

**THE JUSTIFICATION OF PRACTICES  
INVOLVING IONISING RADIATION  
REGULATIONS 2004**

Consultation on the Nuclear Industry  
Association's Application to Justify  
New Nuclear Power Stations

VOLUME 1: CONSULTATION DOCUMENT

DECEMBER 2008







# Contents

<b>Executive Summary</b>	<b>5</b>
Aim of this consultation	5
Background	6
How to respond	7
Confidentiality and data protection	7
Additional copies	8
Help with queries	8
Consultation questions	9
<b>Chapter 1 – Justification and process</b>	<b>10</b>
Class or Type of Practice	11
Justifying authority	11
Benefit and health detriment	12
Considering applications	12
Information requirements	12
<b>Chapter 2 – Class or Type of Practice (CTP)</b>	<b>14</b>
<b>Chapter 3 – The Application</b>	<b>15</b>
<b>Chapter 4 – Consideration of the NIA application</b>	<b>17</b>
Types of reactor design	17
Defining the Class or Type of Practice	18
Possible Classes or Types of Practice	19
The Government’s preliminary view	20
Is the Class or Type of Practice new or existing?	21
Process for assessing the four Classes or Types of Practice	22

<b>Chapter 5 – Questions</b>	<b>23</b>
<b>Chapter 6 – What happens next?</b>	<b>25</b>
Public engagement	25
<b>Appendix A – Indicative timetable</b>	<b>26</b>
<b>Appendix B – NIA application</b>	<b>separate document</b>
<b>Appendix C – Request to NIA for further information</b>	<b>27</b>
<b>Appendix D – Classification of nuclear reactors</b>	<b>31</b>
<b>Appendix E – Consultation Criteria</b>	<b>32</b>

# Executive Summary

## Aim of this consultation

1. This consultation seeks responses to an application submitted by the Nuclear Industry Association (NIA), the representative body for the nuclear industry in the UK, for a Justification decision in relation to new nuclear power stations. The text of the application is at Appendix B, and should be read with this consultation document. This consultation also explores how the Justification process applies to classes or types of practice and in particular seeks views on the NIA's proposed class or type of practice and the Government's preliminary view.
2. Justification is a requirement of EU law<sup>1</sup> under which before any new class or type of practice involving ionising radiation can be introduced it must first undergo a high-level, generic assessment to determine whether its overall benefit outweighs any associated health detriment. This requirement has been implemented in UK law by the Justification of Practices Involving Ionising Radiation Regulations 2004.<sup>2</sup> These Regulations prescribe the process for justifying new classes or types of practice and provide that a person may apply to Government seeking a decision as to whether a particular class or type of practice is new for the purposes of the Regulations and if so, whether it is justified. The NIA have submitted an application under the Regulations asking for a decision as to whether their proposed class or type of practice is new or existing and if it is new, whether it is justified.
3. The application contains evidence which aims to demonstrate that the economic, social or other benefits associated with the class or type of practice proposed in the application outweigh the health detriments. The proposed class or type of practice includes four specific new nuclear power station designs and is described further in chapters 3 and 4. It is the responsibility of the Secretary of State for Energy and Climate Change to reach a decision on whether a proposed class or type of practice qualifies as a new or existing class or type of practice. If new, then the Justifying Authority, which in this case is also the Secretary of State for Energy and Climate Change, must then make a decision on whether it is Justified.
4. This consultation forms part of the Justification process. The responses received will help inform the Secretary of State's decision on whether the application relates to a new class or type of practice. They will also inform the Justifying Authority's consideration of the application. After the close of the consultation, the Government will consider the responses to it and consider the NIA's application. The Justifying Authority will then produce a draft decision (or decisions) in relation to the application which will be published

1 Council Directive 96/29/Euratom O.J.L 159 29/06/1996 page 1

2 <http://www.opsi.gov.uk/si/si2004/20041769.htm>

for consultation in 2009. Following that consultation on the draft decision, the Justifying Authority expects to make a final decision in relation to the application. An indicative timetable is set out in Appendix A.

5. The Government will also be publishing consultations on other facilitative actions set out in the Nuclear White Paper.<sup>3</sup> Information on these consultations will appear on our website.<sup>4</sup>

## Background

6. In May 2007, the Government published a public consultation on the role of nuclear power<sup>5</sup> and a technical consultation on a proposed process for Justification of new nuclear power stations.<sup>6</sup> Responses to the consultation informed the development of this Justification process and the development of guidance for applicants.
7. In January 2008, the Government published its White Paper on Nuclear Power,<sup>7</sup> with an Impact Assessment.<sup>8</sup> In March 2008, the Government issued a call for Justification applications for new nuclear power stations and guidance for applicants.<sup>9</sup> In June 2008, the Government received an application from the Nuclear Industry Association (NIA) for a Justification decision in relation to: 'The generation of electricity from nuclear energy using oxide fuel of low enrichment in fissile content in light water cooled, water moderated thermal reactors using evolutionary designs'.
8. Chapter 1 of this consultation document sets out what Justification is. It explains that it is a high level process and that there are other later licensing and consents processes which examine site-specific issues. Chapter 2 discusses the issues around the definition of a class or type of practice. Chapter 3 covers the NIA's application. Chapter 4 sets out the basis for the Government's preliminary view on the basis for a Justification decision. Chapter 5 asks questions in relation to the NIA's application and the Government's preliminary view on the application and process. These questions are also set out at the end of this Executive Summary. Chapter 5 also asks for any other comments which consultees wish to make. Chapter 6 and Appendix A outline the remaining stages of the consultation process and seek comments on the Government's proposals for public engagement.

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3 BERR, A White Paper on Nuclear Power: Meeting the Energy Challenge, January 2008, <http://www.berr.gov.uk/energy/nuclear-whitepaper/page42765.html>.

4 <http://www.berr.gov.uk/whatwedo/energy/sources/nuclear/consultations/open/page44523.html>

5 BERR, The Role of Nuclear Power in a Low-Carbon Economy, May 2007, <http://www.dti.gov.uk/consultation/nuclearpower2007>.

6 BERR, Consultations on the proposed processes for Justification and Strategic Siting, May 2007, <http://www.berr.gov.uk/energy/nuclear-whitepaper/justification/page45386.html>.

7 BERR, A White Paper on Nuclear Power: Meeting the Energy Challenge, January 2008, <http://www.berr.gov.uk/energy/nuclear-whitepaper/page42765.html>.

8 Impact Assessment of the Government's White Paper on nuclear power, <http://nuclearpower2007.direct.gov.uk/docs/ImpactAssessment.pdf>

9 BERR, The Justification of Practices Involving Ionising Radiation Regulations 2004: Guidance for applications relating to new nuclear power, March 2008, <http://www.berr.gov.uk/energy/nuclear-whitepaper/justification/page45386.html>.

9. **Appendix B, in a separate document, is a copy of the NIA's consolidated application, including the NIA's original application, the questions raised by Government and the NIA's answers. This should be read with this consultation document.** Our questions are also set out at Appendix C. Appendix D is a diagram showing different types of nuclear reactor designs. Appendix E is a copy of the Government's consultation criteria.

## How to respond

10. When responding please state whether you are responding as an individual or representing the views of an organisation. If you are responding on behalf of an organisation, please make it clear who the organisation represents and, where applicable, how you assembled the views of members.
11. This consultation began on 17 December 2008. The deadline for responses is 25 March 2009.
12. Responses should be submitted, preferably by e-mail to:

Owen Jenkins  
The Justification Assessment Centre  
Office for Nuclear Development  
Department of Energy and Climate Change  
Bay 128,  
1 Victoria Street  
London  
SW1H 0ET

Telephone: 020 7215 5223

Fax: 020 7215 2842

Email: [justification@decc.gsi.gov.uk](mailto:justification@decc.gsi.gov.uk)

13. Questions about the issues raised in either the consultation document or the NIA's application can be addressed to the Justification Assessment Centre using the contact details above.

## Confidentiality and data protection

14. Your response may be made public by the Government. If you do not want all or part of your response or name made public, please state this clearly in the response. Any confidentiality disclaimer that may be generated by your organisation's IT system or included as a general statement in your fax cover sheet will be taken to apply only to information in your response for which confidentiality has been specifically requested.

15. Information provided in response to this consultation, including personal information, may be subject to publication or disclosure in accordance with the access to information regimes (primarily the Freedom of Information Act 2000 (FOIA), the Data Protection Act 1998 (DPA) and the Environmental Information Regulations 2004).
16. If you want other information that you provide to be treated as confidential, please be aware that, under the FOIA, there is a statutory Code of Practice with which public authorities must comply and which deals, among other things, with obligations of confidence.
17. In view of this it would be helpful if you could explain to us why you regard the information you have provided as confidential. If we receive a request for disclosure of the information we will take full account of your explanation, but we cannot give an assurance that confidentiality can be maintained in all circumstances. An automatic confidentiality disclaimer generated by your IT system will not, of itself, be regarded as binding on the Department.
18. The Department will process your personal data in accordance with the DPA and in the majority of circumstances this will mean that your personal data will not be disclosed to third parties.

## Additional copies

19. You may make copies of this document without seeking permission. An electronic version can be found at <http://www.berr.gov.uk/whatwedo/energy/sources/nuclear/consultations/open/page44523.html> Hard copies are available from the Justification Assessment Centre.

## Help with queries

20. The Department of Energy and Climate Change will appoint a Consultation Co-ordinator shortly. Until then Tunde Idowu of the Department for Business, Enterprise and Regulatory Reform is acting as our interim Department Co-ordinator. If you have comments or complaints about the way in which this consultation has been conducted, these should be sent to:

Tunde Idowu  
Consultation Co-ordinator  
Department for Business, Enterprise and Regulatory Reform  
Better Regulation Team  
1 Victoria Street  
London  
SW1H 0ET

E-mail: [Babatunde.idowu@berr.gsi.gov.uk](mailto:Babatunde.idowu@berr.gsi.gov.uk)

## Consultation Questions

1	<p><i>Do you agree with the Government’s preliminary view that, following the application submitted by the NIA, the decisions by the Secretary of State and the Justifying Authority should be by reference to four classes or types of practice, based on:</i></p> <p><i>(a) The generation of electricity from nuclear energy using oxide fuel of low enrichment in fissile content in a light water cooled, water moderated thermal reactor known as ACR1000 designed by Atomic Energy of Canada Ltd.</i></p> <p><i>(b) The generation of electricity from nuclear energy using oxide fuel of low enrichment in fissile content in a light water cooled, water moderated thermal reactor known as AP1000 designed by Westinghouse Electric Company LLC of the USA.</i></p> <p><i>(c) The generation of electricity from nuclear energy using oxide fuel of low enrichment in fissile content in a light water cooled, water moderated thermal reactor known as EPR designed by AREVA NP of France and Germany.</i></p> <p><i>(d) The generation of electricity from nuclear energy using oxide fuel of low enrichment in fissile content in a light water cooled, water moderated thermal reactor known as ESBWR designed by GE-Hitachi of the USA, and that these qualify as new classes or types of practice. If not, why not?</i></p>
2	<p><i>Does the NIA application contain sufficient information to enable the Justifying Authority to make an assessment of a) these classes or types of practice and b) the preferred class or type of practice in the NIA application? In either case, if not, what further information is needed?</i></p>
3	<p><i>Do you have any comments on the arguments or evidence in the NIA’s application? Are there any additional arguments or evidence which the Justifying Authority should consider?</i></p>
4	<p><i>Do you have any other comments on the Government’s preliminary view of the classes or types of practice, on the approach preferred by the NIA, or any other options?</i></p>
5	<p><i>Do you have any comments on how best the Government might accommodate changes or developments of the named reactors in its classes or types of practice?</i></p>
6	<p><i>Do you have any suggestions about the way in which the Government proposes to engage with the public in the later stage of the consultation process?</i></p>

# Chapter 1

## Justification and process

- 1.1** “Justification” is based on the internationally accepted principle of radiological protection that no practice involving exposure to ionising radiation should be adopted unless it produces sufficient benefits to the exposed individuals or to society in general to offset any health detriment it may cause. This principle is derived from the recommendations of the International Commission on Radiological Protection (ICRP),<sup>10</sup> in particular, ICRP 60.
- 1.2** European Council Directive 96/29/Euratom of 13 May 1996 (the Basic Safety Standards Directive)<sup>11</sup> makes Justification a requirement of EC law and requires that all new classes or types of practice resulting in exposure to ionising radiation are Justified in advance of being first adopted or approved by their economic, social or other benefits in relation to the health detriment they may cause. This Directive has been implemented in UK law through the Justification of Practices Involving Ionising Radiation Regulations 2004.<sup>12</sup> The Department for Environment, Food and Rural Affairs (Defra) has published Guidance on the application and administration of the Regulations,<sup>13</sup> although these are now the responsibility of the Department of Energy and Climate Change (DECC). The Regulations provide that before any new class or type of practice involving ionising radiation can be introduced in the UK it must first undergo a high-level, generic assessment to determine whether its overall benefit outweighs any associated health detriment.
- 1.3** Justification is the first of a number of regulatory tests that must be satisfied before a new type of nuclear power station could be built in the UK. By itself it does not amount to a permission to build such a station, but only provides a high level assessment of the associated benefits and health detriment. There are other ICRP principles (optimisation and limitation) relevant to the approval of nuclear power stations. These are applied after the Justification process through further statutory regulatory processes – licensing, authorisations and planning consents – which examine site-specific issues. These further processes ensure that the number of people exposed, the likelihood of incurring exposures and the magnitude of individual doses are kept as low as reasonably achievable (taking account of economic and social factors), and below statutory dose limits.

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10 <http://www.icrp.org/>

11 O.J.L 159 29/06/1996 page 1

12 <http://www.opsi.gov.uk/si/si2004/20041769.htm>

13 <http://www.defra.gov.uk/environment/radioactivity/government/legislation/pdf/justification-guidance.pdf>

## Class or Type of Practice

- 1.4** The Directive and Justification Regulations apply to “classes or types of practice” rather than to individual “practices”. “Class or type of practice” is not defined in the Directive. “Practice” is defined in the Directive as “a human activity that can increase the exposure of individuals to radiation from an artificial source or from natural radiation sources where use is being made of its radioactive, fissile or fertile properties”.
- 1.5** The first step in the Justification process is to determine whether the “class or type of practice” for which Justification is sought is new or existing. A practice is a “new practice” for the purposes of the Justification Regulations if no practice in that class or type was carried out in the United Kingdom before 13 May 2000 and if the class or type of practice has not been previously found to be Justified. A class or type of practice is an “existing class or type of practice” for the purposes of the Justification Regulations if either:
- (a) a practice in that class or type was carried out in the United Kingdom before 13 May 2000; or
  - (b) it has been found to be Justified; or both.
- 1.6** A register of “existing practices” is maintained and is available on the Defra website.<sup>14</sup> It is for the Secretary of State to determine whether a class or type of practice is “new” or “existing”. In order to make either determination he must be satisfied that the class or type of practice is capable of being assessed as a class or type of practice. This is covered in further detail in Chapters 2 and 4.

## Justifying Authority

- 1.7** If the class or type of practice is existing then no Justification decision is required, but if it is new then it must be Justified before being introduced. The decision on whether a new practice is Justified is taken by the Justifying Authority. The Justifying Authorities in the UK are the relevant Secretary of State and the three Devolved Administrations to the extent that they have competence in respect of the subject matter of a particular Justification application.
- 1.8** As nuclear energy is a reserved matter, the Secretary of State for Energy and Climate Change will be the Justifying Authority. As such, any Justification decision will be UK-wide. However, before the Secretary of State makes a Justification decision he will, in accordance with Regulation 18(2) of the Justification Regulations, consult the Devolved Administrations. A Concordat<sup>15</sup> between the Government and the Devolved Administrations sets out the

<sup>14</sup> <http://www.defra.gov.uk/environment/radioactivity/government/legislation/justification.htm>

<sup>15</sup> Concordat on the Implementation of the Justification of Practices Involving Ionising Radiation Regulations 2004.

working relations on Justification applications in a way that respects the devolution settlements.

## Benefit and health detriment

- 1.9** Under Regulation 4(2) of the Justification regulations, “Justified” in relation to a new class or type of practice means Justified by its economic, social or other benefits in relation to the health detriment it may cause.
- 1.10** The Directive defines health detriment as an estimate of the risk of reduction in length and quality of life occurring in a population following exposure to ionising radiations. A key feature of Justification is the requirement for an assessment of the health detriment which might be caused by a class or type of practice.
- 1.11** Applicants seeking Justification in relation to new nuclear power stations need to demonstrate to the satisfaction of the Justifying Authority that any health detriment from ionising radiation is outweighed by the benefits associated with the proposed class or type of practice.

## Considering applications

- 1.12** As well as the general guidance referred to in paragraph 1.2, guidance<sup>16</sup> published by the Department for Business, Enterprise and Regulatory Reform (BERR) (now the Department of Energy and Climate Change (DECC)) set out the process for receiving and considering applications for Justification in relation to new nuclear power stations, and provided an indicative timeframe, an updated version of which is at Appendix A.

## Information requirements

- 1.13** The BERR guidance asked applicants to provide information that will enable the Justifying Authority to undertake a high-level assessment of the economic, social or other benefits against the health detriments in relation to the operation of new nuclear power in the UK.
- 1.14** In addition to the information set out in the Defra Guidance,<sup>17</sup> BERR’s guidance set out an indicative list of information expected of applicants. This was not intended to be prescriptive or exhaustive but rather to indicate the main information likely to be necessary to enable a clear, high-level assessment of the health detriments and the economic, social or other benefits associated with the introduction of a particular class or type of practice. Applicants were encouraged to follow the guidance while exercising their own judgement on what might be relevant.

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<sup>16</sup> BERR, The Justification of Practices Involving Ionising Radiation Regulations 2004: Guidance for applications relating to new nuclear power, March 2008, <http://www.berr.gov.uk/energy/nuclear-whitepaper/justification/page45386.html>.

<sup>17</sup> <http://www.defra.gov.uk/environment/radioactivity/government/legislation/pdf/justification-guidance.pdf>

- 1.15** To facilitate the Justification decision, the Justifying Authority requires information on the expected benefits and detriments of the proposed class or type of practice. In addition to anticipated detriments (e.g. routine controlled radioactive discharges and routine worker radiation exposure), applicants were asked to provide information on potential detriments (e.g. accidents). For potential detriments, applicants were asked to summarise how the risks of their occurrence were adequately controlled or mitigated. Applicants were also asked to provide additional information that they considered would help substantiate their application.
- 1.16** The Justifying Authority has powers under the Regulations to seek additional information as necessary in order to make a Justification decision.

# Chapter 2

## Class or type of practice (CTP)

- 2.1** The Justification process applies to “classes or types of practice”. “Class or type of practice” is not defined in the Directive or Justification Regulations. The Directive defines “practice” as “a human activity that can increase the exposure of individuals to radiation from an artificial source or from natural radiation sources where use is being made of its radioactive, fissile or fertile properties”.
- 2.2** BERR’s guidance to those making applications for Justification considered if and how the Justification process should handle concurrent applications covering a number of specific nuclear power reactor designs.
- 2.3** The Defra guidance on the Justification Regulations<sup>18</sup> notes that nuclear power generation represents a very broad generic class or type of practice, and that the benefits and detriments arising from the operation of different types of nuclear power generation could differ substantially. Where there are such substantial differences, it is unlikely that a single Justification decision could be made. However, a single decision could be made in respect of similar designs having broadly similar benefits and detriments. Therefore, it may be possible to make a single decision in relation to a number of similar reactor designs, each employing particular processes, providing that the technical differences do not result in major disparities between the scale and balance of the benefits and detriments.
- 2.4** The Government therefore called for applications which could enable a single Justification decision in relation to a number of different designs.
- 2.5** The Secretary of State will need to satisfy himself that all reactor designs falling within a proposed class or type of practice are sufficiently similar to be considered together as a single class or type of practice.

# Chapter 3

## The Application

- 3.1** In June 2008, the Government received an application from the Nuclear Industry Association (NIA) for a Justification Decision in relation to the following class or type of practice: 'The generation of electricity from nuclear energy using oxide fuel of low enrichment in fissile content in light water cooled, water moderated thermal reactors using evolutionary designs'. The application was published on the Justification website maintained by Defra.
- 3.2** The text of the NIA's application (as revised – see paragraph 3.6) is at Appendix B, and should be read with this consultation document. The proposed class or type of practice is set out in paragraphs 1.3 to 1.8 on pages 6 to 9 of the application. This includes at table 1.1 a set of defining attributes with which the specific reactor designs within the class or type of practice conform.
- 3.3** The NIA's application identifies and provides technical information on four specific reactor designs as examples of designs that the NIA believe fall within the proposed class or type of practice: AECL's ACR-1000, Westinghouse's AP1000, Areva's EPR and GE-Hitachi's ESBWR. The NIA has asked the Justifying Authority (paragraph 1.10 of its application) for a Justification decision under Regulation 9 in relation to its proposed class or type of practice. It also asks, "If the Justifying Authority decides that the application comprises more than one class or type of practice we ask that this application be treated as an application for Justification of each of such new classes or types of practice. Were the Justifying Authority minded to consider each of the four example designs as separate classes or types of practice, each of those practices could be defined by reference to the details [above] and summarised as follows:

"The generation of electricity from nuclear energy using oxide fuel of low enrichment in fissile content in an evolutionary light water cooled, water moderated thermal reactor known as ACR-1000 designed by Atomic Energy of Canada Ltd."

"The generation of electricity from nuclear energy using oxide fuel of low enrichment in fissile content in an evolutionary light water cooled, water moderated thermal reactor known as AP1000 designed by Westinghouse Electric Company LLC of the USA."

"The generation of electricity from nuclear energy using oxide fuel of low enrichment in fissile content in an evolutionary light water cooled, water moderated thermal reactor known as EPR designed by AREVA NP of France and Germany."

“The generation of electricity from nuclear energy using oxide fuel of low enrichment in fissile content in an evolutionary light water cooled, water moderated thermal reactor known as ESBWR designed by GE-Hitachi of the USA.”

- 3.4** The purpose of the application is to demonstrate that the health detriments associated with the proposed class or type of practice are outweighed by the economic, social or other benefits. It is the responsibility of the Secretary of State for Energy and Climate Change to first decide whether the class(es) or type(s) of practice is new or existing. If he determines that it is new then it is his responsibility, as Justifying Authority, to determine whether the benefits of the class(es) or type(s) of practice outweigh the detriments.
- 3.5** The application has been analysed by the Justification Co-ordination Committee (JCC). The JCC is made up of DECC as the Justifying Authority, the Statutory Consultees,<sup>19</sup> the Devolved Administrations and relevant officials from other Government Departments. The Government has also taken into account advice from its technical advisers Integrated Decision Management (IDM).<sup>20</sup> The Government has also taken account of the report from Nexia Solutions published alongside the 2007 technical consultation on the Justification process.<sup>21</sup>
- 3.6** The JCC identified a number of areas where they felt the NIA needed to provide additional information to support the application and the Justifying Authority issued a Notice under Regulation 16 of the Justification Regulations requesting additional information on 30 October 2008. The NIA provided the additional information in the form of a consolidated application, the original text with the questions, and answers to each question at the end of each chapter, on 27 November 2008. This document is reproduced in full at Appendix B of this consultation document, and the Notice issued by the Government is at Appendix C.
- 3.7** The JCC also raised concerns about the way in which the class or type of practice contained in the NIA application is defined. This issue is considered in chapter 4 of this consultation document.
- 3.8** This consultation asks for views on the NIA’s application and on the Government’s proposed approach to handling it.

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19 Health and Safety Executive, Food Standards Agency, Health Protection Agency, Environment Agency/Scottish Environment Protection Agency, Department for the Environment (Northern Ireland).

20 Advice on the influence of reactor technology on the definition of classes or types of practice for new build Justification, by Integrated Decision Management <http://www.berr.gov.uk/whatwedo/energy/sources/nuclear/whitepaper/actions/justification/page45386.html>

21 Justification Process for New Nuclear Power Stations in the UK: a Discussion of the Basis for Considering Together Different Candidate Reactor Systems <http://www.berr.gov.uk/files/file39200.pdf>

# Chapter 4

## Consideration of the NIA application

- 4.1** In calling for applications, the Government encouraged applications which would enable a single Justification decision in relation to a number of different designs. The NIA's application is in such a form. It defines the class or type of practice as 'The generation of electricity from nuclear energy using oxide fuel of low enrichment in fissile content in light water cooled, water moderated thermal reactors using evolutionary designs'. This definition is in turn limited further by the defining attributes set out in table 1.1 of the application. The application identifies four specific reactor designs as examples that fall within the proposed practice – AECLs ACR-1000, Westinghouse's AP1000, Areva's EPR and GE-Hitachi's ESBWR.

## Types of reactor design

- 4.2** This section is intended to give a basic summary of the technology used in the nuclear power station designs in the NIA application, in order to help readers understand the potential basis for classes or types of practice. There are several different groups into which nuclear reactors can be divided, based on their technical features, and different individual designs within each group. At Appendix D is a diagram which sets out in summary form one possible classification of thermal nuclear reactor designs into groups. This information is set out in greater detail in the advice the Government received from Integrated Decision Management<sup>22</sup> referred to in paragraph 3.5.
- 4.3** All the reactor designs in the NIA application relate to light water cooled, water moderated thermal reactors. Water can include "light water" and "heavy water". "Light water" means H<sub>2</sub>O, or water as generally understood. Heavy water is D<sub>2</sub>O where D is deuterium, an isotope of hydrogen with a neutron added to the nucleus.
- 4.4** The nuclear reactor designs in the NIA application all function by bombarding Uranium-235 with neutrons. If these neutrons are moving at the right speed then they are referred to as "thermal". A "moderator" may be used to slow fast moving neutrons to the right speed. When one of these "thermal" neutrons hits a Uranium-235 atom the atom splits, giving off fission products, extra neutrons and heat. The heat given off then heats the "coolant" (the liquid or gas circulating through the core of the reactor so as to transfer the heat

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<sup>22</sup> Advice on the influence of reactor technology on the definition of classes or types of practice for new build Justification, by Integrated Decision Management <http://www.berr.gov.uk/whatwedo/energy/sources/nuclear/whitepaper/actions/justification/page45386.html>

from it) which is, through different means, turned to steam which then drives turbines which generate electricity.

- 4.5** Of the four reactors in the NIA's application, two, the AP1000 and the EPR, are Pressurised Water Reactors (PWRs). PWRs are shown in the diagram as Group 1. This is the most common type of nuclear reactor. It uses light water as both coolant and moderator. The design is distinguished by having a primary cooling circuit which flows through the core of the reactor under very high pressure so that it cannot boil. Heat is then transferred to a secondary circuit in which steam is generated to drive the turbine.
- 4.6** One of the reactors in the NIA's application, the ESBWR, is a Boiling Water Reactor (BWR). BWRs are shown in the diagram as Group 2. This is similar to the PWR, but there is only a single circuit. The coolant turns to steam which drives the turbines, and the turbines are part of the reactor circuit.
- 4.7** One of the reactors, the ACR-1000, is an Advanced CANDU Reactor (ACR). The ACR is shown in the diagram as Group 3. This uses light water as a coolant and heavy water as a moderator.
- 4.8** From the point of view of defining a class or type of practice, there are two main points to note. One is, as noted in paragraph 2.3, that the technical differences and benefits and detriments arising from the operation of different types of nuclear power generation can differ substantially. The other is that there are a large number of reactor designs which fall within Groups 1 and 2 which are not included in the NIA's application. We consider the implications of this below at paragraph 4.15.

## Defining the Class or Type of Practice

- 4.9** The Justification Regulations require the Secretary of State to decide whether the practice in the application relates to a "new or existing" class or type of practice. In order to do this he must first decide what the class or type of practice described in the application is, and whether it is capable of being considered as a class or type of practice for the purposes of the Justification Regulations and the Directive.
- 4.10** If a Justification decision is to apply to a class or type of practice, the benefits and detriments of the different practices that make up the class or type are likely to be broadly similar. In view of this, the Government's view is that a class or type of practice is best defined by reference to a common set of characteristics in so far as they affect the benefits and detriments of the class or type of practice. In practical terms, this is likely to mean that a class or type of practice should be defined by reference to the technical characteristics of the designs, in so far as they affect the benefits and detriments of the practice.

- 4.11** The NIA's proposal is based on such technical characteristics, but is also based on three attributes, set out in paragraphs 1.3 to 1.8 and table 1.1 of their application, which the Government does not believe are technical characteristics. These are:
- evolutionary designs, by which is meant a design which has not at present been constructed or operated, but which could be achieved by small or moderate modifications to existing designs;
  - minimum regulatory status, by which is meant a design currently available for assessment by UK regulators; and
  - readiness for implementation, by which is meant a design commercially available in the UK.
- 4.12** The Government's preliminary view is that these attributes, while they might be weighed in the balance of benefits and detriments, cannot be used as defining criteria in making a Justification decision. Evolutionary design is not a technical criterion which implies a common set of characteristics but is instead a reference to the state of development of a design. Since evolutionary designs may vary considerably, it does not imply a common set of technical characteristics. Minimum regulatory status and readiness for implementation also refer to the state of development of a design, and do not imply a common set of technical characteristics. The Government has therefore formed the preliminary view that it would not be right to use these three attributes to define the class or type of practice.

## Possible Classes or Types of Practice

- 4.13** The NIA's application states in paragraph 1.10 of volume 1: "We recognise however that it is for the Justifying Authority to decide whether the proposed class or type of practice, and the four example designs, constitute a single new class or type of practice or a number of different classes of types of practice. If the Justifying Authority decides that the application comprises more than one class or type of practice we ask that this application be treated as an application for Justification of each of such new classes or types of practice." The NIA suggests that one such option would be for each of the four example designs to be treated as separate classes or types of practice (see paragraph 3.3 of this consultation document).
- 4.14** The Government considered whether it should assess the NIA's proposed class or type of practice with the three non-technical attributes removed. This would give rise to the following class or type of practice: "The generation of electricity from nuclear energy using oxide fuel of low enrichment in fissile content in light water cooled, water moderated thermal reactors". In practice this would include all the reactor designs in the three groups referred to in paragraphs 4.5 to 4.7.

**4.15** Where a class or type of practice covers multiple designs, Justification is of the class or type of practice, not of individual reactor designs. This means that in the case of such a class or type of practice the Justifying Authority might need to identify relevant information on all the designs which fall within it, and their benefits and detriments. Accordingly in the event that the class or type of practice was defined more broadly so that it encompassed designs other than the four designs identified in the NIA application, then it is likely that the Justifying Authority would need to assess information in relation to designs other than those referred to in the NIA application. Such a broad class or type of practice would differ quite significantly from that contained in the NIA application and would be likely to require the Justifying Authority to acquire significant further information. The Government therefore concluded that it would not be right to assess such a broad class or type of practice.

**4.16** The Government therefore considered the alternative approach allowed for in the NIA application of separately Justifying the four individual reactor designs, as set out in paragraph 3.3 above. Given the Government's preliminary view that "evolutionary designs", and the other non-technical criteria, were not suitable characteristics to use in the definition of a class or type of practice, it has been removed from the NIA's suggested definitions. This leaves the following four classes or types of practice:

- (a) The generation of electricity from nuclear energy using oxide fuel of low enrichment in fissile content in a light water cooled, water moderated thermal reactor known as ACR1000 designed by Atomic Energy of Canada Ltd.
- (b) The generation of electricity from nuclear energy using oxide fuel of low enrichment in fissile content in a light water cooled, water moderated thermal reactor known as AP1000 designed by Westinghouse Electric Company LLC of the USA.
- (c) The generation of electricity from nuclear energy using oxide fuel of low enrichment in fissile content in a light water cooled, water moderated thermal reactor known as EPR designed by AREVA NP of France and Germany.
- (d) The generation of electricity from nuclear energy using oxide fuel of low enrichment in fissile content in a light water cooled, water moderated thermal reactor known as ESBWR designed by GE-Hitachi of the USA.

## The Government's preliminary view

**4.17** This approach is anticipated by the NIA application and is consistent with it. It is also based entirely on technical criteria and supported by evidence presented in the NIA application. In view of this, the Government has come to the provisional conclusion that this is the best approach. The Government's preliminary view is that the Secretary of State should treat the NIA application

as an application for a Justification decision on the basis of four different classes or types of practice, each based on one of the reactor designs specified in the NIA application. He will then have to make a decision as to whether or not each of these classes or types of practices is new or existing.

- 4.18** While the Government is satisfied that the type of high-level assessment needed in the Justification process can be carried out on classes or types of practice containing a single reactor design, this does involve a more narrowly defined class or type of practice than is necessarily required for Justification. It would in principle be legitimate to Justify a much broader class or type of practice. However, in this case, we think the narrow approach is more appropriate.
- 4.19** The Government expects that, on the basis of the material in the NIA's application and on responses to the consultation, the Secretary of State will decide whether he should confirm that the classes or types of practice outlined in paragraph 4.16, or another, are suitable classes or types of practice with which to proceed, and whether they are new or existing classes or types of practice. If his decision is that the class(es) or type(s) of practice are new then the Justifying Authority will consider the evidence and draw up a draft decision document on whether or not the class(es) or type(s) of practice are Justified. It will then publish the draft decision document and hold a second consultation on whether the new class(es) or type(s) of practice are Justified.

## Is the Class or Type of Practice new or existing?

- 4.20** It is only necessary to consider whether the class(es) or type(s) of practice is Justified if it is a new class or type of practice. The decision as to whether the class or type of practice is new is taken by the Secretary of State.
- 4.21** There are a number of existing nuclear power stations in the UK. These fall in to three broad categories, Magnox reactors, Advanced Gas Cooled reactors and the Pressurised Water Reactor at Sizewell B.
- 4.22** All the existing reactors are "existing practices" for the purposes of the Regulations and they are listed in the register of existing practices maintained on the Defra website. We have considered whether the class or type of practice proposed in the NIA's application or the four reactor designs listed in the application could be regarded as an "existing practice" on the basis of similarities with the existing reactors in the UK. Having taken technical advice, our preliminary view is that the proposed class of type of practice (or the individual designs) proposed in the NIA application should not be considered as "existing practices" since we think it arguable that there are material differences between the proposed class(es) or type(s) of practice and the existing practices. Also, the decision in relation to Sizewell B was made under a previous version of the Directive which required a site-specific rather than generic consideration of Justification.

## Process for assessing the four Classes or Types of Practice

- 4.23** Depending on whether the Secretary of State concludes that the Justification process should assess either four classes or types of practice (based on the four reactor designs listed in the NIA application) or a single class or type of practice based on the specific class or type of practice set out in paragraphs 1.3 to 1.8 of that application, it may be necessary to make four Justification decisions. In the event that the Justifying Authority decides to make four separate decisions, the Government would seek to handle the processes concurrently wherever possible. But it will be necessary to consider whether it is possible to consider those decisions concurrently or whether one or more of them should be considered later. In particular, resources constraints may mean that all four decisions cannot be considered concurrently. In these circumstances, the Justifying Authority would expect to consult the NIA on this issue and on the timetable for considering the Justification decisions.
- 4.24** If the Secretary of State concludes that the Justification process should assess four classes or types of practice (based on the four reactor designs listed in the NIA application) the Government's preliminary view is that any Justification decision would apply to the individual reactor designs specified in the application but would allow for the possibility of reasonable modifications to those designs which did not affect relevant benefits and detriments.
- 4.25** The questions in Chapter 5 seek responses on all these points.

# Chapter 5

## Questions

- 5.1** It would be helpful if those responding to the consultation could structure their responses around the following questions. Any other points which respondents want to make are also welcome.

Consultation Questions	
1	<p><i>Do you agree with the Government's preliminary view that, following the application submitted by the NIA, the decisions by the Secretary of State and the Justifying Authority should be by reference to four classes or types of practice, based on:</i></p> <p><i>(a) The generation of electricity from nuclear energy using oxide fuel of low enrichment in fissile content in a light water cooled, water moderated thermal reactor known as ACR1000 designed by Atomic Energy of Canada Ltd.</i></p> <p><i>(b) The generation of electricity from nuclear energy using oxide fuel of low enrichment in fissile content in a light water cooled, water moderated thermal reactor known as AP1000 designed by Westinghouse Electric Company LLC of the USA.</i></p> <p><i>(c) The generation of electricity from nuclear energy using oxide fuel of low enrichment in fissile content in a light water cooled, water moderated thermal reactor known as EPR designed by AREVA NP of France and Germany.</i></p> <p><i>(d) The generation of electricity from nuclear energy using oxide fuel of low enrichment in fissile content in a light water cooled, water moderated thermal reactor known as ESBWR designed by GE-Hitachi of the USA, and that these qualify as new classes or types of practice. If not, why not?</i></p>
2	<p><i>Does the NIA application contain sufficient information to enable the Justifying Authority to make an assessment of a) these classes or types of practice and b) the preferred class or type of practice in the NIA application? In either case, if not, what further information is needed?</i></p>
3	<p><i>Do you have any comments on the arguments or evidence in the NIA's application? Are there any additional arguments or evidence which the Justifying Authority should consider?</i></p>
4	<p><i>Do you have any other comments on the Government's preliminary view of the classes or types of practice, on the approach preferred by the NIA, or any other options?</i></p>

### Consultation Questions

5	<i>Do you have any comments on how best the Government might accommodate changes or developments of the named reactors in its classes or types of practice?</i>
6	<i>Do you have any suggestions about the way in which the Government proposes to engage with the public in the later stage of the consultation process?</i>

# Chapter 6

## What happens next?

- 6.1** Responses to this consultation will be taken into account in deciding the correct approach to defining the class or type of practice and undertaking the Justification assessment, determining whether sufficient information has been provided in support of the application and preparing the Justifying Authority's draft decision document. The draft decision document will be subject to a public consultation in 2009.

## Public Engagement

- 6.2** In addition to the written consultation on the draft decision document, the Government proposes to run public engagement events. It is intended that these will provide an opportunity for interested parties to ask questions about the draft decision document. It is intended that these events will be held at one or more locations around the country and that respondents to this consultation and other stakeholders and the public will be invited to attend.

# Appendix A

## Indicative Timetable

Step	Justification Process	Indicative Timetable
1	Government announced call for applications and published guidance.	March 2008
2	Government received Justification application from Nuclear Industry Association.	June 2008
3	Government requested further information from NIA.	October 2008
4	Additional information received from the NIA	November 2008
<b>5</b>	<b>Public consultation on the NIA application (current stage)</b>	<b>December 2008</b>
6	Closing date for responses.	March 2009
7	Consider comments received, seek further information as necessary, and prepare draft decision document, in consultation with the JCC. Draft decision document will set out the Justifying Authority's assessment of the benefits and detriments of the class or type of practice.	April/September 2009
8	Public consultation on proposed decision document, including public engagement events.	September/ December 2009
9	Decision by Secretary of State If the class or type of practice is found to be Justified, the Justifying Authority will make a Justification Decision in the form of secondary legislation (a Statutory Instrument).	January 2010
10	Bring to the attention of any person likely to be affected by the decision by writing to the applicant, issuing a Press Notice and publishing notices in the London, Edinburgh and Belfast Gazettes.	January 2010

# Appendix C

## NOTICE UNDER REGULATION 16 OF THE JUSTIFICATION OF PRACTICES INVOLVING IONISING RADIATION REGULATIONS 2004

To:  
Nuclear Industry Association  
Carlton House  
22a St James's Square  
London  
SW1Y 4JH

On 4 June 2008, the Nuclear Industry Association ("the applicant") submitted an application to the Secretary of State for BERR for the Justification of certain types of New Nuclear Power Stations under the Justification of Practices Involving Ionising Radiation Regulations 2004 (the "Justification Regulations").

The Secretary of State for DECC, in exercise of his powers as the Justifying Authority under Regulation 16 of the Justification Regulations, hereby requires the Nuclear Industry Association to submit, within 28 days of today's date, the information requested in Annex A to this notice.

The information should be sent to the Justification Assessment Centre at [justification@BERR.gsi.gov.uk](mailto:justification@BERR.gsi.gov.uk)

Failure to comply with this notice, or provision of false or misleading information may amount to an offence as specified in Regulation 24 of the Justification Regulations, punishable by fines or imprisonment.

The recipient shall, within 14 days of the receipt of this notice, inform the Justifying Authority of any grounds upon which they believe the Notice ought to be varied or withdrawn.

**Peter McDonald**

For and on behalf of the  
Justifying Authority

**30 October 2008**

### *Chapter 1 – Proposed practice*

1. In **para 1.7** the applicant states that the proposed practice includes designs that were classed as evolutionary in accordance with the IAEA-TECDOC-936, in April 1997. The applicant is asked to confirm whether it is their intention that only those designs requiring engineering and confirmatory testing at that time are included in the proposed practice and, if this is the case, provide evidence that the designs included in the application were deemed to be evolutionary in April 1997.
2. In **Table 1.1** the applicant is asked to provide further clarification of what is meant by “designs within practice commercially available in UK”. (i.e. At what point does the applicant consider that a design becomes commercially available in the UK?)
3. The applicant is asked to provide a further explanation of the contents of **Table 1.3**, including what is meant by “material scale of change” and why there would be a change of position if enrichment and fabrication were to take place solely in the UK.

### *Chapter 2 – Security of Supply*

4. **Para 2.18** notes that the volume requirements for fuel are low in comparison to the global supply. The applicant is asked to provide further information to support this assertion including, where applicable, references to supporting sources and further quantification.

### *Chapter 4 – Potential for Radiological Health Detriments*

5. The applicant is asked to provide further information in support of their assertion in **Chapter 4** that the radiological health detriment associated with the class or type of practice is small, in particular information on the relevance of doses and on levels of risk.
6. **Para 4.64** refers to a “large body of evidence” supporting the assertion that IAEA’S Type B test requirements cover all situations that can be realistically envisaged in the transport of spent fuel. The applicant is asked to provide a representative sample of the supporting evidence, including references.
7. The applicant is asked to provide further information and quantification on dose levels experienced by workers involved specifically in the decommissioning of reactors.

## *Chapter 5 – Radioactive Waste & Decommissioning*

8. **Para 5.42** notes that the amount of spent fuel created by a station would depend on design and burn-up rate. The applicant is asked to provide further information on the relationship between fuel usage, burn-up rate and waste produced for the practice and the four example designs.

## *Chapter 6 – Environmental Impacts*

9. Throughout **Chapter 6** the application makes the assertion that environmental detriment of the designs within the practice would be no greater than “other forms of generation”; however, there is a lack of information on the scale of those detriments relating to the proposed practice. The applicant is asked to provide further detail on the environmental detriments, including:
  - **6.5** – Further information on the environmental impact of plant construction and decommissioning for the practice.
  - **6.6** – Information on the scale of conventional waste produced by the practice.
  - Information on the scale of the environmental impact on water quality, with particular regard to thermal increase (**Para 6.22**) and marine life (**Para 6.28**)
10. The applicant is asked to provide information on the environmental impact of water abstracted for use other than in cooling.
11. The applicant is asked to confirm whether the Control of Major Accident Hazards Regulations 1999 would apply to the chemicals mentioned in **para 6.31**.
12. **The table after para 6.35** sets out figures on land area usage and efficiency for other types of generation. To make these comparisons meaningful, the applicant is asked, where possible, to provide information for nuclear generation in similar terms.

## *Chapter 8 – Other Considerations*

13. The applicant is asked to provide further information on security of supply and export control issues of heavy water, required for the ACR-1000 reactor.
14. The applicant is asked to provide further information on the “controls and measures” noted in **para 8.14** to address additional risks from the implications of climate change.

## Volume 2

### *Annex 6*

- 15.** The applicant is asked to set out why it considers that for key parameters relevant to Justification each of the four example designs would fall within the class or type of practice defined in Volume 1.

### *Other*

- 16.** The applicant is invited to provide the Justifying Authority with any further information or evidence that they feel would be relevant to their application.







