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Emailed to: justification@decc.gsi.gov.uk and posted to the above address.

Dear Mr Jenkins,

GOVERNMENT CONSULTATION ON THE SECRETARY OF STATE'S PROPOSED DECISIONS AS JUSTIFYING AUTHORITY ON THE REGULATORY JUSTIFICATION OF THE NEW NUCLEAR POWER STATION DESIGNS KNOWN AS THE AP1000 AND THE EPR

I attach below the response of the Nuclear Free Local Authorities (NFLA)* to the Government's consultation on its draft decision to justify new nuclear power stations.

1. Executive summary of NFLA response to the Justification consultation

The NFLA does not share the Secretary of State's confidence in the current dose limits and regulatory regime. The NFLA believe a decision should wait until after COMARE has reported on the KiKK study, and its review has been subjected to public debate. In NFLA's view, the KiKK study provides irrefutable evidence that leukaemia risks are more than doubled among children living near nuclear reactors. This provides prima facie evidence that new nuclear reactors cannot be justified under the 2003 Regulations, as it is simply not possible to "justify" the deaths of young children near new nuclear reactors.

Irrespective of whether spent fuel from EPR and AP1000 reactors raises different technical issues compared with legacy waste, the technical problems associated 'disposing' waste of either variety in a deep disposal facility are numerous thereby making any assertion of confidence in the disposability of radioactive waste premature. The health impact assumptions from exposure to ionising radiation from a deep geological disposal facility are imprecise and more akin to educated guesswork than scientific evaluation.

Spending on new reactors will use money and resources that could be more effectively spent elsewhere, building new reactors will actually have a negative impact of meeting the UK's carbon reduction targets, and will delay a potential local energy revolution with local authorities at the forefront. Moving towards a more decentralised energy system with a focus on energy efficiency and the use of combined heat and power is liable to provide a much more effective way of improving energy security.

The balance of evidence is that nuclear electricity will be expensive. In any case, if the Government is attempting to tackle fuel poverty through fuel pricing policy then it is returning to a policy which has failed for the last 30 years.

NFLA fundamentally disagrees with the Secretary of State's Proposed Decision. Indeed NFLA questions the Secretary of State's ability to act as an independent arbiter and does not believe he should be acting as the Justifying Authority given that he has already expressed support for new reactors. We believe that the appropriate way forward would be for the Secretary of State to call a public inquiry, chaired by someone independent of the Government to ensure an open and

transparent decision. An inquiry would be a good opportunity to properly examine issues such as the disposability of the high burn-up spent fuel, and CoMARE's review of the KiKK study.

2. The formal NFLA response to the Justification Questions

Consultation Question 1. **Chapter 3 (Radiological Health Detriment) sets out the evidence on the potential radiological health detriment arising from the class or type of practice. It also sets out the Secretary of State's current views based on that information. Do you agree or disagree with the views presently held by the Secretary of State on these matters?**

Please state the reasons for your answer.

Do you consider that there are any matters relevant to the potential radiological health detriments that are not referred to in this Chapter? If so, please state what they are, and explain how and why they are relevant, and state what conclusions you think should be reached in light of these

The NFLA does not share the Secretary of State's confidence in the current dose limits and regulatory regime. Our view is set out below.

COMARE & KiKK

The German KiKK study reported a 60% increase in solid cancer risks and a 120% increase in leukaemia risks, among infants under 5 years old living within 5 km of all German nuclear power stations. These increased cancer risks were unequivocally linked to proximity to nuclear reactors. The study's findings support over 60 other studies worldwide on increased childhood cancer near nuclear power stations.

The Justification decision documents point out that the Government's Committee on the Medical Aspects of Radiation in the Environment (COMARE) is currently undertaking a further review of the incidence of childhood cancer around nuclear power stations, with particular reference to the KiKK study and expects the outcome of this review to be available at the start of 2010. However, it appears it will not be published until March 2010. It is important that consultees, such as NFLA, are given the opportunity to examine the findings of the COMARE review before the Justification decision is finalised.

As NFLA chair, I wrote to the Secretary of State to request that the deadline for comments on the Justification Consultation is postponed till after COMARE had reported. However, the Secretary of State refused to extend the consultation to allow such consideration of COMARE's report. He notes that, should the COMARE report indicate any specific concerns that Regulation 10 of the Justification regulations allows for a decision to be reviewed at a later date (1).

In reaching this conclusion, the Secretary of State says he has taken into account that the proposed decision documents already refer to COMARE's reanalysis of the data in their tenth report (i.e. the Bithell paper).

However in a recent letter published in Radiation Protection Dosimetry, Dr Ian Fairlie and Dr Alfred Körblein (a German radiation scientist) raise many objections to the Bithell paper (2). They pointed out that the KiKK study is large and statistically powerful and employed precise distances from nuclear sites, whereas the Bithell paper used small numbers and imprecise distance measurements. Most important, the Bithell paper was an inferior ecologic study using only observed and incidence data, whereas the KiKK study was of superior case-control design and examined individual cases. This is a relevant matter, as Fairlie and Körblein point out, because different methodologies can lead to vastly different findings. This is shown by the following example. In October 2008, the KiKK authors decided to test the ecological design used by Bithell et al. They conducted a new analysis of their KiKK leukaemia data using Bithel et al's method and found to their surprise that the increase in the 0–5-km zone was only 41% (SIR = 1.41) compared

to the 120% increase found by the full KiKK study (3). In other words, the difference between the Bithell and KiKK findings was due to their very different methodologies.

Their finding shows that the KiKK study is considerably more reliable than the Bithell study: indeed it severely questions the relevance of the Bithell paper's findings as regards policy making. This is important as the present COMARE re-analysis is being conducted by the Bithell team and is of the discredited ecological design.

The Health Protection Agency has also sought to diminish the KiKK study. It states that the Bithell paper and similar French study "*have not replicated*" the KiKK findings. (4) This is misleading as the two studies actually **did** find small leukaemia increases in children near nuclear power stations. Their data were not statistically significant but this was due to the smallness of the studies and not the absence of effect. The HPA's view remains that official estimated doses from nuclear station releases are much too small to result in the observed levels of leukaemia. But a report from the Government's Committee Examining Radiation Risks of Internal Emitters (CERRIE) in 2004 showed that there could be very large uncertainties in official dose estimates from inhaled and ingested radionuclides. (5)

Other recent epidemiological studies add weight to the case that the Secretary of State should order an inquiry before making his justification decision. For example, Baker and Hoel (2007) carried out a meta-analysis of 136 nuclear sites in the UK, Canada, France, US, Germany, Japan and Spain and found cancer death rates for children were elevated by 5 to 24 per cent depending on proximity to nuclear facilities. (6)

In addition to the COMARE review of KiKK, the Childhood Cancer Research Group (CCRG) at Oxford University has been commissioned by the Department of Health to undertake a study which will extend earlier investigations into childhood cancer excesses around Seascale and Dounreay and also consider adult cancer incidence in these same areas. But preliminary work will not start on this until January 2010. (7)

The NFLA view is that DECC should extend its deadline for consultation on its justification decision at least until the COMARE report is finished, and there has been adequate time for the public to comment on the result. It is clearly important that we fully appreciate the implications of the KiKK evidence before decisions are made on building more nuclear power stations.

Dose Constraints

On 9 February 2010, late in the consultation period, the DECC website, without warning, changed the information supplied on its Justification Consultation. In NFLA's view, this chopping and changing of the information base for its Consultation is unacceptable, as it smacks of arbitrary action by the Government. It is also unfair, as many respondents may not have seen the changes.

The changes in question were the insertion of the following paras in:
http://www.decc.gov.uk/en/content/cms/consultations/reg_just_cons/reg_just_cons.aspx

- **Proposed 0.15 mSv dose constraint:** The Nuclear Industry Association (the Applicant) has confirmed that the statement in Annex E of volumes 2 and 3 of the consultation, referred to in paragraph 3.62 of Volume 2 and paragraph 3.58 of Volume 3, that "We confirm that designs within the proposed practice (and also their associated waste management and disposal facilities) would be capable of meeting such a dose constraint for members of the public set at 0.15 mSv per year" means that the proposed power stations including spent fuel interim storage facilities and waste conditioning and encapsulation plants would be capable of meeting a 0.15mSv/y dose constraint.
- **Errata to consultation documents:** Please note that the corrections detailed in the document below have been made to the consultation documents since publication:

NFLA wishes to comment on the first bullet point. The public dose constraint cited by the Nuclear Industry Association (0.15 mSv per year) is inadequate. Although cited by the HPA in 2008, it is

50% more lax than the 0.1 mSv dose constraint recommended by the ICRP in its latest recommendations in 2007. (ICRP. The 2007 Recommendations of the International Commission on Radiological Protection. Report 103. JAICRP 37(2–4) (2007).) In NFLA's view, the ICRP's more precautionary 0.1 mSv constraint should be used.

NFLA calls upon DECC to ask the applicant, the Nuclear Industry Association, whether its designs would be capable of meeting the ICRP's safer 0.1 mSv dose constraint and to publish its response.

Non-Targeted Effects

From 2001 to 2004 CERRIE looked at several newly discovered effects of radiation - the so-called non-targeted effects - such as *genomic instability* (ongoing, long-term increases in mutations within cells and their offspring), *bystander effects* (cells next to those irradiated are damaged) and *minisatellite mutations* (repeat DNA sequence mutations). The Committee's main finding was that tougher action is needed to allow for new information about the risks from internal radiation. Uncertainties about the risks mean that in some cases we might be exposed to 10 times the risk previously thought, while in other cases the risk may be zero. These uncertainties, said the Committee, require policy makers and regulators to adopt a *precautionary approach* when dealing with exposures to internal radiation.

Since 2004 these non-targeted effects have been described in greater detail. They are called "non-targeted" effects because the radiation doses involved are too low to cause structural DNA damage and because there does not seem to be a specific site or target in the cell for the radiation effects. Although there is little public awareness of these untargeted effects, they have clearly resulted in a "paradigm shift" amongst scientists. Although the precise significance for human risk is still unclear, these effects have an important role in future assessments of radiation risks for a number of reasons, not least of which is that they occur at very low doses. It is not even clear whether these effects have deleterious effects on humans, but the latest evidence seems to indicate both beneficial and adverse effects depending on genetic make-up. If this is true, then a way of protecting those who are more radiosensitive will have to be devised.

The question of whether we should now reassess currently accepted risks of radiation clearly arises. When faced with the uncertainties posed by non targeted effects, it would be wise to apply the precautionary principle – in other words err on the side of more caution rather than more risk. The UK Government has, so far, not responded in a precautionary way. This can only result in diminished public confidence in radiation protection authorities.

These non-targeted effects were considered so important that a four-year European Integrated Project called NOTE (Non-targeted effects of ionising radiation) (8) was set up in 2006, coordinated by STUK - Radiation and Nuclear Safety Authority. Any decisions on radiation exposures from more nuclear reactors should await their report later in 2010.

Question 1 - References

(1) Letter to the NFLA Secretariat from the Department of Energy and Climate Change, 14th Dec 2009
(2) Alfred Körblein and Ian Fairlie, Letters to the Editor, Radiation Protection Dosimetry Advance Access published on October 19, 2009 Radiat Prot Dosimetry 2010 138: 87-88; doi:10.1093/rpd/ncp206
(3) Kaatsch, P., Spix, C., Jung, I. and Blettner, M. Childhood leukaemia in the vicinity of nuclear power plants in Germany. Dtsch. Arztebl. Int. 105(42),725–732 (2008). http://www.aerzteblatt.de/int/article.asp?id=62000
(4) Mobbs et al (2009) An introduction to the estimation of risks arising from the exposure to low doses of ionising radiation. HPA-RPD-055. Health Protection Agency. Oxford.
http://www.hpa.org.uk/web/HPAwebFile/HPAweb_C/1245052106693
(5) CERRIE (2004) Report of the Committee Examining the Radiation Risks of Internal Emitters.
www.cerrie.org
(6) Baker P and Hoel D (2007) Meta-analysis of standardized incidence and mortality rates of childhood leukaemias in proximity to nuclear facilities. Eur J Cancer Care. 2007;16:355–363.
(7) Updated Investigations of Cancer Excesses in the Vicinity of Seascale and Dounreay, Childhood Cancer Research Group, 2009. http://www.ccrg.ox.ac.uk/research/seascale.htm
(8) See https://ssl.note-ip.org/index.asp

Consultation Question 2. **Chapter 4 (Radioactive Waste) sets out the evidence on the potential detriment arising from the waste and decommissioning aspects of the class or type of practice. It also sets out the Secretary of State's current views based on that information. Do you agree or disagree with the views presently held by the Secretary of State on these matters? Please state the reasons for your answer.**

Do you consider that there are any matters relevant to the potential detriment arising from waste and decommissioning that are not referred to in this Chapter? If so, please state what they are, and explain how and why they are relevant, and state what conclusions you think should be reached in light of these matters.

Irrespective of whether spent fuel from EPR and AP1000 reactors raises different technical issues compared with legacy waste, the technical problems associated 'disposing' waste of either variety in a deep disposal facility are numerous thereby making any assertion of confidence in the disposability of radioactive waste premature. The health impact assumptions from exposure to ionising radiation from a deep geological disposal facility are imprecise and more akin to educated guesswork than scientific evaluation. (1)

Geological Disposal

The process of finding a site for a deep geological disposal facility is clearly at a very early stage. In fact, it may not be possible to make a safety case for such a facility. Clive Williams of the Environment Agency has specifically stated that: "*work may or may not indicate that an acceptable safety case can be made*." (2) Four former members of the government's own Committee on Radioactive Waste Management (CoRWM) have previously written to the Secretary of State to say that in their opinion, *"It is unknowable whether or not effective arrangements (for the long term management of new build waste) will exist...."* (3)

In August 2009 the Environment Agency (EA) produced a new list of nine "major knowledge limitations on the technical issues", (4) and in its November 2005 review of Nirex's disposal plans, the Agency listed ten key technical challenges "...*where further work is needed before an acceptable repository safety case could be generated*." (5) In October 2009 the EU Joint Research Centre (EU JRC) listed nearly 40 technical issues indicating that nuclear waste disposal is far from a proven waste management technique. (6) Technical problems and uncertainties described by the EA, and EU JRC such as uncertainties regarding radionuclide properties like solubility and sorption, and the presence as a gas, could mean estimated contamination levels calculated for a deep geological disposal facility are in error by a factor of 10,000 to 1,000,000.

Voluntarism

As well as technical barriers to waste disposal, there may also be political ones. The three Cumbrian authorities looking into whether or not to volunteer may yet decide against hosting a deep geological disposal facility, leaving the Government with no volunteers. The four former CoRWM members say, as well as the scientific and technical requirements not being met the social requirements have not been met either.

NFLA note with alarm paragraph 4.1 which quotes ICRP Publication 77 stating that: "*Waste management and disposal operations are an integral part of the practice generating the waste. It is wrong to regard them as a free standing practice that needs its own justification*."

Under the Planning Act 2008 the Nuclear National Policy Statement (NPS) consultation, which is taking place concurrently with this consultation, will be the last chance to challenge the principle that new nuclear reactors should be built at the ten proposed sites, and that these reactors should be permitted to generate spent nuclear waste fuel which may be stored on the sites for up to 160 years. The Infrastructure Planning Commission (IPC) could simply be told the strategic question of whether nuclear waste should be disposed of in a geological repository has already been decided and any planning application for such a facility only needs to be examined with regard to local

planning issues. In addition, the Government has explicitly stated it is prepared to "*explore other approaches*" i.e. override a Community's wishes – if the voluntarism approach to disposal does not work. (7)

Taken together, these three points - firstly that there will be no justification exercise for nuclear waste disposal facilities; secondly that the IPC may in future be told it need not consider the principal of deep geological disposal at the chosen site, but only look at local issues; and thirdly that a community may yet be forced to accept a disposal facility - imply that, under the current Government proposals, the disposal of spent fuel and nuclear waste from new reactors will not be subject to further public scrutiny after 22nd February 2010.

The Secretary of State urgently needs to set out the process for future public engagement on the question of nuclear waste disposal. He also needs to say whether, if the two draft Justification decisions currently being consulted are agreed, then a geological disposal facility will also be deemed to be justified. If this is the case, this clearly bolsters the case for a public inquiry on justification.

High Burn-up Fuel

The high burn-up fuel proposed for new reactors uses more enriched uranium, and leaves it in the reactor for longer. This gets more output from the fuel, but increases the hazard presented by the spent fuel. High burn-up spent fuel will be twice as hot and twice as radioactive as legacy spent fuel, so it will require twice as long to cool down before disposal. Sites of new nuclear power stations will accumulate and store this hazardous material above ground over very long periods. The spent fuel will need to be protected from accidents and terrorist attacks for up to 160 years.

The long term storage of high burn-up spent fuel is expected to result in greater fuel cladding failure, with consequent higher risk of radiation exposure for the generation attempting to retrieve and condition the failed fuel elements. The designers of facilities for the very long term storage of high burn-up spent fuel face multiple challenges. (8)

The paper summarising the Government's evidence on nuclear waste, published for the NPS consultation (9) mentions (paras 19 and 88) the Nuclear Decommissioning Authority's (NDA's) so-called "disposability assessments". (10) The Government is relying on these documents to support its conclusion that "*effective arrangements will exist to manage and dispose of the waste that will be produced from new nuclear power stations*." (11) These disposability assessments have been submitted to the Generic Design Assessment (GDA) process for review by the EA. The EA review will not be available for public comment until the Agency carries out a consultation exercise on its part of the GDA in Spring 2010. So, again, respondents are being asked to respond to a consultation with incomplete information. A public inquiry would enable cross-examination of both the NDA and the EA on the subject of disposability of high burn-up spent fuel.

Liquid and Gaseous Discharges

On liquid and gaseous discharges of radioactive waste (paras 4.123 – 4.126) there is an attempt to reconcile the fact that the UK is committed to a progressive and substantial reductions of radioactive discharges into the marine environment and achieving close to zero concentrations, at the same time as proceeding with the construction of new reactors. The Secretary of State concludes that he is satisfied that discharges will remain within limits agreed by the regulators, but he does not say how the UK will meet its OSPAR commitments other than referring to the Governments updated 'Strategy for Radioactive Discharges'. (25) The NFLA believe much more needs to be said by the Secretary of State on reconciling reductions in radioactive discharges to the marine environment with new nuclear build.

Question 2 - References

(1) See in particular the Nuclear Waste Advisory Associates submission to the House of Commons Energy and Climate Change Committee, January 2010.

http://www.nuclearwasteadvisory.co.uk/uploads/5964MemorandumforNuclearWasteAdvisoryAssocisates[Final].doc
(2) E-mail to Adam Scott (CORWM Secretariat) & Dr Rachel Western 16th Nov 2009
(3) Letter from Professor Gordon MacKerron, Professor Andrew Blowers, Mary Allan and Pete Wilkinson to Ed Miliband, dated 30th November 2009.
http://www.nuclearwasteadvisory.co.uk/uploads/5962CoRWM1_Letter_201109.pdf
(4) Technical Issues Associated with Deep Repositories for Radioactive Waste in different geological environments. EA August 2009 http://publications.environment-agency.gov.uk/pdf/SCHO0809BQVU-e-e.pdf See especially table 6.5 (pp 141 - 143) "Summary of Major Knowledge Limitations on the Technical Issues"
(5) Review of Nirex Report "The Viability of a Phased Geological Repository Concept for the long-term management of the UK's radioactive waste." Environment Agency, November 2005.
(6) W.E. Falck and K.-F. Nilsson "Geological Disposal of Radioactive Waste: Moving Towards Implementation", European Union – Joint Research Centre – Reference Report http://ec.europa.eu/dgs/jrc/downloads/jrc_reference_report_2009_10_geol_disposal.pdf
(7) DECC "The arrangements for the management and disposal of waste from new nuclear power stations: a summary of evidence" November 2009 (para 106 –page 23)
http://data.energynpsconsultation.decc.gov.uk/documents/wasteassessment.pdf
(8) Storage of Spent Fuel from Power Reactors. Proceedings of an International Conference held in Vienna, 2–6 June 2003 organized by the International Atomic Energy Agency in co-operation with the OECD Nuclear Energy Agency. Foreword.
http://www-pub.iaea.org/MTCD/publications/PDF/csp_020c/Start.pdf
(9) DECC "The arrangements for the management and disposal of waste from new nuclear power stations: a summary of evidence" November
http://data.energynpsconsultation.decc.gov.uk/documents/wasteassessment.pdf
(10) The Summary Disposability Assessment for the AP-1000. http://www.nda.gov.uk/documents/upload/TN-17548-Generic-Design-Assessment-Summary-of-DA-for-Wastes-and-SF-arising-from-Operation-of-APPWR-October-2009.pdf
Summary Disposability Assessment for the EPR.
http://www.nda.gov.uk/documents/upload/TN-17548-Generic-Design-Assessment-Summary-of-Disposability-Assessment-for-Wastes-and-Spent-Fuel-arising-from-Operation-of-the-EPWR.pdf
(11) DECC, Draft National Policy Statement for Nuclear Power EN-6, November 2009 para 3.8.20
http://data.energynpsconsultation.decc.gov.uk/documents/npss/EN-6.pdf
(12)UK Strategy for radioactive discharges, DECC, July 2009 http://www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/nuclear/radioactivity/government/discharges/strategy/strategy.aspx

Consultation Question 3 **Chapter 5 (Environmental Detriment) sets out the evidence on the potential environmental detriment arising from the class or type of practice. It also sets out the Secretary of State's current views based on that information. Do you agree or disagree with the views presently held by the Secretary of State on these matters? Please state the reasons for your answer.**

Do you consider that there are any matters relevant to the potential environmental detriments that are not referred to in this Chapter? If so, please state what they are, and explain how and why they are relevant, and state what conclusions you think should be reached in light of these.

The NFLA believes that no information has been given on how spent fuel and other waste might be transported away from reactor sites, and whether facilities might be required in future for encapsulating the waste, for example. As discussed in its answer to question 2 the NFLA assert that much more information needs to be provided on the impact on the local environment of storing high burn-up spent fuel for up to 160 years, along with an assessment of the hazards associated with encapsulating this spent fuel and transporting it away from the site.

Consultation Question 4 **Chapter 6 (Safety and Security) sets out the evidence on the potential impact of the class or type of practice in terms of safety and security. It also sets out the Secretary of State's current views based on that information. Do you agree or disagree with the views presently held by the Secretary of State on these matters? Please state the reasons for your answer.**

Do you consider that there are any matters relevant to safety and security that are not referred to in this Chapter? If so, please state what they are, and explain how and why they are relevant, and state what conclusions you think should be reached in light of these matters.

The Secretary of State acknowledges the extent of the risk of detriments to health and the environment that would result from a major accident or terrorist attack at a new nuclear power station. However, he says this must be seen in the light of the robust regulatory regime which exists in the UK to prevent accidents and protect against security threats such as terrorist attacks. The NFLA does not share the Secretary of State's confidence that regulation is sufficient protection. It also fundamentally disagrees with the Secretary of State's assessment of the proliferation risks associated with civil nuclear expansion.

Nuclear Safety

In Sweden, a country with a reputation for a regulatory regime which is just as robust as the UK's, the main power supply to the Forsmark-1 reactor was interrupted on 25th July 2006. Two of the four backup generators failed to start, but luckily two were sufficient to run part of the plant's cooling system. If they had not started there could have been a catastrophic meltdown. A former director of Forsmark commented that: "*it was pure luck there wasn't a meltdown*". This highlighted how frequently incidents have occurred in countries with apparently robust regulatory regimes and how vulnerable we are to nuclear catastrophe. There have been widespread and frequent problems in the US and Germany, for example, and a similar incident took place in Belgium in July 2005. (1)

Nuclear safety regulators from three countries – the UK, France and Finland, recently sent a joint letter to Areva asking them to make improvements to the initial EPR design. (2) The US Nuclear Regulatory Commission had sent a key component of the Westinghouse AP1000 back to the drawing board. (3) The Safety Shield Building – the outer structure surrounding the AP1000 containment - does not meet "fundamental engineering standards" with respect to design basis loads. It has several functions, including holding a large tank of water so that in the event of an accident it can be dribbled over the surface of the steel containment dome. It is intended to protect the reactor from severe weather including tornado-hurled projectiles, hurricanes, earthquakes and air crashes. It also adds shielding in the event of a severe accident. But the NRC was not convinced the Safety Shield Building would protect the reactor from "external" events like earthquakes, tornadoes and high winds. (4)

While these actions might be seen as "robust" regulation, they also add to concerns because the Health and Safety Executive is expected to finish its Generic Design Assessment by June 2011 – to a fixed timetable - against a background of severe staff shortages. (5)

Nuclear Security

Nuclear terrorism has the potential to cause a large number of deaths, and the risk of a successful attack will increase if more nuclear power stations and radioactive waste stores are built. (6) The consequences of such an attack would depend on a wide range of variables, such as the type of facility, the extent of the damage and the size of any radiation release; weather conditions; the efficiency of countermeasures. A study by the UK's National Radiological Protection Board (NRPB) on a release from the Sizewell B reactor suggested over a thousand fatal cancers might result with crop restrictions necessary over 1,000km^2. (7)

New reactor sites will also be spent fuel stores. These stores could well be even more vulnerable to attack than the reactors themselves. In a worst-case scenario, a successful attack could result in the loss of water from a spent fuel storage pond, leading to ignition of the fuel. According to a US nuclear security specialist, this could result in large releases of radioactivity. A 1997 study done for the US Nuclear Regulatory Commission estimated the consequences of a spent-fuel fire at a pressurized water reactor (PWR) could include 54,000–143,000 extra cancer deaths. (8)

Leaked documents by EdF on the vulnerability of the new European Pressurised water Reactor (EPR) to terrorist attack revealed a dangerously flawed approach to security. (9) Nuclear engineering consultancy, Large and Associates, has assessed the secret EdF document and concluded that it includes seriously flawed assumptions about whether the reactor could withstand a potential terrorist attack using hijacked commercial aircraft. (10) Clearly modes of attack other than crashing a passenger aircraft into a nuclear site also need to be considered, such as attacks involving vehicles loaded with explosives, or suicide bombers. (11)

The Government dismisses concerns about terrorism risks saying it believes the regulatory framework will ensure that risks are minimised and sensibly managed by the industry. The regulatory framework requires nuclear power stations to have their security arrangements approved by the Office for Civil Nuclear Security. The Generic Design Assessment (GDA) is also considering a wide range of hazards including the ability of reactors to withstand accidental aircraft crash or malicious activity. (12) Despite the huge potential local and regional impacts, local authorities have very little input into these areas. In fact, information on nuclear reactors and radioactive waste facilities is likely to be increasingly withheld, because of security risks, reversing the trend of the last decade to allow greater openness and transparency in what has traditionally been a highly secretive industry. (13) NFLA believes that if these issues cannot be debated in an open and transparent way because of security concerns, then we have to conclude that new reactors are not compatible with an open and democratic society.

Nuclear Proliferation

The Secretary of State also says he is satisfied that any new reactors built in the UK will be required to have in place practices which safeguard nuclear materials against any proliferation risk. The Secretary of State also states (para 6.29) that he sees no reason to think that building new reactors in the UK will result in any significant rise in proliferation risk. The NFLA fundamentally disagrees with this assessment.

The UK is happy to encourage the global expansion of civil nuclear power, and the proposed programme which is the subject of this consultation will add further encouragement. This will require an expansion of uranium enrichment capacity, and probably lead to an expansion of reprocessing too. The diffusion of knowledge and the increase in global trade of the specialized materials and equipment needed to build and operate uranium enrichment facilities and reprocessing plants will make it more difficult to detect clandestine weapons programmes. Separating plutonium from spent fuel does not require a large industrial-scale reprocessing facility like Sellafield. A quick and simply designed plutonium separation facility could be in operation four to six months after the start of construction. (14)

For example, at least 40 developing countries from the Persian Gulf region to Latin America have recently approached the International Atomic Energy Agency (IAEA) to signal interest in starting nuclear power programmes. At least half a dozen countries have also said in the past few years that they are specifically planning to conduct enrichment or reprocessing of nuclear fuel, a prospect that could dramatically expand the global supply of weapons-useable plutonium and enriched uranium. (15) Thirteen of the 40 countries are in the greater Middle East, according to the International Institute for Strategic Studies (IISS). While this surge of interest is consistent with a worldwide trend, some countries appear to be moving down the nuclear path in reaction to the Iranians and concern about their determined pursuit of technologies that appear designed to provide nuclear weapons capability. (16)

Question 4 - References

(1) For a longer discussion about nuclear safety see “Nuclear Reactor Safety Briefing”, No2nuclearpower, January 2007. http://www.no2nuclearpower.org.uk/reports/Nuclear_Safety.pdf
(2) Joint Regulatory Statement 22nd Oct 2009
http://www.stuk.fi/stuk/tiedotteet/sv_FI/news_571/_files/82389010005557285/default/epr_stuk_asn_ja_hse_englanniksi.pdf
(3) “Reactor Design Problems” NuClear News No.12 November 2009
http://www.no2nuclearpower.org.uk/nuclearnews/NuClearNewsNo12.pdf

(4) New York Times 16th Oct 2009
http://www.nytimes.com/2009/10/16/science/earth/16nuke.html?_r=2
(5) "Reactor Problems" NuClear News No.13 December 2009
http://www.no2nuclearpower.org.uk/nuclearnews/NuClearNewsNo13.pdf
(6) See for example:- International Conference on Nuclear Security, Global Directions for the Future, London 16-18 March 2005 Findings of the President of the Conference.
http://www.iaea.org/NewsCenter/News/PDF/conffindings0305.pdf
(7) "Assessing the risk of terrorist attacks on nuclear facilities" Parliament Office of Science and Technology Report 222, July 2004 http://www.parliament.uk/documents/upload/POSTpr222.pdf
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Consultation Question 5. **Chapter 7 (Carbon Reduction Benefit) sets out the evidence on the potential benefit through carbon reduction arising from the class or type of practice. It also sets out the Secretary of State's current views based on that information. Do you agree or disagree with the views presently held by the Secretary of State on these matters? Please state the reasons for your answer.**

Do you consider that there are any matters relevant to the potential benefit through carbon reduction that are not referred to in this Chapter? If so, please state what they are, and explain how and why they are relevant, and state what conclusions you think should be reached in light of these matters.

The Secretary of State says that the EPR and AP1000 reactors will assist in meeting the UK's carbon reduction targets. The NFLA believes the reverse is the case. Because spending on new reactors will use money and resources that could be more effectively spent elsewhere, building new reactors will actually have a negative impact of meeting the UK's carbon reduction targets. (1)

The Government argues it is taking action to reduce carbon emissions on many different fronts including ensuring a diverse low carbon energy mix and investing in energy efficiency. (para 7.18). This suggests the UK has infinite sources of finance to spend on large numbers of energy projects, which is clearly not the case, and particularly so given the extent of the public finances and a worldwide economic recession. A scarcity of resources means anything that is spent on nuclear power will not be available to be spent on other energy projects. Since tackling climate change is an urgent priority, the UK, as a nation, needs to spend its limited resources as effectively as possible. It is imperative that we maximize the carbon reductions achieved with every pound spent. Investing in expensive nuclear power is not cost effective. Energy efficiency can be up to seven

times more cost effective. So investment in new reactors effectively worsens climate change because each pound spent is buying so much less of a 'solution' than if it were spent on energy efficiency measures. (2)

In the 2003 Energy White Paper, local authorities were promised a "step change" in policies and programmes to deliver energy efficiency. Local authorities were encouraged to take the lead, acting as catalysts for change. Some local authorities have indeed been carrying out some innovative climate change strategies, but without the central government support these schemes will never be ambitious enough or at the scale required to meet carbon abatement targets. The UK is still waiting for the step change in energy efficiency which was promised six years ago. (3)

It is very difficult to avoid the conclusion that the worst fears of the Sustainable Development Commission, expressed in 2006, have, in fact been realised, and that re-launching the UK nuclear programme has required "*a substantial slice of political leadership".* Political attention has been shifted and undermined efforts to pursue a strategy based on energy efficiency, renewables and Combined Heat and Power (CHP). (4) Sir Jonathon Porritt, former chair of the Commission, says nuclear power is seriously diverting attention from the hard decisions required to solve the UK's energy challenges. (5)

The Government's Low Carbon Transition Plan (6) expects 30% of UK electricity to come from renewables by 2020 and 10% from nuclear and coal with carbon capture. But only 2 of the 30% would be from small-scale renewables - whereas the solar PV industry alone expects to provide 12% across Europe. The difference between 2 and 12 would be enough to save us having to replace our nuclear reactors. (7) Similarly, the Chief Executive of National Grid, Steve Holliday, says that 15% of the country's electricity production could come from so called "embedded generation" in homes and offices by 2020 as micro generation becomes increasingly viable after the £9 billion rollout of "smart meters" for every home in Britain. (8) This higher figure will include micro-CHP as well as small-scale renewables.

The Government's proposed Feed-in Tariff, or 'Clean Energy Cashback' scheme has been set at a rate that is inappropriately low. Alan Simpson MP, who advised the Government on Feed-in Tariffs, says we should aim to get much more than 2% of electricity from microgeneration. "*If they were five times as ambitious, it would only cost the average family another £2 a year*". But, according to *The Guardian*, the nuclear industry has been lobbying against support for renewables because it undermines the case for new nuclear stations. (9)

Far from assisting the UK in meeting its carbon reduction targets, the Government's strong focus on carrying out 'facilitative actions' to speed up new reactor construction is, in fact, delaying the local energy revolution which we so desperately need.

Electricity only provides around 18% of UK energy demand, and nuclear power only provides around 20% of that electricity - about 8% of total energy. Allowing for losses at the power station, nuclear power's current contribution to the UK's final energy consumption is only 3.6 % (80 TWh/y out of a final consumption of about 2,250 TWh/y). (10)

Therefore, replacing nuclear reactors will save only around 4% of the UK's carbon emissions. The Government has said elsewhere that it challenges the view that 4% is not worth bothering with, and that it has to look across all forms of energy, especially because there will be a greater need to start using more electricity for transport and heating. (11) However, it will need to be absolutely sure that by approving new nuclear reactors it is not going to negatively impact on the ability to deal with the other 96% of emissions. Unfortunately, as things stand at the moment the focus of new reactors appears to be doing just that.

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Consultation Question 6. **Chapter 8 (Security of Supply Benefit) sets out the evidence on the potential benefit through security of supply arising from the class or type of practice. It also sets out the Secretary of State's current views based on that information. Do you agree or disagree with the views presently held by the Secretary of State on these matters? Please state the reasons for your answer.**

Do you consider that there are any matters relevant to the potential benefit through security of supply that are not referred to in this Chapter? If so, please state what they are, and explain how and why they are relevant, and state what conclusions you think should be reached in light of these matters.

The Secretary of State says that the presence of nuclear in the electricity mix can result in reduced need for gas-fired power stations, thus reducing the need for gas imports. But nuclear power can only ever have a limited role to play in substituting for imported oil and gas, because electricity has a limited role in providing heat and energy for transport. In fact several scenario studies suggest that an increase in nuclear capacity could, in fact, increase gas consumption. The NFLA believes that moving towards a more decentralised energy system with a focus on energy efficiency and the use of combined heat and power is liable to provide a much more effective way of improving energy security. Promotion of renewable energy may also be hindered by this decision.

Countries that have turned to nuclear power to reduce their dependence on foreign oil have largely been unsuccessful. After the 1970s oil shocks, France and Japan embarked on major nuclear construction. Although France reduced its reliance on oil for electricity tenfold (from 10% in 1973 to 1.5% in 1985), oil as a percentage of total energy consumption started to climb again after 1985. Its oil consumption per head is higher than the European average, and higher than Germany, UK and Italy. Likewise, Japan has diversified its energy sources to include nuclear power, natural gas, and coal, but it still depends on imports for 96% of its primary energy supply. (1)

The widespread deployment of plug-in hybrid electric vehicles could start to change things, with the proportion of energy supplied by electricity increasing as oil consumption falls. But this would also help intermittent sources like wind and solar power, because plug-in cars could serve as electricity storage, creating a symbiotic relationship. In any event, it will take at least two decades to switch over the estimated 900 million vehicles on the road from oil to electricity. Until then, nuclear energy cannot reduce this heavy reliance on oil.

A key argument made by ministers is that unless the UK builds new nuclear reactors soon, it will become even more dependent on gas as new gas-fired electricity generating stations are built to meet the hypothetical 'electricity gap'. Gas-fired electricity generating stations are quick and cheap to build. Since 1997, more than 32 Gigawatts (GW) of gas-fired plant has been approved by the Government. By 2015, it is expected that 12.2 GW of coal and oil, and 6.9 GW of nuclear power

will come off-stream. The Centre for Policy Studies (CPS) argues that if nothing is done these power stations will be replaced by gas-fired electricity generating stations. By 2020 gas could account for 70% of all the UK's conventional generating capacity. (2)

But only 25-30% of the gas Britain burns is used to produce electricity. The rest is used for industrial processes and domestic heating. Gas generating stations are usually used to generate electricity at peak times because gas turbines can be switched on and off easily. Nuclear-power stations, on the other hand, must be run constantly to be economic so they can only replace a small proportion of the gas used for electricity generation. Secondly, most of Britain's gas now and in the future comes from Norway. And finally Russia is more dependent on Western Europe's revenues than the other way round. (3)

An analysis by the UK Liberal Democrat Party suggests that the effect of allowing nuclear power to operate alongside carbon capture and renewables is to reduce the contribution of wind and wave power, rather than making any difference to the amount of gas imported, largely because nuclear cannot compete economically in the role of flexibly balancing the electricity grid. (4)

Nuclear power too carries with it risks of unreliability. Jim Watson of the Sussex Energy Group says the Government has emphasised the external threats to supplies of fossil fuels but has downplayed other potential threats such as infrastructure failure, underinvestment outside the power sector, civil unrest or even terrorism. (5) Some of the most important threats to UK energy security have been due to civil unrest, such as the miners' strike of 1984/85 and the fuel protests of 2001. There could, in future, be industrial disputes or campaigns by activists that target nuclear power. Nuclear power plants could be targeted by terrorists, or suffer from another Chernobyl-type accident. The consequences of such an attack or accident might be that nuclear reactors all over the globe are forced to close down in response.

The experience of France shows that an electricity system dominated by one technology can be particularly vulnerable. For example, the under-performance of France's nuclear power plants in summer 2003 occurred due to intense heat, drought and lack of cooling water. This contributed to a blackout that affected a large part of continental Europe.

During the late summer of 2002, at the height of British Energy's financial difficulties, five of its eight stations had either one or both reactors closed. If the current fleet is replaced by new reactors built using modular construction techniques and all exactly the same design, this would leave the UK vulnerable to generic faults which could require all reactors to close at the same time for repairs.

Watson concludes that the Government's security case for nuclear power is unconvincing. It neglects key aspects of energy security, and fails to take account of many of the threats that have had a material impact on UK energy security in recent decades. It is not clear how nuclear power will mitigate risks due to under-investment in gas infrastructure, episodes of civil unrest such as fuel protests and strikes, or threats from electricity grid failures. The Government has tended to emphasise the 'problems' of Russian gas and electricity gaps. In both cases, there is little evidence of an impending threat. To the extent that risks to security might occur, it has not been explained why nuclear power has to be part of an insurance policy against them.

Any country that really wants to increase its security of supply and reduce it dependence on imported fossil fuels should dramatically improve energy efficiency. The UK burns gas wastefully in big electricity-generating power stations when local power stations, which use the heat as well, could significantly reduce the need for gas. By combining the production of heat and electricity it is possible to extract twice as much useful work from gas for every ton of carbon emitted into the atmosphere. This could significantly reduce the need for gas.

The UK Government originally set a target for Combined Heat and Power of 5 GWe by 2000. This target was missed, and was only reached in 2005. Government also established, as part of the 2000 Climate Change Programme, a further target, committing itself to achieve a doubling of CHP capacity to 10 GWe of CHP by 2010. The Combined Heat and Power Association reported that the

installed capacity in April 2009 was 5.47GWe with no prospect of reaching the 2010 target. (6) However, the Government's own analysis indicates that there is significant potential for further investment in new CHP capacity over the period to 2015, over which timeframe there is urgent need for investment in new UK power generating capacity. (7)

Energy consultants Pöyry looked at the technical potential for additional large CHP capacity at UK industrial facilities for Greenpeace. Its report outlined 9 case studies of industrial clusters where there is significant potential for Combined Cycle Gas Turbine (CCGT) CHP to meet local heat demand, as well as providing electrical capacity to the grid. The report found that CHP on these sites could produce up to 13GW of power - the same capacity as eight nuclear power stations, and it could be delivered much more quickly and more cheaply than nuclear power, and reduce carbon dioxide emissions by 10 million tonnes. (8)

On a smaller scale micro-CHP has significant potential to reduce gas consumption. Domestic scale micro-CHP boilers would replace conventional domestic central heating boilers, and produce electricity as well as how water for heating without consuming any more gas. Whilst new reactors are not expected to produce any power until around 2017 at the earliest, micro-CHP can be installed 1kW at a time, producing power from day one. In terms of capacity, if all domestic gas boilers are replaced (as they reach the end of their useful life) with micro-CHP, the UK could in theory install 1.5 million units every year. That is equivalent to 1.5GWe, or not far off the size of one nuclear power station in 2010, another in 2011 etc. By 2020, we could have the equivalent of ten new reactors powered by micro CHP. (9)

Amazingly several scenario-based studies show that this is not simply a case of using energy efficiency and/or nuclear power to reduce dependence on gas. In fact going down the nuclear route could, rather counter intuitively increase our dependence on gas imports. The expansion of nuclear capacity doesn't necessarily reduce fossil fuel consumption if electricity demand continues to increase.

In 2006 PB Power was commissioned by Greenpeace to carry out studies which looked at the role of decentralised energy in London (10) and Edinburgh. (11) The London study showed that, despite the use of natural gas for CHP stations, and the increased use of gas in power stations, London's overall gas consumption would be 14.9% lower by 2025 in a high Decentralised Energy scenario compared with the centralised high nuclear scenario. The decentralised scenario uses a wider variety of energy sources, many of which are based on local supplies, thus enhancing energy security. Similarly, Edinburgh's reliance on gas could be reduced by following a decentralised pathway. Under the high Decentralised Energy scenario gas consumption would be almost 15% lower than under the high nuclear scenario by 2025.

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Consultation Question 7**. Chapter 9 (Economic Assessment) sets out the evidence on the potential economic impact of the class or type of practice. It also sets out the Secretary of State's current views based on that information. Do you agree or disagree with the views presently held by the Secretary of State on these matters? Please state the reasons for your answer.**

Do you consider that there are any matters relevant to the potential economic impact that are not referred to in this Chapter? If so, please state what they are, and explain how and why they are relevant, and state what conclusions you think should be reached in light of these matters.

The Secretary of State says there are benefits to the fuel poor from limiting increases in the cost of electricity generation, and that the EPR and AP1000 will contribute to this. In the NFLA's view, the balance of evidence is that nuclear electricity will be expensive. In any case, if the Government is attempting to tackle fuel poverty through fuel pricing policy then it is returning to a policy which has failed for the last 30 years.

Fuel Poverty

The Government has a legal obligation to ensure that 'as far as is reasonably practicable, persons do not live in fuel poverty' by 2016 in England and 2018 in Wales, widely interpreted as 'eradicating' fuel poverty. The Government is also committed to ending the blight of fuel poverty for vulnerable households by 2010. (1)

Ofgem has estimated that renewing infrastructure and meeting carbon targets is likely to require an investment of up to £200 billion which will mean significant increases in domestic energy bills of between 14% and 25% by 2020. (2) Clearly climate policy also has to take into account fuel poverty. Without an integrated strategy for both there is a danger that climate policy will end up worsening the situation with regard to fuel poverty.

It is clear now that the 2010 target is unobtainable. There are parallel worries about the achievability of the 2016 target. The numbers of those suffering still appears to be growing. This worsening fuel poverty would be constraining policy options for climate change alleviation, if the Government were serious about tackling both. Moving towards more electric heating, for example, would not be an option. On the other hand, policies that focus on energy efficiency for the fuel poor, including insulation and appliances would be necessary and appropriate. (3)
If the Government is to meet its target to reduce carbon emissions by 80% by 2050, AND eliminate fuel poverty by 2016, it will need to implement a set of policies which can cut emissions from the domestic sector by 80% by 2050. Every house will need excellent insulation and some form of Low and Zero Carbon Technology – micro-generation or community heating schemes. This means carrying out installations in all of the UK's 25 million dwellings over the next 40 years or 625,000 dwellings every year between now and 2050. (4)

Nuclear Costs

In the US Dr Mark Cooper has analysed three dozen recent cost projections, and concluded that the likely cost of electricity from new reactors would be 12-20 cents per kilowatt hour (c/kWh) (7-12p/kWh at Jan 2010 exchange rates). He says in *"the few short years since the so-called 'Nuclear Renaissance' began there has been a four-fold increase in projected costs."* (5)

Apart from the well documented escalations in the cost of the reactor being built in Finland, three recent developments have also provided evidence to support concerns about the cost of nuclear power. US utility, Exelon, has cited "economic woes" as a major factor in postponing plans to build two reactors in Texas; the Ontario Government has announced the suspension of bidding for two replacement reactors citing excessive costs and uncertainties involving the ownership status of the sole Canadian bidder; and Moody's Investor Services said it is considering *"taking a more negative view for those issuers seeking to build new nuclear power plants".* (6)

In October last year, Toshiba told San Antonio City Council in Texas its new twin $13bn ABWR reactors will cost $4 billion extra, prompting the Council to postpone a crucial vote on the project's financing until January. (7)

Problems are not confined to Europe and North America. Country after country has seen nuclear construction programmes go considerably over budget - for example, completion costs for the last ten Indian reactors have been 300% over budget. (8) China's Tianwan project began commercial operation in June 2007, more than two years later than planned. The Chinese regulator halted construction for almost a year on the first of two Russian-designed reactors while it examined welds in the steel liner for the reactor core. In Taiwan, the Lungmen reactor project was five years behind schedule. Difficulties included welds that failed inspections in 2002 and had to be redone. The World Energy Council says construction times for new reactors have risen from 66 months in the mid-1970s to 116 months - nearly ten years - for completions between 1995 and 2000. The unproven designs being proposed for the UK are likely to lead to more potential delays.

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Consultation Question 8**. Chapter 10 (The Secretary of State's Proposed Decision) sets out the Secretary of State's proposed decision that the class or type of practice is justified by its benefits in relation to the health detriment it may cause. Do you agree or disagree with the Secretary of State's proposed decision? Please state the reasons for your answer.**

Do you consider that there are any matters relevant to the proposed decision that are not referred to in this Chapter? If so, please state what they are, and explain how and why they are relevant, and state what conclusions you think should be reached in light of these matters.

NFLA fundamentally disagrees with the Secretary of State's Proposed Decision. Indeed NFLA question the Secretary of State's ability to act as an independent arbiter and do not believe he

should be acting as the Justifying Authority given that he has already expressed support for new reactors.

We believe that the appropriate way forward would be for the Secretary of State to call for a public inquiry, chaired by someone independent of the Government to ensure an open and transparent decision. An inquiry would be a good opportunity to examine issues such as plans for safely managing radioactive waste from new reactors, the disposability of the high burn-up spent fuel, and the possibility that spent fuel will be stored for up to 160 years at reactor sites, including the public examination of the EA's review of the NDA's disposability assessments. CoMARE's review of the KiKK study could also be subjected to public examination.

If you require any further information on the NFLA response, or have queries with any part of this response, please get in touch with the NFLA Secretariat using the details at the top of this letter.

Yours sincerely,

Bailie George Regan
Chair of Nuclear Free Local Authorities

***Information on the NFLA**

The NFLA is the principal local authority organisation in the UK and Ireland working on nuclear issues. It has 70 member authorities and its terms of reference can be found at the NFLA website – http://www.nuclearpolicy.info.