‘Arresting’ the Silent Killer

Carbon Monoxide Poisoning
– our shared social responsibility

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1 The Silent Killer poster – a film by Wales & West Utilities & The Royal Welsh College of Music and Drama

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Colourless, odourless, poisonous and deadly, Carbon Monoxide (CO) binds to blood haemoglobin over 200 times more strongly than oxygen, and can kill quickly and without warning. At high concentration levels, typically 12,800 parts per million (ppm), a person would die in between 1 and 3 minutes. The long term effects of exposure to lower levels this toxin over extended periods of time are still as yet unknown, but the immediate effects and consequences of high exposure are known all too well by far too many. A product of incomplete combustion, resulting from a lack of oxygen usually due to:

- **Insufficient Primary Air** - induced into the burner by the gas stream; caused by insufficient working pressure which in turn causes over gassing.
- **Insufficient Secondary Air** - supplied to an appliance combustion chamber; caused by insufficient ventilation supplied to the room or appliance.
- **Insufficient Air Changes** - within the appliance to remove the products of combustion; caused by insufficient ventilation, blocked or sooted flues, or the incorrect fluing of appliances or flue size.

Carbon Monoxide can be caused by any fuel that burns and is, by official estimates, responsible for around 50 deaths across the UK per year.² A further 200 people are admitted to hospital suffering serious injuries and around 4,000 people diagnosed at accident and emergency departments as having been exposed and affected by this deadly gas. However, detection and diagnosis remains difficult with Coroners not routinely checking Carbon Monoxide levels as part of a standard post mortem, the limited period over which CO can be detected in the blood and misdiagnosis due to the broad ranging, non-specific symptoms of CO intoxication with confusion with ‘flu-like’ symptoms being common. Whatever the actual number, the general consensus is that an overwhelming majority of cases go unrecognised, unreported, and untreated. A survey carried out by the charity Carbon Monoxide Support showed that in only one case out of 77 was exposure correctly identified on the basis of symptoms alone.³

Similarly, the numbers of people at risk may also be inaccurate with callers to the Emergency Services, Gas or Fire, being advised to ventilate the property prior to evacuation. This allows any CO present to disperse to such a level that it may no longer detectable. Although a number of first responders now wear Personal Alarm Monitors to detect for, amongst other poisonous gasses, Carbon Monoxide, a relatively small percentage carry and are trained to use a flue gas analyser to test whether individual appliance(s) pose a risk. Worryingly, around 250,000 gas appliances are still condemned annually. Assuming that as few as 10% of these appliances were giving off significant amounts of carbon monoxide, and discounting exposure from other domestic sources, this suggests that as many as 25,000 people every year may be exposed to the effects of Carbon Monoxide within their home. Even more worryingly, estimates published by the All Party Parliamentary Gas Safety Group suggest that as few as 12% of these homes are fitted with a CO alarm, compared to 82% fitted with a smoke alarm.⁴ Consequently the numbers of people at risk of or affected by this dangerous gas is believed to be far greater that official figures suggest.

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² Walker E, Hay A. Carbon monoxide poisoning is still an under recognised problem. BMJ1999;319:1082-3
⁴ Preventing Carbon Monoxide Poisoning, Executive Summary p.7 Available at; http://www.policyconnect.org.uk/appgsg/node/494
Official figures and statistics cannot, however, begin to portray what it is like for a mother to lose a child or a husband to lose his wife from something so easily preventable. Dr Roland Wessling, himself a victim, having lost his partner Hazel Woodhams in July 2011 and having almost died himself gave a poignant account of the real life consequences at a speech in London earlier this year;

“What losing Hazel means to me, cannot be put into words, let alone into numbers. What happened to me, can. As a direct result of the CO poisoning, I spent 2 weeks in intensive care, a further 2 weeks in hospital after that, I had 8 operations on my right arm, resulting in a scar with 80 stitches, 70 cm or 28 inches long, 6 hours in 3 sessions in a hyperbolic chamber at a simulated 30 meter depth to get the CO out of my system, I had 6 months of physio- and hydrotherapy up to 5 times a week and, to date, just under 14,500 painkillers to deal with the aftermath of the injuries. All this is the result of taking a small, cold-to-the-touch charcoal BBQ grill into a large tent before going to bed.”

Both Roland and Hazel had MSc’s in forensic sciences and by Roland’s own admission “should have known there was a risk from CO.” As responsible parents, children, employers and citizens, we all have a role to play in further raising awareness of this silent killer.

Ofgem, the industry regulator, continue to encourage Distribution Networks to take an active role in promoting awareness of Carbon Monoxide poisoning. The Discretionary Reward Scheme which rewards innovative thinking, partnerships and the sharing of best practice recognise that there is not a one size fits all approach to tackling the issue. Competition is encouraged, as is the tailoring of initiatives to the dynamic influencing factors with economics and geography, as much as pathology and biochemistry, determining someone's susceptibility to carbon monoxide poisoning. This has allowed for a wide range of initiatives to be trialled with best practice shared across the networks. Following consultation with our stakeholders around the measures they would like to see implemented in this area, WWU has developed a strategy, recognising that CO is not solely a gas issue, which delivers a diverse programme of initiatives both to our staff and more widely, the 7.5 million people who live and work within our network. Thus far, over one million people have benefitted from our campaign, with vulnerable groups including children, students and older people specifically targeted. By using the quality data our Emergency engineers collect at circa 6,000 visits per year relating to suspected Carbon Monoxide poisoning I have developed a “hotspot” analysis tool which has enabled us to build a strategy which proactively targets our initiatives to those areas most at risk.

5 Poster Competition: Speeches at Event 2013 http://www.co-gassafety.co.uk/postercomp_speeches.html
The programme began with the launch of WWU’s educational film ‘Carbon Monoxide - The Silent Killer’. More than 1,000 requests have been received for copies from interested groups, who have used the film for their own educational projects. Recognising the large number of rural communities in Wales in particular, our bespoke campaign which incorporates touch screen learning developed in conjunction with Techniquest has gone on to target major agricultural shows like the Royal Welsh Show, National Eisteddfod and Royal Bath and West. Last summer, we directly interacted with over 5,000 families providing each of them with safety advice and an opportunity to test their improved knowledge to win a CO alarm ourselves winning WWU the coveted “Best Stand of Educational Value 2012” for our approach (see above). The exhibition has already saved one family from potential injury. After receiving and using their free audible CO alarm at the Eisteddfod, a family was immediately alerted to a CO problem at home. The boiler was found to be faulty, and the family returned following day to thank WWU ‘for potentially saving our lives’.

Another initiative, our “Create a Campaign” competition in partnership with Swansea Sound and the Wave, was initially borne out of the receipt of a cost prohibitive quotation for radio advertisements. This focused on one of our key “hotspot” areas and asked children to write and star in their own radio commercial to raise awareness of CO poisoning. The competition reached more than 300,000 listeners at a fraction of the cost of traditional advertisements. We have also taken the message to students, community groups and older people through partnerships with; the Royal Welsh College of Music and Drama, Theatr Na’Nog, The Salvation Army and Age Cymru (see right). In summary, Wales & West Utilities has using its quality data analysis tool to develop a strategy which considers our unique geography, enabling engagement with a wide variety of groups and communities - in areas at most risk - maximizing partnership working opportunities to ensure that messages are delivered effectively, by trusted people within local communities, and at a minimum cost to the consumer. Feedback from surveys of >5,000 people at a variety of events has verified that WWU’s message has been effective with over 90% citing an improvement in awareness, and over 85% committing to pass the message onto a friend or family member. Having already potentially the lives of one family, WWU are committed to this ongoing safety campaign.
WWU are by no means the only network to be creatively addressing this issue, with each of the gas networks receiving a £400,000 share of the Discretionary Reward fund to support the range of initiative delivered last year. Whilst trialling new and innovative ideas our efforts are also focussed on sharing best practice and working toward a common approach for collating and analysing Gas Network collected incident data across the UK. This has taken some time to embed and with the disparate nature and approach of other fuel source first responders and that of the 54 Fire and Rescue services across the UK. This coupled with there being no central repository for incident reporting outside the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR) process, which resulted in only 23 qualifying incidents in our network over the last 12 months. There is still considerable work to be done in building a robust incident dataset for the UK which may highlight the true extent of the problem and consequently secure further investment in this area.

Gas Distribution Networks, supported by Ofgem, Igem, Gas Safe and a number of other interested parties, organisations and charitable groups who are clearly passionate about this cause, often as an unfortunate consequence of having tragically lost a friend or family member, have made excellent progress in raising awareness on the limited funds currently available (see right). The 11/12 Downstream Incident Data Report published last month cites only one CO related fatality from piped natural gas. More modern house design, however, brings its own problems. With the Government keen to promote initiatives to seal homes and prevent heat loss, comes the inevitable consequence that any carbon monoxide will also be sealed in. In a well-insulated home the negative pressure created by a bathroom extractor fan can be enough to cause retrograde flow in an otherwise normal chimney. The provision of a CO alarm was initially scoped as a requirement of a Green Deal grant. However, in reality it is the responsibility of the installer to complete a risk assessment and supply one as and when deemed necessary – every home which doesn’t already have one then? More research is needed in this area to determine the full effects of reduced airflow on CO concentration levels in homes.

Raising awareness of this silent killer is not solely as gas issue; we all need to work toward raising awareness and minimising incidents. In our efforts to prompt a broader response inclusive of shippers, suppliers and other fuel groups, who have generally, by comparison, been astoundingly absent from the campaign thus far, and to identify further technical innovation and identify suitable research projects, WWU is partnering with Igem and the All Party Parliamentary Group to deliver an interactive conference around CO in July this year. The conference invites all interested parties to participate in sharing best practice and innovative thinking to develop a UK response to address the risk of CO. We can and should all do more in this area and have a shared social responsibility to do so. Ultimately, it is irrelevant who takes overall responsibility. What can you do personally or professionally to help prevent further tragedy?

6 11/12 Downstream Incident Data Report can be accessed via; http://www.gas-safety-trust.org.uk/2013/03/didr-2012/
Less of a technical paper then, more of a call to action, perhaps preaching to the converted, but perhaps not – we have seen how people who you would have expected to have known about the risks can and have been affected. Any opportunity to raise awareness of this silent killer should be grabbed with both hands and I would encourage you to do the same with your friends and family tonight.

Tomorrow it could be too late...