Petitions Committee

Meeting Venue:
Committee Room 4 - Ty Hywel

Meeting date:
29 May 2012

Meeting time:
09:30

Cynulliad Cenedlaethol Cymru
National Assembly for Wales

For further information please contact:

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Agenda

1. Introduction, apologies and substitutions 09:30

2. P-04-341 Waste and Incineration (Page 1)

2.1 P-04-341 Waste and Incineration - Oral Evidence (via video conference) **09:30 - 10:00** (Pages 2 - 46)

2.2 P-04-341 Waste and Incineration - Consideration of Oral Evidence Received to Date **10:00 - 10:10**

3. New petitions 10:10 - 10:20

3.1 P-04-393 Llanymynech and Pant Bypass Action Group (Page 47)

3.2 P-04-394 Save our Services - Prince Philip Hospital (Page 48)

4. Updates to previous petitions 10:20 - 10:45

Local Government & Communities

4.1 P-03-220 Lower the speed limit on the A40 near Abergavenny (Pages 49 - 50)

4.2 P-04-363 Town Centre Improvement Scheme for Fishguard (Pages 51 - 55)

The following two items will be considered together

4.3 P-04-377 Continuation of Concessionary Fares on Community Transport

(Page 56)

4.4 P-04-392 Community Transport Petition (Pages 57 - 61)

4.5 P-04-380 Bring back our bus! Petition against the removal of scheduled bus services from east Lampeter, Cwmann & Pencarreg (Pages 62 - 72)

Health & Social Services

4.6 P-04-366 Closure of Aberystwyth Day Centre (Pages 73 - 80)

Education & Skills

4.7 P-04-376 Reorganise Education in Powys (Pages 81 - 98)

5. Paper to Note

5.1 P-03-301 Equality for the transgender community (Pages 99 - 110)

5.2 P-04-341 Waste and Incineration (Pages 111 - 112)

6. Motion under Standing Order 17.42 to resolve to exclude the public from the meeting for the following business:

6.1 P-04-329 Control of noise nuisance from wind turbines **10:45 - 11:00** (Pages 113 - 141)

P-04-341 Waste and Incineration

Petition wording

We call upon the National Assembly to urge the Welsh Government to review

1. Prosiect Gwyrdd, which is against WAG policy of localised facilities, and allow our councils to choose their own waste technology and waste management procurement;
2. The flawed Wales waste survey that only gave people a 2 choice option on waste disposal;
3. By 2020, make it illegal to burn recyclable waste which would promote councils to recycle.

Petition raised by: Terry Evans

Petition first considered by Committee: 15 November 2011

Number of signatures: 21 (an associated petition collected another 13,286 signatures)

Please follow the link to access full consultation response:
http://www.senedd.assemblywales.org/mgIssueHistoryHome.aspx?IId=2294

An Bord Pleanála

Statement of Evidence

Particulate Emissions and Health

Proposed Ringaskiddy Waste-to-Energy Facility

Professor C. Vyvyan Howard MB. ChB. PhD. FRCPath.

June 2009

Professor C. Vyvyan Howard MB. ChB. PhD. FRCPath.

Vyvyan Howard is a medically qualified toxico-pathologist specialising in the problems associated with the action of toxic substances on the fetus and the infant. He is Professor of Bioimaging at the University of Ulster and has written a number of papers and book chapters and spoken in a variety of forums to draw attention to the threat posed by environmental pollutants to the developing fetus.

He is a Fellow of the Royal College of Pathologists, Past President of the Royal Microscopical Society, Member of the British Society of Toxico-Pathologists, Immediate Past President of the International Society of Doctors for the Environment and Member of the European Teratology Society. He has just completed 6 years as a toxicologist on the UK Government DEFRA Advisory Committee on Pesticides.

A large part of Professor Howard's current research is the investigation of the fate toxicology of nanoparticles. His research team is in receipt of two large EU grants; 'NanoInteract and 'NeuroNano'. He has co-edited a book entitled 'Particulate Matter: Properties and Effects upon Health' published in September 1999 [1].

Vyvyan Howard has sat on two EU expert groups considering the threats and benefits posed by nanotechnology and recently addressed the House of Lords Select Committee on Science and Technology investigating the use of nanotechnology in food.

1 Summary:

1.1 Incineration and Health:

Scientific knowledge regarding the effects of solid waste incineration facilities on the health of a population living nearby is constantly being updated.

Adverse health impacts arising from both inhalation of combustion products and from contaminated food from older incineration plants, generally those operating during the 1970's through to the 1990's, are reasonably well described in the epidemiological literature. The main health endpoints studied have tended to relate to

1. respiratory symptoms and illness
2. reproductive effects, especially congenital anomalies
3. cancer.

A practical issue, and one of significant policy importance, is that the majority of published epidemiological studies relate to these older plants. With the more recent European Union regulations [2] many older plants have closed, or been fitted with more stringent emission controls. While this is obviously desirable from a public health perspective, it does raise issues of the relevance of studies around older plants, to populations affected by more modern facilities. Proponents of new facilities tend to dismiss the older research as irrelevant. Opponents take a contrary view arguing, not unreasonably, that similar claims of safety were made in relation to those older facilities when they were operating; that the risk assessments relied upon to show new incinerators are safe would not, if applied to the older plants, reveal the levels of impacts reported in the literature thus indicating that the risk assessments do not validate in real-world situations; and that epidemiology, by it's nature, involves retrospective studies. Furthermore the modern incinerators tend to be much larger than those operated historically so that although the emissions concentrations have reduced the total mass of pollutant emissions may even increase.

The comprehensive review by the Health Research Board [3], commissioned by Department of Environment and Local Government, was obviously aware of these arguments and concluded that "*there is some evidence that incinerator emissions may be associated with respiratory morbidity*" and that "*acute and chronic respiratory symptoms are associated with incinerator emissions*".

The review also confirmed that "a *number of well-designed studies have reported associations between developing certain cancers and living close to incinerator sites. Specific cancers identified include primary liver cancer, laryngeal cancer, soft-tissue sarcoma and lung cancer*".

The Health Research Board recognised the problems of isolating causation in real world epidemiology and commented that "*it is hard to separate the influences of other sources of pollutants, and other causes of cancer and, as a result, the evidence for a link between cancer and proximity to an incinerator is not conclusive*". They suggested that this could be addressed by "*further research, using reliable estimates of exposure, over long periods of time, is required to determine whether living near landfill sites or incinerators increases the risk of developing cancer. Studies of specific environmental agents and specific cancers may prove more definitive in the future*".

A more recent World Health Organisation ('WHO') report [4] similarly concludes by suggesting that "*Further insights on health effects of landfills and incinerators are likely to be gained only from studies that consider exposure pathways and biomarkers of exposure and effect, and compare waste–related exposures with those due to other sources of pollution*."

In that context this evidence reviews the possible health impacts associated with emissions from incinerators and a specifically the concerns associated with ultrafine particulates.

1.2 Air Pollution and Health:

The relationship between air pollution and mortality has been well known for many years. Two of the most notable pollution incidents confirming the effects of air pollution were firstly the tragic events of the Meuse Valley, Belgium, where in December 1930, in the small town of Engis 60 people died in the space of three days [5]. This disaster provided incontrovertible evidence that air pollution could kill and therefore it attracted considerable attention from the scientific community.

In a contemporary editorial in the British Medical Journal, Haldane [6] stated that "the possibility of a similar disaster happening in this country [the UK] is a matter of great public health interest". He thought that disaster had been avoided so far in London because the city emitted a lot of heat, which produced convection currents. He warned – though to no avail, against plans to build big electricity generating stations. The subsequent London pollution incident in December 1952 resulted in an increase in deaths that has been estimated to be of approximately 4,000 by Logan (1953) or 12,000 in a more recent retrospective study [7].

Despite these huge impacts, it has not been until the last decade did the scientific community focus in earnest on the potential health hazard of PM exposure [8].

1.3 Particulates and Health:

Epidemiological studies worldwide have consistently demonstrated links between ambient particulate matter exposure and adverse health outcomes, including increased rates of respiratory and cardiovascular illness, hospitalizations, and pre-mature mortality [9, 10]. Particles are usually defined by their size, e.g., PM10 and PM2.5, as the mass of particles with aerodynamic diameters less than 10 to 2.5 μm, respectively. Recently, however, interest has also focused on the fraction of ultrafine particles (UFP) with a diameter less than 0.1 μm, which are abundant in number but contribute little to the mass [11, 12]. The UFPs are only usually measured for research purposes and are effectively outside regulatory control. It is these emissions that are the main theme of this evidence.

Studies have shown that ultrafine particles are more toxic than larger particles [13-15]. Furthermore, individual particles have been shown to be capable of inducing inflammation and oxidative stress [15], suggesting that particle number concentrations, which are dominated by ultrafine particles, may be more indicative of some potential health impacts than particle mass concentrations. UFP are also important because of their high alveolar deposition fraction, large surface area, ability to induce inflammation, and potential to translocate into the blood circulation system. At a given mass, ultrafine particles (diameter < 0.1 μm) have 10^2 to 10^3 times more surface area than particles with diameters in the 0.1–2.5 μm range and approximately 10^5 times more surface area than coarse particles (2.5 μm < diameter < 10 μm) [16]. This surface area-to-mass effect may affect the relative toxicity of particles to respiratory systems, in combination with a higher deposition efficiency of ultra fines in the alveolar region (Hughes et al., 1998).

Estimates of the number of excess deaths on a global scale due to particle inhalation have been made, and they amount to about 2 million/year of which c.370,000 per year are within the EU. The health effects are not limited to lung injuries. They deaths also include

cardiovascular diseases and cancers [17]. It is interesting in the light of these impacts to consider that as recently as 1992 the Lancet editorial was claiming that "*environmental pollution is unlikely to result in gross excess mortality*" [18].

1.4 Ultrafine Particles and Incineration:

Although not such a high contributor to national PM inventories incinerators appear to be very important local sources of particulate contamination. Aboh [17] assessed the contribution of a modern incinerator in Sweden to local PM2.5 levels and concluded that between 17 % and 32% of the particulates arose from the incinerator. This contribution may seem to be large compared with the relatively small increased modelled by Indaver of 0.5 $\mu g/m^3$ compared with an assessed background level of c 7 $\mu g/m^{3.}$ Indaver appears to ignore, however, the very significant contribution made to particulate burdens by SOx and, especially, NOx emissions.

1.5 The Precautionary Principle:

There remains significant uncertainty about the level of health impacts associated with ultrafine particulates and other emissions from incinerators.

The WHO [4] emphasises that "*priority needs for research include development and application of biomonitoring, both in human observational studies and in toxicological research, the use of pharmacokinetic models to assess the influence of factors such as metabolism and timing of exposures, and the analysis of all relevant environmental matrices, in order to evaluate chemical exposure pathways and to assess the exposure for specific subsets of the population*".

I consider that the evidence of risk of harm to human health and the environment is sufficiently high that a precautionary approach should be taken towards the permitting of new incineration capacity at least until there is much better information from the biomarker studies recommended by the WHO [4] and the Health Research Board [3].

Whilst I believe that it is sufficiently compelling in itself the uncertainties associated with the health evidence are supported by strong policy arguments in areas beyond the scope of this evidence. The 2007 WHO report [4] says "*the evidence of adverse health effects related to landfills and incinerators, although not conclusive, adds to other environmental concerns in directing waste management strategic choices towards reduction of waste production, re-use and recycling schemes, as prescribed by EU Directives*". I note that the Health Research Board review [3] includes similar commentary and says that one submission "*included 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.'*"

The same contributor quoted the Head of EU Waste Management, who stated that incinerators need enormous input in order to be economic and that in many countries they are now considered similar to nuclear power stations and should be avoided:

'The Commission does not support incineration. We do not consider this technique is favourable to the environment or that it is necessary to ensure a stable supply of waste for promoting combustion over the long term. Such a strategy would only slow innovation. We should be promoting prevention and recycling above all. Those countries who are in the process of drafting their planning should not base it upon incineration.'

2 Properties of particulates

2.1 Particle Size

In 1979, the U.S. National Research Council said [19] that measuring particles by weight, without regard to particle size, has "*little utility for judging effects*". Particle size is therefore a vital consideration when it comes to air pollution and health. The respirable fraction of particles found in air are classified into size bands which are generally defined as:

Coarse + fine	PM_{10}	The mass of particles per cubic metre which pass through a size-selective inlet with a 50% efficiency cut-off at 10 μm aerodynamic diameter
Fine	$PM_{2.5}$	As for PM_{10} but with a 2.5 μm cut-off.
Ultrafine = UFP or 'nanoparticles'	$PM_{0.1}$	As for PM_{10} but with a 100 nm cut-off, i.e. up to 0.1 μm diameter

It is helpful to compare the size of the particles with common material like fine beach sand and human hair [20]:

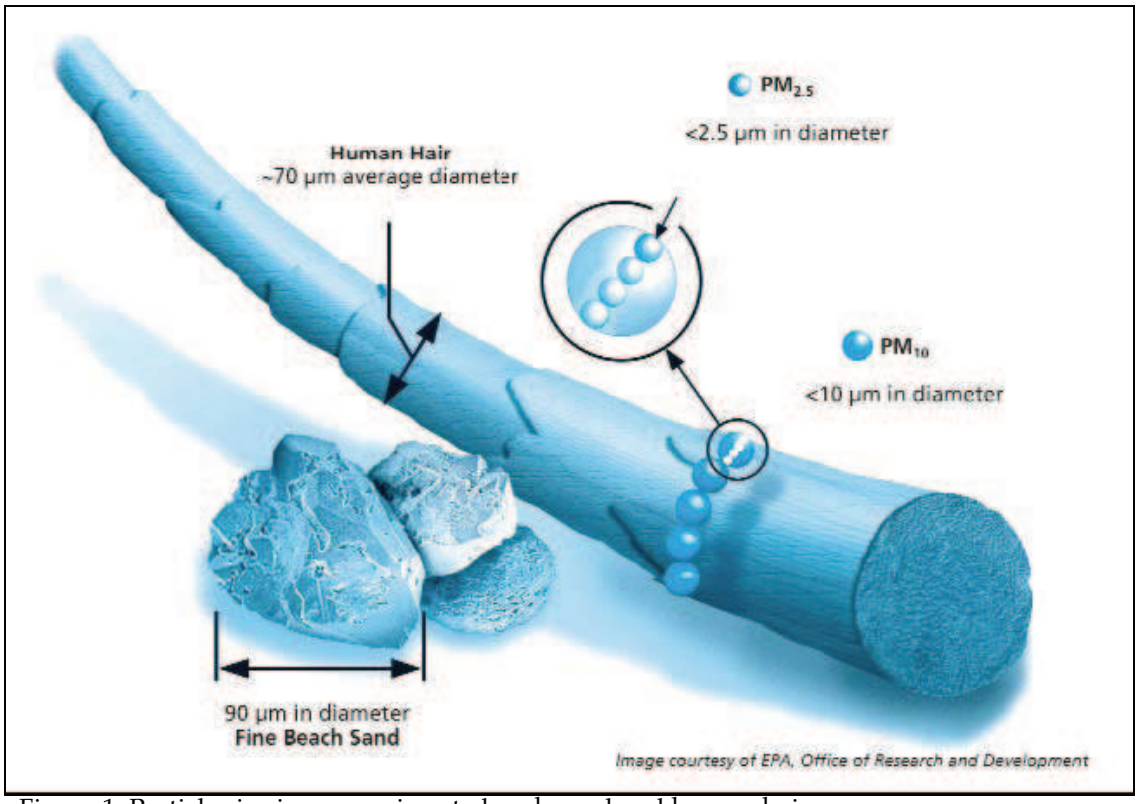

Figure 1: Particle size in comparison to beach sand and human hair

This relative size can also be illustrated by comparison to biological phenomena as per Brook et al. [21]:

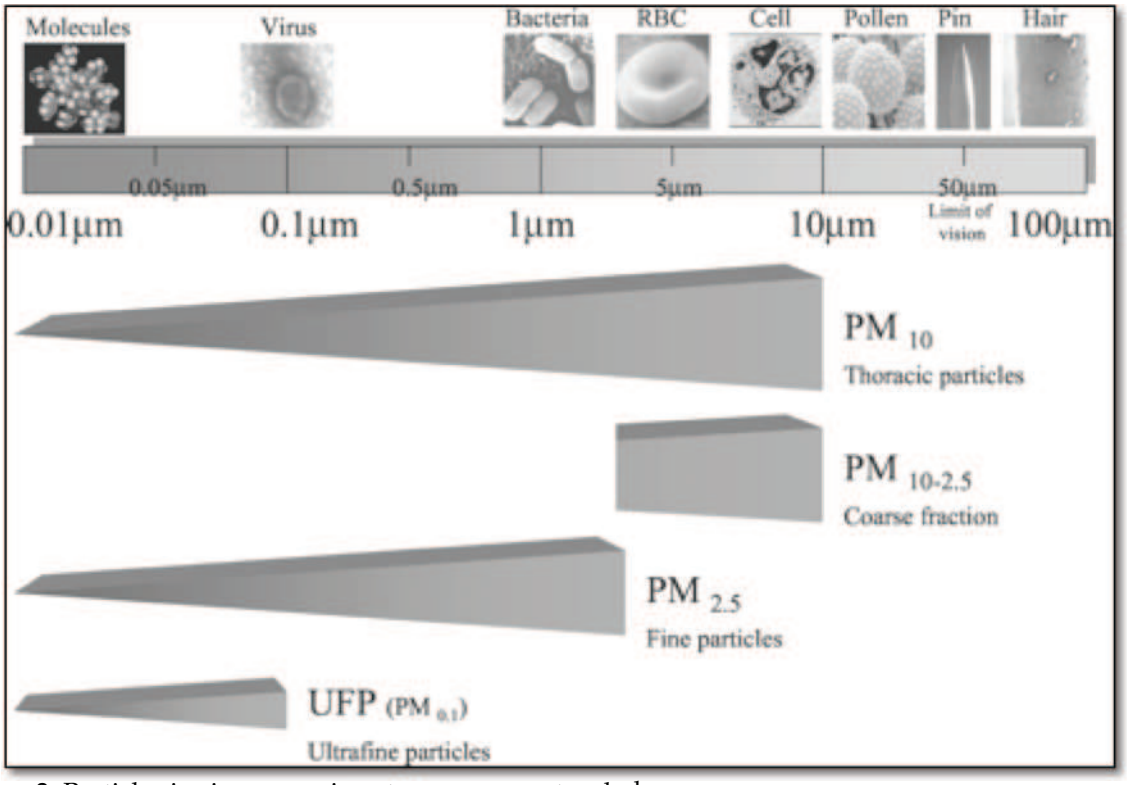

Figure 2: Particle size in comparison to common natural phenomena

The "coarse" particle mode is the difference between PM_{10} and $PM_{2.5}$. It is variable because it includes wind-blown dust and some contribution from building operations; as a 'rule of thumb' $PM_{2.5}$ is normally between 50% and 80% of PM_{10}. [22]

The figure below summarizes what is known about particle size distribution and how size distribution is connected to more common measures of particle number and mass. The percentage values were based on 1995–1998 data from Erfurt [23] and it can be seen that whilst c 97% of the particle mass is found in the components > $PM_{0.1}$ this constitutes only 12% of the particle numbers (note that this is based on total $PM_{2.5}$ levels being 100% of the mass).

	Contribution[a]	
Size (µm)	Number	Mass
Ultrafine particles		
$NC_{0.01-0.03}$ $NC_{0.03-0.05}$ $NC_{0.05-0.1}$	88%	3%
Fine particles		
$MC_{0.1-0.5}$ $MC_{0.5-1.0}$ $MC_{1.0-2.5}$	12%	97%
Total ultrafine and fine particles		
0.01–2.5	100%	100%
Coarse particles		
$PM_{10-2.5}$	—	20%
$TSP-PM_{10}$	—	30%

[a] Based on the data from Erfurt 1995 to 1998: contribution of ultrafine and fine particles to number and mass in the size range of 0.01–2.5 µm and contribution of coarse particles to mass of total aerosol size distribution.

Size Ranges and Contribution to Number and Mass Concentration [23]

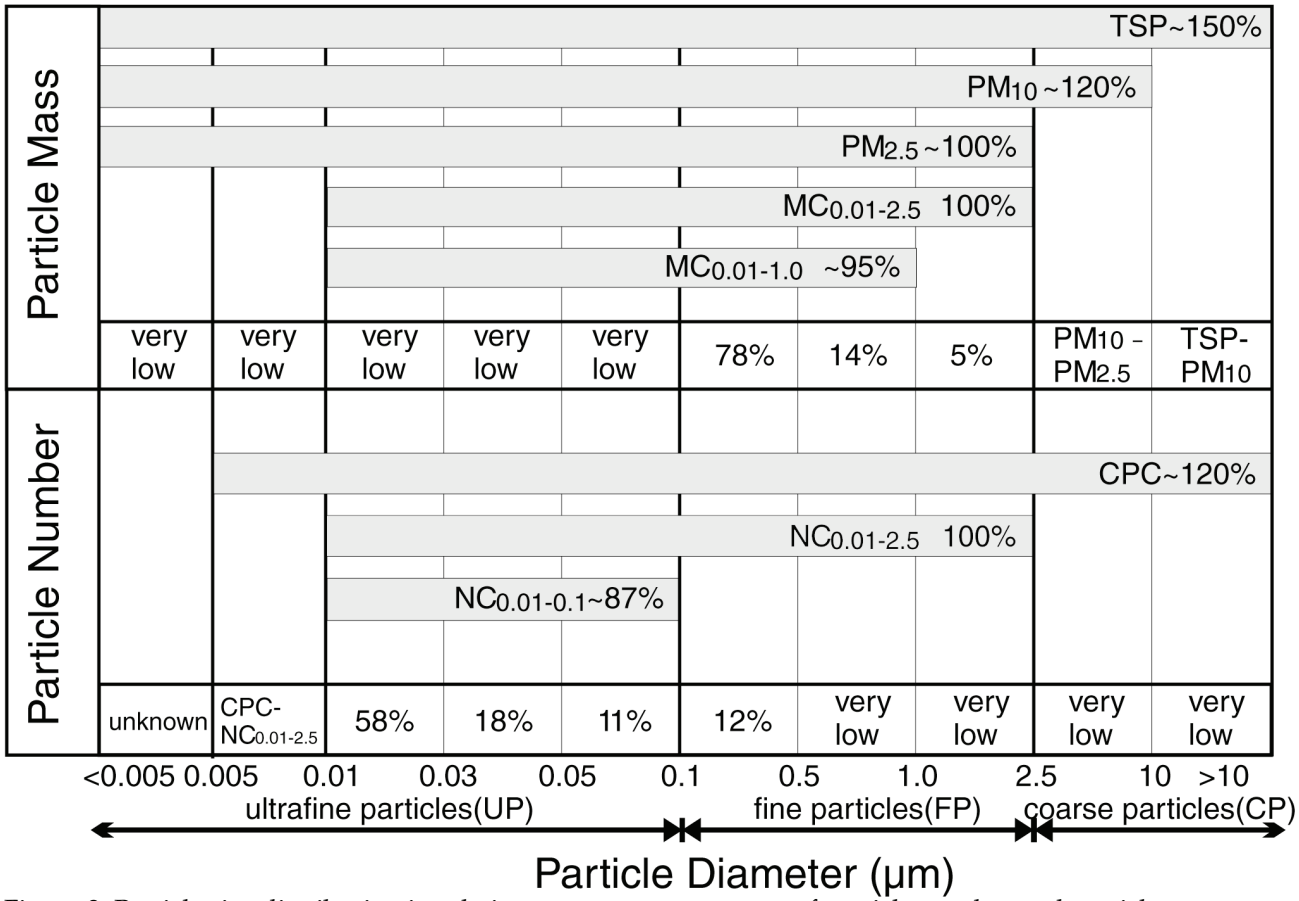

Figure 3: Particle size distribution in relation to common measures of particle number and particle mass

It is clear, therefore, that depending on their sizes, quite substantial differences in numbers or surfaces might constitute the same mass. Just one particle per cm^3 with a diameter of 2.5 μm is sufficient to result in a mass concentration of 10 $\mu g/m^3$ whilst more than two million particles of a diameter of 0.02 μm are needed to obtain the same mass concentration.

During the past 20 years, studies have largely been able to rule out sulphur dioxide and ozone pollution as the cause of the observed deaths although ozone is associated with increased mortality in daily time series studies (0.3–6.7% increase per 20 $\mu g/m^3$) and there is a weak association between SO2 and mortality (about 1% increase per 50 $\mu g/m^3$) which can be difficult to separate from particulate co-pollutants [24].

2.2 Ultrafine particles

Ultrafine particles (UFP) or nanoparticles[1], are very small pieces of matter defined as having dimensions less than 10^{-7} m. They constitute a small proportion of the mass of almost all types of particulate material. They also constitute the majority of the number of particles found in aerosols produced as a result of combustion processes. Their importance in the field of catalyst manufacturing, where their high surface area has a very great influence on reactivity, is widely known [25]. However, at present we know relatively little about their detailed structure, or their chemical and physical properties.

[1] Nanoparticles are smaller than 100nm, but in this evidence I take the terms to be interchangeable.

2.3 History and Regulation:

Regulation in Ireland of particulates as an air pollutant has been based on PM_{10} (particles of <10 μm) and, more recently on $PM_{2.5}$ – although not, so far as I am aware for setting emission standards from processes like incinerators.

In common with many leading researchers in this developing field of nano-toxicology such as Donaldson's [26] and Oberdörster's [27] groups, I have long considered ultrafine particles to be the main contributor to its adverse effects. Though UFP is only a small fraction of PM_{10} , Seaton et al. in 1995 [28] hypothesised biochemical processes whereby it might be the cause of acute cardiovascular effects. The 1999 Royal Society conference "Ultrafine particles in the atmosphere" and proceedings, published in 2000, consolidated the new thinking.

Urban air will often contain 100 billion (10^{11}) one-nanometre-diameter particles in each cubic meter of air, all of them invisible. By weight, these 100 billion particles will only amount to 0.00005 micrograms yet they may be responsible for much of the health damage created by fine-particle pollution. It is clear, therefore, that achievement of a regulatory standard does not ensure protection of health.

2.4 Lack of Standards and Monitoring for UFPs

Standards and monitoring are now being introduced for $PM_{2.5}$ particles – termed 'fine particles' and mostly 1,000 to 2,500nm in size – but there is nothing yet to cover the much smaller ones. The current standards are in terms of total mass, yet UFPs are generally around only one percent of the total mass but present the majority of the surface area that is reactive to human tissues. If the mass of a single inhaled 2.5 μm particle is divided into typical nanoparticles ~80nm, they would have 1000 times more surface area. For that reason alone, the mass-based PM standards are far from appropriate for UFPs.

Wichmann [23] reported some of the earliest epidemiology relating to UFPs and they showed a full distribution over particle sizes in urban air:

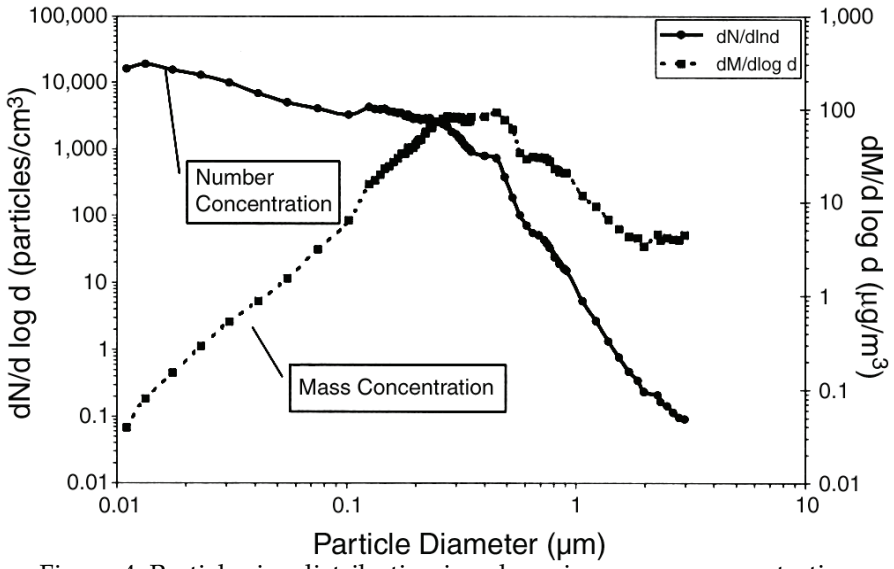

Figure 4: Particle size distribution in urban air mass vs. concentration

This does not show PM10 (cuts off at 3μm) but does indicate that most of the mass is in 0.2 to 0.5 μm particles, yet most of the particles ('number concentration') are under 0.2 μm (i.e. 200 nm).

2.5 Atomic Structure of Nanoparticles

It is only in the last twenty-five years, with the advent of high-resolution electron microscopy (HREM) at 0.1 nm (nanometre) levels, and the consequent ability to resolve inter-atomic spacings at this level, that any real attempt has been made to determine the atomic structure of ***individual*** particles. What has been learned is that these minute particles have an increasing proportion of surface atoms as the particle size decreases. Novel configurations of atoms have been demonstrated in nanoparticles, which cannot exist in the bulk material (Jefferson & Tilley, 1999). The imbalances between the number of atoms and number of electrons means the particles can be electrically charged and have raised chemical reactivity.

3 Damage to Health from Particulates

3.1 Fine Particles Linked to Human Deaths

US studies from the 90s first established that urban particulates in modern times were causing people to die. The 6-cities study of 1993 (Dockery et al.) was followed by the ACS study of half a million adult Americans in 151 metropolitan areas, which clearly established the relationship between fine-particle air pollution and human deaths, ruling out smoking as a cause of the observed deaths (Pope *et al.* 1995, Villeneuve *et al.* 2002, Pope *et al* 2002). This study is particularly important because it didn't simply match death certificates with pollution levels; it actually examined the characteristics (race, gender, weight and height) and lifestyle habits of all 552,138 people. Thus the study was able to rule out confounding factors of tobacco smoking (cigarettes, pipe and cigar); exposure to passive smoke; occupational exposure to fine particles; body mass index (relating to a person's weight and height); and alcohol use.

This study also controlled for changes in outdoor temperature. It found that fine-particle pollution was related to a 15% to 17% difference in death rates between the least polluted cities and the most-polluted cities. This research was vehemently attacked from a number of quarters, particularly those industries potentially most affected by the findings, which labelled it 'junk science'. However, an independent scientific panel conducted a thorough 're-analysis' and confirmed that tiny soot particles can shorten lives (HEI 2000). This basic finding was supported by a European study that found 6% of all deaths correlate with urban concentrations of fine particles, mainly from traffic [29].

The review of air pollution under the European Commission (Clean Air for Europe: CAFÉ) assisted by the WHO led to the Commission declaring in the *Thematic Strategy on Air Quality* that "*serious air pollution impacts persist*" [30].

The Commission also said "*currently in the EU there is a loss in statistical life expectancy of over 8 months due to $PM_{2.5}$ in air, equivalent to 3.6 million life years lost annually*". The thematic strategy shows that even with effective implementation of current policies this will reduce only to around 5.5 months (equivalent to 2.5 million life years lost or 272,000 premature deaths).

3.2 Effects of Particle Types and Mixtures

The effect of mixtures of particles of differing chemical composition entering the blood stream via the lungs in large numbers on a daily basis is beginning to be understood. There is no doubt that some particulate aerosols are indeed hazardous. However the degree of hazard associated with specific types of particle and the precise mechanisms by which exposure leads to pathology are as yet poorly understood and currently the subject of increasingly intense research.

Boekelheide [31] reported that pregnant rat dams were exposed to mixtures of phthalates (suppressors of testosterone synthesis within the fetal testis) and androgen receptor antagonists (acting at the end organs of this signalling pathway). The exposures were orchestrated so that any agent alone had very limited effects while the collective exposure robustly induced hypospadias and epididymal agenesis in the developing males. Overall, the chemicals clearly acted with dose additivity, not response additivity. These effects were induced by chemicals acting by different molecular mechanisms within different organ

systems with different absorption, distribution, metabolism, excretion patterns, and differently shaped dose response curves. By all of our familiar criteria, these chemicals are not toxicologically similar and do not share a mode of action as defined by the USEPA; and yet they can act together to inhibit this developmentally sensitive signalling pathway.

3.3 Threshold Levels

Successive studies have concluded there is no threshold, i.e. no level of fine-particle pollution below which no deaths occur. The ACS researchers have found that even air pollution levels that are well within legal limits are killing people, especially older people and those with chronic heart and lung ailments.

3.4 Respiration of particulates:

The average human lung contains about 2,300 km of airways and 480 million alveoli [32, 33]. On a daily basis, humans inhale around 10,000 litres of ambient air, which comes in close contact with a lung surface area of between 75 and 140 m^2. From this, 350 litres of oxygen diffuses across the alveolar capillary basement membrane into the 10,000 litres of blood flowing through the lungs daily [34]. The respiratory tract, therefore, comes into close contact with a large volume of ambient air and its components on a daily basis – the potential for uptake of contamination contained within that air is obvious.

Whilst US researchers switched to correlating $PM_{2.5}$ with health indicators authorities in Europe have tended to remained entrenched with the concept of $PM_{10.}$ There is, however, no longer and serious doubt that the size of the particles is the most important issue from a public health viewpoint and the reasons are obvious when the respiration of particles is considered in more detail.

- Particles larger than 10 μm (10 millionths of a metre) generally get caught in the nose and throat, never entering the lungs.
- Particles smaller than 10 μm (PM_{10}) can get into the large upper branches just below the throat where they are caught and removed (by coughing and spitting or by swallowing).
- Particles smaller than 5 μm (PM_5) can get into the bronchial tubes, at the top of the lungs.

Only particles smaller than 2.5μm ($PM_{2.5}$) in diameter can get down to the deepest (alveolar) portions of the lungs where gas exchange occurs between the air and the blood stream, oxygen moving in and carbon dioxide moving out [35]. The figure below shows whilst that PM ≥ 10μm in diameter enter the nose and mouth only the thoracic fraction, PM_{10}, passes the larynx and penetrates the trachea and bronchial regions of the lung, distributing mainly at pulmonary bifurcations. The respirable fraction, $PM_{2.5}$, and ultrafine PM, $PM_{0.1,}$ enter the nonciliated alveolar regions and deposit deep within the lungs.

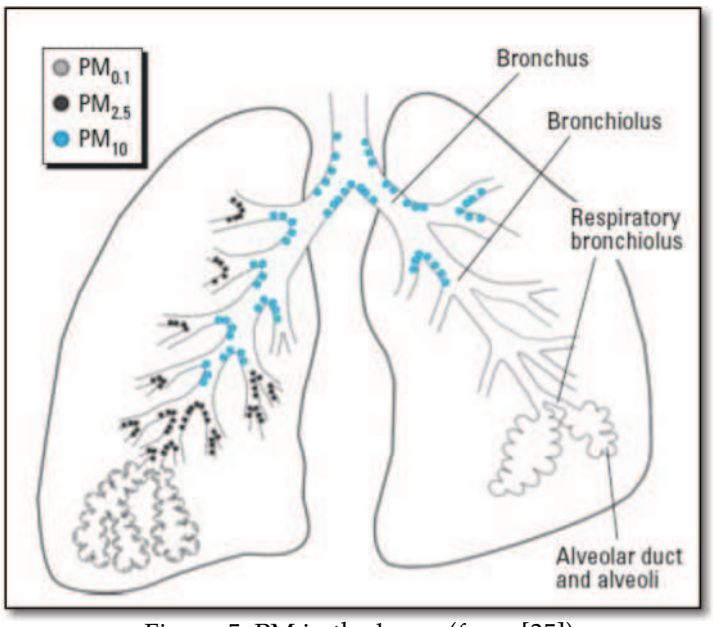

Figure 5: PM in the lungs (from [35])

Not all particles are retained. Larger particles deposit in the airways or mouth and throat, whereas smaller particles deposit in the alveolar region. A higher proportion of particles <1 μm that than those of $PM_{1.0}$ can be exhaled, thereby reducing deep lung deposition:

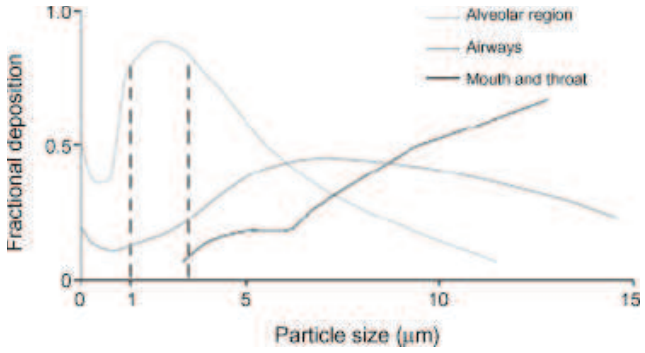

Figure 6: The effect of particle size on the deposition of aerosol particles in the human respiratory tract following a slow inhalation and a 5 s breath hold (from [33])

3.5 Fate of particulates deposited in the lung

Removal of the smaller particles (<2.5 μm) deposited in the alveoli is difficult. If soluble in water, they pass directly into the blood stream within minutes. If insoluble, they are collected by scavenging cells called macrophages, which transport them to lymph nodes where they are retained for months or years (NRC, 1979). However, lung macrophage cells seem to have difficulty in recognising the smaller UFPs (those <65 nm; Donaldson et al. 1999), so may let some of them through the lung epithelium, especially during episodes of high numbers. Once they penetrate the epithelium and enter the blood stream, UFPs may be transported around the body and potentially be absorbed into cells – a process called endocytosis. Gumbleton [36], and more recently, Yang [33] have reviewed nanoparticle mobility and removal mechanisms including endocytosis. UFPs can cross biological membranes, in common with many viruses, and their mobility within the body is thought to be high.

3.6 The mechanism of toxic action

I have summarised and discussed a number of mechanisms by which UFPs can induce cell damage in my 2009 nanoparticle review for the WHO. Unfortunately this is not yet in the public domain and cannot yet be supplied to this inquiry. I will, however, briefly review some of the key developments here.

In recent years it has been established that Ultrafine particles:

- have a high specific surface area, which can catalyse reactions and adsorb high amounts of toxic substances (like PAH), providing a carrier deep into the lung during inhalation [28];

- have a higher deposition probability particularly in small airways and the alveolar region of the lungs than fine particles [11];

- respond differently in men and women - Women receive a greater dose than men in the head and tracheobronchial regions, for example [37];

- are less well phagocytized by alveolar macrophages than larger particles and inhibit their phagocytic ability [38];

- are taken up by other cells of the respiratory epithelium, such as epithelial cells, dendritic cells [39, 40];

- may form complexes with proteins and biomolecules which may result in functional changes of the latter [41];

- have greater access to interstitial spaces than larger particles [42, 43]);

- have access to the blood circulation [43-45];

- induce more oxidative stress than fine particles [15, 46] ;

- cause more pro-inflammatory responses than larger particles [47] ;

- have greatly enhanced toxic potential due to their free location and movement within cells, which promote interactions with intracellular proteins and organelles and even the nuclear DNA [48] ;

- adversely affect cardiac functions and vascular homeostasis [49];

- affect the immune system [27].

For all of these hypotheses there exists a growing body of studies on a mechanistic level providing plausibility or evidence, however, on different levels of causality. From many of these studies it became also clear that the hypotheses listed above may only be applicable to susceptible organisms and individuals predisposed either by disease, genetics or age while the healthy organism does not show any such sensitive reactions.

A large number of studies confirm that fine-particle pollution is responsible for, or exacerbating, a wide range of human health problems, including:

- initiating and worsening asthma, especially in children;
- increasing hospital admissions for bronchitis, asthma and other respiratory diseases;

- increasing emergency hospital visits for respiratory diseases;
- reducing lung function (though modestly) in healthy people as well as (more seriously) in those with chronic diseases;
- increasing upper respiratory symptoms (runny or stuffy nose; sinusitis; sore throat; wet cough; head colds; hay fever; and burning or red eyes);
- increasing lower respiratory symptoms (wheezing; dry cough; phlegm; shortness of breath; and chest discomfort or pain); and
- increasing heart disease.

The 1995 hypothesis of Seaton *et al.* [28] suggested that the particles retained in the deep lung cause inflammation which, in turn, releases natural chemicals into the blood stream causing coagulation of the blood. This was to explain epidemiological findings of increased cardiovascular disease in populations exposed to higher than average PM_{10} exposure [50]. There may be a low exposure threshold, above which these effects will occur, but it appears the classical toxicological dose-response curve is not appropriate. The main end point under investigation is arterial damage, which is consistent with the 1965 findings of Aurerbach that smokers, who voluntarily inhale particulate aerosols, almost all sustain arterial damage themselves.

In vivo studies performed on laboratory animals have looked at the ability of UFPs to produce inflammation in lungs after exposure to UFP aerosols [26, 47, 51, 52] . The degree to which UFPs appear to be able to produce inflammation is related to the smallness of the particles, the 'age' of the aerosol and the level of previous exposure. It has been hypothesised [28] that the chronic inhalation of particles can set up a low grade inflammatory process that can damage the lining of the blood vessels, leading to arterial disease.

Most health studies are now using $PM_{2.5}$, though as runs of data in Europe tend to be of PM_{10}, uncertain corrections are often made. There are few data runs for ultrafine particles ($PM_{0.1}$), despite the finding [53] that they were on an increasing trend (while PM_{10} was decreasing) and probably more hazardous.

3.7 UFPs penetrating into the human body

There is considerable evidence to show that inhaled UFPs can gain access to the blood stream and are then distributed to other organs in the body [54].They can even cross the placental barrier.

One needs also to compare the particle sizes with biology, as in figure two above from Brook et al. [21]. UFPs are much smaller than bacteria, against which cells can defend themselves, and of similar size or smaller than viruses, which can relatively easily penetrate between cells.

The 'passageways' for nanoparticles into and then subsequently around the body are the 'caveolar' openings in the natural membranes which separate body compartments. These openings are between 40 and 100 nm in size and are thought to be involved in the transport of 'macromolecules' such as proteins, including on occasion viruses. They also happen to be about the right size for transporting UFPs. Most of the research on that, to date, has been performed by the pharmaceutical industry, which is interested in finding

ways of improving drug delivery to target organs. This is particularly so for the brain, which is protected by the 'blood brain barrier' which can be very restrictive. This has been reviewed by Gumbleton [36].

Although there are clear advantages to the intentional and controlled targeting of 'difficult' organs, such as the brain, with nanoparticles to increase drug delivery, the obverse of this particular coin needs to be considered. When environmental UFPs (such as from traffic pollution or incineration) gain unintentional entry to the body, it appears that there is a pre-existing mechanism which can deliver them to vital organs [36]. The body is then 'wide open' to any toxic effects that they can exert. The probable reason that we have not built up any defences is that any such environmental toxic UFPs were not part of the prehistoric environment in which we evolved and therefore there was no requirement to develop defensive mechanisms.

Peters et al. [55] having established the vulnerability of remote organs – and particularly the brain - wrote "*The results indicating that particles may contribute to the overall oxidative stress burden of the brain is particularly troublesome, as these long-term health effects may accumulate over decades*". They stressed the need for increased efforts to quantify the relative risks for long-term particle exposure on the onset of Parkinson's and Alzheimer's disease adding "*both Parkinson's and Alzheimer's disease are only diagnosed once manifest clinical signs and symptoms are evident and impact the diseased persons by long years of disabilities and diminished quality of life*". The exposure of the brain to UFPs is a matter of great concern - if our limited capacity to deal with misfolded protein is exceeded then the likely sequelae would be an increase in the incidence of protein misfolding disease in the general population and a tendency to an earlier average age onset.

3.8 Quantifying the Established Health Impacts

A range of impacts have been reported by different researchers for different outcomes. Kunzli [56], for example, reported elevations of 10 $\mu g/m^3$ and 20 $\mu g/m^3$ in $PM_{2.5}$ were associated with 5.9% and 12.1% increases in the development of atherosclerosis in "*healthy*" people who had no previous signs of acute coronary syndromes, but had small elevation of low-density lipoprotein.

Miller et al. reported an increased relative risk of 1.76 for death from cardiovascular disease for every increase of 10 µg per cubic meter in the mean concentration of $PM_{2.5}$ [57].

By comparison, a study by the American Cancer Society showed that each increase of 10 µg per cubic meter in the mean $PM_{2.5}$ concentration was associated with an increased relative risk of 1.12 for death from cardiovascular disease, 1.18 for death from ischemic heart disease (the largest proportion of deaths), and 1.13 for death from arrhythmia, heart failure, or cardiac arrest [58].

Commenting on these data in an editorial of the New England Journal of Medicine Dockery [59] wrote:

"A multifaceted approach that encompasses both public health and medical interventions is needed to reduce the burden of cardiovascular disease attributable to air pollution. Comprehensive management of the harmful effects of fine particles must start with intensive efforts to reduce this destructive form of air pollution. Fine particulate air pollution results not only from the combustion of carbonaceous fuels in our vehicles, power plants, and factories but also from secondary particles produced by oxidation of gaseous pollutants emitted by these same sources".

I note that these secondary particles have not been considered in the application at all and have not been incorporated in the (very limited) assessment of risks. It is clear however that even without the consideration of secondary particulates it is not reasonable to describe the particulate emissions from the proposed incinerators as having no impacts.

3.9 Children as vulnerable and sensitive sub-population:

The WHO and European Commission have recognised that children are specially affected by PM pollution. The WHO *Monograph: the Effects of Air Pollution on Children's health and development: a review of the evidence* [60] reviewed factors affecting children's susceptibility, effects on pregnancy outcomes, infant and childhood mortality, lung function development, asthma and allergies, neurobehavioural development and childhood cancer. It declared that "*the amount of ill-health attributable to air pollution among European children is high*".

The *Children's Environment and Health Action Plan for Europe* (CEHAPE), adopted at the *Budapest Ministerial conference* in June 2004 [61], included air pollution in increasing concern about environmental effects on children's health. It agreed that developing organisms, especially during embryonic and foetal periods and early years of life, are often particularly susceptible. It's now recognised that the inhibition of children's lung development can be very serious, potentially meaning long term harm to their respiratory health. Evidently air pollutants, most probably including particulates, cause harm to children differently to adults.

The expert science view, summarised by Joel Schwartz [62] is that children's exposure to air pollution is of special concern because their immune system and lungs are not fully developed, so many of the epidemiological associations are likely to be causal. The review by Heinrich and Slama [63] found that ambient fine PM is associated with intra-uterine growth retardation, infant mortality; impaired lung function and postneonatal respiratory mortality, but less consistently with sudden infant death syndrome. Hertz-Picciotto et al. [64] found bronchitis in early childhood correlates with $PM_{2.5}$ and PAH levels (UFPs may be a carrier for PAH – see above). While these findings may not all be conclusive, there can be no doubt that children and even the fetus are particularly vulnerable to particulate air pollutants – while this has largely been overlooked in setting current standards and controls.

A review of health effects of poor air quality on children's health [65] emphasised the hazards associated with the siting of major particle-emitting plants and roads in the vicinity of schools or communities containing children.

3.10 Prenatal Exposure:

A 2007 Editorial [66] in the Journal "Reproductive Toxicology" summed up the increasing concerns associated with prenatal exposure admirably:

"There is a major paradigm shift taking place in science that while simple is profound. It states that the root of many diseases, including reproductive diseases and dysfunctions, will not be found by examination of disease onset or etiology hours, days, weeks, or even years prior to disease onset. The new paradigm suggests that susceptibility to disease is set in utero or neonatally as a result of the influences of nutrition and exposures to environmental stressors/toxicants. In utero nutrition and/or in utero or neonatal exposures to environmental toxicants alters susceptibility to disease later

in life as a result of their ability to affect the programming of tissue function that occurs during development. This concept, that is still a hypothesis undergoing scientific testing and scrutiny, is called the developmental basis of health and disease".

There is a growing recognition of the importance of the prenatal period as a ''window of exposure'' for the development of childhood, and possibly adulthood, disease [67]. Henderson et al. [68] have investigated the effects of mothers' exposure to household chemicals during pregnancy, but they acknowledged the difficulty in determining whether the reported health effects could be attributed to pre- or postnatal exposure, or even both. They observed that chemical use in the home before and after birth was highly correlated, making it difficult to separate potential effects of exposure during these periods.

Jedrychowski et al. [69] reported that prenatal exposure to $PM_{2.5}$ particulate matter had a moderate but significant impact on severity of respiratory illness in postnatal early life. The biological mechanisms whereby prenatal $PM_{2.5}$ exposure might cause adverse health outcomes in children are yet unclear. $PM_{2.5}$ is a proxy measure of a whole complex of toxic agents present in the environment – including PAHs – that could adversely affect growth and maturation of lung in early childhood.

Fine particles are usually a product of combustion processes that generate other toxic agents which may interact at the molecular level with DNA as described by Perera et al. [70]. Prenatal exposure to immunotoxic fine particles may impair the immune function of the fetus and subsequently may be responsible for an increased susceptibility of newborns and young infants to respiratory infections.

The synergism of recently proposed role of sulphur dioxide metabolites as inhibitors of enzymes and antioxidants and the adverse effects of nitrogen oxide metabolites in the early embryonic development may lead to symmetric intrauterine growth restriction and premature delivery or low birthweight. The research is directed to point out the toxics from coal combustion products as neglected causes of oxidative stress on human embryogenesis, prematurity, and low birthweight. [71]

3.11 Future Research:

Cormier et al [35] have reviewed the evidence for potential health impacts of particulate emissions from combustion processes. They posed a series of questions that require addressing:

- How are combustion-generated fine PM and ultrafine PM formed?
- How do their chemical properties differ from larger PM?
- What is the nature of association of chemicals with these particles?
- How is the chemical and biological reactivity of these chemicals changed by association with the particles?
- What is the role of PM-associated persistent free radicals in the environmental impacts of fine and ultrafine PM?
- What is the role of PM on cell/organ functioning at initial sites of exposure?
- What is the bioavailability of these particles to other tissues?
- How are these particles translocated to these secondary sites, and do their chemical properties change en route?
- How does acute/chronic exposure lead to adverse organ pathophysiology? Is developmental timing of exposure important?
- What effect does exposure have on predisposing to disease states or on disease progression?

- Most important, what are the specific cellular and molecular mechanisms associated with airborne exposures?

Medical science has been rather slow to fully recognize and explore the serious problems that particulate emissions cause. In spite of the thousands of papers that have been published over the past decade on the issue of UFPs it will inevitably be many years before the answers to all the questions posed are available. Meanwhile it is sensible that particulate emissions, especially those produced in conjunction with toxic chemicals, are reduced so far as possible and that new sources are avoided.

4 Particulate Releases from Incinerators

Modern incinerators are a major source of fine particulate emissions. In 2007, for example, Widory et al. [72] found:

"The main sources of atmospheric particle pollution in Paris are vehicles, central heating and waste incinerators".

It is important to bear in mind that the contribution is not just direct PM emissions, which are now relatively low in terms of total mass and emission concentrations (though not in terms of numbers). Particulate emissions and impacts also include secondary inorganic compounds which can account for a major fraction of PM_{10}, and especially of the $PM_{2.5}$ mass [73]. Almeida [74] found lower but still significant contributions from these secondary particles.

As NO_x emissions from modern incinerators are still rather high (I understand that they normally operate close to the 200 mg/m^3 emission limit) then because of the increased size of modern plants compared with those operated in the early 1990's total levels are of the same order as historically – and the NO_x emissions can form nitrates with metals in the incinerator plume and thus increase the toxicity and availability of the emissions as described by Moffet [75]:

"The frequent observation of these metal-rich particles in an urban area with a high population density also has important implications for health effects. The largest fraction of the Pb-containing particles is less than 2.5 μm, meaning that these particles may be efficiently inhaled. Also, there may be important health ramifications if salts such as $Pb(NO_3)_2$ are formed because lead nitrate is soluble, and therefore more mobile within the human body".

Indaver appear to have completely omitted any consideration of secondary particulates and their impacts from their assessment.

Table 9.2 of the application shows that the proposed Ringaskiddy incinerators would produce 125,486 Nm^3/hr from the grate incinerator and 116,995 Nm^3/hr from the Fluidised bed incinerator i.e a total emission of 242,481 Nm^3/hr. The permitted particulate emission standard, subject to statistical limits, would be 10 mg/m^3 and for oxides of nitrogen 200 mg/m^3. Daily emissions could therefore total 5,819,544 m^3 containing 58.2 kg of particulates and 1,164 kg of NO_x .

These are large emissions in any terms – without any consideration of secondary particulates the authorised incinerator emissions would have the potential to daily fill a space 11km x 11km by 50 m deep to the WHO annual guideline of 10 $\mu g/m^3$ for $PM_{2.5}$.

Secondary particles should, of course, be considered in any case. The formation mechanism of nitrates as secondary particles is illustrated below [76]:

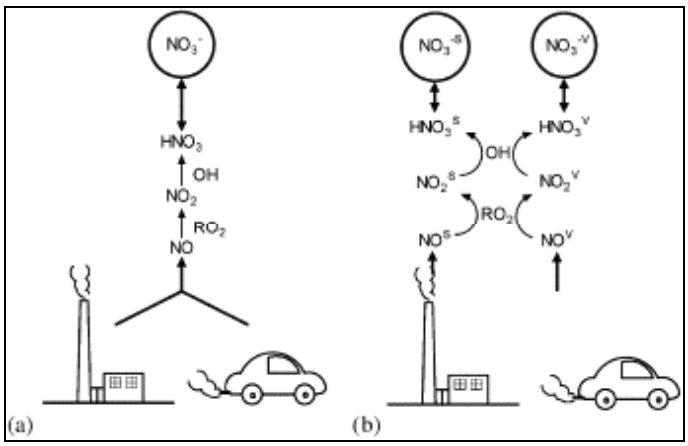

Figure 7: Illustration of source apportionment for secondary PM2.5 nitrate from two sources. (a) Formation of secondary PM2.5 nitrate in traditional air quality model using lumped NO emissions. (b) Formation of secondary PM2.5 nitrate from NO emitted from two sources tracked separately in the source-oriented air quality model used by Ying (from [76]). RO_2 represents a peroxy-type radical, and OH represents hydroxyl radical.

Furthermore emissions from an incinerator installed with a selective non-catalytic reduction (SNCR) NO_x control system as proposed here may actually increase direct emissions of ammonium nitrate which is an important component of $PM_{2.5}$

The efficiency of the filter is therefore not the most significant aspect of the total particulate emission and control of NOx (and to a lesser extent SOx is actually more significant in terms of the contribution to ground level concentrations although neither appear to have been modelled in this application.

4.1 Filter Efficiency:

The proposed incinerator would use a bag filter as the main primary particulate abatement technology. For a given fibrous filter, there is a particle size, usually between 0.05 and 0.5 μm that has the minimum collection efficiency [77] ; that is, all particles, larger or smaller than this size, are collected with greater efficiency. For a given size particle, there is also a velocity for minimum collection efficiency. It is important to establish where this minimum efficiency lies, what the particle density of the emissions at that point are and what the speciation of contaminants (both metals and products of incomplete combustion) carried by those particulates is.

Waste incinerators with the most modern bag filter technology for clean-up of flue gases still emit an aerosol of ultrafine particles, unlimited by legislation [78-81].

Collection efficiencies for particles < 2.5 μm are between 5 and 30% before the filters become coated with lime and activated carbon.

Particle size	Collection efficiency
PM10's	between 95% and 98%
PM 2.5's	between 65% and 70%
PM below 2.5	between 5% and 30%

Efficiency of baghouse filters for particles of differing sizes as claimed by operators. (Onyx 1999)

Though there have been improvements since 1999, the bag filter technology generally used on municipal waste incinerators is not efficient at filtering very fine particles. For particles of less than 1 μm down to about 0.2 μm the abatement efficiency is low. Although very high capture rates, based on gravimetric indices, are generally claimed, the majority by number of ultrafine particles will pass through and current standards do not take into consideration the sizes of the particles emitted by an incinerator. Thus modern plants with their very high gas fluxes are guaranteed to produce an ultrafine particulate aerosol.

Aboh [17] concluded that depending on the number of variables considered, waste incineration and local sources contributed between 17 and 32 percent of $PM_{2.5}$. Whilst the quantitative contribution from the different sources may be treated as indicative since the number of observations were small compared to the number of variables relative strength of the identified sources was seen to change when the variables included in the analysis were varied in number and character, although the same sources remained:

	Waste incineration and local sources	Oil incineration	Biomass burning	Long distance transport (LDT)	Traffic emissions
19 variables	32	33	18	16	1
14 variables	28	29	9	23	12
8 variables	17	21	7	41	14
6 variables	24	11	8	51	6

Ogulei [82] used applied multivariate data analysis methods to a combination of particle size and composition measurements in Baltimore to apportion particulate sources and found that the majority of all the observed Lead (63.4%) and most of the Zn (32.6%) could be attributed to a waste incinerator source. The closest major municipal incinerator to the monitoring site was c. 5 miles away in a direction corresponding to the direction suggested by their analysis. The contribution from this incinerator was about 7.9% which was comparable to the 9.3% contribution that was obtained in their earlier study [83]. The size distribution for this source indicated two modes at 0.02 and 0.15 mm. Whilst the incinerator made approximately the same contribution as both local petrol traffic (8.11%) and coal fired power station (10.34%) the particulate peak was smaller than each of the others and the concentration of heavy metals was much greater in the incinerator particulates.

Ultrafine particle concentrations have been shown to be raised in the plume of a hospital incinerator[3] 350 metres downwind of the plant [84].

4.2 Bimodal Size distribution

It has been known for many years that Aerosol emissions from combustion processes including waste incineration tend to show a bimodal mass distribution with a peak of coarse particles and another of ultrafines *[85, 86].*

Friedlander [87] wrote:

The coarse mode consists of particles with diameters in the range between 1 μm and about 100 μm. In pulverized coal combustion they are formed from the nonburnable mineral inclusions within the fuel particles (Flagan and Friedlander, 1978). In addition to the large fly ash particles there often exists a

[3] The ratio of SO_2/NOx is greater than from vehicle emissions suggesting a fuel of higher sulphur content and discounting a gas fired boiler as an alternative source.

mode of small submicron sized particles which pose a health risk because they are inhalable and may be enriched in toxic metal compounds.

Friedlander pointed out, as we return to below, that the submicron particles are usually less efficiently captured by filter devices and hardly fall under gravity so remain longer in the air .

Ruokojarvi [88] found that half the particle mass in incinerator emissions was under 1.6*μm*, the remainder in a broad distribution up to 14.5*μm.*

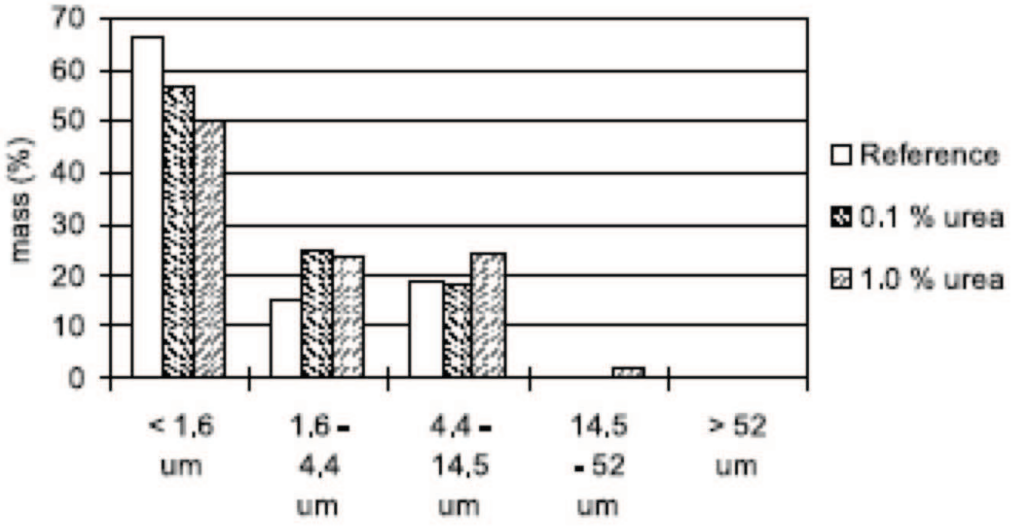

Fig. 4. Mass distribution of particles collected in the cascade centripeter samples.

This figure shows that half the mass is below 1.6μm, somewhat less than in the urban air of Wichmann [23] but it doesn't show the UFPs. Little information has been provided on particles under 1 μm size as the industry is uncomfortable over the issue. Some other data is given below.

4.3 Surface Area of incinerator particles:

The US EPA [89] characterisation of incinerator particulate emissions in the Table below showed that particles <0.7 μm have half the total surface area. Insofar as surface area in contact with lung's surface (epithelium cells) is relevant to exposure/dose effects, the smallest particles carry high weighting, unlike where the total mass (PM index) is considered.

Particle Diameter (μm)[a]	Particle Radius (μm)	Surface Area/ Volume	Fraction of Total Weight	Proportion Available Surface Area	Fraction of Total Surface Area
>15.0	7.50	0.400	0.128	0.0512	0.0149
12.5	6.25	0.480	0.105	0.0504	0.0146
8.1	4.05	0.741	0.104	0.0771	0.0224
5.5	2.75	1.091	0.073	0.0796	0.0231
3.6	1.80	1.667	0.103	0.1717	0.0499
2.0	1.00	3.000	0.105	0.3150	0.0915
1.1	0.55	5.455	0.082	0.4473	0.1290
0.7	0.40	7.500	0.076	0.5700	0.1656
<0.7	0.40	7.500	0.224	1.6800	0.4880

Total surface area: 3.4423 μm^2

Notes: a. Geometric mean diameter in a distribution. Distribution from EPA (1980).

Research has shown that even normally harmless bulk materials tend to become toxic when divided into ultrafine particles. Generally, the smaller the particles, the more reactive and toxic their effect [51, 52]. This is no surprise, because catalysts to enhance industrial chemical reactions are commonly made this way. Making surfaces that are irregular on the scale of just a few hundred atoms creates an enormous area of reactive surface. It is on this surface that catalytic reactions, such as the formation of halogenated organic molecules, can occur. Indeed, because of surface roughness, ash particles can have surface areas 20-30 times the surface area of equivalent spheres [90]. Some of the most reactive nanoparticles to have been studied to date are metals and spinel metal oxides [25]. The upper size limit for such enhanced toxicity of UFPs is not well defined but is generally given between 65 and 200 nm.

4.4 Speciation – inorganic components

Although the particles emitted from large-scale industrial combustion sources are all predominantly in the fine-particle range, their chemical compositions varies substantially depending largely upon fuel types and boiler or furnace operating conditions. This can be illustrated using the fractional abundances of the elements and chemical compounds in the particulate emissions[91].

Typical chemical abundances in source emissions

Source	Dominant particle size	Chemical abundance (mass fractions)			
		>10%	1–10%	0.1–1%	<0.1%
Coal-fired boiler	Fine	Si	SO_4^{2-}, OC, EC, S, Ca, Fe, Al	NH_4^+, P, K, Ti, V Ni, Zn, Sr, Ba, Pb	Cl, Cr, Mn, Ga, As, Se, Br, Rb, Zr
Incinerator	Fine	NH_4^+, Cl, SO_4^{2-}, OC	NO_3^-, Na, EC, Si, S, Ca, Fe, Br, Pb	K, Al, Ti, Zn, Hg	V, Mn, Cu, Ag, Sn
Residual oil boiler	Fine	S, SO_4^{2-}	Ni, OC, EC, V	NH_4^+, Na, Zn, Fe, Si	K, OC, Cl, Ti, Cr, Co, Ga, Se
Wood waste boiler	Fine	K	Na, Fe, Mn	Zn, Br, Cl, Rb	Cr, Cu, Co, Ni, Se, Cd, Ar, Cr, Pb

Key: OC = organic carbon, EC = elemental carbon.

This indicates incinerators are special for Pb, Hg and Br emissions (none of which come in particulates from vehicle emissions).

4.5 Particle Speciation:

Metal emissions from incineration of solid wastes are impacted by compositions of feedstocks and the chemical form of the metals depends on the operating conditions of the incinerator (Wey et al. [92]). A number of studies have identified the 'signature' of incinerators from the metal species. Harrison et al. reported on Birmingham air sampling in 1997 [93], finding zinc and copper to indicate an incineration source. They saw this as the large municipal refuse incinerator within the city (Tyseley), which at the time of sampling was not subject to the tighter Waste Incineration Directive limits.

In the city of Seoul, Mishra et al. [94] found via principal components analysis suggest incineration and the iron and steel industry as possibly significant sources of Pb in particulate matter. Doucet and Carignan [95] examined lead isotopes in French lichens and flyash from different municipal solid waste combustors in the Rhine valley and in other areas of France, concluding that "*these plants* (ie the incinerators) *might be an important source of industrial Pb in the atmosphere*".

Pancras reported [96] "*Large but brief 1.5-h excursions in Zn, Cd, and Pb were found to correlate with winds from the direction of an incinerator in Florida at 17km distance*".

4.6 Speciation – volatile and organic components

Out of over 11 million known chemicals, about 100,000 are being produced on industrial scale and about 1,000-2,000 new chemical entities are being introduced each year [97]. Any of these industrial chemicals may be disposed of by incineration and there is a near infinite number of possible combustion and incomplete combustion products that may be emitted either as particulate matter or by adsorbtion onto or reaction on the surface of particulates. Even if these emissions were monitored, and the vast majority are not, then little or nothing is known about the possible health impacts of the bulk of these emissions.

Volatile chemicals condense on particle surfaces as the incinerator exhaust gases cool. Their concentration on smaller particles is higher, being related to surface area rather than particle mass. This has been subject to particular studies for dioxin and dioxin-like chemicals, but is likely to be similar for many others e.g. [98]. It also holds for volatile chemicals that incinerator UFPs pick up from urban air, specifically the PAHs from vehicle emissions. These cannot penetrate into the body as gases, but if attached firmly to UFPs can be carried through the lung epithelium.

4.7 Range of chemicals coating the particles

There are thousands of chemicals emitted by incinerators. Jay and Stieglitz [99] identified 227 individual organic compounds[4] corresponding to ca. 42% of the total organic carbon

[4] Including: acetic acid, acetone, acetonitrile, aliphatic alcohol, aliphatic amide, aliphatic carbonyl, anthraquinone, benzaldehyde, benzene, benzoic acid, benzoic acid methyl ester, benzoic acid phenyl ester, benzonitrile, benzophenone, benzothiazole, benzyl alcohol, benzyl alcohol, benzylbutylphthalate, bibenzyl, bromochlorobenzene, bromochlorophenol, 2-bromo-4-chlorophenol, bromodichlorophenol, 4-bromo-2,5-dichlorophenol, butanoic acid ethyl ester, 2-butoxyethanol, butyl acetate, C10H20 HC, C10H22 HC (1), C10H22 HC (2), C11H15O2N aromatic, C12H26 HC, C12H26O alcohol, C13H28 HC, C15 acid phthalic ester, C4 alkylbenzene, C5 alkylbenzene, C6H10O2 aliphatic carbonyl, C6H12O, C8H14O cyclohexanone, derivative, C8H5BrCl3 aromatic, MW, 284, C8H5O2N, C9H18O3 aliphatic, C9H8O aromatic, caffeine,

(TOC) in flue gas from an incineration facility of MSW. The identifications exceeded ~50 ng/m^3, 500x higher than the dioxin emission limit set in the Waste Incineration Directive. About 3% of the TOC consisted of halogenated compounds, almost all of which were volatile compounds, while all of the identified semi- and nonvolatile halogenated compounds were aromatic compounds. Besides, 7% of the TOC was aromatic hydrocarbons and 3% of the TOC was phenols [100]. Highly carcinogenic compounds such as dibenzopyrene isomers have been identified and determined in Swedish incinerator emissions by other researchers [101] and it is likely that due to the very heterogeneous nature of the waste emissions will constantly vary with consequences for the speciation of ultrafine particulate emissions.

Similarly Leach [102] found a wide range of VOCs in ground level monitoring around the Marchwood incinerator pre and post shutdowns in November 1996. Although that incinerator has since been replaced the results are indicative of the range of post combustion VOCs that are likely to be found in more modern facilities.

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chlorobenzene, chlorobenzoic acid, 4-chlorobenzoic acid, chloroform, 2-chloro-6-methylphenol, 4-(chloromethyl)toluene, 2-chlorophenol, 4-chlorophenol, cholesterol., cyclohexane, cyclopentasiloxanedecamet, hyl, cyclotetrasiloxaneoctamethy, l, decane, decanecarboxylic acid, dibenzothiophene, dibutylphthalate, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 2,4-dichloro-6-cresol, dichloromethane, 2,6-dichloro-4-nitrophenol, 2,4-dichlorophenol, dichloromethylphenol, 1,3-diethylbenzene, diisooctylphthalate, 2,2'-dimethylbiphenyl, 2,3'-dimethylbiphenyl, 2,4'-dimethylbiphenyl, 3,3'-dimethylbiphenyl, 3,4'-dimethylbiphenyl, 1,2-dimethylcyclohexane, 1,2-dimethylcyclopentane, 1,3-dimethylcyclopentane, dimethyldioxane, dimethyloctane, 2,2-dimethyl-3-pentanol, dimethylphthalate, 2,6-di-t-butyl-*p*benzoquinone, 2,4-di-t-butylphenol, docosane, dodecane, dodecanecarboxylic acid, eicosane, ethanol-1-(2-butoxyethoxy), ethyl acetate, 4-ethylacetophenone, ethyl benzaldehyde, ethylbenzene, ethylbenzoic acid, 2-ethylbiphenyl, ethylcyclohexane, ethylcyclopentane, ethyldimethylbenzene, ethylhexanoic acid, 1-ethyl-2-methylbenzene, 1-ethyl-4-methylbenzene, ethylmethylcyclohexane, 2-ethylnaphthalene-1,2,3,4-, tetrahydro, 1-ethyl-3,5-xylene, 2-ethyl-1,4-xylene, fluorene, fluorenone, fluoroanthene, formic acid, 2-furanecarboxaldehyde, heneicosane, heptadecane, heptadecanecarboxylic acid, heptane, 20, heptanecarboxylic acid, 2-heptanone, hexachlorobenzene, hexachlorobiphenyl, hexadecane, hexadecane amide, hexadecanoic acid, hexadecanoic acid, hexadecyl ester, 9-hexadecene carboxylic, acid, hexanecarboxylic acid, 2-hexanone, hydroxybenzonitrile, hydroxychloroacetophenone, 2-hydroxy-3,5-, dichlorobenzaldehyde, hydroxymethoxybenzaldehy, de, 2-(hydroxymethyl) benzoic, acid, iodomethane, 1(3H)-isobenzofuranone-5-, methyl, isopropylbenzene, methyl acetophenone, 2-methylbenzaldehyde, 4-methylbenzaldehyde, methylbenzoic acid, 4-methylbenzyl alcohol, 2-methylbiphenyl, methylcyclohexane, methyldecane, 3-methyleneheptane, 5-methyl-2-furane, carboxaldehyde, methylhexadecanoic acid, 2-methylhexane, 3-methylhexane, methyl hexanol, 2-methylisopropylbenzene, 2-methyloctane, 2-methylpentane, methylphenanthrene, nonedecane, 4-methylphenol, 1-methyl-2-, phenylmethylbenzene, 2-methyl-2-propanol, 1-methyl-(1-, propenyl)benzene, 2-methylpropyl acetate, 1-methyl-2-propylbenzene, 1-methyl-3-propylbenzene, methylpropylcyclohexane, 12-, methyltetradecanecarboxyli, c acid, naphthalene, N-bearing aromatic, MW, 405, nitrogen compd, MW 269, 2-nitrostyrene, nonane, octadecadienal, octadecadienecarboxylic, acid, octadecane, octadecanecarboxylic acid, octane, octanoic acid, paraldehyde, pentachlorobenzene, pentachlorobiphenyl, pentachlorobiphenyl, pentachlorophenol, pentadecacarboxylic acid, pentane, pentanecarboxylic acid, phenanthrene, phenol, phthalic ester, phthalic ester, propylbenzene, propylcyclohexane, pyrene, Si organic compd, sulphonic acid m.w. 192, sulphonic acid m.w. 224, 2-t-butyl-4-methoxyphenol, tetrachlorobenzene, 1,2,3,5-tetrachlorobenzene, tetrachlorobenzofuran, tetrachloroethylene, 2,3,4,6-tetrachlorophenol, tetradecanecarboxylic acid, tetradecanoic acid isopropyl, ester, toluene, 1,2,3-trichlorobenzene, 1,2,4-trichlorobenzene, 1,2,4-trimethylbenzene, 1,2,5-trichlorobenzene, trichloroethene, trichlorofluoromethane, 3,4,6-trichloro-1-methylphenol, 2,3,4-trichlorophenol, 2,3,5-trichlorophenol, 2,4,6-trichlorophenol, 3,4,5-trichlorophenol, tridecanoic acid, 1,3,5-trimethylbenzene, trimethylcyclohexane, undecane, xylene

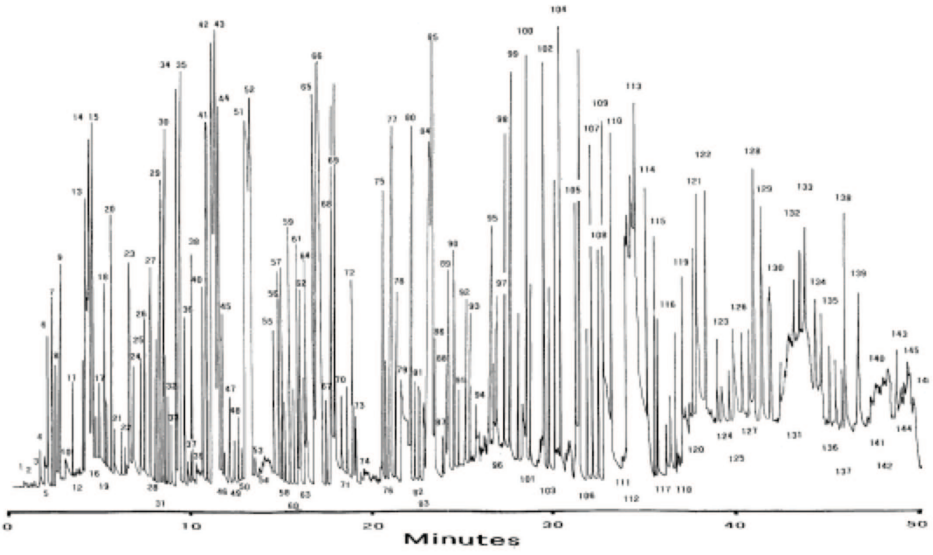

Fig. 4. Representative cGC-FID chromatogram of VOC identified at Sample Station 4, located 100 m south of Marchwood municipal incinerator (September 1996). Peak identifications are given in Table 2.

The toxicity of chemically-coated particles can be enhanced over expectations for single chemicals, because of synergies (coalitive effect, cosynergism and potentiation).

4.8 Dioxins and PCBs on Small Particles:

Fängmark et al. [13] concluded from analyzing incinerator flyash that chlorinated organics tend to be concentrated on the smaller particles. A similar result by Ruokojärvi et al. [9] found the < 1.6-μm fraction was disproportionately loaded. The distribution of PCDD/F with particle size in atmospheric dust collected at four Japanese sites was examined by Kurokawa et al. [11]. The maximum size collected was 30 μm in aerodynamic diameter, and the smallest 0.1 μm. Particles less than 1.1 μm contributed 50% of the total PCDD/F, with an almost equivalent I-TEQ proportion. The distribution of homologues changed with size, with the fraction of less chlorinated congeners in the homologue groups increasing with increasing particle size.

Chang [5] sampled air around a 1995 incinerator in Taiwan that had been fitted with activated carbon filtration to reduce the dioxin emissions to the EU standard of 0.1 ng/m3 and still found PCDD/F concentrations downwind of the MWI to be the highest and upwind to be the lowest among all sampling sites, concluding the MWI is noticeably contributing to dioxin levels in the ambient atmosphere.

Similarly Chao [103] sampled sites 1.1 and 2.1 km downwind from a municipal incinerator in central Taiwan and showed that PCDD/Fs were associated with the full size range of atmospheric particles.

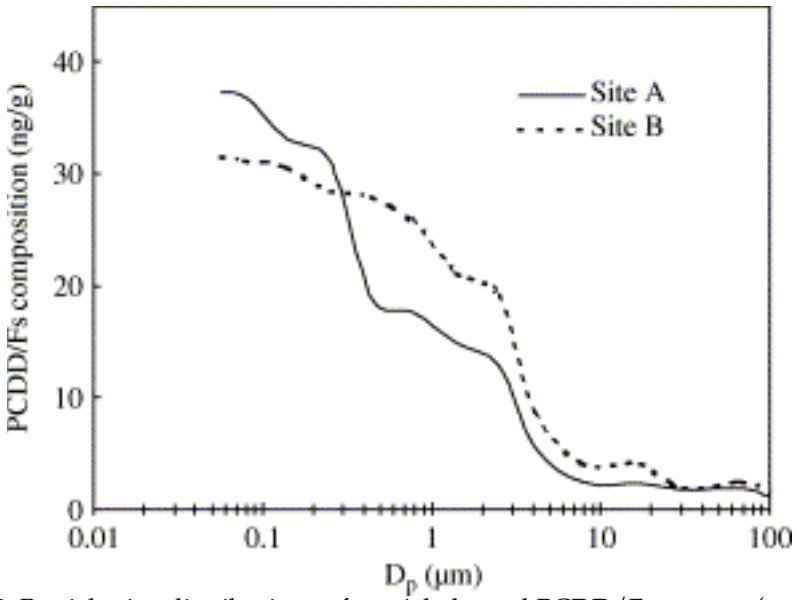

Fig8: Particle size distributions of particle-bound PCDD/Fs content (ng g^{-1})

More than 80% of the PCDD/Fs and toxic equivalents (TEQs) were found to be associated with fine particles of aerodynamic diameter 2.0 μm. Generally a smaller particle had a higher PCDD/Fs content and the dioxin concentration can be seen to increase to the very finest particles. The particle size distributions of PCDD/Fs and TEQs were shifted to larger particles with increasing time and distance.

Professor Sakai [104] analysed the mass balance of total and dioxin-like (co-planar) PCBs across a municipal waste incinerator and found that whereas the input of Co-PCBs into the MSW incineration facilities was 0.13–0.29 μg-TEQ per ton waste, the total output of Co-PCBs (the sum of Co-PCBs released from emission gas, fly ash, and bottom ash) was 4.9μg-TEQ per ton waste. Whilst over 90% of the total PCBs were destroyed in the incineration process the toxicity of the output was found to be higher than that of the input. This emphasizes the importance of assessing PCB emissions as well as those of dioxins and as the indications are that PCB synthesis was taking place post-combustion it is likely that the contaminants on the smallest particles would include PCBs as well as dioxins.

4.9 Halogenated Dioxins

It should be noted that whilst currently 17 dioxins and furans are measured there are actually many more – and this has been recognised for more than 20 years. In 1987, for example, Schechter [105] wrote:

"We are faced with the problem that animal data, upon which risk assessment and standard setting is based, is very incomplete. Also, as noted by Buser, in addition to the 200 plus chlorinated dibenzodioxins and dibenzofurans which may exist, there may be 5,000 chlorinated, brominated or bromochlorodioxins and dibenzofurans which may exist from incineration sources and which may be of potential concern".

Since 1987 it has been demonstrated beyond doubt that brominated and mixed halogenated dioxins are produced by incinerators and that their toxicity is similar to - and sometime greater – than the chlorinated dioxins. In spite of this these dioxins are still not incorporated into incinerator risk assessments.

4.10 Combined Particle Size Distribution and Speciation:

Unfortunately few researchers have combined data on particle size distribution and speciation. Greenberg [106] tested emissions from the Nicosia incinerator and found 70-90% of the Zn, Cu, Cd and Pb to reside in the smallest particles (< 0.8□*m)*. However, that facility had only an electrostatic precipitator at the time, so the results are not directly transferrable to a more modern plant with a bag filter. Nonetheless it is clear that the majority of the metals exposure should be anticipated to arise from the ultrafine fraction of the emissions.

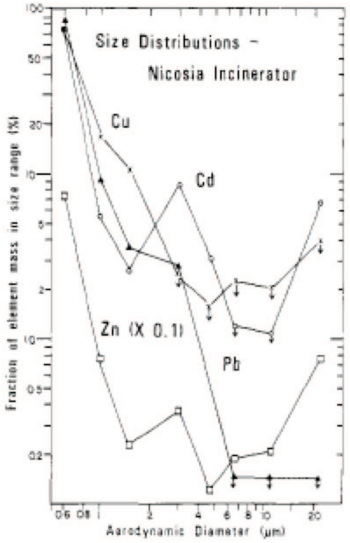

Figure 2. Size distributions of particles bearing indicated elements in terms of stack-gas mass concentration of the element (i.e., total mass per unit volume times elemental concentration in mass) vs. particle diameter, normalized to 100% for each element
Data obtained from analyses of material collected with cascade impactor. First stage collected all particles with $D > 15$ μm; last stage (back-up filter) collected particles <0.8 μm

4.11 Future Risks – Disposal of Nanotechnology wastes:

Nanomaterials are already reportedly used in over 800 products and the sales of which were valued at $147 billion in 2007 and are expected to soar over the coming years with a predicted value of $3.1 trillion by 2015 [107]. Inevitably the quantities of waste containing nanoparticles will increase rapidly but little thought has yet been given to the consequences of this. When products are incinerated, the thermal properties of nanoparticles determine their fate. There is evidence that at least some nanoparticles will pass through incinerators and be dispersed into the environment..

Franco [108] writes: " *whereas the onset temperature reaction for C60 is very low (315 °C), carbon nanotubes display very low reactivity under combustion conditions (onset temperature = 820 °C) and hence may not breakdown in an incinerator [109]. In theory, this means that they could end up in the gaseous effluent and released into the atmosphere*".

This is a significant concern given the inability to filter ultra-fine particles even with modern bag filters [78-81]. Any nanoparticles released from an incinerator increase the risk described above and incineration may increasingly play a role as a very effective delivery mechanism directly into the alveoli for a wide range of products of waste nanotechnology products.

4.12 Risk Assessment:

The risk assessment in relation to particulates that has been undertaken by the Indaver is rather simplistic. The principle assumption, and the basis for the conclusion, it that if air quality standards are not exceeded by the combination of existing ambient concentrations and the marginal increase from the incinerator then no harm is assumed to occur.

This approach is, of course, fundamentally flawed for those emissions, like particulates for which no safe level can be demonstrated.

Kunzli [110] wrote "*In many countries, policy makers currently face the problem that air quality criteria regulations are intended to "protect health", including the health of the most vulnerable people; to date, research has failed to obtain any evidence for a no-effect threshold. Thus, similar to carcinogens, the natural "threshold" might be zero exposure. Therefore, non-zero target values of clean air acts, inherently assume that some health impact of air pollution may be accepted. Impact assessors must choose a level below which they explicitly want to ignore the impact on air pollution*".

Chao [103] comments that even though a large number of atmospheric dispersion models exist and are readily available for use, the risk assessor is generally faced with little or no data on the atmospheric particle size distribution of PCDD/Fs. Lohman and Seigneur [111] conclude that "*it is essential to obtain accurate characterizations of the particle size distribution of particulate PCDD/F because the dry deposition flux is very sensitive to the particle size distribution*". Without such data accurate risk assessment is not possible and yet there is no evidence that it has been collected or used in relation to this application.

4.13 Conclusions on UFPs from Incinerators:

Not only do a high proportion of the UFPs escape the filters, but they are chemically reactive and carry a wide range of products of incomplete combustion and adsorbed metals with them. The subsequent direct uptake of these respirable particles and the ready transfer from the lungs into the blood stream may be part of the reason that traditional toxicology is at a loss to explain the level of impacts for such apparently low exposures.

Aerosols in the ultra-fine size range have much higher mobility in the air and can more effectively deposit in the respiratory system.

Ultrafine particles have been found to be chemically highly reactive, even when originating from a relatively unreactive bulk material [25]. The massive surface area associated with a small mass of nanometre-sized particles can act as a catalytic surface for the secondary formation of organic compounds such as the *de novo* synthesis of dioxins.

The relative toxicity of ultrafine particles arising from different processes remains un-researched. The levels of heavy and transition metal inputs in municipal solid waste are very much higher than with conventional fuels. Such increases must inevitably be associated with an increase in toxicity and consequently the likelihood of adverse health effects among the local receptors.

In my opinion, there is also a need to determine the relative toxicity of the particulate aerosols in the gases emitted by different waste disposal routes, to facilitate rational decisions as to the best disposal method, particularly with respect to public health. This should be addressed urgently but, in the meantime with the significant prospects of serious harm to health, high weight must be given to the precautionary principle.

5 The Precautionary Principle

The Twenty-fourth Report of the Royal Commission on Environmental Pollution, *Chemicals in Products: Safeguarding the Environment and Human Health*, [112]pointed out that the historical record is replete with unexpected toxicological impacts arising following the use of anthropogenic chemicals.

The Royal Commission emphasized that whilst we have learnt a great deal from some of the early episodes we may still be caught unawares, as witnessed with the emergence of a large number of different endocrine disrupting chemicals during the 1980s and 1990s.

"*It was not foreseen that low concentrations of chemicals used as antifouling agents (tributyltin), surfactants (nonyl phenol), flame retardants (polybrominated diphenylethers) and plasticisers (phthalates) would bind to hormone receptors or disrupt hormone metabolism in birds, reptiles, fish and invertebrates and influence sperm counts and the development of testicular malignancy in humans* [113, 114]."

These examples refer to chemicals whose reactivity it was felt was reasonably well understood. This is not the case with the UFPs with their wide range of chemical loading that are released in large quantities from modern incinerators. Apart from the fact that we know they are likely to be harmful at concentrations well below current air quality standards little is known of about the likely extent of environmental effects or their likelihood of causing unintended harm. Furthermore as nanotechnology expands there are even greater future risks from relying on technologies which, in at least some cases, are more likely to disperse them into the atmosphere than to destroy them as described above.

Having reviewed the science and the hazards of ultrafine particles I agree with Kunzli [110] who wrote "*In the light of all the uncertainties and limitations, researchers should not lose sight of the general patterns and perspectives. Given the current level of evidence of the association between air pollution and health, the precautionary principle may provide excellent guide to rigorously implement clean air strategies*".

The precautionary principle is part of the framework for sustainable development and I consider that the principle should be regarded more seriously when considering incineration processes, where there is significant scientific uncertainty and serious risks of harm.

The precautionary principle in its modern formulation is a means to safeguard public health. The European Commission advised the inclusion of public health in 2000 (European Commission Communication on Precautionary Principle, 2 February 2000), saying that the precautionary principle should be applied where "*there are reasonable grounds for concern that potential hazards may affect the environment or human, animal or plant health, and when at the same time the lack of scientific information precludes a detailed scientific evaluation*".

The EU Treaty Article 174(2) as amended at Nice 2004 recognized that scientific evaluation can be inconclusive and accorded priority to public health:

> a precautionary approach must be paramount, as opposed to acting only where proof or very strong suspicion of harm can be demonstrated. The Precautionary Principle should be applied where the possibility of harmful effects on health or the environment has been identified and preliminary scientific evaluation proves inconclusive for assessing the level of risk. Account should be taken of social and environmental costs in examining the level of risk, but the protection of public

health, including the effects of the environment on public health, must be given priority.

I would therefore recommend that this application should not be approved in the light of the likely risks to public health and the Environment detailed in this evidence.

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EDXRF characterisation of elemental contents in PM2.5 in a medium-sized Swedish city dominated by a modern waste incineration plant†

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Energy dispersive x-ray fluorescence (EDXRF) analysis of airborne particles has previously been shown to be a powerful technique for identifying key elements or elemental ratios for identification of important sources of air pollution. In the present work the technique was used for assignment of major sources of aerosol particles (PM2.5) in a medium sized Swedish city in southwestern Sweden, in which a new incinerator of household and industrial waste had recently been installed. Data on particle mass and black carbon contents in PM2.5 were also recorded together with SO_2 and NO_2 during the same study period. In spite of the small data set it was possible to identify five major sources for collected PM2.5, namely, waste incineration together with other local sources, oil incineration, biomass burning, long-distance transport and traffic emissions. Major characteristic elements for the respective sources were identified from regression analysis of the data and from information obtained in previous studies. A receptor model based on the use of trace observations was used for quantitative calculation of the source contribution to PM2.5. The relative strength of the identified sources was seen to change when the variables included in the analysis were varied in number and character, although the same sources remained. It must be noted that the quantitative contribution from the different sources may be treated only as informative at present, since the number of observations are small compared to the number of variables. Copyright © 2007 John Wiley & Sons, Ltd.

INTRODUCTION

Significant changes have occurred during the last few years regarding the attitudes towards waste and waste disposal in the EU and many other countries. The public at large has come to accept the ideas of waste separation and recycling of products and materials as an important means to create a sustainable society. Worldwide, the production of goods has increased seven fold since the 1950s, during which time the world population has doubled. Since a major part of the products ultimately end up as waste, the handling of waste is one of the crucial factors for future sustainability.

In Sweden, deposition of combustible waste on land-fills is prohibited from January 1, 2002. There is also a strong motivation to move further away from the dependence on fossil fuels and increase efficiency in the generation of heat and electricity. The city of Borås has declared itself as one of Sweden's sustainable cities and has for a long time been a pioneer in environmentally friendly waste handling and production of biogas. In order to solve the problems of handling the combustible domestic and industrial waste and at the same time decrease the dependence on fossil fuels, the city of Borås has made substantial investments recently in new technology for classification and incineration of waste in its new incinerators (bubbling fluidised bed) at the district heating plant. It has been designed for research activities on efficiency, emission control and economy and thus gives unique opportunities to conduct full-scale experiments in long-term studies under controlled conditions.[1,2]

In recent years, a large number of scientific reports on waste incineration have been published, many of which concern system studies and properties of the ashes.[3–8] Receptor modelling from waste incineration is less frequent although evidence of environmental effects is obtained as part of statistical treatment and principal component analysis (PCA) of ambient data.[9] Since incineration plants are often located in close proximity to populated areas, it is important to evaluate the impact of the activity and the additional health hazards involved. In the present work, a study has been made on the ambient air quality in the city of Borås with the aim of identifying the characteristics of aerosol particles (PM2.5) due to waste incineration. Ambient air is, however, a complex mixture of gases and particles. Some of the major polluting gases,

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for example NO_2 and SO_2, are continuously monitored in the city of Borås by the Environmental Protection Department. However, suspended particulate matter is not routinely monitored or analysed by the local health authorities.

Health effects due to small aerosol particles have been studied extensively during the last ten years,[10–13] and so far, there does not seem to be any evidence of a 'threshold' or any 'safe' level. Estimates of the number of excess deaths on a global scale due to particle inhalation have been made, and they amount to about 2 million/year and 370 000 per year within the EU.[14] The health effects are not limited to lung injuries. They also include cardiovascular diseases and cancers.

EXPERIMENTAL

Sampling location

The city of Borås with approximately 100 000 inhabitants is located in the southwestern part of Sweden. It is characterised by small and medium-size enterprises (SME). Since the aim of the project was to study the PM2.5 contribution from the waste incineration plant and other major sources to the ambient air, the place of monitoring particles was chosen to represent the general air that the citizens are exposed to. Therefore, it is not located in close proximity to any of the major activities, for example large roads. The position of the measurement location in the city is shown in Fig. 1.

On-line sampling of aerosols and meteorological data

Since the summer of 2004, the University of Borås has operated a tapered element oscillating microbalance (TEOM) instrument, which is set to determine the mass concentrations of aerosol particles of diameters < 2.5μm. The instrument is positioned in the central part of the city approximately 25 m above street level and is not in close proximity to any strong local source.

Figure 1. Map of Borås, showing the sampling position and the waste incineration plant. The distance between the two places is about 900 m.

The TEOM instrument (TEOM particulate mass monitor, Series 1400 Sensor Unit, Rupprecht & Patashnick Inc., USA) collects particles on a Teflon coated glass fibre filter heated to 50 °C. The filter is attached to the tip of a tapered, hollow, oscillating rod. The change in the oscillation frequency is used to make a direct measurement of the accumulation of mass on the filter over time. The TEOM is equipped with a PM10 inlet followed by a PM2.5 inlet (Rupprecht & Patashnick Inc) and has a flow rate of 1.0 m^3/h of which 3.0 l/min pass through the filter.

The Environmental Protection Department of Borås operates a differential optical absorption spectroscopy (DOAS) system at about 200 m distance from the aerosol station which measures NO_2, SO_2, benzene, toluene and xylene with one hour time resolution at approximately the same height.

In a previous study[15], it was found that meteorological variables (e. g. wind speed, wind direction, temperature and humidity) exert a strong influence on the particle concentrations. Results from this study showed that there was a dramatic decrease in particle concentrations when the wind velocity increased from below one to only a few m/s.

Large variations of aerosol particles as well as of ambient gases throughout the day and night can be expected from the daily activities of the city population. Changes in daily averages are not equally dramatic, but can still expose a variation of a factor of 10 between a 'clean' and a 'dirty' day. These variations are largely due to meteorological factors like precipitation, mixing height, inversion and air mass pathways across 'clean' or polluted regions.

Sampling of PM2.5 on filters

In order to study the mass, elemental and black carbon contents of the aerosol particles, a campaign with sampling of aerosol on filters was conducted from the 27th of July to the 23rd of August, 2005, in parallel with the on-line monitoring of particle mass, gases and meteorological data.

The filter sampler used for the PM2.5 aerosol sampling was an impactor manufactured by IVL Swedish Environmental Research Institute Ltd. A sketch of the sampler is shown in Fig. 2. The sampler is mounted inside an upside down plastic bucket that protects the inlet from both rain and from direct deposition of particles from the air.

The sampler in the present work has a flow rate of 1 m^3 h^{-1}. The PM 2.5 particles are collected on thin Teflon filters of 25 mm diameter with pore size of 3.0 μm (TEFLO™ R2PI025, Pall Corporation, Ann Arbor, MI, USA). These thin, high purity filters are suitable for analysis with energy dispersive x-ray fluorescence (EDXRF) technique and have a high particle retention efficiency.[16,17] The filters used in this study were selected from a batch, out of which a representative number had been pre-analysed for trace elements before sampling and found to have negligible concentrations of the studied elements. The Teflon filters were changed manually every 24 h during the sampling period.

Before and after exposure, the filters were weighed after 5 days of moisture equilibration in desiccators, using a microgram sensitive Sartorius balance at room temperature.

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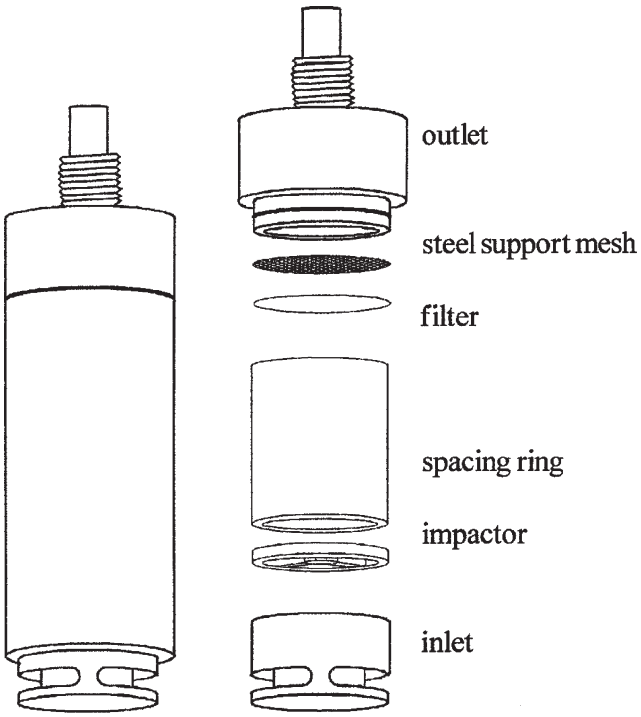

Figure 2. Schematic diagram of the IVL PM2.5 sampler. The filter diameter is 25 mm and the sampler height is 10 cm.

Thus, there was additional information on the aerosol mass during the campaign besides the information obtained by the TEOM instrument.

Analytical techniques applied to aerosol filters

Analysis of black carbon

Concentrations of black carbon (BC) can be calculated by measuring the optical absorption of the sampled aerosol on a filter with a reflectometer. An instrument from Eberline Instruments GmbH, Erlangen, was used.[18] In a previous study, it was shown that glass fibre filters, as recommended by the manufacturer, will give the same results as sampling on Teflon filters, provided that the Teflon filters are supported by a white backing during the BC measurements.[18]

The EDXRF spectrometer

The EDXRF spectrometer at the Department of Natural Sciences, University of Copenhagen was used in the present study.[19] The spectrometer is a compact, versatile and sensitive unit, using a high power Mo x-ray tube. The primary beam is monochromatised by a highly oriented pyrolitic graphite (HOPG) crystal and the detector is a Peltier cooled Si(Li) detector. The detector has an active area of 20 mm^2, FWHM at Mn Kα of 146 eV. The x-ray tube was operated at a voltage of 40 kV and a current of 40 mA in the measurements. The live time of each spectrum was 2000 s. Since the irradiation chamber of the spectrometer is evacuated, elements from Al and heavier can be detected, analysed and quantified. Minimum detection limits (DLs) for the spectrometer are shown in Table 1.

In order to calculate the concentrations of the different elements on the filters, the spectrometer was calibrated using thin film reference material from NIST (NBS SRM 1832). The x-ray fluorescence spectra were quantitatively analysed by the use of a fundamental parameter programme.[20]

Table 1. Minimum detection limits (DL) for particulate matter on Teflon filters with EDXRF technique at the Department of Natural Sciences, University of Copenhagen, Copenhagen, Denmark

Element	DL[a] ng/cm^2	DL[b] ng/m^3
Si	84.0	11.0
P	50.1	6.6
S	31.9	4.2
K	7.7	1.0
Ca	4.3	0.56
Ti	2.4	0.31
V	1.8	0.24
Cr	1.3	0.17
Mn	1.2	0.16
Fe	1.0	0.13
Ni	0.9	0.12
Cu	0.9	0.12
Zn	0.6	0.08
As	0.4	0.05
Se	0.4	0.05
Br	0.3	0.04
Pb	0.7	0.09

[a] DL is calculated as 3 times the square root of background concentration (3σ). Mo Ka:17.44 keV, V = 40 kV, I = 40 mA, collection time 2000 s.

[b] DL for particle concentrations is calculated for a sampling of 24 m^3.

PRINCIPAL COMPONENT ANALYSIS (PCA) AND MODELLING

Theory

Statistical methods are commonly used for identification of the relative importance of different sources.[9,15,18,21–23] Input data for source assignments are chemical species, analysed by many methods, for example IC, INAA, ICP-AES, GC-MS, EDXRF, PIXE, TXRF and thermooptical and light scattering methods, for total, organic and elemental carbon.

In the present approach BC, elemental concentrations and mass were used. The model by Thurston and Spengler[23] was the basis for analysing the typical species ('fingerprints'), which characterised the different sources. In addition, the SO_2 and NO_2 data together with correlations between different species were used in support of the source assignments.

The modelling of absolute source contributions is based on the receptor model approach, where the measured concentration of a particular species is the result of a linear sum of independent contributions from distinct sources. Algebraically this is formulated in the matrix equation:

$$C = P S \quad (1)$$

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Here, C is the data matrix of dimension (n,q), where n is the number of variables and q, the number of samples. P is the source profile matrix of dimension (n,p), where p is the number of distinct sources and S is the source contribution matrix of dimension (p,q). For the present receptor model, samples were collected daily and the variables are elemental concentrations in ng/m^3 and the mass of PM2.5 in μg/m^3.

Once the number of distinct sources is determined, P and S are derived from a PCA analysis giving the relation:

$$Z = L\,F \tag{2}$$

Where a row in Z corresponds to the autoscaled variable of the same row in C:

$$z_{i,j} = (c_{i,j} - \mu_i^c)/\sigma_i^c \tag{3}$$

μ_i^c and σ_i^c are mean and standard deviation of variable i. L and F are the loading matrix and the score matrix and may be found by traditional PCA. The problem is to rescale L and F to the physical meaningful matrices P and S. This is done in two steps: First a 'tracer' sample,[21] with sample number q+1, having all variables set equal to zero is included in the dataset, then a PCA is used to determine the score matrix F in which the rows are treated as autoscaled values of the rows in the source matrix S. Hence, using the result for the 'tracer' sample, the f values are transformed to a scaled source matrix. In the case of the PM2.5 variables the introduction of the 'tracer' sample states:

$$s_{i,q+1} = 0 \tag{4}$$

and for the autoscaled row variable in F:

$$f_{i,j} = (s_{i,j} - \mu_i^s)/\sigma_i^s \tag{5}$$

μ_i^s and σ_i^s are mean and standard deviation of source i and in the case of the ''tracer'' sample:

$$f_{i,q+1} = (s_{i,q+1} - \mu_i^s)/\sigma_i^s \tag{6}$$

Combining (4) and (6) gives:

$$\mu_i^s = -f_{i,q+1} \times \sigma_i^s \tag{7}$$

and in turn combining (5) and (7):

$$s_{i,j} = \sigma_i^s (f_{i,j} - f_{i,q+1}) \tag{8}$$

Secondly, the knowledge of the sample mass is used in a mass balance calculation to transform the scaled score matrix into the unscaled source matrix by regression of the transformed f values on the mass-variable $c_{PM2.5}$. The source matrix PM2.5 values must be related to the experimental mass values, $c_{PM2.5}$ by the relation:

$$c_{PM2.5,j} = \Sigma_i s_{i,j} = \sigma_i^s (f_{i,j} - f_{i,q+1}) \tag{9}$$

The coefficients σ_i^s are found by regression of $(f_{i,j} - f_{i,q+1})$ on $c_{PM2.5,j}$. The elements in the source matrix are now given by Eqn (8) and they describe the daily variation of the PM2.5 mass-variable of the source in ng/m^3. Finally the source profile matrix is calculated:

$$P = C\,S^T (S\,S^T)^{-1} \tag{10}$$

It must be noted that in order to obtain physical meaningful results, negative values in S and L are truncated to zero before further calculations.

Table 2. Average concentrations of elements, BC and mass of PM2.5 particles in the city of Borås

	Mean ng/m^3	Median ng/m^3	Lowest—highest ng/m^3
Si	35.22	24.21	11.7–142.2
P	29.54	24.52	9.9–66.9
S	515.03	454.68	154.9–1139.5
K	36.23	22.98	13.6–181.0
Ca	15.58	12.12	4.7–43.1
Ti	1.01	0.70	0.3–26.4
V	1.73	1.80	0.3–3.3
Cr	0.68	0.48	0.2–1.7
Mn	0.73	0.56	0.3–2.7
Fe	26.00	24.22	10.3–72.7
Ni	0.71	0.77	0.2–1.6
Cu	1.02	0.92	0.5–2.4
Zn	4.16	3.24	1.2–14.6
As	0.60	0.51	0.2–1.3
Se	0.35	0.15	0.1–2.3
Br	1.41	1.42	0.6–2.5
Pb	0.98	0.59	0.1–2.7
BC	0.60×10^3	0.53×10^3	$(0.35–1.17) \times 10^3$
Mass	5.7×10^3	5.4×10^3	$(2.4–13) \times 10^3$

Calculation

Twenty-seven samples of the PM2.5 filters were analysed for 20 elements (ng/m^3), BC (μg/m^3) and particle mass of PM2.5 (μg/m^3). Also the daily mean content of NO_2 and SO_2 (μg/m^3) were measured and used in correlation analysis, but not included in the PCA modelling. Due to severe peak overlap and/or bad counting statistics, the concentrations for Al, Cl and Sr were omitted in the following calculations. Missing values were found for some of the elemental concentrations. There are different ways of treating missing values. In the present study, missing values were set equal to half the value of the DL. The correlation matrix between variables was the key for determining the number of sources.

RESULTS AND DISCUSSION

Concentrations of elements, black carbon, mass and gaseous components

Concentrations of elements, BC and mass of the PM2.5 aerosol are shown in Table 2. The median values are shown in the table because the means will generally have a large influence from extreme values during a few days, and a comparison between means and medians may give information on to what extent the values are influenced by extreme conditions. The STDs for the elemental EDXRF measurements on this instrument are in the order of about 10%.[19]

X-RAY Spectrometry

As seen from Table 2, the BC contents of PM2.5 are in the order of 10% of the mass. For coarse particles, PM(2.5–10), the contribution of BC has been found to be of the order of one percent of the total mass in this fraction.[18] The mass concentrations, on the other hand, are of similar magnitude in PM2.5 and PM(2.5–10) in Swedish urban environment.[15,24] The mean concentration of 6 μg/m^3 for PM2.5 as listed in Table 2 is rather close to that found in other urban locations, provided that measurements are not performed in close proximity to strong sources.[15,24,25]

The median concentrations of NO_2 and SO_2 for the same period were 10.9 and 2.08 μg/m^3 respectively.

In regression analysis of all data on elements, mass, BC and the gaseous components NO_2 and SO_2, the information was used to support the source assignments for the factors obtained in the PCA. It was noted that the correlation coefficient between V and Ni is very high, 0.94, and that the only other significant correlation coefficients are for Br and S (>0.50). Thus, it is highly likely that V and Ni have at least one common source. The close connection between the two elements is illustrated in Fig. 3 for the study period. Many metals, for example Cu and Fe, are highly correlated to the blackness (BC) of the aerosol particles. Another observation is that many of the metals have high correlations between them, again indicating that they have one or more common sources.

Source assignment from PCA modelling

In the principal component analysis several runs were made in which the number of factors were varied, and varimax as well as promax rotations were performed. However, since the pollution sources are independent of each other and because varimax gave the most consistent results when the number of factors was varied, varimax was chosen for the final source assignments.

The Scree plots from principal component analysis using different subsets of variables indicated the number of significant factors to be 4 or 5. Also a hierarchical clustering calculation based on the correlation matrix, in which the variables are observations and the correlation coefficients are variables, indicated a substructure of the dataset based on 5 factors. A dataset of 27 daily observations is small in order to precisely estimate the correlation structure for five sources and therefore stable results are not expected. Nevertheless, calculations based on the previous equations were carried out for different subsets of variables and the percent source contributions to PM2.5 were calculated. The results are shown in Tables 3 and 4.

Thus the following five main factors were identified:

- Incineration of domestic and industrial waste in the city of Borås together with other local sources, with signatures of many metals, for example Pb.
- Oil incineration from small scale oil burning and major refineries in the region. Signatures are in particular V and Ni, as already dicussed.[26]
- Biomass burning occurs in the Borås region in private houses but also in the incineration plant. Previously found signatures are those of K and the K/Zn ratio.[15,24]
- Long distance transport (LDT) to Sweden, mainly from the European continent. LDT has been proved to bring a substantial amount of sulphate into the country. The main indicator is therefore S.[27,28]
- PM2.5 in traffic usually contains a contribution from street dust, but traffic is also known to give rise to gaseous pollutants which may be transformed into particles by gas-to-particle conversion. In the present case we have utilised the positive correlation coefficients (R>0.5) between NO_2 and in particular Fe and Cu as indicators of traffic. It should be noted that NO_2 has few positive correlation coefficients with other metals than the two mentioned and

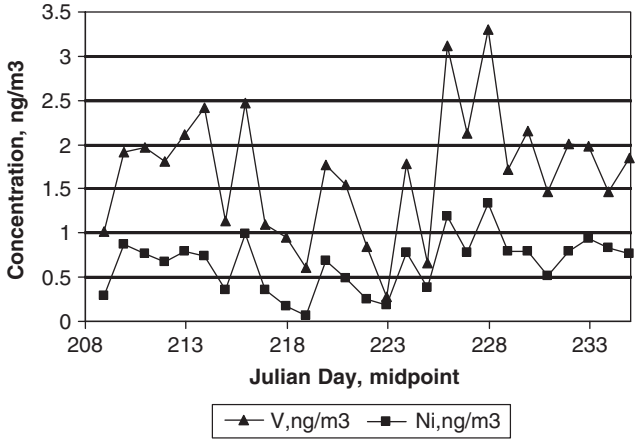

Figure 3. Daily variations of V and Ni during the period of the study.

Table 3. Set of variables used in the calculations of source contributions

19 variables	Si, P, S, K, Ca, Ti, V, Cr, Mn, Fe, Ni, Cu, Zn, As, Se, Br, Pb, BC, mass
14 variables	P, S, K, Ca, Ti, V, Mn, Fe, Ni, Cu, Zn, Br, Pb, mass
8 variables	S, K, V, Fe, Ni, Zn, Pb, mass
6 variables	S, K, V, Fe, Pb, mass

Table 4. Estimated percent contributions of PM2.5, normalised to 100%, for the different sets of variables listed in Table 3

	Waste incineration and local sources	Oil incineration	Biomass burning	Long distance transport (LDT)	Traffic emissions
19 variables	32	33	18	16	1
14 variables	28	29	9	23	12
8 variables	17	21	7	41	14
6 variables	24	11	8	51	6

DOI: 10.1002/xrs

the soil derived elements (Si, Ca, Ti and Mn), although the latter are at a lower level ($R = 0.3$).

Quantification of source influence by the choice of the numbers of variables

Since the measurements were conducted during a limited time period, which gave rise to a limited number of samples, the statistical analysis was also conducted by varying the representative variables. Reduction of variables gives better statistical significance, but it will have to be done considering the available knowledge of the typical fingerprints of the respective sources. In the choice of variables, knowledge from correlation coefficients and from previous work was also used.[15,16,18,27–29]

In the modelling efforts the variables in the dataset were used in the following way:

At first, all species in Table 2 were used in a common dataset. This means that the aerosol, containing both particles and gases, were analysed with respect to listed species. Since the daily variations of all species are very large due to meteorological factors (mixing height, inversion, rainfall, wind direction, wind-speed, air mass trajectory movements etc.) this analysis is highly affected by meteorological factors and the number of variables increase drastically if meteorological factors are included. This approach was however abandoned, not only because of the many variables but also because we were interested in the sources of the PM2.5 particles. These sources can be point sources, or area sources as for traffic emissions, biomass burning and oil incineration in close proximity to the sampling site or at a long distance.

Thus, we turned to the problem of finding the sources for the actual PM2.5 particles and used only the variables, dependent on the composition of the PM2.5 in the aerosol. Thus, the gases were not taken into account, and the element and BC concentrations were normalised to relative concentrations (ng/μg of mass).

In order to study the influence of the number of variables on the source contribution to the sampled PM2.5, the variables in the dataset were varied in number from 19, 14, 8 and down to 6. In the reduction of variables, the character of the main sources remained, but the relative contribution from the different sources varied significantly.

An illustration of the relative strengths of the respective sources as obtained when the number of variables is reduced is shown in Tables 3 and 4 for the different cases. The reason for the large differences for the outcome in the different approaches is not clear but will have to be studied more in detail. It is obvious that too few variables may affect the outcome, but it is also important to choose the best signatures.

CONCLUSIONS

It is satisfying that the same characteristic elements appear in the factors describing the major sources for the PM2.5 aerosol, although some crucial questions remain to be solved regarding how many and which variables should preferably be used in statistical analysis for obtaining quantitatively consistent results on source contributions. This is not a trivial question, because there are many species not studied in the present work, especially chemical organic components. If these species are included in the databases, together with all meteorological variables, the problem of source identification would probably be too cumbersome.

One should also remember that the source strengths vary throughout the year and this is especially pronounced in Nordic countries with a big difference in heating and also work activities between the summer and winter periods. Thus, source strengths are not expected to be the same during the year and also a larger database would need to be broken down into activity-related periods. Also, for these cases it seems unrealistic to obtain a sufficient amount of statistically significant data if all possible variables are to be included in the modelling. Therefore, we find it even more relevant to look for elemental signatures is that are characteristic for the major sources. Elements have the advantage that they are not transformed in chemical reactions in the atmosphere during transport from source to receptor site.

A crude test of the modelling presented in this work can be seen in Fig. 4. In this figure the experimental particle mass is plotted each day together with the modelled mass for the case of using 8 variables as illustrated in Table 3. The results in Fig. 4 show that the PCA method can be used with some confidence, although details in the roles played by the different variables will have to be studied further.

Particle concentrations in winter and in summer only differ slightly: During winter the particle mass concentration as measured by the TEOM is 8.7 ± 4.5 μg/m^3 and in summer 7.7 ± 2.6 μg/m^3. From this relatively small difference we draw the conclusion that, even if our measuring campaign covers a relatively short period during the summer, the source assignments should be valid for other parts of the year as well, although the relative contributions from the respective sources will vary depending on season. The main difference in activities between the summer and winter half of the year is that during winter, heating is needed. In Boras, the additional district heating is then provided through biomass burning. Also, many single-family homes are heated with biomass in the form of wood pellets.

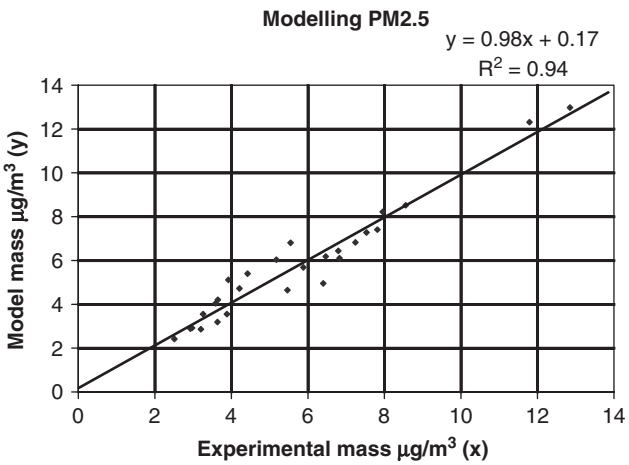

Figure 4. Comparison between model mass and experimental particle mass.

X-Ray Spectrom. 2007; **36**: 104–110
DOI: 10.1002/xrs

X-RAY Spectrometry

In our future work, however, more experimental data will be collected and analysed for making a more detailed analysis of the relative contribution to the levels of PM2.5 when the incinerable waste is varied in composition.

Acknowledgements

The authors want to thank the Carl Trygger Foundation and The Royal Society for Arts and Sciences in Göteborg (KVVS) for financial support. We also thank the IAEA for I. J. Kwame Aboh's fellowship.

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X-Ray Spectrom. 2007; **36**: 104–110
DOI: 10.1002/xrs

P-04-393 Llanymynech and Pant Bypass Action Group

Petition wording:

We call upon the Welsh Government to reinstate plans for the bypass of the villages of Pant and Llanymynech which straddle the English/Welsh border. 15,000 cars and lorries a day pass through these two villages, and it will only increase once the plans for the wind farms get the go-ahead. We call upon the government now to proceed with their plans, or at least open up talks on the bypass and have a full debate, listening to our needs and the voices from our community on how this road is affecting us and our quality of life. We hope, by doing this, that the English government will then take note and proceed with plans on their side. We would like a full and open debate on the need for a bypass for the villages of Pant and Llanymynech, which then, will develop into the actual construction of the bypass once funds are available.

We are fed up of the noise, the pollution, the fact that we cannot walk our children to school, walk to the shops, or walk our dogs along the road. Road improvements such as widening, will not work here. The road was initially designed as a single track lane for horses and carts. The houses on both sides of the road often touch the edge of the road, and there are many lanes which feed onto the A483, which will again make it unsuitable for improvements. A bypass is the only option we feel, taking the road from Llynclys (which is absolutely deadly) around the villages of Pant and Llanymynech and joining the new bypass by the edge of Llandysilio. This is the main trunk road between Manchester and Swansea, and it is not fit for purpose. We have many MPs and AMs on our side and we are determined to get this done, and have a full debate in the Assembly on the subject.

Petition raised by: Duncan Borthwick

Date petition first considered by Committee: 29 May 2012

Number of signatures 84

P-04-394 Prince Philip Action Network

Petition wording:

We the people of Llanelli, the town with the largest population within the Hywel Dda area demand Prince Philip Hospital be restored to a fully functioning District General Hospital with the return of major elective surgery, including gastrointestinal, vascular, urology, gynaecology and trauma, with support from the original 5 ITU beds fully staffed, which would support a fully staffed, consultant led Accident and Emergency Department, providing support for the physicians.

Petition raised by: Prince Philip Action Network

Date petition first considered by Committee: 29 May 2012

Number of signatures: 24,000 (approximately)

P-03-220 Lower the speed limit on the A40 near Abergavenny

Petition wording

Petition to the Welsh Assembly:

In order for pedestrians to be able to walk in safety, we feel it is imperative that the 40 mph speed limit on the A40 between the Hardwick round-a-bout and Plas Derwen Way be lowered to at least 30 mph.

Petition raised by: Councillor Maureen Powell

Number of signatures: 220

First considered by the Committee: 19 May 2009

Carl Sargeant AC / AM
Y Gweinidog Llywodraeth Leol a Chymunedau
Minister for Local Government and Communities

Llywodraeth Cymru
Welsh Government

Eich cyf/Your ref: P-03-220
Ein cyf/Our ref: MB/CS/1601/12

William Powell AM
Chair of the Petitions Committee
Petitions Committee
National Assembly For Wales
CF99 1NA
committee.business@Wales.gsi.gov.uk

May 2012

Dear Bill

I am writing to update you on the current position with regard to the speed limit review on the A40(T) west of Abergavenny.

Our Managing Agents, the South Wales Trunk Road Agency (SWTRA) have carried out a speed limit review on the A40(T) West of Abergavenny and have reported their findings. The "Setting Local Speed Limits in Wales" Guidance recommends that the aim for the mean speed for the section of road should be below the posted speed limit, which in this case is 40mph. The speed data SWTRA gathered for this section of road show a mean speed of 37.5mph and complies with the recommendation that it should be below 40mph.

SWTRA also analysed the accident data for the previous 5 years on that length of road and found only one accident had occurred during that period. This accident was not speed related.

The Review therefore recommends no reduction in the speed limit at this location. Welsh Government Transport Officials as well as Gwent Police support these findings and recommendations.

We are however, proposing to undertake engineering measures to further reduce average speeds, which should alleviate some of the concerns with this road. These engineering measures will include additional speed limit repeater signs and enhancement to the gateway features. Subject to the availability of funding these measures will be implemented in the current financial year.

Carl Sargeant AC / AM

Y Gweinidog Llywodraeth Leol a Chymunedau
Minister for Local Government and Communities

Bae Caerdydd • Cardiff Bay
Caerdydd • Cardiff
CF99 1NA

English Enquiry Line 0845 010 3300
Llinell Ymholiadau Cymraeg 0845 010 4400
Correspondence.Carl.Sargeant@wales.gsi.gov.uk

P-04-363 Town Centre Improvement Scheme for Fishguard

Petition wording:
We, the undersigned, request that the National Assembly supports the call on the Welsh Government to work with Pembrokeshire County Council to ensure that investment is made in a Town Centre Improvement Scheme for Fishguard, including pedestrian and traffic management measures. Such an Improvement Scheme must improve the viability and sustainability of the Town and make it fully accessible for all residents and visitors, including those with mobility and other disability needs.

Petition raised by: Councillor Bob Kilmister

Date petition first considered by Committee: 7 February 2012

Number of signatures: 1,042

Carl Sargeant AC / AM
Y Gweinidog Llywodraeth Leol a Chymunedau
Minister for Local Government and Communities

Llywodraeth Cymru
Welsh Government

Eich cyf/Your ref
Ein cyf/Our ref CS/05711/12
William Powell AM

William.powell@wales.gov.uk

20 March 2012

Thank you for your letter of 27 February in your capacity as Chair of the Petitions Committee, addressed to Edwina Hart AM, which has been passed to me for reply as this is a transport related issue.

I have noted the petition received by the Petitions Committee and its request that the National Assembly support the call on the Welsh Government to work with Pembrokeshire County Council to ensure investment is made in a Town Centre Improvement Scheme for Fishguard.

Unfortunately, the scheme does not currently feature in existing programmes supported by Welsh Government such as the SWWITCH Regional Transport Plan or the National Transport Plan and as a result there is no financial commitment for the scheme in existing budgets.

I am aware that Pembrokeshire County Council is developing the Chimneys Link proposal that will address some of the issues highlighted in the petition. Due to the reduced capital funding available it is unlikely that Welsh Government will be in a position to support such improvements in the near future. This does not however prevent preparation work being undertaken to allow construction to move forward in the event of funding becoming available.

Carl Sargeant AC / AM
Y Gweinidog Llywodraeth Leol a Chymunedau
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Correspondence.Carl.Sargeant@wales.gsi.gov.uk

PET(4)-09-12 : Tuesday 29 May 2012

P-04-363 – Town Centre Improvement Scheme for Fishguard

Thank you for your correspondence.

My response is that I find the ministers reply very strange when the Welsh Assembly Government agreed in the North Pembrokeshire Regeneration of 2003 specific funding for this project. I have enclosed a copy of this plan and I would refer you to page 12 of that report - Section C:

The construction of a town centre relief road, site assembly, development of a new school, the provision of a quality supermarket and extensive upgrading of the principal streets with traffic calming is estimated to be in the order of £11M. WAG will invest about £1.5M for the relief road plus £1M for land assembly and environmental improvements.

Now we are being told that this relief road is not included in any budget. The 2.5m which is mentioned above would be sufficient to deliver the new road and safe pavements for all. Fishguard is simply requesting that it receive what it was promised in 2003.

Regards

Bob Kilmister

Pembrokeshire County Council · Cyngor Sir Penfro

Date · *Dyddiad* 3 April 2012
Your ref · *Eich cyfeirnod* P-04-363
My ref · *Fy nghyfeirnod* SPJ/PEW
Telephone · *Ffôn* 01437 775894
Ask for · *Gofynnwch am* Dr S P Jones
Email · *Ebost* Steven_jones@pembrokeshire.gov.uk

BRYN PARRY-JONES, M.A. (Oxon)
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Director of Development — *Cyfarwyddwr Datblygu*

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Neuadd y Sir, HWLFFORDD,
Sir Benfro, SA61 1TP
DX 98295 HWLFFORDD
Ffôn 01437 764551

Mr William Powell AM
Chair, Petitions Committee
National Assembly of Wales
Cardiff Bay
CARDIFF
CF99 1NA

Mr Powell

Petition: Town Centre Improvement Scheme for Fishguard

I refer to your letter of the 7 March addressed to Mr David Popplewell, Development Manager (Area Teams). Mr Popplewell has forwarded the letter to me for reply.

The County Council has a track record of investing in infrastructure and improvements in Fishguard over the last decade. These have included a new leisure centre and outdoor-all-weather pitch, refurbishment of the Town Hall to include a library, Tourist Information Centre and gallery, an up-grade to the Marine Walk (coastal path) and, more recently, a new Junior School.

Following the closure (in 2002) of the Dewhirst Clothing factory the County Council worked in partnership with the Welsh Assembly Government, former WDA, and range of other agencies and organisations to develop a Strategic Plan for Fishguard and North Pembrokeshire.

The Strategic Plan envisioned an integrated approach to regeneration that would address the impact of a sudden and significant increase in unemployment and enable the town to develop as a 'hub' in the north of the county; a status that was subsequently confirmed in the Wales Spatial Plan.

A number of the key components of the Strategic Plan are still to be delivered. First, and foremost, is a Marina development and, encouragingly, the County Council will shortly consider a planning application for a development at Fishguard harbour. Secondly, a town centre supermarket (to reduce the level of leakage) and associated access and car parking. Whilst an offer from supermarket developer was accepted in 2007, the development has stalled due, in part, to site assembly issues.

The other key element in the Plan was a new link road that would facilitate a gyratory town centre network and enable improvements to the safety of pedestrians and hopefully the viability and vitality of the town centre.

As the road would form part of the Trunk Road network there has been lengthy negotiations with the Welsh Government over this element of the Strategic Plan. Indeed, at the last meeting of the County Council (22 March 2012) Members were advised that the Welsh Government will not be funding any improvements to the trunk road in Fishguard for the foreseeable future.

The County Council remains committed to the Fishguard Strategy and recognises that, alongside other towns in Pembrokeshire, the retail offer has suffered as a result of the in-combination effects of the recession, out-of-town developments and growth of internet shopping.

The County Council notes (and contributed to) the recent Enterprise and Business Committee study on 'Regeneration of town centres' and trusts the Welsh Government's response will recognise the critical role of hub settlements in both its response and its current Review of Regeneration Policy.

Yours sincerely

Dr S P Jones
Director of Development

P-04-377Continuation of Concessionary Fares on Community Transport

Petition wording:
We ask that the Welsh Government takes account of the recommendations in the externally commissioned evaluation of the Community Transport Concessionary Fares Initiative (CTCFI) and that the scheme is rolled out to community transport schemes across Wales on a separate fares basis, to ensure equality for our most vulnerable citizens – those elderly and disabled people who are unable to use their bus pass on conventional public transport.

Petition raised by: Betsan Caldwell

Date petition first considered by Committee: 13 March 2012

Number of signatures: Approximately 4,900

Supporting information: CTCFI will have undertaken c1.3m vital journeys by March 2012, taking elderly and disabled people to services which they would not otherwise have been able to access. Evidence demonstrates clearly the beneficial impact of the scheme on service users' lives, which was set up to ensure equality of access to all. Since Wales' population is ageing, and rates of disability are slightly higher, the need for this service will only grow, with nearly 18,000 registered users of the service already. Around Â£3.9m is needed in 2012-13 to bring CTCFI in as part of the all-Wales CF scheme on a separate fares basis. This would include transition funding to some of the 15 original schemes who could well be facing closure at the end of March, leading to some job losses and loss of valuable volunteer commitment. Cutting CTCFI will not solve the issue of equality, which the Welsh Government has a statutory duty to promote, and will have a disproportionate effect on our most vulnerable citizens.

P-04-392 Community Transport Petition

Petition wording:

We call upon the Welsh Government to continue to fund Community Transport Schemes currently funded by the Community Transport Concessionary Fares Initiative.

Petition raised by: Joan Smith

Date petition first considered by Committee:

Number of signatures: 459 (electronic and paper signatures)

Community transport

WRVS / Age Cymru joint policy briefing

Key points

- The Welsh Government should address the anomaly whereby people entitled to concessionary travel in Wales are not charged for using buses but are charged for using community transport.
- The Welsh Government should impose a requirement on bus companies in Wales to carry out an impact assessment into the effect on older people of any changes to bus services.
- The Welsh Government, local authorities and bus companies need to work in partnership to improve bus services with regard to safety and physical accessibility.
- Good practice models of community transport provision should be replicated and strongly supported by the public sector to ensure their sustainability

Research

Effective transport is key to improving wellbeing amongst older people. Reliable local transport networks become increasingly significant as people get older, with journeys for essential items and social activities sometimes becoming more of a challenge[1]. Without effective transport, older people are more likely to be exposed to loneliness and isolation; this lack of social interaction has been linked with the onset of conditions such as Alzheimer's, and is also closely associated with depression[2].

In Wales, 22% of men and 44% of women aged over 65 live alone; isolated older people are more likely to require services such as home helps or meals-on-wheels[3]. 66% of Welsh single pensioners do not have a car[4]; half of all households without a car consist of individuals aged over the age of 60[5]. Among households without a car, around 40% feel that their local bus service fails to meet their travelling needs to the local town or shops, while around 65% believe it is inadequate for travel to their local hospital[6].

Where assistance is given to older people to access transport, it has a dramatic effect on improving their quality of life. The Older People's Commissioner for Wales[7] found that the Concessionary Bus Pass in Wales has been invaluable in helping older people to retain their independence and remain active:

- 81% of respondents believed that without the pass, their quality of life would suffer.
- 78% believed they would be lonelier without it.
- 92% of respondents said that the bus pass allowed them to be independent.

Age Cymru's Community Calculator looked at the choice and quality of public transport (including community transport) in Wales. 37.9% of respondents rated their local transport as either Fair or Poor, indicating unacceptable levels of provision. Local authorities in Blaenau Gwent, Caerphilly, Ceredigion and Neath & Port Talbot all scored below average. Infrastructure, accessibility, stops, non-peak provision and links to other services were all key concerns. Anecdotally, comments from users suggested a wide range of criticisms of existing transport services:

- "We are not served by a bus – except the school bus. I can only live here while I can drive"

[1] Centre for Social Justice (2011) *Age of Opportunity: transforming the lives of older people in poverty*, London: CSJ, p18/19.
[2] Campaign to End Loneliness (2011) *The Health Impacts of Loneliness*, Campaign to End Loneliness: p1.
[3] National Public Health Service (2007) *A Profile of the Health of Older Persons in Wales*, Wales: NPHS – p45.
[4] The Poverty Site (2009) Wales: Services: Access to transport (accessed 29th June 2011).
[5] Welsh Assembly Government (2007) *Living Longer Living Better: report of the advisory group on the Strategy for Older People in Wales*, Wales: WAG.
[6] Welsh Assembly Government (2009) *A Statistical Focus on Age in Wales: 2009 edition*, Wales: WAG / ONS.
[7] Older People's Commissioner for Wales (2010) *Concessionary Bus Pass Research*, Cardiff: OPCW.

- "Could do with more buses being disabled friendly"
- "Bus stop 15 mins walk down hill, longer walk uphill on return"
- "Bus station could do with more shelters and seating"

Community transport was generally viewed much more positively than regular public transport, with older people praising the vital role community transport has in helping people to access their communities and essential services. There were, however, concerns over whether community transport would be maintained under current funding restrictions.

Community transport services (such as the WRVS Community Cars scheme in Pembrokeshire) are rated extremely highly by users in terms of their positive social impact[8]. Furthermore, research[9] suggests that community transport services offer a positive social return on investment.

Our position

We believe that further options should be explored for extending the concessionary scheme to cover local rail services and provide taxi and community transport tokens on a national basis to improve the transport opportunities for older people who are unable to access bus services.

We are concerned by the difference in the standard of transport services available across local authorities, leading to inconsistent levels of provision and standards of services available for older people in Wales.

Community transport can play a crucial role in helping people to access essential services by providing services where public transport cannot or does not, and on a door-to-door basis for people with specific mobility needs. These services provide an essential lifeline for many older people and we would like to see increased provision across the whole of Wales. Good practice models of community transport provision should be replicated and strongly supported by the public sector to ensure their sustainability.

We are particularly concerned about the existing anomaly whereby people entitled to concessionary travel in Wales are not charged for using buses but are charged for using community transport. The relevant Minister has said that there are no current plans to address this inconsistency[10].

Questions which AMs may wish to raise

- What would be the cost of addressing the anomaly whereby people entitled to concessionary travel in Wales are not charged for using buses but are charged for using community transport?
- Under the new Equality Act, what plans does the Welsh Government have to "age-proof" transport services by ensuring that any service changes only take place after an impact assessment has been carried out with older service users?
- Will the Minister look at 'loaning' unused or idle local authority vehicles to community transport schemes in order to maximise resources?

For more information, contact:

Dr. Ed Bridges
WRVS Public Affairs Manager for Wales

www.wrvs.org.uk

Kate Cubbage
Public Affairs Co-ordinator, Age Cymru

www.agecymru.org.uk

[8] WRVS (2009) *The Real Difference WRVS makes to People's lives: WRVS social impact report 2008*, WRVS.
[9] Frontier Economics (2011) *Social Return on Investment: report for WRVS*, London: Frontier Economics – p3
[10] Carl Sargeant AM, written answer to Llyr Huws Gruffydd AM (WAQ57363), 23rd May 2011.

Carl Sargeant AC / AM
Y Gweinidog Llywodraeth Leol a Chymunedau
Minister for Local Government and Communities

Llywodraeth Cymru
Welsh Government

Eich cyf/Your ref P-04-377
Ein cyf/Our ref CS/05757/12

William Powell AM
Chair, Petitions Committee
National Assembly for Wales
Ty Hywel
Cardiff Bay
Cardiff
CF99 1NA

William.powell@wales.gov.uk

Dear Bill

31st March 2012

Thank you for your letter of 12 March enclosing a Petition from Betsan Caldwell about the Community Transport Concessionary Fares Initiative.

The Capital Symonds' 2009 evaluation report made a number of recommendations about improving the operational aspects of the Initiative. It did not recommend rolling out the Initiative to community transport schemes across Wales. However, the Report identified that the costs of rolling out the Initiative to another 50 different community transport schemes would cost around £40m per annum at 2008-09 prices. This is unaffordable in the face of very tight funding constraints we face.

The evaluation of this six year CTCFI pilot scheme has evidenced significant issues with our continuing to fund the entirety of the scheme on the present basis.

However, I am aware that each of these schemes is a distinct, individual project and I believe it important that we now examine the projects independently to look at the benefits each scheme provides and whether there are alternative funding sources available. Different avenues of funding are available for some of the schemes, particularly those that are suited to being registered as demand responsive services under Section 22 permits, which means they would be eligible for funding from the All-Wales Concessionary Fare Scheme.

Bae Caerdydd • Cardiff Bay
Caerdydd • Cardiff
CF99 1NA

English Enquiry Line 0845 010 3300
Llinell Ymholiadau Cymraeg 0845 010 4400
Correspondence.Carl.Sargeant@wales.gsi.gov.uk

Therefore, I have decided that the funding of the projects will not end in March but will continue whilst this further evaluation takes place. I have written to each of the 15 schemes informing them of this decision.

My officials are in touch with the participating schemes to take this work forward. This will be done over the next few months. I will make a further announcement when I have considered the evidence from this evaluation.

Carl Sargeant AC / AM
Y Gweinidog Llywodraeth Leol a Chymunedau
Minister for Local Government and Communities

P-04-380 Bring Back our Bus! Petition against the Removal of Scheduled Bus Services from East Lampeter, Cwmann and Pencarreg

Petition wording:
We request the urgent implementation of a properly scheduled & timetabled bus service in these affected areas & would urge those governmental agencies concerned, to commit to this on our behalf, at the earliest possible opportunity.

Supporting information:

On February 27th 2012, Arriva began operating as a solely commercial enterprise, ending their subsidies from local County Council & Welsh Assembly and running their operations on an 'express service' as opposed to the previous 'hail & ride' one, which is essential in these very rural areas..

The company rerouted the former X40 service, bypassing east Lampeter, Cwmann & Pencarreg., thereby denying access to essential services like G.P. Dentist, Post Offices& shops, curtailing the ability of people, to exercise their freedom of movement, insofar as access to the above services is concerned.

The removal of regularly scheduled bus services has also had an extremely detrimental effect on the ability of all sectors of our communities to go about their normal daily lives. The evident disregard for peoples' safety cannot be emphasised enough because people are now trying to walk unpaved & unlit roads, populated by fast traffic & juggernauts. .

Carmarthenshire & Ceredigion County Councils are trying to extend the implemented 'Bycabus' scheme, a predominantly pre-booked service, which has proven limited availability and which is currently operating in an economically unsustainable and environmentally inefficient way.

As it is Welsh Assembly and local County Councils who agreed to implement these transport changes, they are responsible under their duty of care to

the people in Wales, especially the elderly and otherwise vulnerable, who are currently having their independence taken away from them and who are in danger of becoming increasingly isolated. Lack of an adequate bus service will also affect the economic, social & welfare aspects of peoples' lives.

Petition raised by: Sharon McNamara

Date petition first considered by Committee: 27 March 2012

Number of signatures: 505 (479 on paper and 26 on website)

Carl Sargeant AC / AM
Y Gweinidog Llywodraeth Leol a Chymunedau
Minister for Local Government and Communities

Llywodraeth Cymru
Welsh Government

Eich cyf/Your ref
Ein cyf/Our ref CS/05893/12

William Powell AM
Chair - Petitions Committee
Ty Hywel
Cardiff Bay
Cardiff
CF99 1NA

committeebusiness@Wales.gsi.gov.uk

21st April 2012

Thank you for your letter dated 26 March following the petition from Sharon McNamara about bus services to east Lampeter, Cwmann and Pencarreg.

In February 2012, Arriva Buses Wales introduced a new number 40 commercial service between Aberystwyth and Carmarthen. This service replaced the X40 TrawsCambria service that was subsidised by Carmarthenshire County Council and Ceredigion County Council, with funding from the Welsh Government.

The new Arriva service takes a different route in the Lampeter area compared to the previous X40 service, and it now misses out the villages of Cwmann, Pencarreg and Cribyn.

At that time, the Welsh Government along with Carmarthenshire County Council and Ceredigion County Council looked at a range of options for protecting services to these villages. However, the provisions in the Transport Act 1985 and the Transport Wales Act 2006 expressly prohibit the Welsh Government or local authorities from taking any action that would inhibit open market competition in the provision of commercial local bus services. This meant that we could no longer subsidise the previous X40 service as it would compete with the new commercial 40 service over most of the route between Aberystwyth and Carmarthen.

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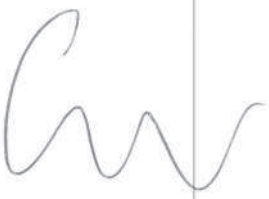
Correspondence.Carl.Sargeant@wales.gsi.gov.uk

The Welsh Government and the County Councils were concerned about the impact these service changes would have on people living in Cwmann, Pencarrig and Cribyn. To address this, we arranged for the extension of the very popular Bwcabus demand responsive service so that people in these villages could maintain access to Lampeter and could also connect with the new number 40 service. So far, we have received good feedback on the take-up of the service from people living in these villages.



Carl Sargeant AC / AM
Y Gweinidog Llywodraeth Leol a Chymunedau
Minister for Local Government and Communities

PET(4)-09-12 : Tuesday 29 May 2012

P-04-380 : Bring back our bus! Petition against the removal of scheduled bus services from east Lampeter, Cwmann & Pencarreg

Response from Sharon McNamara, lead petitioner

The attached documents state, like most correspondence which I have been involved in and as is consistently reiterated at public meetings and within the media, that: Local Authority Councils were forced to allow the Commercial registration of Arriva, because of Welsh Assembly & Welsh Government transport policy. Conversely, Welsh Assembly and Welsh Government representatives insist that Local Authority has responsibility for local transport issues, "in the main". This argument is tautological and subsequently, devalued. Insofar as myself and others are concerned, it is an argument which appears to be a smokescreen, which prevents anyone taking responsibility for the disastrous outcome as regards adequate transport provision in rural areas like ours; the direct result of this transport policy implementation.

Given the Transport Acts 1985 & 2006 and the implications for rural area transport provision, the question may well be asked: Why did the Local Authorities & the Welsh Government collude in allowing the Commercial Registration and subsequent monopolization of an essential service, at all? In their response, the Committee might consider the fact that Arriva is a company which has proved consistently to be non-communicative over its service operations, proved itself unable to operate within its new contractual undertakings and which, in removing return-journey tickets and increasing fares, is pricing itself out of the market and putting prohibitive cost onto service dependents, like parents who now have to pay double to ensure that their children can fulfil their legal obligation to attend school.

Regarding the issue of restricted transport budget finances and the desire to end state funding via subsidy, the committee might consider the following: If people are unable to travel into their workplaces and they do not drive, they are likely to move home, or indeed, be forced to cease work. This means that their spending power is diminished, with less money injected into the local economies. It also has implications for house prices & demand. Cribyn has an increasing population, with many children; it also has a sizable older population. Both relied on the former scheduled service and have now been adversely affected by the implemented changes to transport service provision. It seems to me that the actual consequences of policy are being given little or no consideration. The elected representatives responsible for decision-making either drive, or live in areas where there is street lighting, pavements, cycle lanes and a regular bus and train service. They appear un-empathic regarding daily life in non-urban areas and, I believe,this renders them ultimately unqualified in determining policy, the impact of which is almost entirely negative. Rural areas like ours are a special case because of our inherent lack of infrastructure.

Bwcabus is regularly cited as the solution to the problems arising from the scheduled service cessation. As a service user however, I can confidently state that any new uptake in the use of this dial-a-ride service is the result of pure necessity; many other people are disregarding the service entirely. People dislike this form of 'monitored' travel whereby they need to have their demographic recorded in order to be able to access essential transport. They dislike having to live pre-booked lives, whereby every aspect of spontaneity and independence of travel is removed from them and, speaking for myself, I dislike having to spend hours at an unwanted destination prior to going to work, purely because Bycabus cannot transport me at my required time, as a scheduled service could. Given that Bycabus is a conception from the University of Glamorgan, it would seem pertinent to ask what U.G. is doing with the data gleaned from recorded Bycabus passenger carriage. For example: is this being used as a barometer of demographic travel needs in rural areas, on which to base future transport policy? If so, then the picture it presents will be inherently flawed.

In a time of decreased availability of public money, there are concerns about the funding that the Bycabus service has received. £1.5 million + is the figure stated on the promotional literature. For this

money, there are rented 4 buses from the 2 bus companies involved. There are the wages of the drivers and running costs of the vehicle. A high-tech communications system is lauded in the promotions but in point of fact: the drivers rely on their personal i-phones to receive information from the call center - which is non-locally based in north Wales - because they are regularly out of signal range for the bus GTS to work.

Regarding Bycabus efficiency, the buses regularly spend a sizable part of their day parked up and empty, waiting for their appointed bookers; my driver had his last solo passenger at 16.15 and then had to park up until my booking at 18.45, when I was, as usual, the sole passenger. Given that there were no bookings for the 1.75hrs in between these times, one wonders why 'availability' or to be more precise, the professed lack of, meant that I had to wait, post-shift, an hour before being transported home.

We are advised that the parties involved in the dial-a-ride bus franchise AKA Bycabus are: Carmarthen County Council, Ceredigion County Council and Glamorgan University and we would like therefore, to ask: who is actually receiving money from the transport grant funding and for what? This information should be made available and interests publicly declared.

It is noted that there is the intention to bring in a 'Service Quality Guide' to assess the transport provision in rural Wales; it would be hoped that relevant factors such as the sub-standard vehicles currently being used by Arriva, illegally high road speeds travelled at - in order to comply with unrealistic schedule targets - and a grossly inflated fare-pricing system, will be factors considered.

Thank You for allowing my comments & I hope that these and others provided prior to the hearing, will be given all due consideration.

PET(4)-09-12 : Tuesday 29 May 2012

P-04-380 : Bring back our bus! Petition against the removal of scheduled bus services from east Lampeter, Cwmann & Pencarreg

Response from Peter Hoskins, petitioner

I write to submit remarks on a letter dated 21st April 2012 from Carl Sargeant AM to William Powell AM, Chair of Petitions Committee.

Residents of the three adversely affected settlements must accept that under current law in Wales, as cited by the Minister, a local authority is prevented from subsidising a bus service that would compete with an already registered commercial service. My purpose therefore is not to challenge the application of the law but to draw attention to the resultant unacceptable situation following the withdrawal by Arriva from service X40.

I feel it incumbent to advise the Minister that his conclusion that the extension of the 'very popular' Bwcabus experiment to the affected settlements has enjoyed much if any popularity is seriously mistaken. This became evident at an extraordinary surgery hosted by Mark Williams MP in Lampeter on Friday 27th April 2012 where Cribyn residents recalled in detail many instances of Bwcabus service failure.

It was revealed that favourable reports collected on the performance of Bwcabus are exclusively from users who have actually managed to book a service that has turned up and delivered them to the requested destination in accordance with the undertaking to provide service given at the time a telephone booking was made. The opinions of users who did not manage to secure service are not included in any survey of use. Needless to say this gives an indisputably unbalanced view of customer satisfaction.

I understand from casual conversation from Arriva drivers that the service bus is required to wait for up to 15 minutes for the arrival of a Bwcabus vehicle at an identified stop where a passenger may alight from the Bwabus vehicle to board the service bus. This has resulted in instances of severe delay to the service bus.

On another occasion when I raised the subject of Bwcabus the Arriva driver recounted to me the experience of an old lady in Ffostrasol, I think it was, who used to catch the 551, the service that ran from New Quay to Pencader or covered parts of this route until displaced by Bwcabus. The lady had a hospital appointment at Glangwili and duly telephoned Bwcabus in good time to be informed that on the day of her appointment the vehicle would pick her up. At 9.30 on the day of intended travel she received a call from Bwcabus stating that her journey had been cancelled as no one else had booked in the meantime which meant that the journey could not be justified. She then had to book a taxi in haste which cost her 18 GBP.

I cannot use the Bwcabus service myself since I habitually use the 19.00

40 service from Aberystwyth to return home from work. I am now obliged to alight in Lampeter as Cwmann and Pencarreg are no longer served by Arriva. I therefore have no choice but to walk home beyond Cwmann. I count myself among the fortunate or certainly among the less adversely affected. The Bwcabus vehicles are required to be back at their base by 19.00 hours. This therefore precludes any Bwcabus connection from Lampeter to Cwmann and Pencarreg for passengers alighting in Lampeter from the 18.00 or 19.00 southbound 40 services from Aberystwyth.

I make no effort to conceal my deep disgust at what I consider to be a truly scandalous investment of substantial monies in what amounts to no more than a half-baked scheme which by its extension to Cribyn, Cwmann and Penacerrg has been revealed to be an unworkable and disproportionately if not prohibitively expensive misadventure, strikingly so in times of severe financial restraint. I have no idea how the monies from the initial investment of 850K GBP were applied.

http://www.sirgaerfyrddin.gov.uk/English/transport/Buses/TravelTimes/Pages/Bwcabus1yearon.aspx

It alarms me to discover that yet further monies in the sum of 1.3M GBP were devoted to this scheme last year. What is there to show for all this investment? All I see is four leased vehicles and positions created in local government to operate the so-called service.

http://transport.research.glam.ac.uk/news/en/2011/jun/08/funding-boost-bwcabus/

All I read on this second page is sickening self-congratulation concealing the truth of the experiment as an unqualified disaster. The scheme may have found favour in the Llandysul area but that is a rather different situation from Cribyn, Cwmann and Pencarreg. Until the establishment of Arriva service 41 in February 2012 Llandysul enjoyed only scant regular through services. The withdrawal of service 461 can only have aggravated the situation. Any mini-bus service offering connection from Llandysul to the route of the more frequent service 460 was bound to be welcomed no matter how it were branded, be it Dial-A-Ride, Community Transport or even Bwcabus. The name of the service has no bearing on its claimed success.

As if discovery of the investment of what I can only describe as an obscene amount of money into this reckless scheme is not serious cause enough for public concern in times of restraint I discovered two weeks ago that Carmarthenshire County Council does in fact operate a parallel Dial-A-Ride scheme. Clearly the Bwcabus scheme is nothing but another Dial-A-Ride scheme under a silly new name to distinguish it from the existing scheme. The procedure for booking a journey may be slightly different but I discern no significant difference let alone any element of novelty in Bwcabus that has brought it plaudits from within Wales and beyond.

I am exercised to know how these monies have been dissipated. I am concerned about the funding of the Bwcabus project at Glamorgan University. I have not investigated its source of funding or whether it is paid in tranches throughout the duration of the project but if the Welsh Government has any influence upon its provision I urge the Minister to order a review without delay. It crosses my mind that a sum of 1.3M GBP could have been more profitably applied to the acquisition of a small fleet of Optare buses among any number of other much more worthier causes to assist communities which suddenly find themselves deprived of a regular and popular bus service which they have enjoyed for decades. It should not be overlooked that communities such as Cribyn, Cwmann and Pencarreg have flourished and continue to attract residents because of the very provision of desired services including, until of late, bus services.

There is no doubt in my mind that the Bwcabus scheme should be scrapped before any further monies are misguidedly squandered on it. In Cribyn, Cwmann and Pencarreg it has been experienced and shown to be an unworkable scheme which stands absolutely no chance of fulfilling the needs of unjustifiably deprived residents of those places arising from the unacceptable new route chosen by Arriva for their unpopular service 40.

Cyng / *Cllr* Trevor Roberts, Cadeirydd / *Chairman*
Swyddfa TraCC *Office,* Canolfan Rheidol, Rhodfa Padarn, Llanbadarn Fawr, Aberystwyth, Ceredigion SY23 3UE

Mr William Powell AM
Committee Chair
Petitions Committee
National Assembly for Wales
Cardiff Bay
Cardiff
CF99 1NA

Eich cyf / *Your ref*: P-04-380
Ein cyf / *Our ref:* BUS008/05/2012

Dyddiad / *Date:* 8th May 2012

Ffôn / *Phone:* 01970 633431/ 077814 473632
Ffacs / *Fax:* 01970 633 430

e-bost / *e-mail:* enquiries@tracc.gov.uk

Dear Mr Powell

RE: 'Bring Back Our Bus!' Petition.

Thank you for your letter dated 19th April 2012 with regard to the 'Bring Back Our Bus!' Petition. I have taken some time to look into the matter and can offer the following response.

In general terms, decisions affecting particular routes and services remain the responsibility of individual local authorities (rather than being a function delegated to the regional transport consortia) for non-commercially-operated services supported through public subsidy. Local bus operating companies may choose to run any bus service or network of services on a commercial basis and whilst such occurrences might generally be welcomed, local authorities do not have any control over such a decision and its implications for the wider network. This situation is of course similar across the whole of Wales. In Mid Wales, almost 95% of local bus services are operated under public subsidy rather than on a commercial basis and this has significant implications for government at a time of restrained public finances. The particular challenge is to continue to support (or improve) access to employment, educations and skills training, healthcare and other essential services in rural areas. Alongside the local authorities, the Welsh Government retains an interest in supporting existing TrawsCymru-branded services and further developing the network.

In Feb 2012, Arriva Buses Wales introduced a new number 40 commercial service between Aberystwyth and Carmarthen. This service replaced the X40 TrawsCambria service that was subsidised by Carmarthenshire County Council and Ceredigion County Council, with funding from the Welsh Government. The new Arriva service operates a different route in the Lampeter area and now misses out the villages of Cwmann, Pencarreg and Cribyn.

The Welsh Government in partnership with Carmarthenshire County Council and Ceredigion County Council looked at a range of options for protecting services to these villages. However, the provisions in the Transport Act 1985 and the Transport Wales Act 2006 prohibit the Welsh Government or local authorities from taking any action that would inhibit open market competition in the provision of commercial local bus services. This meant that the

previous X40 service could no longer be subsidised as it would compete with the new commercially-operated 40 bus service.

The Welsh Government and the local authorities were concerned about the impact these service changes would have on people living in Cwmann, Pencarreg and Cribyn. To address this, the very popular rural Bwcabus demand responsive service was extended so that people

in these villages could maintain access to Lampeter and could also connect with the new number 40 service. So far, the feedback has been positive in terms of the on the take-up of the Bwcabus service from people living in these villages.

I understand that the local authorities and Welsh Government continue to monitor the situation and are working closely together with bus companies to create a new Statutory Quality Bus Partnership scheme for the corridor to improve quality standards further.

Yours sincerely

Chris Wilson
TraCC Co-ordinator
On behalf of the Chair

CC: David Hall, TrawsCymru Manager, Welsh Government
John Forsey, Interim Passenger Transport Unit Manager, CWIC

Powys

www.tracc.gov.uk

P-04-366 Closure of Aberystwyth Day Centre

Petition wording:
We the undersigned call on the Welsh Government to consider if proposals for day care for the vulnerable elderly, to be moved from a purpose built, thirty year old Day Centre, to an unsuitable basement in an old building, previously used as the Town Hall Aberystwyth, are compliant with statutory requirements, and any relevant guidance. The County Council are planning to demolish the Centre as part of a development to build a car park, a supermarket and a retail outlet.

Petition raised by: Pamela Ellis

Date petition first considered by Committee: 28 February 2012

Number of signatures: 10 (An associated petition collected approximately 6,000 signatures)

Supporting information: The present Day Centre is a purpose built facility, about thirty years old. It is in a convenient situation in the town centre, with easy access, a large drop off point and is near a road safety crossing. It is light and sunny, and can accommodate about 90 clients of mixed dependency, in several spacious rooms. The envisaged centre is not quite half the size and will only be able to cater for 32 clients in one main room. At present those carers of disabled clients or those caring for victims of a stroke, can have access to respite care on 2 or 3 days of the week. We feel the move will discriminate against this group as already fewer people are being assesses and referred by Social Services for this respite care. The council have admitted there will be rationing. Because of difficulties of access to the basement area, an outdoor, steep ramp with a 180 angle turning point half way down has been built. We feel strongly that carers or mobile chair users will have huge problems, particularly in stormy or icy weather. The ceilings in the basement are low; there is a large pillar in the centre of the room making it difficult to move wheelchairs or trolleys, natural light levels are low as it is partially below ground and several doors have to be navigated to access toilets. The old centre has a superb new kitchen providing good meals, the weekly luncheon club, a valuable socially inclusive option, has been closed already. In future, meals will be prepared elsewhere and brought in. There will only be one area available for meals and all other activities; thus space will be extremely limited. The local WVS presently provides drinks and snacks; that will no longer exist. The present centre has a large bathroom with a hoist, also laundry facilities, which were invaluable. The new centre will have a shower built into a toilet for assisted bathing, which opens directly onto a communal area. As this is the only disabled

toilet, it will be difficult for a disabled client to access a toilet if another client is having a shower. If the only new facility will only be able to cater for 32 clients, these will almost certainly have to be those needing respite cares, so those older citizens who value the opportunity to enjoy time at the centre to socialise, take part in activities, have a bath and enjoy a good meal will not be able to do so. The present centre has a very pleasant garden with seats, ample parking, a bay for dropping off people and is completely accessible to all. The present centre is made available in the evenings to groups of elderly, for example the Arthritis Care group fear that they will not be able to cope with the ram, in the dark, for their evening meetings. The new centre is on a dangerous main road turning, with heavy traffic use. Former users of the basement when it was the Town Hall have complained that it is too hot in the summer and cold and damp in the winter. The heating system has been improved, but the present sash window are not being replaced and there will be no air-conditioning installed. Whilst the County Council have made efforts to meet our concerns, we strongly believe that the proposed new centre is absolutely unsuitable and is vastly inferior in the present centre. We would add that the Council have admitted that they did not carry out a proper consultation. Hence the formation of this pressure group.

Cyngor Sir CEREDIGION
ADRAN GWASANAETHAU CYMDEITHASOL

… yn gofalu i wneud gwahaniaeth

A Parry Davies
Cyfarwyddwr
Director

CEREDIGION County Council
SOCIAL SERVICES DEPARTMENT
…taking care to make a difference

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William Powell AM
Petitions Committee Chair,
Petitions Committee,
Welsh Government,
Cardiff Bay,
Cardiff.
CF99 1NA

Dyddiad / Date 30 April 2012

Gofynnwch am / Please ask for

Llinell Uniongyrchol / Direct line

FY nghyf / My ref AJ/BD/ED

Eich cyf / Your ref P-04-366

Dear Mr Powell,

Re: Petition P-04-366 Closure of Aberystwyth Day Centre.

With reference to your letter dated 19th April 2012 please find below the information that you have requested regarding meeting the needs of vulnerable people and meeting statutory requirements.

The Departmental Aims and Expected Outcomes for service users are laid out in the Department's **Business Plan (2012-2013)** as follows:

Ceredigion Social Services is committed to improve continuously in the following areas:

- ***Promoting and supporting independence and inclusion***
  People are supported in the community or in a family setting rather than in institutional care, wherever possible.
  Effective support for carers (numbers of carers assessments, outcomes, use of carer's grant)
  Services in place to support independence and develop life skills (e.g. health services, education, training and employment opportunities, progress with person centred planning)
  Equality and diversity promoted effectively (including hard to reach groups)
  Direct payments used appropriately

- ***Safeguarding/Protecting vulnerable people***
  Effective response to allegations of abuse or neglect, in terms of good quality risk assessment and risk management processes (including out of hours).
  Services needed in place to safeguard vulnerable people.
  Multi-agency procedures and safeguarding bodies that work well.
  Effective working arrangements for safeguarding vulnerable groups from abuse by staff and others in positions of trust.

- ***Access to services***
  Comprehensive and accessible information available to the public, about all services, in relevant languages and formats.
  Effective arrangements for members of the public to make contact with social services (prompt and effective response to enquirers and referrers, during the working day and out of office hours).
  Effective arrangements for receiving and managing referrals.

Well managed Waiting Lists.
Systems in place for monitoring and assessing the effectiveness of access arrangements.

- ***Assessing people's needs, managing people's care and ensuring regular review.***
  Effective systems for deciding eligibility and prioritising assessments.
  Compliance of Assessments with guidance/standards in respect of timeliness, quality, content and updating.
  Service users and carers involvement in assessments and sharing of assessments.
  Progress and monitoring with the provision of carers' assessments.
  Availability of specialist expertise to contribute to assessments as necessary.
  Social Services appropriately allocate, transfer and close cases.
  Views of users and carers considered in developing and agreeing care plans.
  Care Plans specify the services to be provided, the intended outcomes and how risks will be managed.
  Service elements of plans properly costed.
  Arrangements for undertaking effective reviews timeliness, quality of reviews, delivering agreed changes.

- ***Developing an appropriate range of good quality services.***
  Social services ability to identify gaps and what needs improvement (e.g. delays, unmet need, excessive costs).
  Partnership arrangements that works well for delivering services.
  Arrangements in place for consulting about the range of services provided or the development/design of future service provision.
  Services provide reliable standards of care.
  Quality consistent across services, sectors and communities.
  Views and circumstances of service users and carers (including ethnicity) sought and reflected in the services provided.
  Services responsive to problems and emergencies.
  Complaints, representations and compliments used to improve the quality of services.

Services are provided to adults experiencing difficulties in the following areas:

- Adult in need of protection
- Adults with physical disabilities, visual and sensory impairment
- Adults with learning disabilities
- Adults living with autism
- Adults living with mental health issues
- Adults who misuse substances
- Older People in need of support

The Department also has a specific Carers Strategy but the Joint Carers Strategy effectively came to an end in 2011/12 as is the case in many parts of Wales. There will not be a full replacement of the Strategy but there will be a move towards a Business Plan model with Action Plans. The principles will carry forward linked to the on-going Business Plan (as quoted above) whilst we await the development of the Carers Measure Strategy and the Welsh Government's Carers Strategy Review during 2012/2013.

Services for Older People are also underpinned by the Ceredigion Strategy for Older People 2004. It has not been a requirement to provide a strategy since then and following Welsh Government's rationalisation of plans, the Strategy for Older People objectives have formed part of the Health, Social Care and Well Being Strategy. The Strategy content is still valid given its emphasis on accommodation and independence for older people and given the prevention

agenda. The Health, Social Care and Well Being Strategy can be viewed on the Ceredigion County Council web-site by following the Health and Well Being link or by using the following web-address.
http://www.ceredigion.gov.uk/utilities/action/act_download.cfm?mediaid=31782&langtoken=eng

There is no specific Policy for the non-statutory provision of Day Centres in the County therefore there isn't a separate Policy for Park Avenue Day Centre. However, Park Avenue Day Centre does have its own Information Leaflet (updated January 2010) for its service users and is copied below:

This brochure is designed to give you an idea as to what happens at the Day Centre should you decide to attend. It will also tell you how attendance can be arranged.

We try to ensure that the Centre is a warm, friendly, welcoming place and encourage our service users to help us achieve this.

Uniquely, for residents of Ceredigion over 50 we now operate an Open Access Day every Wednesday. You will be required to complete a simple registration form on your first attendance, purchase a lunch ticket and serve yourself.

How is the Centre staffed?

The Centre is run by a Manager, supported by a Clerical Assistants, Care Assistants, Catering and Domestic staff. All care staff are trained to NVQ Standards and are expected to follow the Codes of Practice, thereby ensuring a high quality service.

How is attendance arranged?

Day Centre attendance can only be provided to service users once they have received a Community Care Assessment which is in accordance with various statutory regulations. To arrange a Community Care Assessment you need to contact the Social Services Contact Centre on 01545 574000. This assessment will be completed by a Health or Social Care Professional and a Care Plan will be drawn up indicating that attendance at the Day Centre is required. On receipt of this referral the Manager will visit you to discuss your proposed attendance. If appropriate, arrangements will be made for your attendance, including transport if this is required. There is an additional fee for this service.

What happens on the first visit?

You will be allocated a Keyworker, who will help you to settle into the Centre and will work with you to draw up a plan of the service you will receive whilst at the Centre. The support you require will be established and how this will be achieved will be discussed with you. At all times our aim will be to ensure you maintain your independence. This care plan will be regularly monitored, reviewed and changed, as your needs change, working together to achieve the desired outcome.

What if I need help to move about?

The Health and Safety of both service users and staff is of paramount importance to us and, as part of this, we have to conform with the EEC Regulations on Manual Handling, aimed at

minimising risk to you and to our staff. We will undertake a manual handling assessment when you first attend, at all times encouraging you to be as independent as possible. However, should you require the assistance of our staff to physically support you e.g., to access toilet facilities, this will be included in the assessment. This may involve the assistance of two staff, the use of simple aids or more specialist equipment. Two of our staff are trained as Manual Handling Coordinators and they will carry out this assessment

What activities are provided?

The Centre offers a wide range of activities in which you can choose to participate. These include, bingo, gentle exercise with a trained member of staff, basic toe nail cutting by trained staff, knitting, board games, art classes, jigsaws, word games, dominoes, music quizzes, Holy Communion, internet access and basic computer skills etc. We also try to arrange additional activities and entertainments e.g., music sessions, craft work, talks and discussions. We also have regular visits by a hairdresser for the benefit of service users.

A bathing or showering service is available for users who are either experiencing difficulties in accessing their own facilities or waiting for adaptations to their homes. Our aim is to support you to be as independent as possible at all times encouraging you to do as much as you can for yourself. The centre also provides a laundry service for a nominal fee.

What meals are provided?

All lunches, for a nominal fee, are freshly prepared on the premises with a varied choice of menu daily, catering for all special dietary needs. Mid-morning and afternoon snacks and drinks are available for a small charge from the tea bar which is run by WRVS volunteers.

Ceredigion County Council wholeheartedly supports the principle of equality and recognises the importance of fair access and actively promotes equality of opportunity for all service users and Carers.

We are in the process of developing Advocacy Services and if possible, we will arrange for someone to help you put your point across in your dealings with us if you are not able to do this yourself and don't have family or friends to help you.

In relation to Adult Services, "Eich Dewis Chi" offers an Advocacy service for people who suffer with:

- *Mental Health problems*
- *Have a Learning Disability*
- *For people who are Elderly and Mentally Infirm*
- *For Vulnerable Adults.*

Information Sharing and Confidentiality

Any information that you give us will be kept safe and confidential. We will not disclose your information to anyone not involved in your care without your consent, unless we are obliged to do so by law or there are exceptional circumstances, such as your safety and/or the safety of others.

Representations/Complaints/Comments

If at any time you are unhappy with the service you receive, please discuss your concerns immediately with the Manager. We sincerely hope that the problem can be resolved at this stage. However, if your concerns have not been resolved, then you are able to make a formal complaint via the Complaints Officer, Social Services at Min-Aeron, Rhiw Goch, Aberaeron, SA46 0DY

……

I can confirm that the Day Centre has always operated on a referred basis for four days a week with one day, Wednesdays, being classed as "open access day" for non-referred individuals who can drop in to the Centre.

The referred service users have all undergone a Unified Assessment by Care Assessors or Social Workers in line with Welsh Government legislation and will have been deemed eligible for the service based on either a Critical or Substantial risk to their independence. There are four eligibility criteria defined by Welsh Government – Critical, Substantial, Moderate, Low. Local Authorities have discretion to operate at their chosen level and Ceredigion is currently operating on meeting the needs of individuals assessed as Critical or Substantial. This applies for all services provided in Adult Services.

Wednesdays at Park Avenue Day Centre were defined as "open access days" which allowed non-referred older people to attend and utilise the facilities. The intention of this arrangement was to promote the Day Centre as a resource for people and to encourage people to partake in activities with the support of staff at the Centre. However, the reality has been that the individuals that visited the Day Centre on a Wednesday arrived just before lunch and left shortly after. It was essentially, therefore, a Luncheon Club for people. Given that the Town Hall will not have a producing kitchen this arrangement was no longer feasible and a Social Services employee was tasked with consulting specifically with the Wednesday attendees and has been exploring options, one of which is using the Town Hall as a "drop-in" facility outside of referred service users' core hours.

The Football Club is now providing an appropriate substitute for lunches – it is in the same area and close to the services which are convenient for Park Avenue Day Centre and it was therefore considered a suitable venue for the sole provision of a Luncheon Club.

There are two Cabinet Reports that considered Park Avenue Day Centre and then concluded that Park Avenue Day Centre should be demolished as part of the Mill Street development and the Town Hall used as a replacement. These are dated 9th November 2010 and 1st March 2011.

The November 2010 report included a **detailed analysis of the day service functions, the numbers of attendees at Park Avenue Day Centre and the overall needs of those attending**. This illustrates that the needs of the service users were well considered and informed the decision-making process.

An Equality Impact Assessment (EIA) also commenced in November 2010 and as part of this process the Council carried out a Service User Needs Analysis which considered both the current and future needs of service users. When carrying out the EIA, officers considered all 5 criteria but were of the view that there was no impact in 4 of those categories.

Combining the Day Centre facilities with the Library and County Archives opens new possibilities for service users. Day Centre users will have access to excellent computer resources and experience taster sessions in using the internet and more advanced IT classes that suit them. The co-located Library and Archive's other resources will provide additional access to materials that will entertain and enthuse. The presence of all these services will result in a community-focused centre that will promote inter-generational activities.

The option of re-providing day services at the Town Hall was, therefore, made on the basis of enhanced provision and opportunities for older people who need day care and need to be supported to live ordinary lives. In this respect the relocation demonstrates a corporate, forward thinking and innovative vision which retains the Authority's commitment to the provision of day services in Aberystwyth rather than close a Day Centre because of budgetary pressures - as is the case in some other Authorities.

I hope that this response serves to answer your questions and alleviate your concerns.

Yours sincerely,

Mr Allan Jones
Assistant Director
Commissioning & Business Support

P-04-376 Reorganise Education in Powys

Petition wording:
We call on the National Assembly for Wales to urge the Welsh Government to call in Powys County Council's proposals to reorganise education in Powys, which would lead to Builth Wells' bilingual dual stream English-medium sixth form becoming a Welsh designated sixth form.

Petition raised by: Sarah Wheeler

Date petition first considered by Committee: 13 March 2012

Number of signatures: 1,177

E-mail 05-03-2012

Hi Sarita,
The letter from Cllr Avril York was received December 2011 and was sent to Builth Wells Supporting Education for All as an update to members following the county councillors meeting with the Education portfolio holder – Cllr. Stephen Hayes.
The letter from Cllr Stephen Hayes was sent to the Builth and surrounding area county councillors on 7/12/11. Please find attached the minutes from the cabinet meeting 22/11/11 which was a public meeting, Cllr Avril York, attempted to present the Builth Wells Community outrage at the decision to close the English medium sixth form at Builth Wells High School. Builth Wells Supporting Education for All met with Cllr Stephen Hayes early Dec 2011 along with Cllr Avril York and his rational for closing Builth Wells High School English medium sixth form was that 'some will say having a bilingual dual stream high school will contaminate the welsh language', hence welsh designation sixth form, despite not having the critical mass to maintain a welsh designation sixth form. Please note throughout the consultation process we have as a community attempted to ensure the maintenance of a bilingual dual stream 11 – 18 yrs high school. The supporting petition was also acknowledged as part of the consultation process with 1021 signatures. All we are now aiming for is the removal of the welsh only designation sixth form and all members hope for is fair and equitable education for **All i**n Builth Wells High School with the ability to have a thriving bilingual dual stream 11 – 18yrs school and maintenance of a bilingual dual stream sixth from.
Hope this is of help?

Please contact me if you require any further background information.

Best wishes

Sarah Wheeler

E-mail 02-03-2012

Dear Rhodri,

Please find three documents attached as evidence for the petitions committee. I am sending apologies due to the inability to attend the formal meeting to present the evidence.
Please note Sarita Marshall, Deputy Committee Clerk, Petitions Committee has a copy of the manual petition containing over 1020 signatures as supporting evidence for Builth Wells Community.
May I take this opportunity to thank you and your team for your on-going support and advice throughout the E-petition process.
Please do not hesitate to contact me for any further information.
Very best wishes.
Yours sincerely

Sarah Wheeler
(Sent on behalf of Builth Wells Supporting Education for All)

Petition Committee evidence
Builth Wells Supporting Education for All
1st march 2012

'We call on the National Assembly for Wales to urge the Welsh Government to call in Powys County Council's proposals to reorganise education in Powys, which would lead to Builth Wells's **bilingual dual stream** English-medium sixth form becoming a Welsh designated sixth form.'

As a community what we are petitioning for is that the Education Portfolio Holder Cllr.Stephen Hayes, Powys County Council, will re-instate the Sixth form English Medium A level designation at Builth Wells High School, which he has closed in the secondary education modernisation in Powys. He has stated there have been radical changes in secondary education, but it appears the only change he has made is close the second largest viable English medium sixth form in Powys (Currently 125 pupils). This option taken by Cllr Hayes was not part of the consultation for secondary school modernisation. This decision has now created inequity, segregation of pupils who wish to maintain their Bilingual dual stream sixth form. (Currently there is one pupil studying 'A' levels in Welsh medium from the 2011 cohort). Builth Wells High School welsh designation sixth form is mentioned throughout the draft Welsh Education Strategy Plan document for Powys, which also has made the Builth Wells community feel very nervous and powerless despite the majority of the community not being in support of this proposal. The community are very proud of the bilingual dual stream High School at Builth Wells and it forms the centre of a rural community, the change to the designation of the school will also lead to negative effects to the socio-economics of this rural bilingual speaking community.

Please find attached two letters that were sent to the Builth Wells Supporting Education for All, one from local councillors and one from the Education Portfolio Holder Cllr. Stephen Hayes on the 7th December 2011 to the local Councillors. The letters evidence that there is not the critical mass to have a viable welsh medium sixth from at Builth Wells High School :-

> *"the implementation of post 16 education solely through the medium of Welsh should be allowed to grow organically and at its own speed and not implemented until a) it was financially viable and b) that there were sufficient pupils seeking to be educated through the medium of Welsh at 'A' Level.*
> ***AND***
> *"I also accept that the date mentioned in the report of 2015 for full change-over is likely to prove unrealistic, as the time necessary for cohorts of pupils to move through earlier stages of their education will require a lengthier transition period."*

With this statement in mind, why sanction the closure and demise of a large thriving, successful and viable English medium sixth form? The majority of the community oppose this decision and still remain proud of the bilingual dual stream 11-18 yrs High School. All the members hope for is that the welsh designation is changed back to Bilingual dual stream sixth form, to give the English medium A level students equality of opportunity which is an entitlement for all pupils regardless of the medium of education.

Summary of points relating to the closure of the English Medium Sixth form at Builth Wells High School.

This decision still dismays and confuses the Builth Wells community for several reasons:-

- Builth Wells High School is the only sixth form in Powys to be closed for English medium, the community feels there is now an **inequity** that Powys County Council education portfolio holder has endorsed, compared to the rest of Powys sixth forms. Equality of opportunity which is an entitlement for all pupils regardless of the medium of education.
- Builth Wells High School is the second largest English medium sixth forms in South Powys and has maintained high achievement's with A level results and the sixth form is financially viable.
- The current sixth form AS & A level 2011-2012 has 120 pupils opting to take their A levels at Builth Wells High School, this figure includes 8 pupils from the Welsh medium GCSE cohort, 7 of those pupils elected to take English medium A levels and now 1 (one) pupil is taking Welsh medium A levels.
- The area is 95% English speaking households, but the community remains proud of the bilingual status of the High School and closure of the English medium sixth form will inevitably lead to the demise and eventual closure of the 11 to 16 English medium education provision.
- The education portfolio holder Cllr Stephen Hayes has now acknowledged that *"the implementation of post 16 education solely through the medium of Welsh should be allowed to grow organically and at its own speed and not implemented until a) it was financially viable and b) that there were sufficient pupils seeking to be educated through the medium of Welsh at 'A' Level.*
- *Education Portfolio holder, Cllr. Stephen Hayes quoted "I also accept that the date mentioned in the report of 2015 for full change-over is likely to prove unrealistic, as the time necessary for cohorts of pupils to move through earlier stages of their education will require a lengthier transition period."*

- **Most importantly the pupils wish to continue the bilingual dual stream sixth form in Builth Wells High School, pupils do not want separation or segregation from their friends/peers**.
- The decision will lead to the slow demise of the school with parents opting to not send their children to Builth Wells High School English Medium school due to the lack of choices, uncertainty and loss of continuation of English medium education provision to 18yrs.
- The local economy of Builth Wells community will be severely affected, potentially less investment and less migration to this beautiful area due to loss of English medium High School Education. The community are proud of the bilingual status of the school.

We hope that Powys County Council will change the designation of the sixth form and re-instate the English medium sixth form. Please keep our High School as a Dual Stream Bilingual sixth form. Let the school prove they have a financially viable bilingual dual stream sixth form, why close a Band 2 school, one of only two High Schools who achieved this level in all of South Powys?

Please help the High School and community in Builth Wells to request a re-think of Powys County Councils decision to close the English medium sixth form, give Builth Wells High School an equal chance with the rest of the sixth forms in Powys. The request is that Powys County Council removes the welsh designation and re-instates the bilingual dual stream sixth form. Please do not treat Builth Wells High School and community unequally compared to the rest of Powys High School pupils.

Yours sincerely
Builth Wells Supporting education For All
(Sarah Wheeler)

NB. Sarita Marshall, Deputy Committee Clerk, Petitions Commitee has a copy of the manual petition containing over 1020 signatures as supporting evidence for Builth Wells Community.

Cllr Kelvyn Curry,
Cllr Maureen MacKenzie,
Cllr David Price,
Cllr T Van Rees,
Cllr Avril York

Dear Members,

Secondary, Welsh Medium and Post-16 school modernisation

Thank you for your letter of 5th December regarding the modernisation proposals as they affect Builth High School.

As you know, and I am happy to confirm, the proposals to establish centres of excellence for post-16 Welsh Medium education at Caereinion and Builth High Schools, which were agreed by Cabinet on 22nd November, envisage a move by increments to a position where the two schools offer A and AS courses through the medium of Welsh only.

As the Cabinet paper stated, the intention is 'to create sufficient critical mass of learners to enable the cost-effective delivery of courses and to enhance the range of courses available'. The aim, as the paper said, is to commission an increasing number of Welsh medium A/AS courses from Builth Wells Secondary school. The paper went on to say that it is anticipated that English Medium A/AS provision will cease to be provided at Builth in due course, with pupils accessing this provision at Llandrindod Wells High School.

It is clearly accepted, therefore, that progression to designated Welsh medium status at post-16 will occur over time, with no overnight cessation of English medium courses. I referred in presenting the report to the undertaking that no pupil who begins a course or a key stage at a school will be required to move before they complete that course of study. I also accept that the date mentioned in the report of 2015 for full change-over is likely to prove unrealistic, as the time necessary for cohorts of pupils to move through earlier stages of their education will require a lengthier transition period.

At the Cabinet meeting, a question was asked about the effect of the new central commissioning of courses on post-16 provision in Builth HS, and I confirmed that any new commissioning body would be free to make such decisions relating to courses in either medium as it considered justified by demand and available resources. It is not proposed that any application

will be made to alter the designation of Builth and Caereinion High Schools prior to the setting up of the new commissioning body.

The commitment to providing a full range of Welsh-medium courses at post-16 is an important one, and goes hand in hand with the decision to fund enhanced Welsh medium provision at 11-16 at both Builth and Brecon High Schools. There are currently over 450 pupils receiving primary education through the Welsh medium in the catchments of the two High Schools, with demand growing. It is important that we give these pupils, and others in the future, the prospect of first-class secondary education through the Welsh medium. Far from being a threat to the future of Builth HS, the proposal gives the school a key strategic role in the south of the county.

Finally, I am happy to confirm that the details of implementing what is a high-level strategy decision will need to be considered and taken forward through the Authority's Welsh in Education Strategic Plan. The draft of this plan will be worked up with stakeholders, including school governing bodies and senior management teams, and consultation will take place before submission of the final document to Welsh Government. This gives a genuine opportunity not only for those immediately affected, but for the wider public, to input their views on all aspects of implementation of the decision.

Yours sincerely,

Schools Modernisation Programme

Since the announcements on Schools Modernisation on 8th November, I have been working to improve the position of Builth Wells High School in relation to its sixth form provision.

Cabinet meeting on 22nd November: I spoke against the proposal for a Welsh only sixth form provision and requested that Builth Wells High School was able to work with the commissioning body to put on a range of economically viable English medium courses. This was picked up by one of the cabinet members, Tony Thomas; the minutes for the meeting state ..

The Portfolio Holder explained the rationale for a central planning and funding system for commissioning post-16 courses. He confirmed that this approach had the support of the Welsh Government. In answer to Members' questions he advised that it was necessary for the commissioning body to be autonomous and free from competing interests. Democratic overview would be provided by the Scrutiny Committees. He confirmed that when a preferred model for the commissioning body had been approved by Cabinet, consultation would take place before submission to Welsh Government. He wanted the commissioning body to work with neighbouring authorities including those in England. He advised that there was nothing preventing the new body commissioning a small number of subjects in English at the schools designated Welsh medium.

Because of continued confusion about what had been agreed, Cllr Tim Van Rees, myself and three other councillors wrote to the portfolio holder, Stephen Hayes, on 5th December to clarify the position. We reminded Cllr Hayes that the concession was given that *"the implementation of post 16 education solely through the medium of Welsh should be allowed to grow organically and at its own speed and not implemented until a) it was financially viable and b) that there were sufficient pupils seeking to be educated through the medium of Welsh at 'A' Level. It was also conceded that the commissioning body could provide 'A' Level education through the medium of English in subjects again if financially viable"*

Cllr Hayes responded by letter on December 7th. He accepts that the date in the report of 2015 is likely to prove unrealistic and that it will require a much lengthier transition period. He confirmed that *"any new commissioning body would be free to make such decisions relating to courses in either medium as it considered justified by demand and available resources"* Cllr Hayes continued that *"It is not proposed that any application to change the designation of Builth and Caereinion High Schools will be made prior to setting up of the new Commissioning Body"*

I trust this clarifies the position for Builth Wells High School – and I wish to record my thanks to Cllrs Tim Van Rees, David Price, Maureen Mackenzie and Kelvyn Curry for supporting me.

Avril York

MINUTES OF A MEETING OF THE CABINET HELD AT THE PAVILION, LLANDRINDOD WELLS ON 22ND NOVEMBER 2011

PRESENT County Councillor E.M. Jones (Leader)

County Councillors L.G. Davies, W.A. Fitzpatrick, K.A. Harris, Mrs M.R. Harris, S.M. Hayes, G.G. Hopkins, W.T. Jones, Mrs K.M. Roberts-Jones and A.G. Thomas

1.	APOLOGIES	C140 – 2011

There were no apologies for absence.

2.	DECLARATIONS OF INTEREST	C141 – 2011

County Councillors L.G. Davies, W.A. Fitzpatrick, K.A. Harris, Mrs M.R. Harris, G.G. Hopkins, E.M. Jones, W.J. Jones and Mrs K.M. Roberts-Jones declared personal but non pecuniary interests in C142 – 2011 Secondary School Modernisation as LEA appointed governors.

3.	SECONDARY SCHOOL MODERNISATION	C142 – 2011

The Portfolio Holder for Learning and Leisure gave an overview of the proposals contained within his reports. He referred to the challenges of improving educational standards, pressures on school budgets and falling pupil numbers. He refered to the consulation and feedback arrangements which would apply to the various proposals.

The Cabinet then heard representations from County Councillors D.R. Jones, for the Shires Independent Group, A.W. Davies for the Welsh Conservative Group, Mrs S.C. Davies for the Welsh Labour Group, D.W. Meredith for Brecon High School, Mrs A. York for Builth Wells High School, Miss M.J.B. Davies for Gwernyfed High School and speaking also on behalf of J.G. Morris for Crickhowell High School who was unable to attend, M.D. Hodges for Llandrindod Wells High School, P.E. Lewis for Llanfyllin High School, G. Morgan for Llanidloes High School, Mrs F.H. Jump for Welshpool High School, J.M. Williams for Ysgol Bro Ddyfi, K. Pathak for Ysgol Maesydderwen and Mrs E.M. Jones for Ysgol Uwchradd Caereinion.

The Cabinet then considered each of the reports in turn.

Secondary and Post 16 Modernisation Overview

The report set out the background to the proposals and made the case for change.

RESOLVED	Reason for Decision:
That the Cabinet notes the strategy for transforming secondary and post-16 education contained within this report.	**To ensure full understanding of the challenges facing the sector and the strategy to address these.**

Secondary Modernisation – proposals for 11 – 16 Secondary Education

The Portfolio Holder set out the rationale for the proposals to establish families of schools with formal collaborative governance arrangements and explained that the funding formula would be reviewed to incentivise collaboration. The proposed families were:

- Maesydderwen-Crickhowell-Brecon-Gwernyfed
- Builth Wells-Llandrindod Wells-John Beddoes
- Newtown-Llanidloes-Bro Ddyfi
- Welshpool-Llanfair Caereinion-Llanfyllin

It was proposed that the arrangements would be in place from September 2012. In answer to Members' questions he noted that the proposals would allow for a substantial reallocation of funds to 11-16 education equivalent to approximately £150 per pupil. He did not feel it was appropriate to slot the three special schools into the local families of schools as the three constituted a family in themselves and had been a model of collaboration. In relation to these proposals a two month feedback period commencing 29th November 2011 would allow the views of interested parties to be considered during the implementation process.

RESOLVED	Reason for Decision:
1. To establish 'Families' of schools with formal collaborative governance arrangements under the Collaboration between Maintained Schools Regulations 2008;	**To ensure that schools collaborate to raise standards and develop a cost-effective education system.**
2. To carry out a review of the Authority's overall funding formula for schools.	**To ensure that the secondary sector is funded in a transparent, standardised and sustainable manner.**

Secondary Modernisation – Proposal for Post-16 education

The Portfolio Holder explained the rationale for a central planning and funding system for commissioning post-16 courses. He confirmed that this approach had the support of the Welsh Government. In answer to Members' questions he advised that it was necessary for the commissioning body to be autonomous and free from competing interests. Democratic overview would be provided by the Scrutiny Committees. He confirmed that when a preferred model for the commissioning body had been approved by Cabinet, consultation would take place before submission to Welsh Government. He wanted the commissioning body to work with neighbouring authorities including those in England. He advised that there was nothing preventing the new body commissioning a small number of subjects in English at the schools designated Welsh medium.

RESOLVED	Reason for Decision:
1. That the Local Authority moves to a central planning and funding	**To ensure that post-16 education is delivered as cost-effectively and**

system of commissioning post-16 courses; **2. That in collaboration with other education providers in Powys, the Authority takes forward plans to formalise the central commissioning system by establishing a new legal entity for all academic and vocational provision within three years.**	**sustainably as possible, whilst ensuring that learners have access to a broad curriculum, both in English and Welsh.**

Secondary Modernisation – proposals for Welsh Medium education

The Portfolio Holder explained that the rationale for his proposals to focus provision was to foster and encourage Welsh language provision, provide continuity of provision for pupils and increase breadth of curriculum choice through the Welsh medium. He explained that he had taken on board representations made in respect of Ysgol Dyffryn Trannon and was therefore recommending to the Cabinet that funding for Welsh medium 11-16 education at Llanidloes High School be retained at its current level pending consideration of needs of pupils at Ysgol Dyffryn Trannon under the Welsh in Education Strategic Plan. All proposals relating to Welsh Medium Education would be taken forward under the authority's Welsh in Education Strategic Plan which included a period of consultation before the final plan was submitted to the Welsh Government.

RESOLVED	**Reason for Decision:**
1. To deliver 11-16 Welsh Medium education from <u>five</u> dual-stream schools as follows: • **Brecon High School** • **Builth Wells High School** • **Caereinion High School** • **Llanfyllin High School** • **Ysgol Bro Ddyfi** **2. To provide additional investment and support to these schools to enhance and maintain the curriculum at the appropriate level;** **3. To retain funding of Welsh medium 11-16 education at Llanidloes High School at its current level pending consideration of the needs of Welsh medium learners at Ysgol Dyffryn Trannon under the Welsh in Education Strategic Plan.** **4. To commission post-16 Welsh**	**To ensure that all pupils have equal access to the broadest range of subjects through the medium of Welsh.** **To ensure that the provision is delivered in a efficient and effective manner**

Medium provision from <u>three</u> of these schools, of which two will become designated Welsh Medium post-16 providers and one continues as a dual-stream provider: • **Caereinion High School – Welsh Medium** • **Builth Wells High School – Welsh Medium** • **Ysgol Bro Ddyfi – dual stream**	

Secondary Modernisation – Associated proposals, including All Through Schools

The Portfolio Holder presented a number of further proposals in relation to

- supporting the establishment of an All Through school in Machynlleth;
- supporting investigation into the feasibility of All Through Schools in other catchment areas if appropriate;
- the implementation of a long term strategy of modernising school buildings and maximising the benefits of ICT to support teaching and learning in schools;
- reducing surplus places by removing surplus buildings and demountables and investigating alternative community use of empty spaces;
- local consultation on the revised home to school transport policy and undertake a review of all transport routes.

The Portfolio Holder confirmed that the two month feedback period would apply to these proposals.

RESOLVED	**Reason for Decision:**
1. To actively support the development of an All Through School in Machynlleth;	**To ensure a sustainable, cost-effective education system in this area that leads to an improvement in outcomes for learners.**
2. To support schools in other catchment areas to explore the feasibility of All Through Schools, if appropriate;	**To assess the potential of this model to deliver a sustainable, cost-effective education system in this area that leads to an improvement in outcomes for learners.**
3. To support the proposals in respect of modernising school buildings, reducing surplus capacity, and reviewing home-to-school transport policy as set out in the report.	**To create a long-term, sustainable education infrastructure;**

The Leader thanked the Portfolio Holder for Learning and Leisure and officers for their work and he also thanked the previous Portfolio Holder whose earlier work and consultations had informed much of the proposals.

4.	LOCAL AUTHORITY MORTGAGE SCHEME	C143 – 2011

It was agreed to defer this report to 6th December.

E.M. JONES
Leader

Leighton Andrews AC / AM
Y Gweinidog Addysg a Sgiliau
Minister for Education and Skills

Llywodraeth Cymru
Welsh Government

Eich cyf/Your ref P-04-376
Ein cyf/Our ref LA/05504/12

William Powell AM

committeebusiness@Wales.gsi.gov.uk

27 March 2012

Dear William,

Thank you for your letter of 12 March about a petition received from Sarah Wheeler of Powys.

I believe that the concerns about 6th form provision at Builth Wells High School have arisen because of 2 separate but related consultation exercises recently conducted by Powys. On 29 November 2011 the local authority issued, for consultation, plans for secondary schools and sixth forms which were based on an expectation that schools would be retained but that they would collaborate to raise standards. The plans also suggested that commissioning arrangements would be put in place to coordinate provision and that 2 secondary schools, one of which was Builth Wells High, would become designated Welsh medium post-16 providers. This consultation was followed by a wider consultation on the local authority's Welsh Education Strategic Plan, and this exercise was completed in mid February. This plan reflected the earlier suggestion that Builth Wells High would provide Welsh medium education at post-16. I understand that the local authority does not plan to make this change in the very near future, but that change by 2015 is under consideration.

The inclusion of this target for Builth Wells High in the strategic plan does not render the change inevitable, and there is no specific mechanism for the plan to be called in at present. The Welsh Education Strategic Plan has in any case been submitted to Welsh Ministers and will be scrutinised by the Welsh Language Unit in my department and feedback on its content will be provided to the local authority before Easter.

Under current legislation, even if a regulated change forms part of a plan such as a Welsh Education Strategic Plan, it would still be necessary to undertake statutory procedures under the School Standards and Framework Act 1998. The change from dual stream provision to Welsh-only provision would be a regulated change at the sixth form at Builth Wells School. The statutory procedures include consultation on proposals and the publication of notices with the opportunity for objection. Such proposals currently come to me for determination where objections arise. When I am required to determine proposals to make changes to schools, I take account of all relevant factors, including the views of objectors, before deciding whether or not to approve them.

Bae Caerdydd • Cardiff Bay
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CF99 1NA

English Enquiry Line 0845 010 3300
Llinell Ymholiadau Cymraeg 0845 010 4400
Correspondence.Leighton.Andrews@wales.gsi.gov.uk

I hope that this explanation provides some reassurance that appropriate mechanisms are in place when changes to schools are under consideration. I will ensure that when the local authority is provided with feedback on its Welsh Education Strategic Plan, they are reminded that statutory procedures would be necessary for a number of the changes contained within the plan, including that in view for Builth Wells High School.

Yours sincerely

Leighton Andrews AC / AM
Y Gweinidog Addysg a Sgiliau
Minister for Education and Skills

PET(4)-09-12 : Tuesday 29 May 2012
P-04-376 Reorganise Education in Powys

3rd May 2012

Petitions committee- response for 15th May 2012 meeting

Sarah Wheeler on behalf of Builth Wells Supporting Education for All

Thank you for the copy of the letter from Leighton Andrews AM, Minister for Education and Skills dated 21/3/12. Can I take this opportunity to clarify the petition statement?

> 'We call on the National Assembly for Wales to urge the Welsh Government to call in Powys County Council's proposals to reorganise education in Powys, which would lead to Builth Wells' **bilingual dual stream** English-medium sixth form becoming a Welsh designated sixth form.'

Regarding Leighton's first paragraph where he stated that there were 2 consultations one in November 2011, modernisation plans for education and a welsh education strategy consultation (WESP) in February 2012. The Minister needs to be aware that the secondary school and sixth form consultation options within the document **have no relation** to the proposals now sanctioned for the sixth form that was decided by Powys County Council education committee for Builth Wells High School. The proposals have been opposed by the majority of the Builth Wells Community, with a large petition(1180) submitted to the petitions committee; the social and economic effects of the closure of the thriving English medium sixth form would be devastating for the school and the community.

To date we are unaware of the outcome of the WESP and have been unable to source any current information regarding the strategy, welsh designated sixth form at Builth Wells High School is fundamental to the consulted document. At no point has there been an impact assessment released for this proposal in Builth Wells. As a community when the minister states these changes are not imminent, 2015 is imminent and having closure of the sixth form 'hanging over the school' compromises future intakes of students.

We as a community wonder what the minister means by 'no specific mechanism for the plans to be called in at present' if there is a statutory procedure for regulated change under the Schools Standards and Framework Act 1998.
We as a community do feel that the minister has clearly stated there will be a statutory procedure including consultation on proposals and the publication of

notices with the opportunity for objection. Builth Wells hope to be given the chance to comment and object; or would this be a closed consultation process?

Please find attached two letters that were forwarded to the Builth Wells Supporting Education for all, from the Education Portfolio Holder Cllr. Stephen Hayes on the 7th December 2011 and the local Councillor. The letters evidence that there is not the critical mass to have a viable welsh medium sixth from at Builth Wells High School:-

> *"the implementation of post 16 education solely through the medium of Welsh should be allowed to grow organically and at its own speed and not implemented until a) it was financially viable and b) that there were sufficient pupils seeking to be educated through the medium of Welsh at 'A' Level.*
> ***AND***
> *"I also accept that the date mentioned in the report of 2015 for full change-over is likely to prove unrealistic, as the time necessary for cohorts of pupils to move through earlier stages of their education will require a lengthier transition period."*

With this statement in mind, why sanction the closure and demise of a large thriving, successful and viable English medium sixth form? The majority of the community oppose this decision and still remain proud of the bilingual dual stream 11-18 yrs. High School. All the members hope for is the welsh designation is changed back to Bilingual dual stream sixth form, to give the English medium A level students equality of opportunity which is an entitlement for all pupils regardless of the medium of education.

Yours sincerely

Builth Wells Supporting Education for All

And

Sarah Wheeler

FOR INFORMATION

GIG CYMRU NHS WALES

Pwyllgor Gwasanaethau Iechyd Arbenigol Cymru (PGIAC)

Welsh Health Specialised Services Committee (WHSSC)

AGENDA ITEM 13

27 March 2012

SPECIALISED GENDER IDENTITY SERVICES PROJECT

Report of	Director of Planning
Paper prepared by	Acting Assistant Director of Planning
Executive Summary	The WHSSC Management Team acts as the Project Board for the Specialised Gender Identity Services Project. The Project has now concluded, and the final report is due to be submitted to the next meeting of the Directors of Primary Care, Community and Mental Health Services, prior to consideration by the Joint Committee in June 2012. This report provides a summary of the key findings and recommendations from the review.
Action/Decision required	To **NOTE** the key findings and recommendations from the review, and to **NOTE** the timeline for receiving the final report.
Link to Board Committee (s)	N/A

Link to Standards for Health Services in Wales	2.	Equality, diversity and human rights
	6.	Participating in Quality Improvement Activities
	7.	Safe and Clinically Effective Care
	10.	Dignity and respect

INTRODUCTION

The Welsh Health Specialised Services Committee is responsible for planning:

- Specialist assessment and monitoring of real life experience for patients with Gender Dysphoria
- Gender confirmation surgery

Following an internal review of the processes for managing referrals to the specialised gender identity assessment services in London, a number of actions were agreed by the Joint Committee in order to strengthen and improve the process, including a review of the service pathway and model for the provision of specialised assessment services.

Following a series of meetings with service users and representatives from third sector organisations, the project was initiated on the 1st September 2011. The overall aim of the project was to improve the planning and securing of specialised mental health services for patients with gender dysphoria and gender confirmation surgical services.

SPECIALISED GENDER IDENTITY SERVICES PROJECT

Objectives

The following four objectives were identified:

i. Revise the current policy to reflect the revised planning arrangements within NHS Wales, including an equality impact assessment and a review of existing evidence including performance indicators and outcome measures and monitoring of equality data.

ii. Revise the referral pathway and to advise on the definitive model for providing Gender Dysphoria assessment and review for patients resident in Wales.

iii. Identify criteria for selecting preferred providers for specialised assessment and gender reassignment surgery.

iv. Clarify the role of services within Wales.

Methodology

In order to facilitate the delivery of the project within the agreed timescales, the role of the Project Board was taken on by the WHSSC management team. A Project Management Group, chaired by the WHSSC Director of Planning, was established to lead and manage the project, and coordinate the work of the two working groups:

Service Model Working Group –responsible for developing the following documents:

- ***Directory of service within Wales*** – identifying services within Wales that provide support to patients with gender dysphoria.
- ***Service Specification and Model*** – identifying the preferred service model for the provision of assessment services for patients with gender dysphoria.

Service Quality Working Group - responsible for developing the following documents:

- ***Quality indicators and Outcome measures*** –for assessment and specialised surgical services
- ***Key performance indicators***–for assessment and specialised surgical services.
- ***Criteria for preferred provider*** – to inform the identification of preferred providers for specialised assessment and surgical services for patients resident in Wales.

Both groups had service user representatives, and had further support from the NHS Centre for Equality and Human Rights.

In addition to the two working groups, a Stakeholder Reference Group was established. This group was chaired by Dr Michelle Northcott, a service user, and was responsible for ensuring that key stakeholders were kept up to date on the progress of the project and the development of the key products, and to provide a forum for discussion and feedback. The group was responsible for:

- Providing a forum for discussion and feedback through the Project Management Team and the Service Quality and Service Model Working Groups;
- ensuring key stakeholders are kept up to date on the progress of the project and the development of the key products;

- ensuring that the Service Quality and Service Model Working Groups adopt an Equality Impact Assessment approach for the development of their products.

The chairs of the stakeholder reference group and the chairs of the two working groups were members of the Project Management Group.

MEETING PUBLIC SECTOR EQUALITY DUTIES

The Equality Act (2010) places a positive duty on public authorities to promote equality for all the protected groups and requires Welsh public bodies to demonstrate how they pay "due regard" to equality when carrying out their functions and activities.

As a subcommittee of the seven Health Boards, WHSCC is required to pay due regard to the promotion of equality when planning and delivering a service, including the contract criteria, the conditions of monitoring the performance of the contractor and the user experience.

From the outset it was agreed that the project management group agreed would use an Equality Impact Assessment (EQIA) framework to anticipate the consequences of decisions on relevant groups. The NHS Centre for Equality and Human Rights provided support to the working groups and stakeholder reference group with the EQIA framework throughout the project.

The intention was to ensure that as far as possible, negative consequences were eliminated or minimised, and opportunities for promoting equality and human rights were maximised.

The framework adopted was based on the following principles that underpin the Public Sector Equality Duties:

- Evidence based

- Transparent
- Engagement
- Leadership

The approach enabled the working groups to design what they feel and believe as service users, clinicians, and planners to be a flexible service responsive to the needs and circumstances of individuals undergoing a very personal and unique journey.

During the course of this work it was evident that there were a number of wider, potentially discriminatory issues, outside of the scope of WHSSC, which need to be addressed. A significant proportion of these issues relate to the experience of patients with primary care and mental health services, therefore the final report will be submitted to the next meeting of the Directors of Primary Care, Community and Mental Health Services. The aim is to ensure that full consideration can be given to the issues raised, at the appropriate level within each of the Health Boards, in order to ensure that Joint Committee members are sufficiently briefed to be able to make decisions on the final report at the June meeting of the Joint Committee.

KEY FINDINGS AND RECOMMENDATIONS

Key Findings

The Project has revealed significant gaps in the provision of services to support patients with Gender Dysphoria.

In particular Welsh patients living outside Betsi Cadwaldr University Health Board and Aneurin Bevan Health Board do not have any access to local assessment services, or other support services such as endocrinology and speech and language therapy. As a consequence such patients are required to travel out of area to access services provided by the West London Mental Health Trust.

There are a number of emerging equality and human rights themes which must be considered and addressed by the wider healthcare community:

- The role of primary healthcare in relation to referral care pathways, knowledge of Gender Dysphoria, attitudes towards the Transgender community and improving the experience of service users.
- The needs of people detained under the Mental Health Act; offenders and those with a personality disorder or learning disabilities that might require treatment.
- Discussions with service users revealed a lack of clarity around the level and appropriateness of service provision and support for people under 18.
- The lack of current up to date information and guidance for Health Boards on Gender Dysphoria, the patient experience and the associated equality and human rights issues.
- There is a gap in data around the health needs and experiences of the Transgendered community.

Recommendations

1. Gaps in provision of locally delivered services should be addressed as soon as possible. In those areas which do not have endocrinology services, arrangements should be put in place to enable patients to access services provided by an adjacent local health board.

2. Specialised assessment – further work should be undertaken over the next six months in partnership with

Local Health Boards and WHSSC to develop proposals for providing regional specialised assessment services within existing resources, including the resource mapping of existing local health board funded provision and the out of area services currently commissioned through WHSSC.

It is recommended that this work is led by Betsi Cadwaladr University Health Board, as the Health Board already has significant managerial and clinical experience in the development and delivery of these services.

3. Gender confirmation surgery – currently there is not a sufficient critical mass to support the development of the full range of gender confirmation surgical services within Wales. Whilst a small number of procedures, e.g. mastectomy, hysterectomy, can be undertaken locally, it is recommended that WHSSC continues to commission the more highly specialised surgical procedures from recognised English centres.

4. Wider consultation should be undertaken with service users and providers to consider whether the proposed Quality Indicators and Key Performance Indicators are fit for purpose of:
    a. Auditing existing assessment and surgical services
    b. Informing the development of proposals for a regional assessment service
    c. Informing the designation of surgical services for Welsh patients.
    d. Informing and improving the equality evidence base

5. A partnership board should be established to support the development of future NHS Wales strategy for gender identity services and to review the audit of assessment and surgical services against the quality indicators and key performance indicators. The scope of the partnership board Should extend beyond the services currently commissioned by WHSSC, and would include primary and secondary care services provided and commissioned by Local Health Boards. The board should have clear terms of reference which ensure that equality and human rights issues and legislative requirements are taken into account for all stages of policy development and review. It is envisaged that the board would be independently chaired, and would be supported by the NHS Centre for Equality and Human Rights.

6. The existing planning policy should be amended to incorporate the proposed care pathways developed by the service model group, and should be further reviewed once the work on the specialised assessment services has been concluded and the Joint Committee have reached a decision of the future model of provision.

CONCLUSION

The project has addressed the key objectives as agreed by the Joint Committee in November 2010, and has identified key findings and recommendations for improving planning of services for patients with gender dysphoria.

Further work is required to address the key issues of inequity surrounding access to primary and secondary care services, and to scope the feasibility of developing regional assessment services for Welsh patients.

RECOMMENDATIONS

Members of the Joint Committee are asked to:

- **NOTE** the key findings and recommendations from the review; and
- **NOTE** the timeline for receiving the final report

IMPACT ASSESSMENT

Health Improvement	Implementation of the project's recommendations should lead to reduction in the inequity experienced by individuals with Gender Dysphoria who are unable to access local endocrinology and speech and language support.
Workforce	The project has recommended that further work is undertaken on the models of provision to identify the workforce impact.
Education and Training	The report has identified that there are training and education gaps in primary care services.
Financial	The project has recommended that further work is undertaken on the models of provision to identify how existing resources can be used to develop regional services.
Legal	There are no specific legal issues that arise as a result of the Review.
Equality	The report has identified significant issues

	relating to the equality act, the implementation of the key recommendations will address the issues raised.
Environmental	The provision of local services will reduce the requirement of individuals to travel out of area, and thus result in a reduced carbon footprint.

RISK ASSESSMENT

Clinical/Service	The implementation of recommendations would be expected to result in an improved service for users in terms of efficiency, quality, equity and user experience.
Financial	The project has recommended that further work is undertaken on the models of provision to identify how existing resources can be used to develop regional services.
Reputational	There has been full engagement with stakeholders from the Transgender community throughout the project.

Acronyms and abbreviations	

CONSULTATION AND ENGAGEMENT

The Stakeholder Reference Group were involved throughout the project and the development of the key products, and provided a forum for discussion and feedback.

SOURCES OF INFORMATION

A full list of references is included within the final report. Copies of the report are available upon request.

Stop Newport & Monmouthshire Incinerator Campaign

John Griffiths AM

Minister for Environment and Sustainable Development

5th Floor, Tŷ Hywel, Cardiff Bay,CF99 1NA

20 May 2012

Dear John

INCINERATION : (1) ABOLITION OF THE HPA (2) OUTCOME OF LOCAL ELECTIONS

During evidence to the Petitions Committee in late March, SNIC were rather surprised to hear your statement that you were "not aware of the Health Protection Agency's imminent demise".

I consulted the Clerk to the Committee and agreed that SNIC would write to you direct on this matter, but I am copying this letter to the Committee so that they are fully aware of this particular follow-up enquiry.

The proposed abolition of the HPA, and the transfer of all its functions to Mr Lansley's Ministry were originally announced in July 2010. The HPA is to be abolished under Section 56 of the Health and Social Care Act 2012 which received Royal Assent earlier this year. We do not know when that Section of the Act will be brought into force. We do know that Earl Howe explained during the final Lords' stages of the Health Bill, that the HPA's functions are to be transferred in their entirety to a new body – Public Health England – which does not have NDPB status and whose executive control will be vested in a Chief Executive reporting to the English Health Minister. **Perhaps your officials could establish when the HPA will be abolished and inform us, given the reliance placed on the HPA by WG Ministers and officials in relation to the safety of incineration emissions ?**

As WG were apparently unaware that the HPA faced abolition, despite the Government's public reliance on its previous advice in respect of the health risk from incinerators, SNIC and others with an interest in the health implications of incinerators would be grateful to **learn which bodies will take over the HPA functions in respect of Wales ?**

The previous declared policy of your Ministry issued by your predecessor last year was to support the construction of EfW waste incinerators in every region of Wales. The same policy statement confirmed that the Welsh Government was only "technology neutral" between different kinds of incinerators. Your officers have constantly reaffirmed this stance. We hope that you do not share this view, as you have assured me on several occasions that you are genuinely open to alternatives to mass-burn incineration. However as there has been no recent Ministerial statement to modify the previous policy, widespread public concern inevitably remains about the health implications. It is vital that health advice of the highest quality and objectivity is available, and can be reviewed and updated regularly, with the benefit of further research commissioned by Welsh Government Ministers to meet the needs of Wales. This is urgent : once Section 56 of the new Act is in force, the UK Government will no longer have any duty to provide health advice on incinerators in respect of Wales.

You will be aware of public dissatisfaction with the advice from the HPA on health effects from waste incinerators, partly because of its narrow focus on epidemiology (unlike the US EPA), and partly because independent bio-medical experts come to different conclusions. In particular, Prof C.V. Howard, who is shortly presenting evidence to the Assembly Petitions Committee, judges that a precautionary approach (as under Wales's sustainable development duty) favours non-incineration treatments of municipal wastes. Evidence

from Cardiff Against The Incinerator to the Petitions Committee details how the University Health Board used HPA advice on the Viridor incinerator license application (decided by the EA permitting team in England) but evaded most of the evidence presented to them, including documents from Professor Howard. I felt that pro-incinerator witnesses on 27 March were taking a similar approach to the recent Italian studies on health impacts of incineration which SNIC quoted to the Petitions Committee. Taking the line that *HPA have said x and we are sticking to x whatever new evidence others may submit* is surely not the right way to proceed if we are trying to establish the truth ?

You and Ministerial colleagues for health have an opportunity to remedy these deficiencies and to broaden and improve the sources of advice to the Welsh government and Welsh health bodies in respect of incineration (and to include incinerator ash as well as emissions). **Would you ensure that the new advice-giving process is fully transparent and open to scrutiny in Wales ?** Can you say too, what budget transfers, if any, have been, or will be, made between the Government in Westminster and the devolved government in Cardiff in respect of the transferred functions and programmes?

Outcome of Local Elections

SNIC note that you are quoted in your recent article in the CPRW magazine as stating that you "want to look at some of our most pressurized urban environments to ensure that we deliver a better quality of life for people who live there". This surely applies to Newport and its "urban fringe" around the priceless Gwent Levels **. We wonder what contribution you expect a waste incinerator and its associated emissions, new lorry traffic and production of toxic ash will make to deliver a better quality of life for the people of East Newport, including those living in the new housing at the Llanwern regeneration site at Glan Llyn, and the surrounding villages?**

Every current trend shows the environmental and economic weakness of the case for mass-burn incinerators. The views expressed publicly this month by the European Commission, warning countries like Denmark and Germany to cut back on incineration in order to meet EU parameters for waste, are indicative. The EU will surely continue to increase the requirements on all Governments to recycle and the EC is now saying more clearly than ever that burning cannot be counted as recycling. Energy generation does not compensate for this. Meanwhile residual waste streams are falling across the UK and Europe, threatening the economic viability of new mass-burn incinerators everywhere. Incinerators are even being closed in Rotterdam. It would a tragic mistake if Wales adopted incinerators and thereby put a *de facto* ceiling on recycling just at the moment when incinerators are being restricted and reduced right across the rest of Europe.

An incinerator in Newport would place an unacceptable environmental, health and cost burden on the whole population. There is near-unanimous opposition by local residents in Newport and Monmouthshire to an incinerator. This has been expressed in petitions and letters from the public, by the views of at least 7 local community councils, by the partnerships regenerating the former steelworks site at Glan Llyn and by both successful Labour and Conservative candidates in the recent local elections. We can see no mandate for the Welsh Government to override these views – or to ignore the manifesto of the newly elected Labour City Council in Newport – by forcing through a mass-burn incinerator in Newport. Such action would damage the physical and mental health of our people, and our economic and social prospects. **SNIC hope you will respect the outcome of the recent Elections, publicly change the policy embraced by your predecessor and instruct your officials to co-operate with Newport City Council and other local authorities to find a solution to waste disposal in our area that does not rely on mass-burn incineration.**

Yours sincerely

R G Hepworth

Rob Hepworth

Chair, SNIC

By virtue of paragraph(s) vi of Standing Order 17.42

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