP21: What does the Paris climate agreement mean for me?

By Mark Kinver
Environment reporter, BBC News

14 December 2015 | Science & Environment

Share

As the euphoria of delegates at the UN climate talks in Paris fades, it is time to get down to the business of saving the planet and ask what does it mean for me?

UN Secretary-General Ban Ki-moon and French President Hollande join in the celebrations

What did I miss?

Over the past two weeks, almost every nation on the planet has sent a team of negotiators to Paris to pore over page after page of nuanced jargon peppered with what seemed like a world record attempt for the most square brackets in a document.

But these brackets did matter. In the tense talks at a conference centre in north Paris, semantics was king.

Negotiators inhabited a world were "shall" would result in something becoming legally binding and "should" actually meant voluntary, as **BBC environment analyst Roger Harrabin explained here**.

The fortnight kicked off with more than 150 world leaders, including Presidents Obama, Putin and Xi, descending on Paris to tell delegates that climate change was the most important issue facing us in the 21st Century.

Whether that was welcome support or unnecessary pressures it meant negotiators got down to business, often working through the night.

On Saturday evening - to claps, cheers and tears - a new landmark deal was born.

It was agreed by 195 nations. They will attempt to cut greenhouse gas emissions to a level that will limit the global average temperature to a rise "well below" 2C (3.6F) compared to pre-industrial levels - a level of warming deemed to be the point when dangerous climate change could threaten life on Earth.

You can **read the final document here**.

Who sealed the deal?

Nations have not been shy in coming forward to highlight their role in delivering a deal in Paris.

For example, just a few hours after the global climate deal was struck, US President Barack Obama told millions of TV viewers that it provided the "best chance we have to save the one planet we have". He also did not miss the opportunity to highlight the importance of "American leadership" in clinching the deal.

UK Prime Minister David Cameron said the deal represented "a huge step forward in securing the future of the planet".

The reaction from world leaders echoed the rousing rhetoric of their speeches on the opening day of the two weeks of negotiations.

The fact is that every nation played their part. Under the UN system, a single nation could have objected and refused to adopt the agreement and the deal would have been lost.

Hottest June ever recorded worldwide - NOAA

19 July 2016 | Science & Environment Share

Children cooling off at a water park in Alhambra, east of downtown Los Angeles, last month

Last month was the hottest June ever recorded worldwide, and the 14th straight month that global heat records were broken, scientists say.

The US National Oceanic and Atmospheric Administration (NOAA) says global sea temperatures were fractionally higher than for June last year while land temperatures tied.

Its global temperature records date back 137 years, to 1880.

Most scientists attribute the increases to greenhouse gas emissions.

They also say climate change is at least partially to blame for a number of environmental disasters around the world.

- **Climate change explained in six graphics**

The combined average temperature over global land and ocean surfaces for June was 0.9C above the 20th Century average of 15.5C, the NOAA said in **its monthly report.**

Last year was the hottest on record, beating 2014, which had previously held the title.

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The pain of producing a global climate change deal
12 June 2015

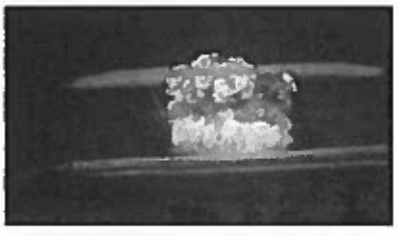
Science & Environment

First firm to fly on used SpaceX rocket

30 August 2016 | Science & Environment

Badger cull extended to more counties

30 August 2016 | England



Search for Anthropocene 'golden spike'

30 August 2016 | Science & Environment

The Welsh Government, working for a fairer and more prosperous Wales

Llywodraeth Cymru
Welsh Government

Reducing Welsh emissions

Last updated 15 August 2016

The Environment (Wales) Act 2016 sets out the approach to help Wales reduce its carbon emissions.

The adoption of the legislation will help accelerate emission reductions and move to a clean economy and low carbon society. The Act will:

- Place a duty on Welsh Ministers to ensure that they are at least 80% lower that the base lines for green house gases
- Puts in place provision for interim emissions targets to be set for 2020, 2030 & 2040
- Place a duty on Welsh Ministers to set five yearly carbon budgets
- Place a duty on Welsh Ministers to publish a statement after each carbon budget measuring progress
- Duty on Welsh Ministers to prepare and publish a report for each budgetary period setting out their policies and proposals for that period
- Establishes body to advise Government on latest scientific evidence and report progress being made against budgets targets

The **Environment Act** is a major step change which fully recognises the implications of the Paris Agreement and aims accelerate action to tackle it across all sectors.

Environment and countryside

Climate change

Reducing Welsh emissions

UK and EU regulations

Climate Change Strategy for Wales

RELATED LINKS

Climate Change Engagement Strategy

The Strategy encourages everyone to take action and change what they do to reduce greenhouse gas emissions

Sustainable Development Charter

This charter allows organisations to demonstrate their commitment to sustainable development.

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What We're Doing

Carbon Reduction and Energy Efficiency

Under the Council Priority "An Environmentally Responsible Place" Wrexham County Borough Council are committed to reducing carbon emissions by 50% by 2015/16 and 70% by 2020, against a 2005/06 baseline. To achieve this we are:

- Installing energy efficient technologies such as efficient lighting and upgrading boilers in our offices, schools, leisure centres and other non domestic buildings
- Carrying out a rolling programme of energy awareness campaigns in primary and secondary schools
- Upgrading social housing to be more energy efficient, including installing cavity and loft insulation and solar PV.
- Increasing recycling rates through kerbside collections and the development of the waste recycling plant on Wrexham Industrial Estate
- Replacing end of life vehicles with more fuel efficient versions and providing efficient driver training
- Upgrading street lighting in residential areas

So far we have reduced our carbon emissions by 37,651 tonnes of CO2 against the baseline year in 2005/2006. This includes carbon emissions from the Council's offices, schools, leisure centres and other non domestic buildings, Council owned housing, waste and recycling, our fleet vehicles and staff business travel. 37,651 tonnes of CO2 is equivalent to travelling 112,990,651 miles in a car or 388,595,971 miles by train. 1 tonne of CO2 roughly takes up the same volume as a 2 storey house!

Sustainability and Climate Change

Sustainability means using our common sense to improve the long term wellbeing of our communities and future generations. For Wrexham County Borough Council, this will be achieved by aligning and integrating our economic, social and environmental objectives, through our Council Plan.

The Welsh Government is developing a new legislative bill on sustainable development. This will place a statutory duty on Welsh public sector organisations, including local authorities, to make sustainability central to their work. A key implication of the Bill is that it will expect Welsh public sector organisations to plan for the long term.

What's on News Jobs Schools X

Our climate is changing. There is now a clear scientific case that this change is being brought about by human activity. Unchecked climate change disturbs the pattern of rainfall, sunshine, winds and currents in the oceans. It threatens the basic elements of life for people and environments around the world, including access to water, food production, health and use of the land.

Urgent and sustained action to cut emissions is needed to avoid the worst impacts of climate change. At the same time, no matter how much we reduce greenhouse gas emissions, we will experience some degree of climate change here in the future and we will need to adapt to that. This is why our approach at WCBC is to do what we can to minimise our current CO2 emissions, whilst planning for how we can support resilient communities to be resilient to adapt to the changing world we will live in the future.

Schools Power Campaign

As part of our wider work we have a rolling schools engagement programme focussing on climate change and energy use, led by the Environmental Education Officer. Schools are one of the biggest energy users, and currently account for over 50% of the carbon emissions from Council buildings. The programme aims to stimulate action across the schools, involving the staff and pupils, through assemblies, lessons and energy audits and is linked to the National Curriculum. This culminates in the Power Challenge Week where the whole school works together to try to reduce energy consumption as much as possible.

For schools that have already taken part in the programme and would like to continue, a full set of teacher resources can be found on the People Power Wrexham website. For schools interested in taking part then please contact us for more information.

More information

- The Council Plan
- The Sustainable Development Bill
- Cynnal Cymru/Sustain Wales
- People Power Wrexham: Teacher Resources