

Summary Report of the RGI Workshop on: Environmental Impacts of Grids

Renewable energy technologies are now established and appreciated as a key means of producing electricity in a climate and environmentally friendly way. However, to transport the electricity from these new generation sites to the users, additional power lines are needed. These new lines can raise serious concerns regarding their impact on the environment, including biodiversity, ecosystems and the landscape.

The European Commission is currently working on a new legislation on permit granting procedures, to be released this fall, to ensure that the energy infrastructure needed for implementing the EU climate and energy targets will be built in time. For improving and shortening the current procedures, the way environmental impact assessments (EIA) will be carried out will be crucial. Environmental impacts of grid expansion are a legitimate concern and need to be fully understood and addressed.

For these reasons, on the 16th of June 2011, RGI organised its third workshop¹ at the Strathclyde University of Glasgow to better understand environmental impacts of grids and to identify steps needed to enable the necessary grid expansion while safeguarding biodiversity, the environment, and citizens' quality of life. State of the art strategic planning and environmental assessment were discussed, and innovative solutions for environmental enhancement explored. National Grid and the Royal Society for the Protection of Birds (RSPB) hosted the workshop.

The workshop was structured in four parts; the first and last parts were plenary sessions, the two middle sessions split the 70 participants into two working groups each.

- Setting the context:
 - Co-existence of power lines and birds, the main environmental challenge of grids (NABU)
 - Practical approaches to grid expansion and environmental protection (Scottish Government, Strathclyde University and National Grid)
 - Current EU activities and responses from stakeholders (EU Commission, RGI and WWF)
- In the second part, two working groups explored the impacts of grids on the living environment (species, habitats and ecosystems) and on the non-living environmental aspects such as landscape and discussed how to best minimise these impacts. RSPB and Landschap in Verandering provided input.
- In the third parts, the working groups brainstormed and discussed how to develop guidelines for an environmental friendly implementation of the upcoming permit granting procedures prepared by the European Commission. Impulses from RSPB and RGI.
- In the fourth part, a panel discussion on how to maximise environmental benefits of grid development was chaired by Scottish Power Renewables and included panellists from Friends of Earth Scotland, RSPB, TenneT and National Grid.

¹ The first two RGI workshops were on transmission technologies and storage hosted by TenneT and Swissgrid/SGN respectively

First Part: Setting the context

Scottish Energy Scene (Prof. Stephen McArthur, Director of Energy and Environment, Strathclyde University)

Scotland has a very ambitious policy target for renewable energies that aims at reaching 100% renewable electricity by 2020. This target will be achieved through the large onshore and offshore wind potential, which is amongst the best in Europe. Scotland is expected to face a number of challenges and opportunities related to such a large integration of renewable energies in the Scottish energy system. Lessons can be learned from Scotland's different approaches on tackling these issues, as it is a first mover in this area.

Large efforts are being undertaken by actors from industry, policy and academia to reach the targets and to make Scotland a leading centre for renewables in Europe, including the creation of a sustainable industry with thousands of new jobs. Major companies investing (or planning to invest) in Scotland include SSE, Iberdrola, Gamesa, Thyssen Power Systems and others. In Scotland, research on renewables and smart grid technology receive substantial funding². A very successful model to foster cooperation is the "Energy Technology Partnership", where various academic institutions jointly 'pool' the need for research and decisions are taken cooperatively on who focuses on what. This avoids inefficient distribution of research funds, where everyone is doing everything and no one gets to excel in their field. Another successful model is the strategic partnership between research institutes and industry. Long-term research projects are jointly developed and carried out, involving multiple scientific disciplines that run over time horizons of 5-6 years. Such strategic partnerships prove to be far more effective than the 'usual' 3-year collaboration via individual PhD projects.

Why TSOs need to take the environment seriously (Antonella Battaglini, Executive Director, RGI)

Neglecting environmental concerns will prevent a sustained build-up of energy infrastructure. Only if environmental concerns are considered sufficiently, the nature and biodiversity of Europe will not be impacted by the expansion of electricity grids. On the other hand, a lack of consideration may have strong negative impacts and will thereby lead to a lack of support by the public, eventually leading to strong public opposition. Given the expected large need for further grid developments, before and after 2020, public opposition could become a 'showstopper' for the expansion of the grid and therefore to that of renewable energies.

While historically TSOs and NGOs used to lack a common objective, the situation today is different. NGOs support the shift from fossil and nuclear to renewable energies, and the expansion of the electricity grid that is required to achieve this. The integration of renewables into the grid is a common objective of TSOs and NGOs. This common ground is the basis for joint work for which RGI provides a forum and a platform.

However, Natura 2000 clauses need to be fully respected without being stronger constrained through a stronger new permitting procedure. Convinced that a serious protection of the environment is a crucial condition for building up the necessary public support for a rapid grid expansion, RGI claims for a full endorsement of EIAs in the future and proposes to engage stakeholders in a joint effort to find the best solutions by endorsing the clear hierarchy of (i) avoiding (ii) reducing and finally (iii) compensating negative impacts of grids on the environment. This approach will not only deliver the best possible results with regards to the environment, but also speed up the implementation of grid expansion projects.

The need for renewables and new grid infrastructure from an environmental perspective (Dr. Stephan Singer, Director Global Energy Policy, WWF)

The grid infrastructure build-up required in order to achieve the vision of 100% renewable energy in Europe by 2050 is fully supported by key NGOs, such as WWF (one of the founding members of RGI). The discussion on what infrastructure is needed and how to implement it must be lead in a very rational and transparent manner. Public opposition is a very important concern. NGOs can help to achieve the 2020 renewable targets by working together with TSOs in communicating to the public the need for renewables-driven grid expansion. To achieve this, a case-by-case approach is necessary that allows NGOs to support only such projects that are driven by the integration of

² One such example is the new "Technology and Innovation Center" that is equipped with almost 90 million GBP

renewables into the grid. The expansion of electricity grids should be supported where they are needed for the integration of renewables, and not for connecting new nuclear power plants.

Impacts of power lines on bird populations in Europe (Markus Nipkow, Officer for Ornithology and Bird Protection, NABU)

Overhead power lines (especially the low and middle voltage levels) still strongly affect birds, especially flagship species. Negative impacts are primarily:

- electrocution (birds dying because of touching more than one conducting cable)
- collision with grid lines (birds flying against unexpected and low-visible obstacles)
- negative impacts on habitats (e.g. pylons constructed in nesting areas)

Today's high demand for protecting birds can be met by:

- respecting EIAs (Environmental Impact Assessments) and SEAs (Strategic Environmental Assessments)
- sensitivity mapping of new power lines
- installing underground cables or bird friendly overhead lines for middle voltage (applying adequate design (suspended, single-level, well visible cables) and insulating wires and poles)

The following legal instruments provide for bird protection by electricity grids for over 30 years and are slowly being implemented:

- Bonn Convention on the Conservation of Migratory Species of Wild Animals (1979/2002) and Berne Convention on the Conservation of European Wildlife and Natural Habitats (1979/2004)
- EU Birds Directive (79/409/EEC, today: 2009/147/EC)
- National laws, e.g. German and Slovakian laws of 2002

Bird Life International's position on the risks to birds from electricity transmission facilities and how to minimise such effects has been published in a position statement adopted in 2007. In the Budapest Declaration of April 2011, Birdlife International adopted the statement that bird losses on new power lines are to be eliminated from 2016 onwards.

The North Sea Impacts of power lines on bird populations in Europe (Carole Cook, Future Networks, National Grid)

In the North Sea, choosing a configuration option that fully integrates offshore wind parks and interconnections between neighbouring countries can reduce the environmental impact of the future transmission grid.

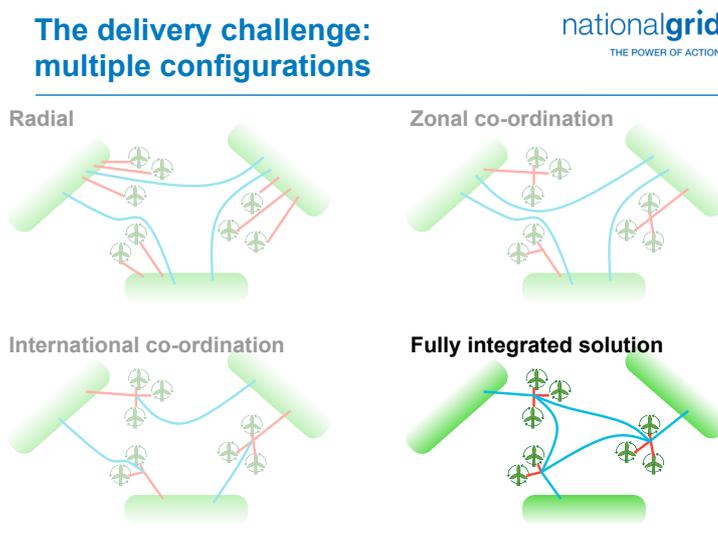


Figure 1: Configuration options for a North Sea Offshore Grid³

The aim is to minimise environmental harms by reducing the number of undersea cables, bringing along multiple further benefits (reducing planning consent issues, better management and utilisation of valuable resources, economical savings, European integration). Reaching such an integrated solution however is very challenging due to the numerous countries involved and their respective project developers, programmes, time scales, interface location options, processes, legal requirements and stakeholders.

Practical experience: Building a power line from Beaulieu to Denny (Colin Imrie, Head of Energy and International Low Carbon Division, Scottish Government)

A 132 kV line between Beaulieu and Denny near Glasgow that crosses a national park and 9 habitat areas, was to be replaced by a 400 kV line. The line also crosses peat land, an especially sensitive ground, which can strongly be affected (for example by lorries). The government set conditions to the two developers, who were leading the whole planning process. An extensive public local inquiry resulted in 17,000 representations, of which only 50 were supportive. To meet the challenge, an Environmental Liaison Group and a Tourism, Cultural Heritage and Community Liaison Group were set up, and a visual mitigation scheme was elaborated. The processes resulted in considerable reduction of overhead lines especially in the national park. The experience shows, amongst other, that⁴:

- environmental issues need to be considered from the beginning of planning
- early and extensive public consultation is a legitimate right of the public
- the location and design of the lines can strongly minimise the environmental impacts of power lines

Second Part: Understanding environmental impacts of grids

Environmental Impact Assessments (EIAs) answer what kind of questions? (Ivan Scrase, Senior Climate Change Officer, RSPB)

The different types of environmental assessments are: i) Strategic Environmental Assessment (SEA), ii) Environmental Impact Assessment (EIA), and iii) Appropriate Assessment (AA). The key dimensions in which these different assessments differ are:

1. Aim - what type of developments are targeted?
2. When – in which occasion is it done?
3. Focus - what is assessed?
4. Effect – How are results used?

³ “The challenges of building transmission” presentation, Carole Hook, National Grid, RGI environment workshop, 16/6/2011

⁴ Further information, including insights in the EIAs, are available at:

<http://www.scotland.gov.uk/Topics/Business-Industry/Energy/Infrastructure/Energy-Consents/Beaulieu-Denny-Index>

<http://www.sse.com/BeaulieuDenny/>

<http://www.spenergynetworks.co.uk/PublicInformation/denny.asp>

	SEA	EIA	AA
What?	'Strategic environmental assessment' (SEA Directive 2001)	'Environmental impact assessment' (EIA Directive 1985)	'Appropriate assessment' (Birds Directive 1979; Habitats Directive 1992)
Aim	To provide for a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparations and adoption of <u>plans and programmes</u> with a view to promoting sustainable development.	To ensure that planning decisions are made with full knowledge of a <u>project's</u> likely significant environmental effects, and that any negative effects are prevented, reduced or offset, while positive effects are enhanced.	To avoid adverse effects of <u>plans, programmes and projects</u> on Natura 2000 sites and thereby maintain the integrity of the Natura 2000 network and its features.
When?	'Plan or programme' that an 'authority' is required to produce, and that is likely to have significant effects on the environment.	Projects in Annexes 1 (compulsory) or 2 of the EIA Directive: 1. "Construction of overhead electrical power lines with a voltage of 220 kV or more and a length of more than 15 km." 2. "Transmission of electrical energy by overhead cables"	Proposals likely to have a significant effect on a Natura 2000 site, either alone or in combination with other plans or projects.
Focus	Issues set out in Annex 1 of the SEA Directive including biodiversity, population, human health, flora, fauna, soil, water, air, climate, landscape, material assets, cultural heritage and the interaction of the above factors.	Issues set out in Article 3 of the EIA Directive including the indirect and direct effects of a project on human beings, fauna and flora, soil, air, water, climate, landscape, material assets, cultural heritage and the interaction of the above factors.	The ecological features for which the site has been designated.
Effect	Provides information to be taken account in the decision on adoption of the plan or programme.	Consenting authority is required to have regard to the Environmental Statement, as well as to other material considerations.	If adverse effects cannot be ruled out then options: 1. Reject the plan/ project. 2. Consider alternative solutions. 3. Proceed if there are no alternative solutions, and 'imperative reasons of overriding public interest', and compensation measures for damage have been secured.

Figure 2: Different types of environmental assessments⁵

Impacts on species, habitats and ecosystems, their minimisation and opportunities for environmental enhancement (Guido Axmann, THEMA1 and Aedan Smith, Head of Planning and Development, RSPB)

RSPB Scotland is involved in cases of infrastructure build-up where threats to birds or other wildlife are significant or where significant enhancement potential exists. These are currently approximately 400 cases per year, of which in 2010, only 9 were for power lines. Potential direct impacts that are considered are:

1. Direct habitat loss
2. Displacement (avoidance)
3. Collision

To minimise impacts, potential negative effects must be considered already at the planning stage. To this end, a „criticality-map“ has been developed for Scotland, where 9 different levels of criticality of nature protection are mapped. Most critical areas in Scotland are in the northwest, while currently most energy infrastructure is being developed in the southeast, where integration into the grid is easier. As the north, including the northwest, features very good wind potential, a conflict between expansion of wind energy and nature protection could arise. This leads to another, indirect effect of grid development: an improvement of grid infrastructure in a certain area is likely to contribute to further expansion of other energy infrastructure in the area.

The core opportunity for environmental enhancement that is applied in Scotland is the removal of forestry. Many forests have been artificially planted for commercial purposes. By restoring such areas to their original state, habitat that is reduced due to grid expansion is compensated for.

In the discussion that followed, it became clear that birds are the animals that are probably most affected by expansion of power lines. On birds, a quite substantive amount of research has been conducted, but, as one participant mentioned, "the knowledge is there, but I am surprised how little people know it is there". Beyond this knowledge, it became clear that a case-by-case analysis is required and that general impacts on nature are difficult to generalise.

⁵ "Environmental impact assessments answer what kind of questions?" presentation, Ivan Scrase, RSPB, RGI environment workshop, 16/6/2011

An overall hierarchy in the approach of minimising impacts of grids on nature was discussed. This could be to:

1. Avoid – e.g. reduce the need for grid expansion
2. Enhance – e.g. find solutions that make the grid an improvement to nature
3. Reduce – e.g. use technical solutions that prevent electrocution or collision of birds
4. Compensate – e.g. create new habitat space in other areas nearby

The discussants agreed that successful minimisation of negative impacts must start at the strategic level. An overall mapping of e.g. three levels of criticality was suggested, yet “a map with only red areas would not add value”.

Non-biodiversity impacts, their minimisation and innovative solutions and opportunities for environmental enhancement (Antonella Battaglini, Executive Director, RGI and Jhon van Veelen, Architect, Landschap in Verandering)

From an architect’s perspective, all elements of the grid expansion project’s process should be designed (pylons, line, etc). However, the focus of the design should be on the lines. Straight lines minimise visual complexity and can use existing routes. On the contrary, angles can appear visually as if two different lines exist. Hence, the route selection process is of vital importance. It needs to be flexible in planning and include all factors (visual, environmental, health, technical) in order to find a balance between nature intrusion, impact and human needs.

Industry is becoming more open to non-technical input on grid design/planning. Likewise the attitude of the public towards a new line should change towards a more balanced approach that acknowledges the need for new grids, the need to minimise new grids, and the need for beautiful structures.

Among the aspects of new lines that were discussed were the internalisation of cost externalities (e.g. properties devalued by lines), consideration of the ‘use’ of lines (e.g. transferring coal or renewable generated electricity), community benefits through decentralised electricity.

Third Part: Speeding up grid development without sacrificing environmental achievements

Developing environmental guidelines for grid planning: common knowledge, key elements, collaborative authorship (Antonella Battaglini, Executive Director, RGI and Ivan Scrase, Senior Climate Change Officer, RSPB)

The European Commission is likely to start a process for developing European environmental guidelines that are expected to focus primarily on Natura 2000. Useful contributions to this process can be i) best practice examples that would eventually lead to standard practices, ii) a memorandum of understanding between NGOs/TSOs that could also be accepted by the broader community on how these procedures can be developed. The participants further brainstormed on the areas that such a MoU should and should not cover. Stakeholder engagement, environmental standards, strategic planning, minimising infrastructure requirements (reduce/reuse and then built) were among the areas to be included, whereas compensation and health impacts were out of scope. Such a MoU would need to reflect the national realities and not just the European dimension.

Permitting legislation while keeping robust Environmental Impact Assessments (EIA): strategic alliances, political agenda, stakeholder engagement (Tor Inge Akselsen, Director of Communications, Statnett and Daniel Fürstenwerth, RGI)

Guidelines are legally non-binding instruments that support and mainstream the implementation of the legally binding directives by the different member states. During this session the participants brainstormed with whom and how to engage in order to facilitate the adoption of guidelines to ensure that future accelerated permitting procedures keep grid development in line with Natura 2000.

Beyond the stakeholders that are likely to engage in developing guidelines (NGOs, TSOs, national authorities), further stakeholders to engage with were suggested:

- EU MEPs: Rapporteur Francis Wagner; EEP Sirpa Pietikainen, Maria de Graca Caravelho and Herbert Reul; Socialists Vittorio Prodi and Teresa Riera-Madurell; Greens Claude Turmes and Bas Eickhout; Liberals Graham Watson and Gerben Jan Gerbrandy; ECR Jonas Eller.
- ACER
- Academia: Wageningen University (NL) specialised in environmental impacts of grids.
- Communities: since citizens are directly concerned, a bottom-up process is required, f.ex. an associative agreement, cooperatives etc.

Ways to engage as proposed by the participants include:

- Encourage bottom-up engagement at a community level through cooperatives, partnerships
- RGI Memorandum of Understanding
- Pilot projects with RGI partners
- Educate and debate the larger picture with citizens and journalists (European energy vision)
- Share best practices. For example, benefit sharing and demand-side management in France: A compensation process provided by law lead to shares of the profits being distributed to residents nearby wind farms, resulting in a dramatic drop of opposition. Furthermore, citizens in Bretagne and South of France areas can register on a website and receive information on peak availability of electricity, enabling them to contribute to the energy balance by adapting their use of electricity to its availability.
- Enforce guideline by setting incentives
- Align legal objectives across policy areas (energy/environment) and levels (EU/national/regional/communal), including through one-stop-shops.

Fourth Part: Panel discussion on how to maximise environmental benefits of grid development

Chair: Susan Deacon (Chairperson Scottish Power Renewables)

Panellists: Julian Buttery (Head of UK Community Relations, National Grid), Aedan Smith (Head of Planning and Development, RSPB), Stan Blackley (Chief Executive, Friends of the Earth Scotland), Alan Croes (Manager Grid Strategy, TenneT)

Panelists were asked to give their perspective on key challenges with regards to the future grid development and what different actors can contribute.

One challenge mentioned is to balance the objectives of reducing climate change vs. reducing grid infrastructure. While it is necessary to fight climate change and to build new grids, the impact of grids on environments may be severe and must be considered sufficiently. Other challenges mentioned were: i) the need to work jointly towards improving the policy framework that allows an expansion of the grid in line with environmental concerns, ii) the need to reach a stable and secure energy infrastructure in time, and iii) the need to ensure that public in the future will support the new energy infrastructure system (which will depend on the level of public participation and on the distribution of ownership).

With regards to the contribution to achieve the integration of renewable energy into the grid, a key role of TSOs was seen in a) “consider issues beyond electricity” (e.g. TenneT is having engineers and spatial planners working in one team), and b) apply and share best practices, e.g. on how to involve the public in the grid planning process. The contribution of NGOs was seen in a) communicating the need for a renewables grid to their members (e.g. RSPB has 1 million members; Friends of the Earth produced a brochure “Understanding Power in Scotland”) and a broader public, and b) to be a critical cooperating partner in the process, that can be very critical and raises its voice wherever necessary.

The discussion touched upon the issue of grid expansion for renewables vs. nuclear. It was made clear that TSOs do not have any impact on the choice of the type of energy transmitted and are by law required to connect any generation source. NGOs on the other side see a large difference between lines built to connect nuclear vs. lines needed for connecting renewable generation. A best-practice approach was presented, to focus on “no-regret-moves”, where power lines that will be required for renewables in the future, e.g. to offshore wind parks, are build and also used to connect fossil plants that are “on the way”.

RGI Upcoming Activities

RGI is planning a series of activities until the end of the year:

- In autumn we intend to have a stakeholders conference in Brussels to discuss public acceptance for new grids. The conference is meant to be a joint effort of SEFEP and RGI and it will be in close collaboration with the European Commission.
- Also in autumn a workshop on “Understanding the grid and the simulation trainer” will be hosted by 50Hertz near Cottbus.
- Co-organised with RTE we intend to have a workshop on impact of grids on health. The event should take place in Paris towards the end of the year.

Please register for our newsletter for updated information about upcoming activities