
**Aileen Campbell, Minister for Children and Young People….**

*We want Scotland to be the best place in the world for children to grow up. We want a Scotland where the rights of children and young people are not just recognised, but rooted deep in our society and our public services. A nation that strives to make these rights real in our everyday lives*[1].

**Tam Baillie, Scotland's Commissioner for Children and Young People….**

*Unconventional Gas (UCG) refers to gas in an unusual location whose extraction involves processes such as hydraulic fracturing, (fracking), coal bed methane extraction (CBM) and underground coal gasification. These processes are controversial. Some see them as helping to contribute to the world's increasing energy demands. Others have environmental and health concerns around their impact. To safeguard children's rights, I would urge adopting the precautionary principle. This states that if an action has a suspected risk of causing harm to the public, those proposing it must show that it does not— even if some elements of the science behind it remain unclear*[2].

**Barriers to achieving the above**

- Every aspect of our current way of life throws up problems - each one is a priority for someone. They interfere with the quality of our lives and our life expectancy. In Glasgow this can vary from 50 years in one place to over 80 years in another. It is worse in many parts of the world;

- In addition to the growing threat from resource wars, there are two challenges which differ in that they affect all living things. They are existential, i.e. they threaten the existence of all life on earth;

- Pollution of our planet, including pollution of our bodies and those of all living organisms, occurs directly from burning fossil fuels and from our use of numerous everyday objects derived from fossil fuels;

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[1] *A Scotland for Children: A Consultation on the Children and Young People Bill (4th July, 2012)*

[2] *Fracking: a children's rights issue; Briefing from Scotland's Commissioner for Children and Young People (Dec 2014)*

- Every one of these issues is connected to all the rest: they arise from the global social and economic system that dominates all life on earth.

We will concentrate on these existential issues because of their urgency and because all else is linked to them.

**Some Definitions**

Endocrine: hormone. Hormones are chemicals made by numerous cells/glands in the bodies of all living things, regulating every cell and every function - growth, development, maturing, reproduction, digestion, excretion, thinking, behaviour and brain function, regulating temperature, metabolism, etc…… Disorders of these have been called the modern epidemics.

Carcinogen: a substance/practice which can initiate cancer.

**Current State-of-the-Art Research on Exposures to Industrial Toxins**

We are now producing and using thousands of chemicals. The Registration, Evaluation , Authorisation and Restriction of Chemicals (REACH) http://www.reachonline.eu ,estimated 106,000 chemicals in commercial use in the EU; about 1000 new ones are added yearly; only about 7% have full toxicity testing. Many of these substances have similar properties to our natural hormones, so can interfere with/ disrupt their normal healthy function. These are known as endocrine disrupting chemicals (EDCs). There are now many scientific papers on this. Freely available on line are: WHO publication Endocrine Disrupters and Child Health http://apps.who.int/iris/bitstream/10665/75342/1/9789241503761_eng.pdf ;

The Endocrine Society Scientific Report at https://www.endocrine.org/ ;
Introduction to Endocrine Disrupting Chemicals(EDCs) A Guide for Public Interest Organisations and Policy Makers from The Endocrine Society and IPEN at IPEN.org
Endocrine Disruption Exchange at https://www.endocrine.org/ *

State of the Art Assessment of Endocrine Disrupters, Final Report EU 2012 at ec.europa.eu/environment/.../endocrine/pdf/sota_edc_final_report.pdf *
endocrinedisruption.org;
Professor Phillipe Grandjean's book: Only One Chance to Make a Brain

The disturbing short film by Dr Bruce Lamphear: Little Things Matter: The Impact of Toxins on the Developing Brain on youtube…** and hundreds of published research papers books and documents.

The presence of multiple toxins in humans has been clearly shown by biomonitoring studies, one small such having been carried out in Scotland. The most disturbing one was the 10 Americans study carried out by the Environmental Working Group and can be seen now at www.youtube.com/watch?v=0-kc3AIM_LU Essential viewing but be prepared to be shocked.**

* and ** indicate our first choices for busy people!
Hundreds of substances (and situations) that can initiate cancers,(carcinogens) and their classification can be seen at the International Agency for Research on Cancer (IARC) of the World Health Organisation, (WHO.) http://monographs.iarc.fr/ENG/Classification/ which lists about 500 substances as known, probable and possible carcinogens.

The Endocrine Disruption Exchange lists about 1,000 known or suspected endocrine disrupters. Most of these substances can have additional adverse health effects.

The Challenges of Climate Change: Children on the front line. http://www.unicef-irc.org/publications , a disturbing collection of essays showing how climate change is already affecting the world's children. Following the comments of the Commissioner for Children and Young People above, we note that UNICEF identifies at least 15 rights at risk from climate change related setbacks, including

**Article 2 (non discrimination):** Climate change exacerbates inequity because its impacts often hit children more than adults.
**Article 3 (best interests):** Climate change can work in opposition to the best interests of children in vulnerable countries e.g. through increased risk of disease or the growing risk of natural hazards disrupting education and impacting child protection;

**Article 5 (survival and development**: A child's right to survival is challenged by increasing climate-related disasters and by increased risk of disease and hunger as a result of climate change;

**Article 12 (voice of the child):** Decisions on climate change at local, national and international level will impact on children now and in the future. Children will also bear the social, economic and environmental impacts of inadequate and unambitious climate change decision-making today. Limiting their opportunities to voice opinions and provide solutions inhibits this right.

**Article 22 (right to protection as refugees**): Climate change has led to increased migration from dangerous and uninhabitable areas. Children are negatively affected when they are displaced, meaning that climate change makes their right to refugee protection increasingly necessary.

**Article 24 (Right to health):** a child's right to health is directly and indirectly threatened by climate change. 85% of the burden of disease from climate change affects children. A child's right to health is infringed when health-sustaining conditions such as clean water and nutritious food are compromised by climate change. Increasing greenhouse gas emissions contribute directly to air pollution which in turn drives climate change. Air pollution also contributes to increased respiratory diseases amongst children and challenges the fulfilment of a child's right to health.

**Right to social protection (article 25):** developing countries have additional need of resources dedicated to ensuring that children are able to cope. This right is increasingly at risk owing to developed countries' slow progress in providing the additional funds that would help vulnerable countries to adapt to climate change.

**Right to an adequate standard of living (article 27)** Climate-induced sea-level rise, flooding and extreme weather destroys housing and create unsafe living conditions for children.

**Right to education (article 28):** children are kept from attending school when family livelihoods and financial resources are affected by climate change. Access to education can be disrupted when schools are damaged or destroyed by climate-related disasters.

**Problems arising from Industrial / Environmental Chemicals**

**1.Climate**

It is now agreed by 95% of global climate scientists that climate change is more serious than previously acknowledged and action cannot be delayed. Current data on climate change from ex NASA climatologist Dr James Hansen: *there is a widely accepted view that 'science' established 2°C above preindustrial temperature as a safe upper limit for global warming. That is unadulterated hogwash. The paper we published 12 months ago, Assessing "Dangerous Climate Change" with recognised international experts in relevant fields, shows that 2°C global*

*warming is a target for disaster.…However, I will note one key aspect of another shibboleth: the falsehood that it is implausible to keep global warming far below the misanthropic 2°C "guardrail".*

Professor Kevin Anderson, the Tyndall Climate Centre.University of Manchester: *The upbeat utterances on which we are told international diplomacy and negotiations depend have so far failed to trigger any meaningful action to reduce emissions. After eighteen years it is perhaps time to ditch any and all astrology and turn directly to the numbers and the science to inform policy. There is currently nothing substantive to suggest we are heading for anything other that a 4°C rise in temperature, and possibly as early as the 2060s. Yet over a pint of ale or sharing a coffee it is hard to find any scientist seriously engaged in climate change who considers a 4°C rise within this century as anything other than catastrophic for both human society and ecosystems. Moreover, ask those same scientists if 4°C is likely to be as high as it could get prior to the temperature beginning to fall, and many will shake their heads pointing to a range of discontinuities (tipping points) that may see us witness temperatures increasing well beyond 4°C. Against such a backdrop, is it therefore not time for those of us who work in climate change to refrain from finessing our analysis, and instead be as blunt and direct publically as we are prepared to be privately? Until such time, policy makers will remain ill-equipped to embrace the science and escape the astrology; and next year's negotiations in Durban and those the following year in Rio will be doomed to failure before they even start."*

The current figure for global temperature rise is approaching 1degree C above pre-industrial levels. Consider the devastating events already attributed to this level of warming.

**2.Public Health**

The equally, if not more serious, question comes from our exposures to occupational and environmental toxins. What we are currently witnessing in the rising incidences of the so-called Modern Epidemics, listed above, would indicate that this could overtake even the worst of climate predictions as the greatest threat to our existence.

The range of disturbances/diseases of form and function were first demonstrated in many wildlife species in the 90s in the remarkable publication"Our Stolen Future" by Dr Theo Colborn, Daniella Dumanoski and Dr Peter Myers. These were found to be associated with the pollution of the Everglades from upstream industry. Later it was uncovered that similar disturbances/diseases were showing up and increasing in human populations.
The developing foetus is the most vulnerable. Effects via the placenta, and 'epigenetic' (influencing, but not initiated by, DNA) routes, are numerous, serious and irreversible and include developmental, learning, behavioural, metabolic (type 2 diabetes and obesity), allergies, reproductive disorders and hormone related cancers.

Some disorders are obvious at birth, many do not appear until later in life. We are already familiar with the effects of prenatal exposures to maternal alcohol, tobacco, early pregnancy X-rays, thalidomide, diethylstilboestrol and the effects of the severe famine in Nazi occupied Holland in 1944-45 which influenced future patterns of obesity in offspring. The Natural History Museum, Life Sciences at www.nhm.ac.uk

**Failings of Current Regulations**
We should not assume that the 'permitted' level of exposure to a toxin is equivalent to a 'safe' level. Research on the effects of low doses of carcinogens and endocrine disrupters in animals and humans demonstrate clearly that the idea of a cut off point below which no harm is assumed is misleading. That there is no safe dose of a carcinogen is now accepted by the world's science and medical establishments, including the WHO. Risk may be very small but it never disappears, even at the lowest levels of exposure.

At parts per billion (ppb), or trillion (ppt) – substances with properties similar to hormones (EDCs) can have far-reaching effects. To give some idea of how tiny these amounts are, one part per billion and one part per trillion are equivalent to one drop of water diluted into 1, or 20, Olympic-sized swimming pools respectively. Medicines also operate at these minute levels in our bodies.

Extensive research has been published worldwide on the use of chemicals with both endocrine disrupting and carcinogenic effects in UG operations.
From the Endocrine Disruption Exchange in the US:
Of the 353 products used in UG extraction with CAS accreditation ( an unique numerical identifier assigned by Chemical Abstracts Service (CAS) to every chemical substance),

- 75% affect skin and eyes and respiratory and digestive system;
- 40-50% affect the brain and nervous , immune , renal and cardiovascular systems;
- 37% affect the endocrine system; and
- 25% could cause mutations and cancer.

NB. Totals add up to more than 100% because many of the chemicals have multiple effect

**A Not- So-Little Local Affair**

**PEDL 133( licence for proposed development at Airth)**
Produced and Treated Water (Treated to remove toxins)
Water is pumped out from the coal bed . This releases the methane gas. This water is the Produced Water. It is treated to remove toxins. Thousands of gallons can be extracted from each well each day. In shale bed fracking millions of gallons of water are injected for each frack. SEPA sets a daily limit on the volume of water to be extracted at Airth when fully operational at 40 cubic metres (about 9000 gallons) per well and a total of 888m3(about 194000 gallons) from the site. http://www.sepa.org.uk This water can be contaminated with chemicals used to facilitate the drilling and to protect the machinery and with those occurring naturally in the seams.

From information Dart publicly report on their website and additional data from SEPA under EIRS 200417, requested by the Women's Environmental Network Scotland (WENS) in a Freedom of Information request , WENS and Concerned Citizens of Falkirk (CCoF) looked at the health risks of 15 chemicals in Dart's Treated Water. We were limited to 15 because of our limited resources and the limited data available from Dart and SEPA at the time.

All 15 chemicals appear in the US Government's Agency for Toxic Substances and Disease Registry's (ATSDR) priority list of hazardous substances "which are determined to pose the most significant potential threat to human health due to their known or suspected toxicity".
http://www.atsdr.cdc.gov

Gas mining and the burning of fossil fuels may also disturb and release Normally Occurring Radioactive Materials 'Norms' such as Thorium, Radium, Uranium, Potassium and their decay products, where they naturally occur in the ground.

Toxins removed by Dart from the Produced Water are disposed of by SEPA. The "treated" water is discharged into the River Forth.

**How Much Pollution?**
Although the readings that Dart shows in its one litre samples are small, (micrograms per litre), we note that many millions of gallons of water are involved in Unconventional Gas operations. When scaled up for the number of proposed wells at Airth and over their expected lifetimes, we find that many thousands of kilograms of highly toxic chemicals will contaminate our

environment. When scaled up to take into account the recent issue of licences (November 2014) by the Department of the Environment and Climate Change (DECC) to explore in Scotland and the rest of the UK for hundreds of drilling sites with multiple wells, the potential widespread damage to people and environment is patently unacceptable.

Our calculations for PEDL133 can be seen at FAUG.org.uk, (Falkirk Against Unconventional Gas, Potential Public Health Risks), but can be calculated from any description of UCG operations, even allowing for the fact that some information may be withheld by the operators on the grounds of commercial confidentiality. and the gagging agreements with those who have agreed to allow drilling on their land.
Note that we have just dealt with the water. There is also air, soil and worker pollution. Serious worker exposures to silica and to benzene are now reported from the US. Workers' Silica Exposure at Fracking Sites Far Exceeds the US Occupational Safety & Health Administration (OSHA) Limit, according to The US National Institute for Occupational Safety and Health (NIOSH) Study , 2013) http://www.cdc.gov/niosh/

**Act Now or Wait and See?**
Do we act now on what we are only 'pretty sure' of, thus taking a precautionary view, or do we wait for certainty and risk passing the point of no return. The European Environment Agency publication Late Lessons from Early Warnings is a valuable source of data on how ignoring warnings has already resulted in an unacceptable toll of disasters, diseases and deaths.

The magnitude of the risks we now face is so great that it is clear there has never before been such need for adopting the Precautionary Principle which the UK agreed to at the Rio Environment Summit in '92 and which states : When an activity raises threats of harm to the environment or human health, precautionary measures should be taken, even if some cause and effect relationships are not fully established scientifically.

Considering the scientific knowledge we now possess, e.g. in the December 2014 European Commission Joint Research Centre Institute for Health and Consumer Protection at https://ec.europa.eu/jrc/sites/default/files/lbna25919enn.pdf dealing with 'Key scientific issues relevant to the identification and characterisation of endocrine disrupting substances Report of the Endocrine Disrupters Expert Advisory Group (ED EAG),'we can reach no conclusion other than that the risks from our use of fossil fuels to health and life, both as fuel and feedstock for consumer goods, far outweigh their economic benefits*, and that our conscience and duty of care demands that we ban all Unconventional Gas(UG) operations and expedite the phase out of our use of all Fossil Fuels.

*We ask that the true cost of our use of Fossil Fuels, and of use of other environmental and occupational toxins, is properly accounted: much of the cost is hidden/externalised and picked up by Local Authorities, by Social and Health services and by the people who are damaged by these activities and exposures.

The European Health and Environment Alliance estimate that €31 billion per year in EU health savings are possible from reducing exposures to hormone disrupting chemicals.
Current political energy discourse is predominantly about the market and oil and gas prices. However important that may be, it pales beside the need to consider the effects of our energy choices for protecting human health and a habitable planet.

**POST SCRIPT**
In the first half of December 2014 alone there was a further surge of reports. academic papers. and notice of a conference on EDCs and on the dangers to health arising from oil and gas drilling.

1.Developmental and reproductive effects of chemicals associated with unconventional oil and natural gas operations - Center for Environmental Health New York; The Institute for Health and the Environment , New York,

**University of Missouri** – ***Biological Sciences***, Columbia, Missouri,
**University of Missouri** – **Obstetrics, Gynaecology and Women's Health.**

2.**The (world renowned) Endocrine Society and IPEN** (International Pops Elimination Network) joint publication: **Introduction to Endocrine Disrupting Chemicals (EDCs) A guide for Public Interest Organisations and Policy Makers.**

3**. European Commission Joint Research Centre** Institute for Health and Consumer Protection Key scientific issues relevant to the identification and characterisation of endocrine disrupting substances.
**Report of the Endocrine Disrupters Expert Advisory Group (first published 2013)**

4. Concerned Health Professionals of New York 2nd edition: Compendium of Scientific, Medical, and Media findings demonstrating risks and harms of fracking ( unconventional gas and oil extraction)

5.**SAICM Strategic Approach to International Chemicals Management (**The United Nations Environment Programme (UNEP) and the World Health Organisation (WHO)
Working Group Geneva 16th 17th December 2014
International Conference Madrid 3rd -5th March 2015

6.**Little Things Matter http://www.huffingtonpost.com/2014/11/20/toxins-children-brain-little-things-matter_n_6189726.html**

**7.**Over the past year, more than 140 governments from Africa, Asia and the Pacific, and Latin America and the Caribbean recognised the special vulnerability of children during critical periods of development and declared the need for more awareness, information and monitoring of EDCs including in children's products, pesticides, electronics, building materials and textiles. Governments also called for a list of potential EDCs and their associated health effects along with safer substitutes including non-chemical alternatives.

8. On 7th January 15 published by the US National Library of Medicine National Institutes of Health: Early-life exposure to endocrine disrupting chemicals and later-life health outcomes: an epigenetic bridge? The purpose of this review is to provide a summary of recent research findings which indicate that exposure to EDCs during in-utero and/or neonatal development can cause long-term health outcomes via mechanisms of epigenetic memory.