Consultation on petition P-04-341 Waste and Incineration
Response from Abergavenny & Crickhowell Friends of the Earth

To: Ms Abigail Phillips
Clerk to the WA Petitions Committee

Welsh Assembly Petitions Committee - P-04-341 Waste and Incineration

SUBMISSION ON BEHALF OF ABERGAVENNY & CRICKHOWELL FOE
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BIAS TOWARDS "ENERGY FROM WASTE" INCINERATION WHICH IS AN ENVIRONMENTALLY BAD SOLUTION

0 SUMMARY

- Current Welsh Government strategy enjoins 'energy from waste' as the treatment for residual waste and discourages all alternatives. It has favoured incineration in its funding policies and actively promoted it – sometimes in questionable ways.
- Prosiect Gwyrdd, whose decisions have not been open to proper scrutiny, has claimed that it is 'technologically neutral', but there is evidence that it has favoured 'energy from waste' incineration applicants from the start to the disadvantage of other technologies.
- A waste incinerator, if permitted, would be a heavy greenhouse gas emitter over the 25 years of its contract, when action to combat Climate Change is of critical importance.
- The argument that CO2 emissions are 'offset' by energy generated is unacceptable, and calculations are in any case flawed since among other things they assume a high rate of heat supply to nearby users, which is difficult to achieve in practice.
- Despite claims to the contrary, waste incineration is likely to have an inhibiting effect on waste reduction and recycling programmes.
- Incinerators do no recycling other than recover low-grade metals from the bottom ash. Use of incinerator bottom ash is not recycling and should not be categorised as such.
- 'Energy from waste' efficiencies of incineration are low and would get lower if plastics, paper etc needed for the combustion process decrease in the waste stream – an illustration of how the needs of incinerators are in conflict with waste reduction & recycling.
- Mass-burn incinerators are inflexible in their ability to respond to changing composition and volumes of waste, in contrast to modular systems of waste management containing mechanical separation of recyclables or autoclaving, biological treatments and advanced thermal treatments of final residues.
- There is a clear health risk from waste incinerators: fine and ultrafine particles escape an incinerator's pollution control equipment; such emissions from incinerators are poorly monitored and regulated in the UK; and ultra-fine particulate matter, which is hazardous to human health via inhalation or ingestion, can be carried in the air for several miles.
- Authorities responsible, the Environment Agency and Health Protection Agency notably, are complacent. They do not admit that fine and ultra-fine particulate emissions are not well monitored and regulated or constitute a health risk.
- There have been numerous breaches of emissions from modern incinerators in the UK, and these are only the 'tip of the iceberg' since they only relate to what the Environment Agency can monitor, not the fine and ultrafine particulate emissions which they cannot.
- There should be a ban on new incinerator building until key studies are carried out. There are fast developing, more environmentally friendly technologies available which should be employed instead.

1. BIAS TOWARDS "ENERGY FROM WASTE"

The evidence is clear that Prosiect Gwyrdd – despite assurances of being technologically neutral – has favoured 'Energy from Waste'(EfW) incineration,[1] due in part to Welsh Government promotion of incineration and in part to decisions by Prosiect Gwyrdd management. As a consequence of this bias, technologies other than EfW have been disadvantaged in the procurement process.

1.1 Welsh Government Waste Policy

Current Welsh Government Waste Strategies prescribe EfW incineration for residual waste treatment:

1.1.1 'Towards Zero Waste' (launched in 2010) calls unequivocally for EFW incineration: "In respect of projects receiving Welsh Assembly Government funding support, the reference solution for dealing with municipal waste is to meet the recycling/composting targets set in Towards Zero Waste, treat the separated food waste via AD and recover energy from the residual waste at an energy from waste (EfW) plant." (our underlining)

1.1.2 The discussion paper, "Future Directions for Municipal Waste Management in Wales" (preceding 'Towards Zero Waste') states the case for EfW incineration thus: "as landfill capacity runs out and environmental benefits of recovering 'energy from waste' rather than sending it to landfill become a higher priority, the development of 'energy from waste' capacity will become more important" and "a provision of 'energy from waste' capacity will also serve to help Wales become more resilient in the face of potential future emergencies such as an outbreak of avian flu".

1.2 Measures to encourage incineration and discourage alternatives

Specific Welsh Government measures which have encouraged incineration and discouraged alternatives include the following:

1.2.1 Funding policies:

- Through funding available under the Making the Connections Programme, the Welsh Government has encouraged local authorities to join together in procurement partnerships such as Prosiect Gwyrdd. Such partnerships favour large projects and the building of big EfW incinerators. They disadvantage smaller companies unable to finance large projects, which were thus eliminated by Prosiect Gwyrdd at an early stage.
- When the Regional Capital Access Fund was first made available in 2007-8, alternative technologies such as Mechanical and Biological Treatment (MBT) were deemed ineligible on the grounds they comprised an 'intermediate treatment' – an indication of the Welsh Government's refusal to countenance solutions other than incineration. (It is not known whether the restriction has been maintained.)
- A grant was offered to Prosiect Gwyrdd of 25 per cent or £9,124,000 per annum - whichever is less - towards the contract revenue costs over 25 years. By contrast, In England seven EfW incinerator projects have had their PFI funding cut as part of the budget cuts. While the Welsh Government grant does not specify which technology was to be chosen by Prosiect Gwyrdd, incineration was the probable outcome.

1.2.2 The EC Directive 2008/98/EC (Waste Framework Directive) lays down minimum efficiencies for an incinerator to qualify as 'recovery' rather than 'disposal': 0.60 for installations in operation and permitted before 1 January 2009 and 0.65 for those permitted

after 31 December 2008. The Welsh Government should be insisting that such minimum efficiencies are achieved, yet an email to the writer from Dr Andy Rees, Head of Welsh Government Waste Strategy Branch (dated 13/1/2011) admits that the Welsh Government (at that date) had "not made the 0.65 efficiency threshold a requirement for all incinerators operating in Wales".

1.2.3 Such efficiencies are more likely to be achieved in small EfW CHP plants than large ones. It might be thought that the Welsh Government should thereby be using its influence to limit the size of incinerators. On the contrary, and in defiance of its own Principle of Proximity, it will be seen in sec 1.3.5 that the Welsh Government was active in helping Covanta in their bid to build an incinerator that would be among the largest – if not the largest – in the UK and would seek to source waste from the whole of Wales and from outside Wales.

1.2.4 Disposing of final residues is a significant economic cost in waste treatments. Here again, bias towards incineration is evident. The UK and Welsh Governments have given every help to the disposal of incineration bottom ash (IBA). Use of IBA in building construction materials, despite toxicity concerns (see sec 2.3.14-17), is strongly encouraged, and remaining quantities of IBA to be landfilled are charged the lowest rate of landfill tax.

It may be noted that the UK government (landfill tax rates are not deferred to the Welsh Government) dropped plans in 2010 to hike up the rate of landfill tax paid on bottom ash from incinerators following intensive lobbying from both councils and businesses that the change would alter "the economic case for energy from waste incineration."
[Wednesday 07 April 2010 Waste Management News]

1.2.5 The Welsh Government has gone further. Incineration bottom ash (IBA) comes from the burning of waste that, whatever the denials, contains recyclable materials (see sec 2.2.4). Use of this ash ought to be regarded as down-cycling at best. Yet the Welsh Government in its wish to advance the cause of incineration classifies it as 'recycling'. The benefit to incinerators from such a move is to falsify their 'carbon footprint' – they can be claimed to be 'doing recycling'. The lobby for such a move in England was turned down. This decision of the Welsh Government, if incinerators are built, would incidentally undermine Wales's genuine national recycling figures.

1.2.6 Mechanical and Biological Treatment (MBT) is identified by the UK Committee on Climate Change (1 Dec 2008) as having "significant potential" to reduce greenhouse gas emissions. However, in contrast to 'EfW', residues of MBT and Autoclaving plants face every impediment. Although stabilised MBT residues, with due inspection, may be spread on land in England, the Welsh Government bans it completely. [It was proposed in "Future Directions" that the ban on MBT outputs to land will not be revisited until 2016.]

As for the landfilling of stabilised MBT and Autoclave residues, a full rate of £56 per tonne is charged, increasing to £64 in April 2012, whereas a basement rate of £2.50 per tonne is charged for IBA – a huge cost advantage to incineration.

1.3 Selling incineration to the Welsh public

The Welsh Government's determination to promote incineration was underlined by the then Minister, Jane Davidson, in 2010. When launching the 'Towards Zero Waste Strategy' she said "We believe that cheap electricity is a far better outcome than methane from landfill sites. We know this is not a universally popular solution but it means facing up to the waste issue. We are determined to use every means necessary to reach our waste goals." Section 1.3 illustrates ways in which 'energy from waste' incineration has been promoted:

1.3.1 Several conferences to advance the case of 'energy from waste' were held in Wales from 2005-7.

1.3.2 The South East Wales Regional Waste Plan consultations in 2007 were contracted to Hyder Consulting PLC. They spent a disproportionate time extolling 'EfW', even showing to people artist drawings of incinerators and saying 'they would soon get used to them'.

1.3.3. The implications in the extract from 'Future Directions' in sec 1.1.2 that there is a straight choice between landfill and EfW and that EfW can help save Wales from avian flu and other unspecified catastrophes are an instance of the specious arguments with which the Welsh Government has been presenting their promotion of waste incineration.

1.3.4 A further instance is the 'research' into Public Attitudes to Waste in Wales [2] carried out in 2010 by Waste Awareness Wales, an arm of the Welsh Government, and claiming that people in Wales were in favour of waste incineration. It is research that is plainly loaded in favour of its conclusion:

- The survey only presented the respondents with two options – 'burn or bury'. They were not told of other ways of treating residual waste, for example by mechanical and biological treatment (MBT) or autoclaving.
- Respondents were told that one of the options is <u>not</u> an option. "Landfill is running out", it is "unlikely that we will be able to build more" and "landfill gases pollute the atmosphere". They were not told that the problem is not landfill per se but its biodegradable content, or that landfill would be needed for incinerator bottom ash or that, if plastics are not recycled, it may be less of a health risk to bury than burn them.
- The remaining option, by contrast, is given every accolade. "Burning non-recyclable rubbish to produce energy is clean, safe, and makes good economic and environmental sense." Each of these assertions is questionable and can be challenged.
- Despite being offered no real choice, only 63% of the respondents felt 'energy recovery' a good idea, many raising concerns that it would pollute the environment. This did not inhibit Waste Awareness Wales from issuing a press release on Oct 12th 2010 headlined "Wales says burn don't bury our rubbish". As for the environmental concerns expressed, their Report states baldly that the public's fears of pollution should 'be assuaged'.
- When questioned on this 'research' a Welsh Government Waste Strategy Officer (letter to the writer dated 1st August 2011) admitted its purpose: it had "sought views on incineration as a way of recovering energy from residual waste rather than landfilling it".

1.3.5 Finally, details have emerged of dealings between the Welsh Government and Covanta Energy USA in which the Welsh Government appears to make undertakings of doubtful probity to help the company locate a large incinerator at Merthyr. An email obtained under the Freedom of Information Act reveals some of the details. [3]

1.4 Prosiect Gwyrdd Bias

The previous sections have shown the Welsh Government's determination to promote 'energy from waste' incineration. The question arises to what degree Prosiect Gwyrdd itself has been 'technologically neutral'. If biased, too, towards an 'energy from waste' solution then companies offering alternative technologies will be justifiably aggrieved.

1.4.1 It is to be regretted that, including by pleading commercial confidentially, decisions of Prosiect Gwyrdd have been kept secret even from the Joint Scrutiny Committee until after they have been made – and, even then, reasons for the decisions have not been fully explained.

1.4.2 Prosiect Gwyrdd's interest in waste incineration was demonstrated from the start. By the time the five Local Authority partners signed a formal Memorandum of Understanding in July 2007 the Prosiect Gwyrdd Steering Committee (composed of officers and councillors from the five LAs) had already visited Project Integra in January 2007 – a local authority partnership in Hampshire that had opted for an 'energy from waste' incineration solution and Veolia as their contractor. Was Project Integra in any way an early model for Prosiect Gwyrdd?

1.4.3 Cardiff Council, Lead Council for the five LAs in Prosiect Gwyrdd, has been facing a critical shortage of landfill space. Executive Business Meeting Minutes on 5th July 2007 reveal that Cardiff looked to Prosiect Gwyrdd and EfW for rescue: "The analysis [of potential landfill sites] concludes that within the required timescales there is no realistic prospect of identifying a new site" .....and that instead ,"it is recommended that Prosiect Gwyrdd... is taken forward to deliver the alternative residual waste treatment solution by 2013"..."This conclusion confirms that the principles of the benefits and solutions offered by the proposed EfW have been recognised by the Council." (our underlining)

1.4.4 Whether by coincidence or not, the South Wales Echo reported on 11 Sept 2008 that plans had been announced by Viridor Waste Management for "a new plant that turns waste into energy" at Cardiff Bay, with Dan Cooke, external affairs manager for Viridor, saying "Waste from five local authorities – Cardiff, the Vale of Glamorgan, Newport, Caerphilly and Monmouthshire – would be taken to the plant under the proposed scheme."

1.4.5 Prosiect Gwyrdd's Outline Business Case, submitted to the Welsh Government to secure funding, was based on 'energy from waste' as its reference technology.

1.4.6 In December 2010, Prosiect Gwyrdd revealed an all-incinerator short list of four companies all proposing to build 'energy from waste' plants.

1.4.7 Alternative technologies did apply but were all excluded, several on the grounds of inadequate financial/ economic standing – a direct result of Prosiect Gwyrdd being made a large project which only large incinerator-building companies had the financial resources to mount.

1.4.8 When two or more bidders had pulled out shortly after the first short listing of eight companies, no reserve bidders were called up to replace them. Similarly when, after the short-listing of four incinerator-building companies, two of them (WRG and Covanta) withdrew, no reserves from the eight were called up. Hence, possible opportunities to present the participating LAs with a choice of technologies occurred, but were passed over. There may indeed be rules in the procurement procedure that prevent the promotion of a reserve from the original list of applicants when a short-listed company drops out, but if so Prosiect Gwyrdd management has failed to produce them to us.

1.4.9 To account for the absence of alternative technologies, Prosiect Gwyrdd management team have either denied that such technologies "came forward with bids" or criticised the technologies concerned while strongly defending their choice of 'energy from waste' incineration. The fact that there are at least thirty waste treatment plants in the UK other than incinerators which are operational or with planning permission and that some of the companies involved applied for Prosiect Gwyrdd, has not deterred those driving Prosiect Gwyrdd from 'rubbishing' all alternatives to incineration.

2 WHY WASTE INCINERATION IS BAD ENVIRONMENTALLY

SUMMARY

Incinerators, contrary to what is claimed for them:

- **are huge carbon emitters at a time of critical climate change**
- **are in conflict with waste reduction and waste recycling programmes**
- **are a health risk because burning of waste (e.g. of plastics) produces toxic substances that pollute the environment**

2.1 CLIMATE CHANGE EMISSIONS

According to Cllr Mark Stephens, Chair of the Prosiect Gwyrdd Joint Committee, in November 2009 "The Partnership will deliver a low carbon impact solution".

2.1.1 Waste incinerators typically emit between 0.7 and 1.3 tonnes of CO2 per tonne of waste, depending on waste composition.[4] For example, the incinerator in Stoke, which has a contract with Staffordshire CC to burn 180,000 tonnes of waste per year, is calculated to have released 209,000 tonnes of CO2 in 2006. The proposed Viridor incinerator in Cardiff, with over twice the capacity could thus release over 400,000 tonnes of CO2 per annum, while the proposed Covanta incinerator at Merthyr, which was projected to burn 750,000 tonnes per year, could have emitted over 870,000 tonnes of CO2 a year. Such incinerators would be heavy greenhouse gas emitters at a time of increasingly critical climate change and escalating carbon costs.

2.1.2 Incineration supporters and incinerator-building companies like Viridor maintain that these emissions would be more than offset by the energy they generate avoiding the burning of fossil fuels, hence their incinerators would have a 'positive carbon footprint'. Such an argument is unacceptable – GHG emissions are emissions; they damage the climate.

However, even if one grants the validity of discounting emissions in this way, the actual amount of 'offsetting' would hinge on whether, additional to electricity, outlets can be guaranteed for the majority of the heat generated. Hogg (2006) notes that, outside areas such as Scandinavia that have a high demand for heat, this can be problematic.[5] Use of a major proportion of their heat is in fact implicit in the requirement set out in Annex II of the Waste Directive 2008/98/EC that incinerators must achieve a 0.65 efficiency level to qualify as "energy recovery". The proposed incinerators in south-east Wales make expansive promises in this direction, but are exceedingly unlikely to supply large amounts of heat to meet the requirement – only one or two incinerators in the UK have actually done so. The difficulties of securing sufficient guaranteed heat outputs include:

- Relaying the heating is expensive – Viridor at the time of their planning application in November 2008 observed that "the cost of pipeline can be up to £1,000 per metre";
- Retro-fitting adds further costs compared with integrating the heating supply into a new development as it is being built;
- The most viable outputs would be buildings situated within close proximity to the incinerator using fairly large amounts of heat, preferably with 24 hour demand. Finding such users would not be easy.

The offsetting claim is further contradicted by the fact that, by 2025, Wales aims to be producing 100% of its electricity through renewable sources. Increasingly therefore, over the 25-year life of an incinerator contract, the argument that electricity generated would be displacing fossil fuel sources is nullified.

2.1.3 A Eunomia Research & Consulting and EnviroCentre study carried out for the Greater London Authority in 2008 [6] examines several options for the treatment of residual waste and finds, contrary to the WRATE model employed by Prosiect Gwyrdd,[7] that:

> "*The incineration scenarios modelled were amongst the worst performing on greenhouse gas emissions"* [8]

2.2 IMPACT ON WASTE REDUCTION AND RECYCLING

Proponents of EfW incineration deny that mass-burn incineration has a negative effect on waste reduction and recycling programmes. They maintain that in mainland Europe high levels of recycling exist alongside, and are not compromised by EfW incineration.

2.2.1 Common sense alone indicates otherwise. Why spend effort and resources intensifying waste reduction and recycling effort when everything can be fed into an incinerator? Targets that are set by the Welsh Government, even if compulsory, can be missed or performance can be fudged.[9]

2.2.2 Figures can be produced which indicate the opposite of what the advocates for incineration claim. Below is recycling and incineration data from Denmark in 2005 showing that regions with the highest incineration had the lowest recycling.

Region	Recycling	Incineration	Landfill
Hovedstaden	21%	77%	2%
Nordjyllnad	29%	63%	8%
Sjælland	31%	59%	10%
Midtjylland	40%	53%	7%
Syddanmark	41%	52%	6%

[http://www2.mst.dk/Udgiv/publications/2007/978-87-7052-581-7/html/helepubl_eng.htm] .

As for the UK, MSW statistics published by DEFRA in November 2010 showed that none of the top five UK incinerator authorities rank in the top 100 recycling authorities.

2.2.3 The high building costs of waste incinerators can only be recouped by waste authorities being locked into long term contracts (typically 25 years) and into maintenance of a minimum level of waste intake, thereby endangering recycling and composting targets. Councils with long contracts to supply incinerators have seen recycling directly suffering:

1) In 1995, Cleveland CC signed a contract to supply waste for incineration. A 12,000 tonnes 'shortfall' in the first year led to penalties of £147,000. The Associate Director of Environmental Services at Stockton BC was quoted as saying "essentially we are into waste maximisation… constrained from doing even a modest amount of recycling." [ENDS Report 1996: "Emission deadline heralds new era in municipal incineration".]

2) It was reported in the Guardian in 2006 that East Sussex CC was "so worried it may not be able to fulfil its contract that it has now capped Lewes and Wealden's recycling levels" [Guardian newspaper, Wednesday 9th August 2006.]

3) "Project Integra" in Hampshire, visited by Prosiect Gwyrdd and possibly a model for it, built three new incinerators. It was reported in 2006 that the contractor Veolia was topping them up with recyclables from recycling centres to help meet shortfalls in intake of household waste. "We do take material from household waste recycling centres if there is a shortfall of black bag waste" admitted Project Integra Director, Steve Read.
[News item in: www.letsrecycle.com]

2.2.4 Incinerator-building companies claim they only burn 'non-recyclable waste'. Viridor in its Cardiff planning application, for example, says "the facility will manage municipal waste which cannot be segregated for recycling and composting." But this is patently untrue. The Welsh Government's 70% recycling target is not due to be met until 2025. Until then and even after the 70% target has been reached, quantities of recyclable municipal waste would inevitably be fed into incinerators if built.

Incinerators can in any case burn recyclables contained in commercial and industrial waste which, according to DEFRA, totals approximately one quarter of all waste in England [http://www.defra.gov.uk/statistics/environment/waste/wrfg03-indcom] and is as yet lightly regulated compared to municipal waste.

2.2.5 The claim that incinerators themselves do a lot of recycling is untrue. Whereas technologies like mechanical and biological treatment (MBT) and autoclaving aim to recover recyclables from the waste stream, the proposed Viridor plant in Cardiff, for example, would itself carry out no recovery of materials prior to combustion – the waste arriving at the plant would be fed straight into the incinerator. Its claim to be 'recycling' relies on the recovery of some low-grade metals from the bottom ash and the unacceptable notion (as seen in sec 1.2.5) that finding a use for some of the bottom ash in construction constitutes 'recycling'.

2.2.6 Mass-burn waste incinerators are utterly inflexible in their ability to respond to changing composition and volumes of waste. By contrast, modular systems of residual waste management may contain mechanical separation of recyclables or autoclaving, biological treatments and advanced thermal treatments of final residues. The modules can work in batch mode and be upsized, down-sized or replaced according to need.

2.2.7 Supporters of waste incineration claim that 'with an EfW-led strategy we can get high levels of recycling and composting followed by high levels of energy from residual waste.' In fact, the higher the level of recycling the lower the level of energy delivered by incineration since combustion depends on presence of materials such as paper and plastics in the feedstock. The demands of incinerators are thus in direct competition with sustainable resource management.

2.3 HEALTH IMPACT

Are modern incinerators free of health risk as claimed? The question is of extreme concern to communities who would be living near an incinerator since combustion produces numerous noxious substances harmful to human health, including persistent organic pollutants such as dioxins & furans and heavy metals such as vanadium, manganese, chromium, nickel, arsenic, mercury, lead & cadmium.

2.3.1 Viridor, in their Cardiff planning application of November 2008, claim that "the Emissions from the facility are clean prior to release, preventing pollution to the environment." Such claims by companies building incinerators and by incineration supporters in general are strongly challenged. In the face of public concerns, Local Authorities rely on the advice of the responsible authorities. What do they say? The Environment Agency, which is the authority actually responsible for permitting and regulating incinerators, defers judgement on health risk to the Health Authorities. And what do they say? A Health Protection Agency Report of February 2010 states

While it is not possible to rule out adverse health effects from modern, well regulated municipal waste incinerators with complete certainty, any potential damage to the health of those living close-by is likely to be very small, if detectable. This view is based on detailed assessments of the effects of air pollutants on health and on the fact that modern and well managed municipal waste incinerators make only a very small contribution to local concentrations of air pollutants…… Since any possible health effects are likely to be very small, if detectable, studies of public health around modern, well managed municipal waste incinerators are not recommended.

The statement is complacent. The reader will notice the possible implication that, whereas older incinerators emitted pollutants. 'modern' ones don't; the sweeping assumptions that incinerators are 'well regulated' and 'well managed'; the assertions that the contribution of incinerators to concentrations of air pollutants is 'very small'; and that health effects if any are 'very small, if detectable'.

2.3.2 An incinerator may be 'modern' and 'state-of-the-art' but still release pollutants into the environment.

- An EfW incinerator in Dundee, built in 2000, in November 2007 was in breach of emission limits for particulates, dioxins, furans and metals. The following year it failed an Operator Performance Assessment by again breaching limits for dioxins and furans. Both of these breaches occurred despite the installation of £1.2m of new clean up technology in 2004.
- An EfW plant in Dumfries, which only started operation in October 2009, has breached its permit for carbon monoxide, nitrous oxides, VOCs, and ammonia emissions, and also for non-reporting, late reporting. The local press reported 172 emission breaches in its first year of operation.
- It was reported in the Western Mail that Covanta, who (as seen in sec 1.3.5) were courted by the Welsh Government and short-listed by Prosiect Gwyrdd, has been fined hundreds of thousands of dollars in the United States for emitting cancer-causing chemicals from EfW plants similar to that they proposed building at Merthyr.[10] In July 2011, Covanta was fined again for dioxin emissions. A report from Wallingford in New Jersey USA on 21st July states that Covanta was ordered to pay a $400,000 fine and has been forced to upgrade one of its incinerators due to an emissions violation in summer 2010. The plant was found to be emitting twice its permitted levels of Dioxin, yet it still remained in use after this was discovered. There is no evidence to show how long it had been emitting these dangerous levels of dioxins.

These emissions relate only to those actually detected and measured, and give little account of ultrafine particulate emissions which are largely undetected and a greater danger to health.

2.3.3 Such is the concern over persistent organic pollutants (POPs), including toxic dioxins and furans that several countries, including the UK, have signed up to the Stockholm Convention on Persistent Organic Pollutants. The aim of the convention is to reduce and eliminate the production of persistent organic pollutants. The Convention is incorporated into European law by Council Regulation (EC) 850/2004 and implemented in Wales through the Persistent Organic Pollutants Regulations 2007. These regulations require that "priority consideration" be given to avoiding processes such as waste incineration which generate persistent organic pollutants.

This has not deterred the Welsh Government from its drive to see incinerators built all over Wales, while the Environment Agency (EA) and Local Authorities appear to simply 'pass the buck' between one another: The (EA) have made it clear that responsibility lies with LA planning authorities. United Kingdom without Incineration Network (UKWIN), however,

claims there is no evidence to demonstrate that local authorities are either qualified or willing to meet these responsibilities. "Indeed, we have a wealth of evidence that shows that local authority planning officers routinely insist that the entire responsibility for POPs rests solely with the EA. In the event, no authority takes proper responsibility for the UK's compliance with the laws regarding the avoidance of unintended POPs." [http://ukwin.org.uk/]

2.3.4 Assertions that waste incinerator emissions are 'clean' are flawed:

- pollution filtering devices age and break down;
- emissions are not monitored continuously, for example during start-up and shutdown;
- the monitoring data is supplied by the plant operator;
- crucial tests are only typically carried out twice a year and are often scheduled, rather than spot-checked, so that facility engineers can ensure all equipment is in optimum working condition;
- ultra-fine particle emission levels are neither monitored nor regulated.

Nor are the tests actually carried out comprehensive. For example, only a fraction of a possible 5,100 halogenated dioxins are measured. The House of Commons Environment Select Committee observes: "concern about impacts of emissions from incinerators upon human health" cannot be assuaged or dismissed while "emissions standards are based on what can be measured and what is technologically achievable, rather than what is safe...." [House of Commons (2001), Delivering Sustainable Waste Management.]

2.3.5 There are as yet few good data showing the levels and frequency of releases during combustion malfunctions, but the emissions are likely to be significant and potentially very high. As an example, some testing of the 1983 Columbus Ohio incinerator in the early 1990s showed that enormous quantities of dioxins can be released when operations went wrong. This single incinerator released more dioxins to air than were produced by the entire UK according to a dioxin inventory at that time.

2.3.6 In March 2005, the Environment Agency reported that during routine emissions sampling of the Eastcroft Incinerator in Nottinghamshire, the level of dioxins released into the atmosphere were found to exceed their authorised amount by 900 %. Given that dioxins are usually only measured every six months, the question arises whether emissions were nine times higher over the entire six months since the previous test.

2.3.7 Concerning emissions during start-up and shut down of incinerators, Tejima et al (2007) tested a modern Japanese incinerator equipped with better dioxin abatement than UK incinerators. It was found that just a single incinerator start-up released more dioxins to air than operating the incinerator in steady state conditions non-stop for over 2 months. Contamination levels of ash were also increased.[11]

2.3.8 The EA depends on monitoring data provided by the EfW plant operators. An ENDS Report in 2009 reports 'whistle blowing' allegations made by an employee at an EfW plant which raises the issue of whether plant operators can and do (whether the allegations reported are confirmed or not) manage the data to conceal incidents at an incinerator.

> *A UK waste incinerator has operated under a management regime that falsified emissions monitoring data in breach of its environmental permit, a former employee at the site has alleged. The operator rejects the claims but the Environment Agency has pledged to investigate. A former employee at Greater Manchester Waste's Raikes Lane incinerator in Bolton has made allegations of malpractice and environmental failures at the plant to ENDS and UKWIN, a network of campaign groups opposed to waste incineration. A culture of poor management, he said, has seen routine falsification of pollution-monitoring records and logbook data, illicit effluent discharges to sewer and engineering problems which have endangered the health of*

operators. The malpractice, he said, has escaped the Environment Agency's attention. [ENDS Report 411, April 2009, pp 21-22.]

The Bolton plant concerned is managed by Viridor. A spokesman for the company said the Bolton facility had "an excellent compliance record" and that its emissions monitoring systems were audited and verified by the Environment Agency.

2.3.9 De Fré and Wevers (1998) have shown how spot measurements do not give a representative indication of the actual emissions over a period: continuous monitoring over a period showed that actual emissions could be 30 to 50 times higher than spot measurements.[12]

2.3.10 Pollution abatement equipment is designed to capture PM10 particles. Fine particles PM2.5s are less effectively captured and ultra-fine particles (nanoparticles) are substantially un-detected and unregulated.

Nanoparticles are the size of a virus or molecule — less than 0.18 micrometers, or about one-thousandth the size of a human hair. The EPA (Environment Protection Agency) currently regulates fine particles, which are the next size up, at 2.5 micrometers, but doesn't monitor particles in the nano or ultrafine range. These particles are too small to capture in a filter, so new technology must be developed to track their contribution to adverse health effects.

[http://www.sciencedaily.com/releases/2008/01/080121084718.htm]

Ultra-fine particles / nanoparticles produced by the combustion process penetrate through lung tissue into the blood system and organs and are strongly suspected to be a cause of negative health impacts such as cardiovascular disease, pulmonary disease and cancer and of oxidative stress that potentially affects several of the body's biochemical systems.

The EA seems utterly complacent about the effectiveness of regulation of fine and ultra-fine particles – When asked what proportions of PM 2.5s and PM 0.1s are captured by standard incinerator pollution abatement equipment, they replied [letter to the writer dated 13th Sept 2011) "we do not hold the information you have requested", "we have not requested any such data on filter efficiency and are thus unable to furnish you with the information sought," and "if you are concerned about the efficiency of the filters generally at incinerator plants, you can contact the operators and request plant-specific data."

Howard (2009), however, cites information on capture of fine and ultrafine particles supplied by Veolia, a waste management company short-listed by Prosiect Gwyrdd .

". . . baghouse filter collection efficiency was 95-99% for PM10s, 65-70% for PM2.5s, and only 5-30% for particles smaller than 2.5 microns, even before the filters become coated with lime and activated carbon."

[Professor C. Vyvyan Howard MB. ChB. PhD. FRC Path. June 2009 Statement of Evidence, Particulate Emissions and Health, Proposed Ringaskiddy Waste-to-Energy Facility.]

Cormier et al (2006) warn that fine and nanoparticles escape incinerator stack pollution filtering devices: [13]

"Nanoparticles are not efficiently captured by air pollution control devices, are transported over long distances, and penetrate deep into the respiratory system, all of which enhance the potential negative health impacts" .....

"we have ..... found that persistent free radicals are present in combustion-generated fine and ultrafine particulate matter and that these radicals induce DNA damage" .....

"PM10 deposits mainly in the upper respiratory tract and may be cleared by mucociliary actions. PM2.5 and PM0.1 penetrate the alveolar regions of the lung, where the ultrafine PM rapidly penetrates the epithelium (Oberdorster 2001)."

2.3.11 Waste incineration apologists, unable to deny that fine and ultra-fine particulate matter escapes incineration pollution filters, say that the amounts are microscopic – "compared to road traffic sources, for example, amounts of particulate matter escaping from incinerators are so insignificant as to be hardly discernible". The HPA, as seen in sec 2.3.1, themselves describe the amounts emitted by municipal waste incinerators as making "only a very small contribution to local concentrations of air pollutants."

They evidently have not read Aboh, et al. 2007, who looked into a medium-sized city in south-western Sweden, and identified a new modern incinerator as the single most significant source of PM2.5s.[14]

2.3.12 Emissions to air are not the only hazardous products of incineration. Flue ash recovered from the stacks is highly toxic. 3,000–6,000 tonnes of it is produced from every 100,000 tonnes of waste burnt per annum and has to be transported by lorry from the plant to a special toxic waste tip outside Wales because there is no hazardous waste landfill in any of the Welsh regions, nor is any proposed in the three Regional Waste Plans. The production of waste for which no disposal facilities exist in each Welsh region contravenes the regional self-sufficiency and Proximity Principle. [15]

2.3.13 . Such hazardous waste disposal sites can themselves be a source of health risk. Under new regulations governing landfill sites coming into force in 2004, only 12 have been given the necessary permits to accept hazardous incinerator waste under the new regulations. Bishops Cleeve near Cheltenham is one of these. Despite assurances by the landfill site operator and also for years by the Environment Agency, recent studies show that hazardous dust is escaping.

A study commissioned by the Environment Agency measured dust levels at eight sites within 250m of the Wingmoor Farm site at Bishops Cleeve in 2008. It found one reading "strongly associated" with dust and others where potentially hazardous dust was present. Another study was carried out by scientist Dr Andrew Tubb, of Greenfield Science Ltd, commissioned by a local campaign group.

> *An investigation to establish whether there is any contamination of the local environment from Wingmoor Farm hazardous landfill site was undertaken by sampling and analysing kerbside dusts and dust on plant leaves along Stoke Road, adjacent to Wingmoor Farm hazardous landfill site. Samples were examined using scanning electron microscopy with energy dispersive analysis using X-rays (SEM-EDAX). This analytical technique is able to measure the relative amounts of different elements in a sample. The technique has been recommended by the Environment Agency for tracing pollution sources (Deed, C. et al., 2004). The evidence gathered is consistent with APC dusts escaping from Wingmoor Farm hazardous landfill site, and suggests that these make a considerable contribution to the local environment.*

[Tubb A.L. Air pollution Control (APC) Dust Spillage from Wingmoor Farm Hazardous Landfill Site, 17/5/2010].

2.3.14 In addition, 20,000–30,000 tonnes of incinerator bottom ash (IBA) is produced from every 100,000 tonnes burnt per annum. Some is used as an aggregate in building construction. The remaining portion of IBA is landfilled. From experience in England generally and Hampshire in particular (Project Integra) the proportion to be landfilled is at least half. The Welsh Government is pressing for less to be landfilled and more to be used in building construction. Given the hazardous content of IBA this is controversial and indicative of the Welsh Government's determination to do all it can to smooth the path for incineration in Wales. As seen in sec.1.2.5-6, their attitude to the residues from MBT is in stark contrast.

2.3.15 Incineration bottom ash (IBA) is not 'inert' as Viridor claim in their Cardiff planning application (Nov 2008, sec 4.7.5). Tests on IBA samples from 2006 showed at least 12% of

samples would be “hazardous” waste according to the Waste Incineration Directive. Then in mid-2008, the EA concluded its non-hazardous designation of IBA could be sustained no longer.[16]

2.3.16 A United Nations Environment Programme report (2005) warned against using incinerator ash in engineering works, saying “Both fly ash and bottom ash contain chemical constituents that pose potential serious risks to operating personnel and the public. The chemical constituents of concern include heavy metals, dioxins, and furans”.

2.3.17 Article 9 of the Waste Incineration Directive 2000/76/EC requires: Prior to determining the routes for the disposal or recycling of the residues from incineration and co-incineration plants, appropriate tests shall be carried out to establish the physical and chemical characteristics and the polluting potential of the different incineration residues. The analysis shall concern the total soluble fraction and heavy metals soluble fraction.

2.3.18 The authorities deny any health risk exists from incinerators, but there are already several papers which show possible health damage, particularly to the very young:

1) Vinceti, M., C. Malagoli, et al (2008) noted “an increase in prevalence of birth defects” in women residing or working near the municipal solid waste incinerator of Modena, northern Italy during the 2003-2006 period who experienced higher levels of exposure to polychlorinated dibenzo-p-dioxins and dibenzofurans compared to the remaining municipal population.” [17]

2) Cordier, S., C. Chevrier, et al. (2004) assessed at a regional level (in southeast France) the impact of emissions from municipal solid waste incinerators on birth defect rates. Communities with fewer than 50 000 inhabitants surrounding the 70 incinerators that operated at least one year from 1988 to 1997 were studied. Some subgroups of major birth anomalies, specifically facial clefts and renal dysplasia, were more frequent in the exposed communities. Among exposed communities, a dose-response trend of risk with increasing exposure was observed for obstructive uropathies.[18]

3) Tango, T., T. Fujita, et al. (2004) examined the association of adverse reproductive outcomes with mothers living within 10 km from 63 municipal solid waste incinerators with high dioxin emission levels (above 80 ng international toxic equivalents TEQ/m3) in Japan. A statistically significant peak-decline in risk with distance from the incinerators up to 10 km was found for infant deaths ($p=0.023$) and infant deaths with all congenital malformations combined ($p=0.047$), where a "peak" is detected around 1-2 km.[19]

4) Bianchi, F; Minichilli, F; Pierini, A; Linzalone, N; Rial, M (2007) investigated infant mortality over 2 periods (1981-1991, 1992-2001) in 27 Italian municipalities with active incinerators in the 1981-2001 time frame. A multiple metaregression model was used to analyze the study, activity and latency periods, the incinerator burning capacity, the number of resident newborns, the residence density, the deprivation index. The pooled estimation of the O/E ratio resulted 1.04 (CI 95%: 0.97-1.11) for total cases. The multiple metaregression model showed the incinerator burning capacity as a statistically significant factor ($P=0.011$). Municipalities having incinerators with a burning capacity >50,000 ton/year showed a higher mortality excess (O/E=1.11, CI 95% 1.03-1.20) compared to municipalities with incinerators of <50,000 ton/year (O/E=0.95; CI 95%: 0.86-1.04). [20]

2.3.19 It is not necessary to be able to assert that health damage from emissions or toxic ash from incinerators has indisputably occurred – harm that may be suspected may not be proven or there may be long latency periods. It is enough to have demonstrated:

(1) that fine and ultrafine particles (nanoparticles) escape an incinerator’s pollution control equipment;

(2) that such fine and ultrafine emissions from incinerators are not substantially monitored or regulated in the UK;
(3) that such ultra-fine particulate matter can be carried in the air for several miles and can be hazardous to human health via inhalation or ingestion.

2.3.20 The Welsh Government and Prosiect Gwyrdd are so determined to deliver 'energy from waste' incineration, that they deny any environmental – including health – risk. If they do not change course, Wales is going to be landed with a generation of greenhouse-gas and pollution-emitting waste incinerators for 25 or more years when more flexible and environmentally friendly technologies are available and fast developing.

There should be a ban on incinerator-building in Wales at least until biomarker studies recommended by the World Health Organization in 2007 (WHO) [21] and the Health Research Board [22], together with new research commissioned by the UK Health Protection Agency itself, have been completed and evaluated. The Health Research Board review includes a letter from the EU Environment Commissioner, which stressed that 'incinerators are not the answer to waste management. Incinerators only reduce the volume of waste but the environmental impact of incineration is significant.'".

End Notes

1. FOE is strongly opposed to the use of the term "energy from waste" as a synonym for incineration. It is a transparent attempt to rebrand incinerators and is utterly misleading. A number of other treatments of waste, including pyrolysis, gasification, anaerobic digestion and different types of MBT, can also produce energy from waste – more efficiently in several cases. The energy efficiency of incinerators is in fact low. Covanta, who were short-listed for Prosiect Gwyrdd, stated it to be *"23.5% for typical modern EfW facilities delivering electricity alone". Only if "heat is added to the exported electricity will it raise the overall energy efficiency of the facility to a maximum design value of 41.7% and an average expected operating efficiency of 37% with the currently anticipated heat load".* [Engineering Design Statement Brig-y-Cwm Incinerator Dec 2010.] The assumptions of Covanta and other incinerator providers of being able to supply substantial amounts of heat to neighbouring users are almost always, however, unfounded.

2. The Waste Awareness Wales Survey was carried out in August 2010 and a Report and Press Release "Public Attitudes to Waste in Wales" were issued on 12th October 2010. Both can be seen on their website: www.wasteawarenesswales.org.uk

3. Below is a verbatim reproduction of part of an email in September 2008 from Covanta (short listed for Prosiect Gwyrdd) to the Welsh Government:

From Jason Baldwin
To Geraint Jones, Mel Hiscox
23 September 2008
Geraint / Mel
Just a note of Thanks for last week, I hope you found the visits in Washington to be informative.
The Ryder Cup was excellent shame about the result.
As regards our welsh project below is the summary of points we discussed.
(a) WAG to prepare a position paper on energy from waste making references to Covanta

(b) WAG to provide information to Covanta on the forecasted rail improvement programme for North, Mid and South Wales to allow Covanta the ability to assess the waste capture from Mid and North Wales via rail

(c) WAG to investigate potential companies which would benefit from co-location with Covanta

4. Burnley, S. J. (2007). *The use of chemical composition data in waste management planning - A case study*. In: Waste Management 27(3): 327-336.

5. Hogg, D. (2006). *A Changing Climate for Energy from Waste*. Eunomia Research and Consulting Ltd, (section. 2.2.0).

6. Eunomia Research & Consulting and EnviroCentre (2008). *Greenhouse Gas Impacts of Waste Management Technologies*, Report for the Greater London Authority. http://www.london.gov.uk/mayor/environment/waste/climate-change/greenhousegas.jsp

7. It is sufficient to say here that Assessment Tools like WRATE depend on the assumptions & weightings put into them. Specific criticisms of WRATE include that it omits biogenic CO2 emitted via incineration – the IPCC stipulates that if incineration of waste is used for energy purposes, both fossil and biogenic CO2 emissions should be estimated – and that their rating for the carbon footprint of incineration assumes over-high rates of power generation and of heat supply to nearby users. The Modelling has also failed to cost the production of CO2. Each 216,000 tpa plant will produce around 200,000 tonnes of CO2 per year. That would have a cost of £2.4 million per year if CO2 emissions were priced at the same £12/tonne as used to model the expansion of Heathrow.

8. **Table A: Ranking of Scenarios under Central Assumptions**

[Eunomia Research & Consulting and EnviroCentre (2008)] Greenhouse Gas Impacts of Waste Management Technologies, Report for the Greater London Authority. http://www.london.gov.uk/mayor/environment/waste/climate-change/greenhousegas.jsp

Rank	Scenario Number	Scenario Description	Net Externality (£s)
1	11	MBT (AD and maturation) with output to landfill and export of biogas for conversion to H_2 for use in vehicles	4.48
2	21	Plasma gasification (following autoclaving) with export of syngas for conversion to H_2 for use in vehicles and plastics to reprocessing	4.83
3	13	MBT (AD and maturation) with output to landfill and export of biogas to H_2 fuel cell for stationery power generation (CHP)	5.25
4	12	MBT (AD and maturation) with output to landfill and export of biogas to H_2 fuel cell for stationery power generation (electricity only)	5.45
5	5	Gasification (following autoclaving) with export of syngas for conversion to H_2 for use in vehicles and plastics to reprocessing	5.75
6	9	MBT (AD with maturation) with CHP, output sent to landfill and plastics to reprocessing	6.01
7	14	MBT (AD with maturation) with output to landfill and compression of biogas for use in vehicles	6.21

8	10	MBT (AD with maturation) with CHP, output to landfill and plastics sent for pyrolysis to synthetic diesel	6.47
9	20	Plasma gasification (following autoclaving) with export of syngas to H_2 fuel cell for power generation (CHP) and plastics to reprocessing	6.50
10	6	Gasification (following autoclaving) export of syngas to H_2 fuel cell for stationery power generation (CHP) and plastics to reprocessing	6.90
11	15(b)	Gasification (following autoclaving) using a gas engine (CHP) and plastics sent for reprocessing	7.35
12	16b)	Gasification (following autoclaving) using a gas engine (CHP) and plastics sent for pyrolysis to synthetic diesel	7.53
13	17	'Biomass' boiler (following autoclaving) using a steam turbine (CHP) and plastics sent for reprocessing	7.67
14	19	Plasma gasification (following autoclaving) using a gas engine (CHP) and plastics sent for reprocessing	7.98
15	15(a)	Gasification (following autoclaving) using a steam turbine (CHP) and plastics sent for reprocessing	8.38
16	16(a)	Gasification (following autoclaving) using a steam turbine (CHP) and plastics sent for pyrolysis to synthetic diesel	8.57
17	8(b)	Gasification (following MBT bio-drying and maturation of rejects) using a gas engine (CHP)	9.01
18	7	MBT (bio-stabilisation) with output sent to landfill	9.55
19	3	Incineration (with CHP)	10.21
20	8(a)	Gasification (following MBT bio-drying and maturation of rejects) using a steam turbine (CHP)	10.71
21	18	Incineration (following MBT bio-drying and maturation of rejects) using a steam turbine (electricity only)	10.97
22	2	Incineration (with electricity only)	11.45
23	4	Incineration (with heat only)	11.66
24	1	Landfill (with electricity only)	31.90

Figure 4. Incineration options are found to be the worst performing in climate change impact.

9. High rates of green (e.g. garden) waste collection can, for example, be made to disguise sluggish growth in collection of dry recyclables (paper, glass etc).

10. The Western Mail, 9 Feb 2009.

11. Tejima, Hajime et al. (2007). *Characteristics of dioxin emissions at start-up and shut-down of MSW incinerators.* In: Chemosphere, Vol. 66, no 6, pp 1123-1130.

12. De Fre, R. & Wevers, M, (1998). *Underestimation in dioxin emission inventories*. In: Organohalogen Compounds. Vol. 36.

13. Cormier, S. et al., (2006). *Origin and Health Impacts of Emissions of Toxic By-Products and Fine Particles from Combustion and Thermal Treatment of Hazardous Wastes and Materials.* In: Environmental Health Perspectives, Vol. 114.

14. Aboh, J. et al., (2007). *Elemental contents in a medium-sized Swedish city dominated by a modern waste incineration plant*. Paper presented as part of a special issue of papers from the June 2006 European X-ray Spectrometry Conference, Paris, France.

15. “The Proximity Principle states that waste should be treated and / or disposed of as near to the source of origin as possible because transporting waste itself has an environmental impact. This principle recognises the need for us all to take responsibility for our own waste arisings and not be content with distributing it to other locations for disposal, even if there has always been a tradition of doing so.” [TAN 21 Waste 2001 sec 3.1.]

16. Bower G., Environment Agency, *Classification of Incineration Bottom Ash*, 27 Oct 06. [http://www.environment-agency.gov.uk/ourviews/857198/1498985/?version=1&lang=_e.]

17. Vinceti, M., C. Malagoli, et al. (2008). *Adverse pregnancy outcomes in a population exposed to the emissions of a municipal waste incinerator*. In: Science of the Total Environment 407(1): 116-21.]

18. Cordier, S., C. Chevrier, et al. (2004). *Risk of congenital anomalies in the vicinity of municipal solid waste incinerators*. In: Occupational & Environmental Medicine 61(1): 8-15.

19. Tango, T., T. Fujita, et al. (2004). *Risk of adverse reproductive outcomes associated with proximity to municipal solid waste incinerators with high dioxin emission levels in Japan.* In: Journal of Epidemiology 14(3): 83-93.

20. Bianchi, F; Minichilli, F; Pierini, A; Linzalone, N; Rial, M (2007) *Infant Mortality in 27 Italian Municipalities With Solid Waste Incinerators (1981-2001)* In: Epidemiology: Vol 18(5) Suppl September 2007 p S125.

21. World Health Organisation, Population health and waste management: scientific data and policy options Report of a WHO workshop Rome, Italy, 29-30 March 2007.

22. Health Research Board, et al., Health and Environmental Effects of Landfilling and Incineration of Waste – A Literature Review. 2003, Dublin: Health Research Board. viii, p 284.