

**RESPONSE TO THE REVISED DRAFT NATIONAL POLICY  
STATEMENT FOR ELECTRICITY NETWORKS  
INFRASTRUCTURE (EN-5)**

**Summary**

1. This paper argues that the policy contained in the revised draft National Policy Statement for Electricity Networks Infrastructure is premature, ill-conceived, does not take account of recent cabling technology developments and has not taken account of significant research findings.

2 It argues for a complete rethink on the government's policy for the transmission of electricity as part of the national policy on the future of energy generation.

3. In particular, it suggests that a significant change in generation policy (through the provision of nuclear generators and the use of wind, wave and solar power) must be accompanied by a change in policy in the means of transmission of the energy that is generated.

4. The current draft of EN-5 privileges overhead transmission lines. Instead the development control regime introduced by the Planning Act 2008 should be amended to include all electricity transmission methods. The decision on which technology to adopt should be based on an assessment of the lowest whole life cost including environmental and social costs.

5. EN-5 discounts the use of underground cabling because it claims that the costs of that method are significantly higher; it takes no account of the development of this technology over the last twenty years; makes no reference to the potential for sub-sea connections from land-based generation and has a flawed methodology for calculating the comparative costs of the competing technologies.

6. Key issues that have been identified include:

a) The prematurity of the draft given that there are two major current studies on (i) the comparative costs of all transmission methods and (ii) national attitudes to undergrounding of cables. These are fundamental to the development of national transmission policy.

b) The chaotic and inconsistent approach to the development control of the overhead, underground and sub-sea means of connection (each being

governed by different legislation), when all are projects that are crucial to the fulfilment of the national energy policy and thus should be defined as Nationally Significant Infrastructure Projects under the Planning Act 2008;

c) The continued use of the Holford Rules 1959 for the mitigation of visual effects on the landscape, when the current scale of connections is such that the pylons will exceed 40 metres and there is no planting scheme that could possibly mitigate the effects in open countryside. Where it is impossible to mitigate the visual effects of overhead lines, an alternative means of transmission must be utilised;

d) The need to consider both the generation and connection issues as a single entity;

e) The need to take account of international guidelines for limiting exposure to time-varying electric and magnetic fields (including consideration of possible long-term effects on health) that were published in December 2010.

7. The paper urges the government to halt the current consultation until the studies referred to in 6(a) above have reported and account can be taken of their findings.

## **1. Overview**

1.1 This paper focuses on draft National Policy Statement (NPS) for Electricity Networks Infrastructure (EN-5) The views expressed herein are those of Pylon-Moor-Pressure (PMP), a campaign group that was formed in December 2009 to represent the views of residents in Mark and East Huntspill; villages on the Somerset Levels. This area would be affected by the proposed connection of the proposed Hinkley C nuclear reactor to the electricity grid. Our views are based partly on our experience of dealing with the consultation for the Hinkley C Connection project but also on wider experience of the development control system in England and Wales.

1.2 The introduction of National Policy Statements is an essential part of the revised process for major infrastructure projects provided by the 2008 Planning Act. They will provide clarity for those seeking a development consent order (DCO), for the Infrastructure Planning Commission<sup>1</sup> in

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<sup>1</sup> References throughout this paper to the IPC include its proposed successor body and the proposed Ministerial decision-maker.

forming a judgement on the application for a DCO and for whichever body is charged with the responsibility for taking the final decision on an application. Thus it is essential that the National Policy Statements for Energy are complete, without ambiguity and that they reflect current policy objectives.

1.3 This paper considers the draft NPS EN-5 only at the policy level and does not provide any detailed commentary on the drafting of individual sections or paragraphs.<sup>2</sup> That is because we believe the revised draft to be premature and thus ill-conceived and also because it fails to take account of recent significant research findings. The paper urges the Government to halt the current consultation on this draft NPS until major relevant studies (discussed in Section 2 below) have reported and account can be taken of their findings.

## **2. Prematurity of the Current Consultation Exercise on EN-5**

2.1 Consultation on the revised draft National Policy Statements on Energy opened on 18 October 2010 and will run until 24 January 2010. It is clear from the Department for Energy and Climate Change (DECC) website that the main purpose of this consultation round is to obtain responses to the changes made in the drafts of the NPSs although the DECC webpages do state that other responses will be taken into consideration.

2.2 The technology for electricity transmission is a fast-changing area. There are regular reports of other nations using sub-sea connections and super grids to achieve transmission and mutually beneficial transmission of electricity between nations is achievable provided they are prepared to invest in the infrastructure. Indeed the UK is involved in inter-governmental discussions on a super-grid for the North Sea. The references in the current draft to undergrounding cables take no account of the developments in this technology over the last twenty years and the substantial benefits of technology such as gas insulated lines or XPLE over oil-impregnated cables that have historically been utilised in the UK.

2.3 The current draft of EN-5 continues to privilege overhead transmission of electricity as the main method of achieving the objective of meeting the nation's need for power. It ignores the fact that economies of scale have significant potential to reduce the costs of alternative means of connection and may well continue so to do. Thus the current draft is based on some false premises.

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<sup>2</sup> Although reference is made to some paragraphs as a development of the main arguments.

2.4. It is notable that the Government Response Document on EN-5 states (paragraph 5.1.3) that alternative technologies to overhead cables (underground or sub-sea cables) “are generally much more costly”. This is an assertion made with no supporting evidence and no definition of cost. It mirrors National Grid’s own obsession with front-end capital cost to the exclusion of whole-life financial cost and other social, economic and environmental disbenefits. This assertion of significantly higher costs also appears in the revised draft EN-5 (see paragraph 2.8.8), again unsupported by any evidence.

2.5 Paragraph 5.15 of the Government Response Document states: “The Government recognises that there is no independent calculation of the *additional* costs involved in undergrounding high voltage cables” (it;ics added). Thus there is an inherent presumption contained in this statement that all underground connections will incur additional costs, because it is only the front-end capital costs that are taken into consideration.

2.6 On 12 November 2010 the Institution of Engineering and Technology announced a comprehensive study into the costs of building new high voltage cables. The IET, in partnership with the energy consultancy KEMA, will produce an independent report comparing the costs of laying power transmission cables under the ground, in tunnels or under the sea against the costs of building new overhead lines. The study is funded by National Grid and is due to report in 2011. The report will provide an objective and independent basis for assessing the overall costs of the different transmission methods (including whole life costs) of the environmental impacts of each technology. The intention is to provide a baseline position when considering each of the different means of transmission.

2.7 The IET press release announcing the study contained the following quotation from Charles Hendry, the Minister of State for Energy:

“Getting electricity transmission right will be crucial to making sure that we get the new energy infrastructure we need on stream and on time. Over the coming years major network reinforcements will need to be undertaken and it is essential that this is done on the basis of informed discussion and the best available knowledge, if this work is to carry public support.”

This independent and authoritative assessment will give more clarity on the relative costs and impacts of high voltage overhead lines compared to undergrounding.”

2.8 We note that the Minister has used the phrase “getting electricity transmission right” in the quote supplied to IET for the press release and thus clearly sees this independent study as contributing substantial evidence to that government objective. It is not just in “the coming years” that “major network reinforcements will need to be undertaken”. We are at that point now with 2 major schemes (the connections for Sizewell and Hinkley C) in development, both based on overhead lines: the default transmission method utilised by National Grid as the monopoly provider of electricity transmission infrastructure in England and Wales. These schemes must be put on hold until the IET report is available and DECC has considered its findings and adjusted transmission policy as necessary. A decision by DECC to continue with the consultation and Parliamentary approval of the current draft of EN-5 flies in the face of their own Minister’s stated objective.

2.9 On 15 December 2010 National Grid announced the launch of a public consultation “into its approach to undergrounding the electricity lines needed to connect new power generation.” The consultation seeks the views of “the public, industry, government, environmental and other organisations”. The Press Release contained the following statement: “As a transmission operator, we need to comply with statutory duties such as building a network that is efficient, coordinated and economic to construct, build and maintain. We need to manage the costs of these projects responsibly as these costs will ultimately be paid for by electricity consumers. However, we also need to consider the impact on the local landscape and communities of what we build.” The closing date for responses to this consultation is 16 March 2011. The outcome of this consultation and policy review may well be that there is a change in the company policy.

2.10 It would be perverse for DECC to come to a view on the final form of the policy for electricity networks infrastructure until the results of both these major studies are known. Failure to delay the final draft of the policy would mean that both EN-1 (the Overarching National Policy for Energy) and EN-5 would be seriously compromised and that they could immediately be subject to the need for substantial amendment, requiring further consultation and Parliamentary approval. That is in no one’s interests.

***Recommendation 1: That the current consultation process should be halted until the results of both these studies are known and account can be taken of their findings in formulating a policy for electricity transmission. That has implications for the timescale of both EN-1 and EN-5.***

### **3. Infrastructure covered by the draft NPS EN-5**

3.1 Pylon-Moor-Pressure note that it is only overhead transmission lines that come within the ambit of EN-5 as it is currently drafted. We understand that at present underground connections are permitted development under The Town and Country Planning (General Permitted Development) Order 1995 (GDO), although the sealing compounds that are required as part of this method of transmission are subject to the usual development control procedures under the Town and Country Planning 1990. Sub-sea connections are governed by marine legislation.

3.2 This appears to be completely inconsistent. Not only are the procedures for dealing with applications different but the levels of consultation required and the scope of consultees differ in each case. This is confusing to the public at large. If an overhead transmission line is a Nationally Significant Infrastructure Project (NSIP) then surely one that runs underground to achieve the same connection requirement must also be considered an NSIP? Both have the potential to disrupt the environment at construction stage and impact adversely on landowners or their tenants<sup>3</sup>. In this context we note that the House of Commons Energy and Climate Change Committee noted in its Second Report “The future of Britain’s electricity networks”<sup>4</sup> that there were inconsistencies in the treatment of the various transmission methods as only overhead connections were brought under the Planning Act 2010 and recommended this be kept under review. (Paragraph 48)<sup>5</sup>

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<sup>3</sup> Although the impact of undergrounding is much less in terms of land take than the reference in EN-5 where the swathe of land required is significantly overstated.

<sup>4</sup> Published on 23 February 2010.

<sup>5</sup> “Reform of the planning process is vital if network improvements are to be delivered on time to connect new generating capacity in the future. We note the recent changes to the planning systems in England and Wales, and Scotland [...] We hope the new system will lead to a faster decision-making process, but one that nonetheless will take account of the environmental concerns associated with new proposals. For this, developers have a duty to ensure their initial applications take adequate account of alternative options. The Government should also look closely at the consenting process for applications in England and Wales that will not fall to the Infrastructure Planning Commission to see whether reform or improved guidance is necessary at this level as well”.

3.3 The stated purpose of the Planning Act 2008 was to expedite projects that are regarded as NSIPs. If, as is argued, the provision of major infrastructure to generate power and to connect the results of that generation to the grid is fundamental to meeting the continuing and future need for electricity in England and Wales, any means of effecting that connection should be governed by the same legislation. The Planning Act 2008 not only provides a process whereby developers of NSIPs are required to consult systematically and thoroughly, including with those communities and individuals who would be affected by their proposals, with a view to reaching as much agreement as possible before the application for a development consent order is submitted, but also provides the means by which the development, once consented, can take place quickly. This is through the provisions of the Act whereby a developer can apply for the necessary land rights as part of their DCO application in order to be able to move quickly to undertake the development once the DCO is granted.

3.4 In the case of underground cables (permitted under the GDO 1995) it is quite possible that opponents of such a scheme could delay the provision of the infrastructure required for the connection of renewably generated energy by forcing the developer to apply for compulsory rights over the land required for the infrastructure. That would not be helpful to the achievement of the national objectives on energy.

3.5 Finally, the fact that the current draft EN-5 deals solely with overhead transmission has the perhaps unintended consequence of privileging that connection method over the adoption of other means of transmission.

3.6 Although the assessment of DECC is that there is a “significant need for new major infrastructure generally” the fact that it is only overhead transmission that is covered by the draft of EN-5 is completely inconsistent. Using the Hinkley C Connection project as an example, any form of electricity network infrastructure which covers a swathe of land of 37 miles is a major scheme and should have been included under the NSIPs designated by the 2008 Planning Act. Underground cabling on that scale is also likely to generate initial disquiet among residents and landowners although the intrusion is at the point of installation, not for generations to come, and may thus be more acceptable. It is perverse that one of the arguments that DECC has used against underground cables is that they are more disruptive of the terrain (although the figures quoted in EN-5 for the land disruption are significantly over-stated) and yet the cabling itself is not subject to any form of development control, being permitted development.

3.7 In addition, given that other options for connection (underground or sub-sea) are not covered in the current draft of EN-5, the first action of the IPC following consideration of the adequacy of consultation under the duty imposed by s.55 of the 2008 Planning Act, should be to request the developer to submit a case showing that an overhead line is justified. This needs to include a whole-life economic appraisal of all the options for transmission.

***Recommendation 2:***

- (a) that the Department for Energy and Climate Change bring forward amendments to the legislation as a matter of urgency; and***
- b) consequently to NPSs EN-1 and EN-5 to remove the privileging of transmission by an overhead line. What is required here is a broader, more generalised policy relating to “electricity transmission infrastructure”***

**4. The Continued Use of the Holford Rules (1959) for the Mitigation of Adverse Visual Effects from Overhead Lines**

4.1 Pylon-Moor-Pressure note that considerable reliance has been placed in the draft of EN-5 on the Holford Rules (as slightly amended). These rules date from 1959 when the UK was considering the first tranche of universal connection of consumers to the grid. At that time there were no competing technologies: if connection to generating stations was required the only way of effecting such a connection was through the use of overhead lines carried on pylons.

4.2 The Holford Rules provided guidance for the mitigation of the degradation of the landscape as a consequence of the need for a substantial programme of electricity transmission. Such mitigation included the installation of power lines that followed the contours of the landscape and the use of trees to screen the infrastructure. In 1959 pylons were considerably lower in height than those which are available, and necessary, in the 21<sup>st</sup> century.

4.3 If we take the example of the Somerset Moors and Levels as a context for the application of the Holford Rules it may be seen that they are completely impractical as a means of mitigating the effect of pylons on this type of landscape. There are hardly any high areas of land in this area and there are no known trees (native or otherwise) which grow quickly to a height of 46.5 metres, so neither of these suggested mitigation techniques could be deployed. The same will be true of many coastal

areas where the landscape is relatively level and which would provide the on-shore connection for off-shore wind farms.

4.4 A value must be placed on open countryside in its own right. That has been national policy for successive governments since the introduction of development control in the mid-twentieth century. At present it is only certain designated areas in England and Wales<sup>6</sup> that have any form of statutory protection from development which would have a deleterious effect on the natural landscapes. In such areas there is a presumption against development. However, turning once again to the example of the Somerset Levels this is an area that was being promoted as a candidate for World Heritage Status by Somerset County Council (SCC). It was only in June 2010 that a decision was taken that promotion of the candidature of this area this should not be pursued because of expenditure constraints. Since then SCC has had to make very substantial budgetary cuts across all the areas for which it has statutory responsibility. Nonetheless, there has been recognition by the County Council that the Somerset Moors and Levels represent a landscape that is potentially unique in the world. As such it should be protected from alien, industrial infrastructure which will not only degrade the visual amenity of a landscape which attracts many visitors but will also introduce noise (under certain conditions including rainfall) into its rural tranquillity.

***Recommendation 3: Where potential landscape degradation cannot be successfully mitigated by the application of the Holford Rules two considerations should flow from this:***

- a) that it is accepted that the proposed generation facility is sited in the wrong place and thus consideration should be given to resiting it<sup>7</sup>; or if this is impracticable;***
- b) that it is conceded that transmission lines should be buried underground (or placed sub-sea where that is a practical option because of the proximity to the coast of both the generation facility and the receiving substation) and that the additional costs of this form of connection should be subsidised by Ofgem/ directly by the Government.***

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<sup>6</sup> National Parks, Areas of Outstanding Natural Beauty, Heritage Coasts and World Heritage Sites.

<sup>7</sup> Which argues in favour of the application for power generation and power transmission infrastructure to be required to be considered together under the Planning Act 2008. See Section 5 below.

## **5. The Need to Consider both the Generation and Connection Issues as a Single Entity**

5.1 There is no requirement in EN-1 and EN-5 for the generation and transmission aspects to be considered together although it is noted that this would be desirable. In the case of the proposed generation at Hinkley Point (Hinkley C project: proposer = EDF) and grid connection (Hinkley C Connection: proposer = National Grid)<sup>8</sup>, were a DCO to be refused for the generator the basis of any DCO application for connection by National Grid would fall away.

5.2 The policy should be changed to require that where the generation and transmission infrastructure elements are inextricably linked, they must be considered as a single entity by the IPC even though the applications for DCOs would be made by two separate proposers. In the context of both the Hinkley C and the Sizewell proposals the need for the transmission infrastructure has not yet been proven as the generator proposal applications have not yet been made and yet the properties in the areas of the possible route corridors have been blighted with no prospect at present for any compensation for their owners.

*Recommendation 4: That the Government should require that the generator and connection projects should be submitted either as a single application/simultaneously so that the issues can be considered in tandem.*

*Recommendation 5: Were this recommendation not to be adopted, an alternative recommendation would be to make it a requirement of any connection application that: “The developer should provide complete evidence of the need for further electricity transmission capacity if the application for transmission is not associated with a generator proposal”.<sup>9</sup>*

## **6. The Need to Take Account of International Guidelines for Limiting Exposure to Electric and Magnetic Fields**

6.1 The current draft of EN-5 predates the publication of the International Commission on Non-Ionizing Radiation Protection (ICNIRP) Guidelines

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<sup>8</sup> And similarly for the Sizewell generator and National Grid’s proposals for connection.

<sup>9</sup> Paragraphs 2.3.3-2.3.4 of EN-5

for Limiting Exposure to Time-Varying Electric and Magnetic Fields (1Hz to 100 kHz)<sup>10</sup>

6.2 In a section headed “Considerations Regarding Possible Long-Term Effects” the Guidelines state:

“As noted above, epidemiological studies have consistently found that everyday chronic low-intensity (above 0.3 – 0.4  $\mu$ T) power frequency magnetic field exposure is associated with an increased risk of childhood leukaemia.” (p.830)

The same paragraph of the Guidelines states that:

“The absence of established causality means that this effect cannot be addressed in the basic restrictions.”

6.3 Thus the ICNIRP basic restrictions, and hence the limits as referred to in EN-5, do not address this issue. The ICNIRP suggests instead that this is

“best addressed within the national risk management framework.”

6.4 The current draft of EN-5 ignores this issue. The Simplified Route Map for dealing with EMFs in section 2.10 of EN-5 merely asks: “Is evidence provided that the line complies with ICNIRP limits at the nearest residential property?”

6.5 Nineteenth century surgeons who were made aware of an association between chlorinated hand-washing and post-operative survival rates refused to start this type of hand-washing for twenty years, thus delaying an improvement in survival rates, because there was no causal explanation known at the time. A similar lack of knowledge in the twentieth century delayed the association between smoking and lung cancer leading to a reduction in lung cancer.

6.6 In the twenty-first century the DECC should ensure that it does not make the error of assuming that just because a causal model has not yet been fully established there is no need to adhere to limits on proximity in the interests of public health. In fact published research is addressing the need for causal models to explain the association between childhood leukaemia and proximity to power lines. The most favoured explanation is that exposure to low-frequency EMFs does not in itself directly damage DNA, but leads to other changes such as perturbations of enzymes within the cells of a human, and that these then lead to DNA damage. [See, for

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<sup>10</sup> Health Physics, (December 2010) Vol. 99:No. 6 (818-836)

example, Case-only study of interactions between DNA repair genes (hMLH1, APEX1, MGMT, XRCC1 and XPD) and low-frequency electromagnetic fields in childhood acute leukemia. 2008. Yang *et al.* LEUKEMIA & LYMPHOMA Volume: 49 Issue: 12 Pages: 2344-2350.]

6.7 The ICNIRP Guidelines do not refer in great detail to the recent epidemiological study:

Residence Near Power Lines and Mortality From Neurodegenerative Diseases: Longitudinal Study of the Swiss Population. Huss *et al.* AMERICAN JOURNAL OF EPIDEMIOLOGY 2009 Volume: 169 Issue: 2 Pages: 167-175.

6.8 This study shows an association between proximity to power lines and senile dementia/Alzheimer's disease. The comment is made in the ICNIRP Guidelines that the increased risk for Alzheimer's disease found by this study is based on very small numbers of cases. The mortality data from 2000 - 2005 for the whole of Switzerland was used for this study and so the numbers involved were very large, for example the study used data concerning 9,228 deaths from Alzheimer's disease and 28,288 deaths from senile dementia. The number of cases of Alzheimer's disease for people living at least 15 years before death within 50 m of a power line was 15; this is a statistically very significant number giving an adjusted hazard ratio of 2.00 with 95% confidence interval of 1.21 – 3.33. So people who lived this close to a power line for at least 15 years prior to death were estimated to be twice as likely to have died from Alzheimer's than people who had lived more than 600 m away from a power line for 15 years, and the 95% confidence interval for the increased risk is from at least 21% to as large as 233%. For senile dementia there were 33 cases giving an adjusted hazard ratio of 1.41, with 95% confidence interval 1.00 – 1.98.

6.9 With such significant results this is not a study that should be considered inconclusive. Furthermore, the authors of this study point out that the relatively small number of Alzheimer deaths may be underestimated by a factor of between 2 to 8, as they only used diagnoses based on death certificates instead of on clinical examination.

***Recommendation 6: DECC needs to implement the recommendation of the ICNIRP Guidelines to address the issue within the national risk management framework, and change the Simplified Route Map contained in EN-5 section 2.10 so that it does not only ask for compliance to limits that do not address the issue of childhood leukaemia.***

***Recommendation 7: In view of the public concern about neurodegenerative diseases of old age, DECC should change the Simplified Route Map in EN-5 section 2.10, so that it does not only ask for compliance to limits that do not address the health risks of neurodegenerative conditions such as senile dementia and Alzheimer's disease***

## **7. Conclusions**

7.1 Government policy on electricity transmission smacks of a short-term approach to a long-term and complex issue. It is recognised that Britain needs a substantial increase in electricity, and that such an increase should be achieved through the use of renewable energy to achieve a low-carbon economy and to reduce climate change.

7.2 The proposed sites for the new generation of nuclear reactors, which will meet a substantial proportion of the increased demand for power rely heavily upon the re-utilization of the sites of the decommissioned nuclear power stations (e.g. Sizewell and Hinkley Point). They are viewed as sites where people have grown up with the idea of living close to a nuclear power station and their re-use would not despoil a greenfield site (an important consideration in major proposals for industrial structures). Yet they are not ideally placed if the power generation and transmission infrastructure is considered as a whole. For both the Hinkley C and Sizewell generators the power generated (the vast majority of which will be exported to other parts of the country) involves transmission over swathes of hitherto largely unspoilt countryside. The local economy of both areas relies heavily on tourism from visitors (both British and foreign) who are attracted by the beauty of the landscape and its heritage. That source of income could be jeopardised by the adoption of a visually intrusive technology.

7.3 If the government and the nation as a whole wants sufficient power generation to keep Britain as an economically competitive nation which still manages to attract significant revenue from overseas tourists, it must recognise that the rural areas around the new power stations cannot be despoiled and degraded. There is a price to pay and that price is in providing additional funding for the difference in costs between the old technology and the new. Some of this could, and should, be met directly by government, while some should be borne by the consumers of electricity. It would be wholly unfair for people who live in rural areas which would be spoilt by super-sized pylons (and who rely heavily on income from tourism) to bear the social, economic and environmental

costs of the need for a substantial increase in power. It is a short-sighted and partial approach to a long-term national problem.

7.4 There must be changes in the way that Ofgem regulate the monopoly of electricity transmission by a company which seeks to maximise its dividends to share-holders. The Government must also recognise that a national need for power should not impact adversely on sections of the population who happen to live in areas where renewable energy is created, not just for them and their region, but for the greater good.

7.5 There are two key issues in all this. The first is that if there is to be a national strategy for providing energy for the future needs of the nation that has to take forward all elements of the strategy. There has to be a sea-change not just in respect of the generation of electricity but also in the approach to its transmission. Instead the government seeks to make a significant change in generating policy while relying on an obsolete approach to transmission which ignores both the availability of alternative technologies and the significantly increased public demand for the protection of threatened rural landscapes.

7.6 Second, the current approach to both consultation and decision-making on major transmission projects is chaotic since the three alternatives available for achieving an identical outcome namely connection to the grid, are dealt with by radically different planning processes and legislative requirements. All means of connection should be subject to the provisions of the Planning Act 2008.

**MG/PMP/January 2011**