

Wasting **our Future**
Presentation on UK situation to
The International Conference on
Nuclear Waste Problems
- *from Mining to Reactor Waste*

Stockholm 17-18 October 2009

By Dr David Lowry

Nuclear Waste Advisory Associates (UK)

“I feel nuclear waste is only a minor worry,
compared with all the
other forms of waste we are
inflicting on future generations”

-David MacKay, Professor in the Department of Physics
at Cambridge University
and author of the influential book
'Sustainable Energy - without the hot air'

He studied Natural Sciences at Cambridge then obtained his PhD in Computation and Neural Systems at the California Institute of Technology.

He is internationally known for his research in machine learning, information theory, and communication systems, including the invention of *Dasher*, a software interface that enables efficient communication in any language with any muscle.

He has taught Physics in Cambridge since 1995.

Since 2005, he has devoted increasing amounts of time to public teaching about energy.

David MacKay is a Fellow of the Royal Society and a member of the World Economic Forum Global Agenda Council on Climate Change

Unfortunately, that is not all he does, for he has been appointed Chief Scientific Advisor to the UK Department of Energy and Climate Change.

The Chief Scientific Advisor's role is to ensure that the Department's policies and operations, and its contributions to wider Government issues, are underpinned by the best science and engineering advice available, according to his department.

United Kingdom Energy & Climate Change Secretary Ed Miliband said:

“David MacKay is known for making science accessible and helping to explain clearly the urgency and the challenges of moving to a low carbon economy. I want him to bring all of these qualities to the job of advising DECC on how we can meet Britain's carbon targets and energy security needs.”

“Small is beautiful,”
but the fact that the nuclear
waste stream is small
doesn't mean that
it's not a problem;
it's just a
“beautifully small” problem.

Part of this “small problem” is no less than 20 million
cubic meters, that is
20,000,000 m³
of radioactively contaminated soil at Sellafield – under and around
the current buildings - which is ultimately going to
absorb the biggest proportion of the
£76 billion, that’s
£76,000,000,000 (= €100,000,000,000)
final nuclear clean-up cost calculated by the UK
Nuclear Decommissioning Authority
for all UK radioactive waste.

If we have learned anything from the history
of nuclear industry guesswork is they
always underestimate the costs. So that astronomical bill
will undoubtedly go even higher!

Explosive Demolition





SELLAFIELD LTD BUILDING FOR THE FUTURE

The Sellafield nuclear site is refocusing its activities around a massive decommissioning programme.

Sellafield Ltd exhibitor profile

CIVILS
2008

London Earls Court 2
18th-20th November

KEY FACTS AND FIGURES:

SELLAFIELD STATISTICS

Approximately 10,000 employees work on the Sellafield site, including agency and

Sellafield on the West Cumbrian coast has been a key part of the nuclear industry for more than five decades. It covers over 280ha and employs over 11,000 people.

Today, the focus of the site is on decommissioning, and addressing the issues and challenges associated with cleaning up the UK's historic nuclear legacy.

However, in order to continue safe operations and to enable decommissioning work to be carried out more effectively, a major programme of new-build projects is now underway to create safe treatment and storage facilities to manage both the historic legacy waste and future operational arisings.

Although the new-builds taking place at Sellafield are in themselves standard construction projects, what sets them

developed the world's first civil nuclear programme, and in 1953 the prime minister, Winston Churchill, ordered the construction of four nuclear reactors at the Calder Hall site, adjacent to Sellafield. Queen Elizabeth II officially opened the world's first commercial nuclear power station on 17 October 1956.

As more and more of the facilities on the Sellafield site come to the end of their operational lives, and enter the decommissioning and demolition phase, it is easy to understand why many believe that the site is in decline, but these new major construction projects signify a very different picture.

Working in partnership with a highly skilled and experienced supply chain, Sellafield Ltd are clearly demonstrating their commitment to building new facilities to world class standards, with nuclear safety,

ZONE 1

Includes the legacy ponds and legacy silos facilities plus their associated waste plants, which include much of the site's radiological and nuclear hazard.

ZONES 2 & 3

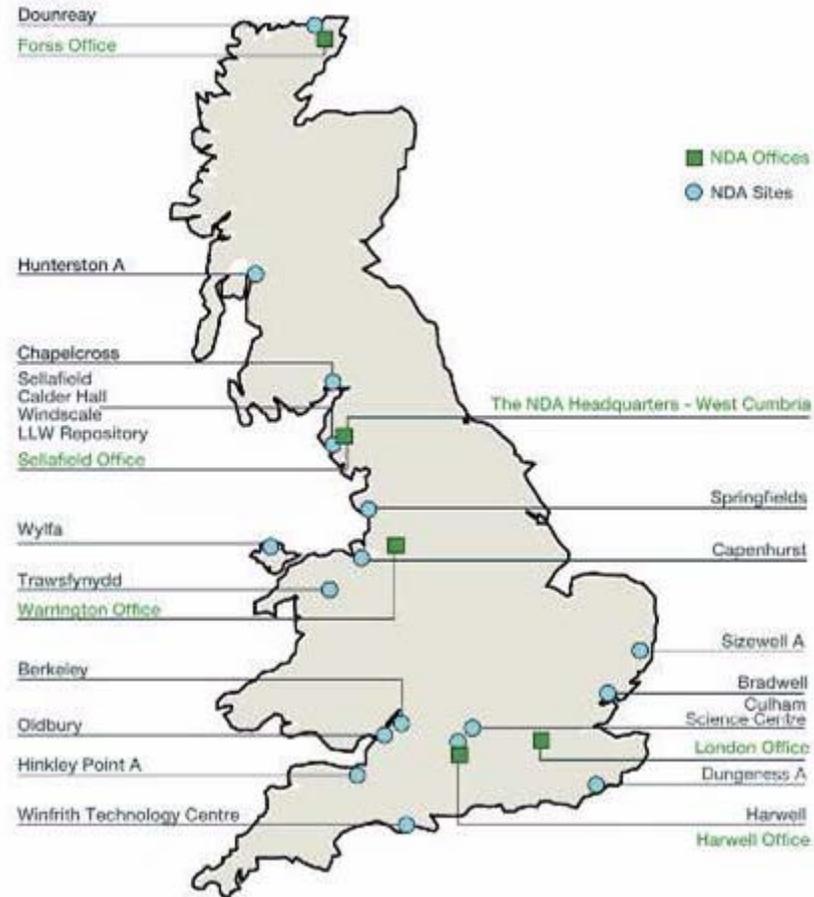
Include the remaining redundant legacy facilities, both inside and outside of the site's separation area, as well as land quality projects and decommissioning end state.

ZONE 4

Covers conventional new-build projects. These have low or negligible risk in terms of radiological [or radioactive?] and nuclear hazard, although these take a high priority in their design; however they are crucial to the ongoing decommissioning and continued operation of the Sellafield site.







Radioactive wastes and nuclear decommissioning expenditure

Hansard, Official Report of United Kingdom Parliament,
27 October 2008: Column 740W

Steve Webb: To ask the Secretary of State for Energy and Climate Change what the annual budget of his Department (*a*) is in 2008-09 and (*b*) will be in 2009-10; how much of the budget in each is attributable to the costs of nuclear decommissioning and the handling of nuclear waste; and if he will make a statement. [227240]

Mr. Mike O'Brien [*Energy Minister*]: The machinery of government changes of 3 October 2008 announced the creation of the Department of Energy and Climate Change, formed from the Energy Group located in the Department for Business, Enterprise and Regulatory Reform and the Climate Change Group located in the Department for Environment, Food and Rural Affairs.

The Department for Business, Enterprise and Regulatory Reform and the Department for Environment, Food and Rural Affairs will transfer their budgets for energy and climate change respectively to the new Department, based on the settlements agreed in the comprehensive spending review 2007 (CSR07), for the financial years 2008-09, 2009-10 and 2010-11. The annual budgets for the Department of Energy and Climate Change will be agreed in due course.

The Nuclear Decommissioning Authority (NDA) ensures that civil nuclear sites are managed, decommissioned and cleaned up safely, securely, cost-effectively and in ways that protect the environment. The NDA was assigned a programme budget of £1.53 billion in the comprehensive spending review 2007 (CSR07) for 2008-09, and £1.61 billion for 2009-10.

County council 'interested' in nuclear dump

Whitehaven News, Thursday, 01 January 2009

<http://www.whitehaven-news.co.uk/se/1.307488>

CUMBRIA County Council has written to the Government to formally express an interest in hosting an underground nuclear dump.

Council leader Stewart Young wrote to Secretary of State for Energy and Climate Change Ed Miliband to offer Copeland as a site for a deep geological repository to store atomic waste. The offer may also extend to Allerdale, if its borough council agrees.

The Government is asking for volunteers to host a site, with areas expected to receive investment in roads, schools and hospitals in return.

Cumbria's expression of interest is without commitment and was ratified by the county council cabinet on December 9. It allows the council to discuss the best solution with the Government for disposing of higher level radioactive waste, but does not involve any commitment that Cumbria will eventually host a repository. The decision was taken partly because 70 per cent of the UK's higher level nuclear waste is already stored at Sellafield.

Tim Knowles, Cumbria County Council's cabinet member responsible for nuclear issues, said: "The decision doesn't involve any commitments but it does formally bring Cumbria County Council to the table. It ensures that a decision on whether Cumbria is the right place for a deep geological repository will take on board the views of the democratic body representing everyone in Cumbria."

"We're a long way from deciding whether Cumbria is the right place to store nuclear waste deep underground and there's a huge amount of detail still required on what community support packages are acceptable, long-term environmental safety and potential site locations. But we can now start planning the best way to engage local people to make sure their views are taken on board."

The Government is expected to identify two possible sites by April 2012, investigate sites between 2014 and 2015 and announce the site by 2025. The first waste would be laid by 2040 and the first spent nuclear fuel by 2075. The repository would be expected to close by 2128.

Councillors call in decision on nuclear waste

West Briton, Tuesday, January 06, 2009,

<http://www.thisissomerset.co.uk/news/Warning-Hinkley-waste-shipped/article-592583-detail/article.html>

A DECISION to turn down a lucrative invitation to store nuclear waste in Cornwall has been questioned by county councillors. The county would receive billions of pounds from the Government for infrastructure and services if it hosted the facility. But last month Cornwall County Council's executive voted narrowly in support of a recommendation that no expression of interest should be submitted for the geological disposal facility for nuclear waste.

Liberal Democrat councillor Bryan Rawlins has now called in the decision, backed by councillors George Edwards and Les Hunkin. Cllr Rawlins said: "There is on offer in Excess of **£3 billion to £6 billion** in development funding which could turn around the fortunes of Cornwall. Liberal Democrat councillor Bryan Rawlins has now called in the decision, backed by Councillors George Edwards and Les Hunkin.

Cllr Rawlins said: "There is on offer in excess of £3 billion to £6 billion in development funding which could turn around the fortunes of Cornwall." "This issue went before two committees and both of them have simply objected to it. I say that we should look at this in much more detail and what is actually being offered here."

Nuclear dump: Cornwall cannot be bought, say MPs

This is Cornwall, 09 January 2009

<http://www.thisiscornwall.co.uk/news/Nuclear-dump-Cornwall-bought-say-MPs/article-600116-detail/article.html>

Cornwall's Liberal Democrat MPs and Parliamentary candidates have united to slam plans to investigate the possibility of a nuclear waste site being located in the Duchy.

Leading members of the Lib Dems in Cornwall have strongly criticised the move by Liberal Democrat county councillor Bryan Rawlins to call-in the decision to turn down an invitation by the Government to make an expression of interest in having a nuclear waste storage facility in Cornwall.

Cllr Rawlins was supported by two other councillors in making the call-in following the decision by the council's executive to reject the invitation.

Cllr Rawlins said: "This is an opportunity for Cornwall and it must be explored to see if it could be something we should move forward. The benefits could be massive for Cornwall. It is difficult to believe that we could walk away from such an opportunity."

However other Lib Dems say that no amount of money would be enough to convince them it would be a good idea.

Stephen Gilbert, parliamentary candidate for St Austell and Newquay, said: "My view is very simple, the Government could never offer Cornwall enough money for me to believe that we should be used as the dumping ground for Britain's nuclear waste" adding that Cornwall had fought long and hard to develop its reputation as being at the forefront of the green revolution, with great local food producers, new technologies and a growing environmental tourism sector. We must not put this reputation at risk."

North Cornwall MP Dan Rogerson said simply:

"We will not accept the Government's bribes."

People power sees nuclear waste invitation scrapped

This is Cornwall, Monday, 12 January 2009

<http://www.thisiscornwall.co.uk/westbriton/Nuclear-waste-invitation-scrapped-thisiscornwall-uk-direct-influence/article-606858-detail/article.html>

A CALL to have a fresh look at an invitation to store nuclear waste in Cornwall has been scrapped with opponents claiming it as a victory for people power. One of the leading campaigners against the nuclear waste plans said that the dozens of comments left by readers at www.thisiscornwall.co.uk in response to stories on the website and in its sister newspapers the Cornish Guardian and West Briton had played a part in forcing the u-turn by councillors.

Nuclear dump could be for us says Allerdale

West Cumberland Times & Star, Thursday, 29 January 2009

<http://www.timesandstar.co.uk/news/politics/1.506586>

ALLERDALE council will express an interest in hosting a new nuclear waste dump, members agreed on Wednesday. The full council ratified a recommendation from its executive committee to express a without-commitment interest in Government plans for a high-level nuclear waste repository.

Deputy council leader Margaret Jackson said

“West Cumbria had the largest concentration of high-level nuclear waste in the country and that a repository in Allerdale could bring jobs to the area, boost local businesses and bring improvements such as new roads.”

There was much debate, with some councillors welcoming the money and jobs the site could bring and others worried about the long-term impact.

Coun Eric Nicholson said:

“If this goes ahead Cumbria will become known as the nuclear dump. You will hear it said that this could be 50 years away. In 2059, God willing, I expect my grandchildren to still be alive. I don't want to be responsible for leaving them this.”

Coun Tim Heslop said:

“This is one of the most important decisions this council will ever make and there are strong feelings on all sides.....About 70 per cent of this nuclear waste is at Sellafield already. If that isn't buried at West Cumbria it has to be dealt with and possibly the risk in transporting the waste through the county is just as great as burying it underground.”

A geological study will be carried out to rule out unsuitable sites and the matter will be subject to public consultation. Allerdale will retain the right to pull out of any involvement in the scheme until work begins on any chosen site.

Copeland council has already expressed an interest and Cumbria County Council has given its backing to any district authority that responds.

We can't check everything, admits atomic safety chief after 14-year leak

- *Campaigners furious that discharges stayed secret*
- *Lawyers allege 11 breaches of radioactive disposal*

[The Guardian](#), Monday 2 February 2009

<http://www.guardian.co.uk/environment/2009/feb/02/nuclear-power-leak>

The most senior figure in nuclear safety has defended the regulation of an atomic power station barely 50 miles from the centre of London that leaked radioactive material for 14 years.

But as soon as the leak in the sump of one of the Magnox reactors at Bradwell-on-Sea was discovered the safety body did all it could to ensure that the cause of the problem was identified and dealt with, he added.

The leak became public when a little-publicised case started by the Environment Agency against the then owners of the plant, Magnox Electric Ltd, for 11 breaches of safety regulations came to court last month.

Bradwell has been earmarked as a potential site for one of the new plants. It ceased producing electricity in 2002 and is being dismantled by a US company, EnergySolutions.

Dr Mike Weightman, who told the Guardian the NII operated a "sampling regulatory regime" including inspection that targets those aspects of design and operation that have most significance for safety.

"It is not possible for the regulator to inspect or check every feature of a complex plant," he explained. "In this case the sump was effectively underground and the sump pump was not part of the strict maintenance schedule, and hence would have been most unlikely to have been part of any of our inspection programmes."

"Once we were informed of the leak, which was discovered by the licensee when washing down the sump to address a problem with the sump pump, we instructed the licensee not to use the pump again until the matter was investigated and resolved. We conducted a joint investigation with EA, and agreed afterwards with the licensee measures to determine the extent of the leakage, assess its significance and refurbish the sump to modern standards."

The power station is said by the Environment Agency to be responsible for allowing liquids to seep into the ground from 1990 to 2004. "It has taken a long time to get to court because it is a complicated case with a lot of detail," said a spokesman for the agency. Mark Harris, prosecuting on behalf of the agency, told a jury at Chelmsford crown court that leaks were caused by poor design and continued because of a lack of checks and maintenance.

"The case concerns the disposal of liquid radioactive waste which leaked to the ground from a sump at the site of what is now the former Bradwell nuclear power station," said Harris. "These leaks occurred on a number of occasions between as long ago as 1990 until discovery of these leaks in February 2004. In the period when this company was running it ... there was no routine inspection or maintenance of the sump until after the leak was discovered."

Planned nuclear reactors will produce seven times more hazardous waste

Monday, 2 February 2009

<http://www.greenpeace.org.uk/media/press-releases/planned-nuclear-reactors-will-produce-seven-times-more-hazardous-waste-20090202>

Nuclear waste from the reactors likely to be built in the UK will be up to seven times more hazardous than that produced by existing reactors.

The admission was made in an 'environmental impact assessment' report by nuclear company Posiva. Posiva are responsible for managing the waste which will be produced by the European Pressurised Reactor (EPR) currently being constructed in Olkiluoto, Finland.

And an independent nuclear consultant has warned that this will increase the costs of nuclear energy, as waste storage and safety expenses will rise above expected levels.

Normandy in France is the site of the only other EPR being built in the world. It is the design that French government-owned EdF will attempt to build in Britain.

Independent nuclear consultant John Large said:

"This means that not only will spent nuclear fuel produced by the EPR be more dangerous than is acknowledged by the French nuclear industry, but also storage and disposal will be more expensive than the industry and governments proclaim, and will increase the overall cost of nuclear energy.

The EPR is designed to extract more energy from nuclear fuel than current nuclear reactors. But this causes the amount of radioactive substances in spent fuel to increase disproportionately. If the fuel is disposed of by burying it in an underground nuclear waste dump, in the long-term, the largest health risk comes from a hazardous substance known as iodine-129. The amount of iodine-129 produced by the EPR is seven times as large as that of a current operating reactor.

Warning: With a new reactor will come a 100-year plus nuclear waste store

On 15th April your community was included on a list of potential sites for a new nuclear power plant issued by the Government.

While there may be local economic benefits, and short term problems like increased traffic and the inevitable disruption caused by the influx of hundreds of construction workers, there will also be longer term problems which the Government and nuclear industry have not spelled out. Any new nuclear plant will inevitably become a long term store for hazardous radioactive waste over at least a 100 years, probably longer.

Spent nuclear fuel - highly radioactive and intensely hot - will have to sit in ponds or in casks at the reactor sites until (and if ever) the hosting of a central waste repository is agreed to by a local community, demonstrated to be safe, built and made ready for acceptance of waste.

After just two or three or more generations, climate change will have taken its toll, sea-levels will have risen, possibly by well over 1 metre, and future generations will be left to look after the waste that this generation has decided to create, and constantly guard it from terrorist activity for every hour of every day.

We the undersigned feel strongly that there is a moral imperative for those who create this waste (for profit they are private companies), to ensure that it is safely disposed of, and to be held accountable for any failure to do so. Our understanding of the scientific facts is that this requirement is unachievable, and that the local communities will therefore end up the victims.

When the new reactor sites were announced the Minister said "I want to listen to what people have to say about these nominations." We would encourage local residents to make representations about plans to convert your local community into a radioactive waste storage site for a century and more.

***Professor Andrew Blowers**

Dr Rachel Western

Dr Jill Sutcliffe

Dr David Lowry

Val Mainwood

Phil Davies

Peter Roche

***Peter Wilkinson**

Members, Nuclear Waste Advisory Associates (NWAA)

www.nuclearwasteadvisory.co.uk

***former members of Government's Committee on Radioactive Waste Management (CORWM)**

Too much hot air?

Morning Star, letters, Thursday 15 October 2009

www.morningstaronline.co.uk/index.php/news/letters/Too-much-hot-air

David Leal wonders in his letter ([M Star October 13](#)) whether nuclear has a role in our future.

As someone who has been involved professionally in energy policy research for 30 years and whose PhD thesis was on how Britain took its nuclear reactor decisions from 1955-79, I was disturbed at the pronouncements of Professor David MacKay, the chief scientist at the Department of Energy and Climate Change, on expanding nuclear power. He has come to the conclusion that the answer is nuclear.

I took the opportunity of reading Prof MacKay's recent book *Sustainable Energy - Without The Hot Air*. Some of his cavalier comments make me wonder whether he is competent to advise ministers.

He seems to believe that such decisions can be reduced to number crunching: "Please don't get me wrong: I'm not trying to be pro-nuclear. I'm just pro-arithmetic."

Prof MacKay asserts: "I feel nuclear waste is only a minor worry, compared with all the other forms of waste we are inflicting on future generations."

The ministers who have grappled over the decades with this major issue would have wished he was right. But he isn't. Nuclear waste decisions involve much more than arithmetic. There are ethical questions such as whether future generations should pay for inherited problems when they have enjoyed none of the benefits, and security, which was not mentioned once in his book. This is despite the IAEA recently emphasising "an emerging need for the security regime to match the existing safety regime because of the growing terrorist threat to nuclear material and installations."

David Leal is certainly right to point to the importance of the ethical dimension.

Dr David Lowry

Stoneleigh

Södermanlands tidning
Monday 14 May 2007, kl 11.09
Transports Targets for Terrorists
NYKÖPING

Transports from the world's largest nuclear power plant (sic), Sellafield in Great Britain to Studsvik outside Nyköping may be a prime target for terrorists, a nuclear expert warns.

By the terms of a new contract Studsvik will receive radioactive steel from Sellafield for the purpose of separating the steel from radioactive waste. The material will be shipped from Great Britain to Sweden and then be shipped back again after the steel has been processed. The arrangement reduces the pressure on storage facilities for radioactive waste in Great Britain, The Telegraph reports.

But David Lowry, a nuclear expert who is critical of radioactive transports, told the paper that the freight transports between Sellafield and Studsvik may become targets for terrorist attacks In SN [Södermanlands Nyheter] last week, several environmental organisations warned of radioactive pollution of the Baltic Sea risks due to the transports.

Official Report of United Kingdom Parliament (Hansard)
9 September 2009 : Column 1976W
Plutonium: Exports

Mr. Dai Davies: To ask the Secretary of State for Energy and Climate Change what quantities of safeguarded plutonium have been exported since July 2008; and for what purpose. [287543]

Mr. Kidney: There have been two exports of material containing small amounts of safeguarded plutonium since July 2008. Both were delivered to consignees in **Sweden**. The first shipment, in April 2009, was Intermediate Level Waste containing approximately 5g of plutonium. The waste was returned to Sweden as part of contracted work to reprocess spent nuclear fuel at Sellafield from Sweden's R1 research reactor. The second shipment, in June 2009, was a container of 46 irradiated Advanced Gas-Cooled Reactor (AGR) fuel pins containing less than 400 g of plutonium. This material will be returned to the UK following analytical examination.

[http://www.publications.parliament.uk/pa/cm200809/cmhansrd/cm090909/text/90909w0018.htm#column_1976W]

House of Commons

Session 2008 - 09

**Written Questions for Answer on
Monday 12 October 2009**

[The Questions Book](#)

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Mr Dai Davies (Blaenau Gwent): To ask the Secretary of State for Energy and Climate Change, pursuant to the Answer of 9 September 2009, Official Report, column 1976W, on plutonium: exports, (a) which ships were used in each respective transport to which reference is made and (b) which United Kingdom port of departure and **Swedish** port of destination was used in each case; and when he expects the irradiated advanced cooled reactor fuel pins to be returned to the United Kingdom from **Sweden**