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Public Engagement in Electricity Network Development: A Case Study of the Beauly–Denny Project in Scotland

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Keywords Electricity transmission, public engagement, property rights

JEL Classification L94, L98, D23, P48

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Abstract

Ambitious renewable energy targets and an aging infrastructure necessitate a substantial upgrading and expansion of the electricity transmission networks around Europe and beyond. Although vital for the functioning of the economy, grid development projects are often met by public opposition, which increase costs and lengthy planning processes. The current planning processes have proven ineffective at resolving the conflicts among stakeholders, indicating the need for a new approach. We analyse these issues from an Economic perspective, outlining the economic characteristics of transmission developments and public engagement. We identify previously overlooked features of the planning process that are contributing to the rise in conflicts, public opposition and prolonged project realisation. The Scottish Beauly-Denny high voltage transmission development is discussed in detail and our findings indicate a need for increased engagement with local communities at an earlier stage of planning. Trust between communities, developers and government is important for future negotiations and can be achieved through transparency, specific education and set guidelines for stakeholder engagement in the planning process.

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1. Introduction

The future of energy networks holds important technical, economic, and social challenges. The emergence of new energy and climate change concerns has proved the conventional forms and norms of policy and decision-making inept. Across Europe, the electricity grids are aging and in need of modernisation to support the ongoing development of energy production and transmission. Additionally, further extension of networks is needed to connect the large number of emerging renewable and energy generation plants. However, network developments are often met by significant public opposition[1] and the existing institutions and decision making frameworks are ineffective at solving these conflicts which cause costly delays or cause projects to be abandoned altogether. As a result, the potential for reaching the targets for reducing carbon emissions and climate change is jeopardised (European Commission, 2008).

Each grid development project affects a number of stakeholders – from state and local communities to NGOs, landowners and corporations – each with different objectives and perceptions of the project and related matters. The existing decision-making processes and institutions have proven ineffective at resettling the conflicts between different stakeholders, causing uncertainty and delays. Increased information provision and public engagement in project planning is suggested to increase public trust in network companies, public acceptance and therefore accelerate the realisation of new developments (RGI, 2012; Newig and Kvarda, 2012; Cotton and Devine-Wright, 2010). The Aarhus Convention (signed by and implemented European Community in 1998 and 2003 respectively) advocates early and effective public participation to increase the transparency of the planning and decision-making process.

[1] Objections to major development projects often relate to environmental, visual and health aspects (Soini *et al.*, 2011).

Public engagement implies the involvement of members of the public in policy-forming and policy development. The concept is not new but it is becoming increasingly important in infrastructural developments. However, there are no established guidelines, rules or frameworks defining how public participation ought to be formalised. Recent high-profile projects, such as the Norwegian Hardanger line and the Scottish Beauly-Denny line[2], show that transmission projects increasingly involve vested social, economic and political interests. Noticeably, there is a need for new approaches for defining and organising the role and tasks of the actors, including the public and affected communities.

Exploring project characteristics and stakeholder relations using an economic approach is previously untested but can contribute to better understanding of community engagement with grid projects. Using the contagious Beauly-Denny High Voltage Transmission Line project, this paper outlines the economic background and identifies relevant economic theories and concepts that help explore the community opposition faced by transmission developments.

The paper is outlined as follows: Section 2 outlines the economic characteristics of transmission developments and public engagement, Section 3 presents and discusses the case of the Beauly-Denny transmission line in Scotland. Section 4 concludes.

2. Theoretical Framework

2.1 Economic Characteristics of Transmission Developments

Transmission lines are essentially electricity highways with the purpose to transport electricity, e.g. from an area rich in resources to one where demand outweighs supply. Areas at either end of a transmission line can enjoy benefits from new installations, including income from energy production, reduced

[2] The Hardanger transmission line, due to cross the Hardanger fjord on the Norwegian west coast, was one of the most reported news stories in Norway in 2010 and the Beauly-Denny transmission line received over 20,000 objections and was covered extensively by UK media.

electricity prices and a more reliable service. The benefits to the areas along the route of the lines are, however, less obvious. Connecting renewable energy sources and reliable networks benefit the country as a whole, yet potential costs of reduced property prices, visual amenity, tourism and damages to wildlife are mainly borne by the communities along the lines. These costs are not easily quantified as they can either be labelled as public goods or often they are not directly observable. Thus, the construction of new transmission lines produce externalities in the form of local social costs.

The planning process of grid developments is highly context specific and depends on the knowledge and experience of consumers, developers and authorities. Reaching unanimous decisions in transmission developments is difficult as the physical and financial size of projects, as well as the number of stakeholders, equally makes cooperation difficult as the involved parties have different objectives and stakes in the project. Public knowledge regarding electricity networks relate largely to technical aspects, such as pylons and wires, rather than organisations (Devine-Wright *et al.*, 2010). The low level of public knowledge regarding transmission line development and administration is not only a cause of increased public opposition to new grid projects, it also restricts increased public participation and a more active role for communities within the development process.

Another aspect is the large number of affected communities along the transmission line. Although all stakeholders should have the chance to express their views towards a project, it would be impossible to consider all statements and objections. The Beauly-Denny project alone received over 20,000 objections. The developer and the planning authority must balance the public's right to be taken into account and the acceleration of developments.

2.2 Economic Characteristics of Public Engagement

Public engagement is defined as the practice of involving members of the public in policy-forming and decision-making activities of organisations responsible for policy development. Depending on the flow of information between the

participating public and the responsible organisation, public engagement can be divided into (i) public communication; (ii) public consultation; and (iii) public participation. Public communication relates to a one-way information flow from the organisation to the public whilst public consultation considers a flow of information from the public to the organisation. In public participation, a formal dialogue takes place and information is exchanged between members of the public and the organisation (Rowe and Frewer, 2005). Public engagement is therefore considered in policy and decision-making frameworks only if initiated by the responsible organisation. However, the extent to which public engagement is ultimately allowed to influence the process is often unclear.

As Newig (2007) notes the rationale for public participation includes access to local knowledge, attitudes and acceptance, increased awareness, transparency and, thus, trust between stakeholders. Combined, this could ultimately alleviate conflicts. Given the similarities between sustainable environmental planning and the characteristics of the energy sector, such as multiple stakeholders, public goods and market failure, experiences from environmental governance are also applicable to transmission developments. When properly framed, some of the lessons from public participation could be used to address opposition and conflicts in grid development projects.

Public engagement in transmission line projects shares some features with that of other major infrastructure developments. Such engagements have often been discussed in the literature in the context of specific types of projects: e.g. nuclear power plants (Otway *et al*. 1978), in the context of carbon capture and storage (Kraeusel and Möst, 2012), wind power (e.g., Swofford and Slattery, 2010) or airports (e.g., Jue *et al.* 1984). Recent large-scale grid projects like the Beauly-Denny transmission line (see the Case Study in the following Section 3) however show that the public takes an increasing role in the realisation and success of these projects.

3. The Beauly-Denny High Voltage Transmission Line

The Beauly-Denny High Voltage Transmission Line (HTVL) is a high profile grid development project and led to the longest ever public inquiry in Scotland. It has been followed closely in media and has generated close to 20,000 objections from all over the world (see Douglas, 2010). The planning process took ten years from the initial identification of the need for the project to the start of construction. Applying the theoretical framework outlined in Section 2, this paper will focus on how community engagement was managed in the Beauly-Denny planning process. The project represents a relevant example of how conflicting interests of stakeholders delay the execution of projects and reveals the weaknesses the conventional decision-making framework for such developments. The study is based on first hand information collected through interviews with key stakeholders and an extensive research and collection of information published by all the relevant stakeholders.

3.1 Electricity transmission in Scotland

There are two main transmission network operators in Scotland: Scottish Hydro Electric Transmission Ltd (SHETL), a subsidiary of Scottish and Southern Energy (SSE), and Scottish Power Transmission Limited (SPT), a subsidiary of SP Energy Networks. Scotland's energy policy is devolved from the UK government, and independently decides on consents for developments of energy infrastructures. However, transmission system operators (TSOs) in Scotland are still regulated by the UK wide Office of Gas and Electricity Markets (Ofgem).

3.2 The need for the project

The Scottish and UK government targets of tackling climate change have prompted an increase of renewable energy generation. The existing transmission capacity is insufficient to allow the intended renewable energy facilities to connect to the network. As part of their transmission licences, SHETL and SPL maintain that they have a duty under the Electricity Act 1989 to develop and maintain an efficient, co-ordinated and economical system of electricity

transmission. This is to facilitate competition in electricity supply and generation markets. The Beauly-Denny line is argued to be a key infrastructural development to maintain competition and enable development of renewable energy in Scotland.

3.3 Beauly-Denny project facts

In September 2005, SHETL and SPT applied for planning consent under Section 37 of the Electricity Act 1989 to construct a new high voltage power-line between Beauly, near Inverness, and Denny, near Stirling. The project involves the construction of a 220 kilometres[3] long 400kV double circuit overhead transmission line set to replace the current single circuit 132kV transmission line, which will be dismantled as part of the development. One circuit will operate at a voltage of 400kV and the other at 275kV. Further expansion and construction of substations will also take place. Approximately 600 steel pylons between 43 and 65m tall will support the line, although the majority of towers are between 50 and 56 meters tall. The spacing of towers are dependent on topography, altitude and the exposure of weather effects, such as high winds, but will normally vary in a range of 275 to 450m and they will be fixed in the ground using concrete tower foundations (SSE, 2012a; SSE, 2012b).

The new power-line will mainly follow the same route as the old 132kV line, however changes in the use of land in the course of time required slight deviations from the old route (Figure 3.1 illustrates the new route in relation to the old route). The 220km long stretch is divided into four sections, separated by the new substations. The landscape along the line is characterised by varying land uses including remote moorland, forests, river valleys, roads (A9) and some more populated areas[4]. The routing around the Stirling area was particularly contentious as the power-line passes close to residential areas and near Stirling's most famous tourist attractions: Stirling Castle and the Wallace monument. Following the longest public inquiry in Scotland, the Ministers gave consent to

[3] SHETL is responsible for 200km and SPT is responsible for 20km.

[4] See Appendix 1 for a more detailed outline.

the construction of the line in 2010, provided that certain mitigation measures were adapted. SPT voluntarily work with Stirling council to reach agreement on an appropriate mitigation scheme and the final consent was given in December 2011 and construction commenced in February 2012[5].

3.3.1 Strategic options

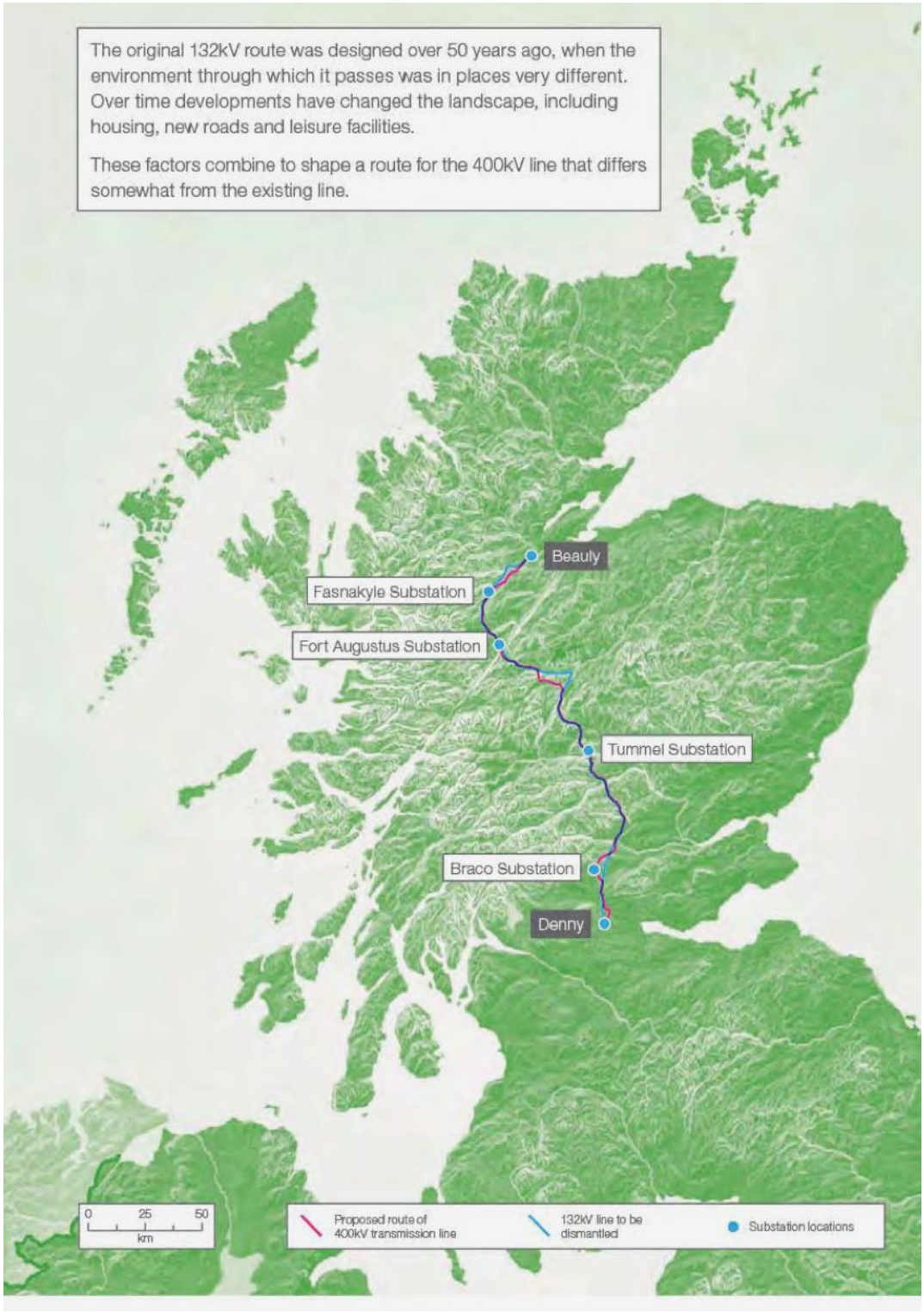
Several strategic options for routing of the corridors and alternatives for achieving the required transmission capacity were considered at the initial stage of planning. The identification of a number of plausible routes was followed by a more detailed analysis of technical, economic and environmental aspects. The environmental assessment followed the guidelines of the Holford Rules[6] and aimed to achieve the best fit within the landscape, balancing minimal effects on sensitive landscapes with the requirement of keeping alignments more than 100m from residential buildings.

A public consultation was exercised once an 'optimal' route was identified. Undergrounding of the line was considered at early stages of the project. Although undergrounding the line or sections of it would reduce potential visual or health effects, it will still have a significant environmental impact. SSE states that a 25m wide corridor of land would be cleared in order to position the power-line. Such a corridor would be needed to remain clear after construction to allow for future access for maintenance and upgrading of the line (SSE, 2012b). National Grid (2009) estimates that, using modern cable technics, undergrounding a typical 400kV double circuit power-line will cost 12 to 17 times as much as installing the same line overhead. This is mainly due to the differences in the cables themselves, the insulation of underground cables and the construction method itself.

[5] See Appendix 2 for a project timeline.

[6] Guidelines for the construction of new high voltage overhead transmission lines. Includes the notion to avoid major areas of high amenity value, areas of scientific interests, choosing the most direct line and a preference for tree and hill backgrounds rather than sky (National Grid, 2012).

Figure 3.1, Overview of the Beauly-Denny power-line routing.



Source: Used with the permission of SSE

3.4 Stakeholder objectives of the project

The difficulty in any major infrastructural development is to strike a balance between the long-term objectives of the various stakeholders and the overall benefits of the development. The complex nature of the planning process is largely due to conflicting interests, information asymmetry and the various principal-agent relationships amongst the vast range of stakeholders. Such conflicts occasion transaction costs, further increasing the externalities of projects. This section outlines the participants' differing practical roles in the planning process and discusses the theoretical underpinnings, characteristics and incentives relative to the varied range of stakeholders. The focus is on the process in Scotland, however the theoretical aspects, characteristics and incentives are not country specific.

3.4.1 The Scottish Government

The Scottish Government belongs to the public sector and is characterised by a multiplicity of dimensions regarding tasks, stakeholders and conflicting interests. A multitude of principal-agent relationships arise from dealings related to both distributive and allocative issues. Governments generally set out to maximise welfare rather than profits and therefore often fail to minimise costs and maximise economic value (Libecap, 1989). In particular, compared to the private sector, incentives for efficiency in the public sector are rather weak due to the absence of competitive situations.

The Scottish government is responsible for setting long-term targets through its Energy Policy. It provides a framework for the authorities and is an important factor in guiding private sector interests. In The Climate Change Act 2009, the Scottish Government set an ambitious target for greenhouse gas emissions at reductions of 42 per cent by 2020 and 80 per cent by 2050. Scotland aims to drive technological development and place itself at the global forefront of providing a sustainable low carbon economy. The main sources of renewable energy in Scotland have until now been hydropower and onshore wind farms, however, the Scottish government is implementing support schemes for the development of offshore wind farms, wave power, tidal stream and biomass, of

which a growing level is situated in the north of Scotland. An important aspect of the challenge lies in connecting these generation facilities to the transmission network. The construction of the Beauly-Denny HVTL will increase the transmission capacity between the Highlands and central Scotland and is therefore important for the Scottish Energy Policy (Scottish Government, 2010). The Beauly-Denny line will enable the construction of an interconnection between Scotland and England – Scotland's port to export green energy.

3.4.2 Office of Gas and Electricity Markets (Ofgem)

The UK regulator of the gas and electricity markets is Ofgem. Its main priority is to protect customers by promoting competition and regulating (natural) monopolies where competition is not an alternative. The focus lies in providing Britain with a secure energy supply and contributing to limit the energy sector's adverse environmental effects Ofgem regulates the TSOs through eight-year price control periods, which aim to incentivise innovation, efficiency and curb expenditure. The price controls set the maximum revenue TSOs are allowed to generate through transmission levies[7].

Major network updates require significant investments from the TSOs who seek approval from Ofgem to recover the costs through increased transmission charges. The TSOs are pressured to minimise the expenditure of any project as Ofgem will only approve the costs that are clearly justifiable. However, despite claiming that the interests of the UK consumers are the main priority, Ofgem does not operate within a framework that allows for consumer participation (Littlechild, 2012). Moreover, according to North (1994) the formal rules within this framework may not have been created to be socially efficient. North suggests that institutional rules are designed to benefit those with the bargaining power to effect change. In the context of grid development the TSOs, relative to communities, are the players with the bargaining power; they are rich in capital and resources and have all the experience in the planning and execution of grid development.

[7] Transmission levies form part of the end-user's energy bill.

Although the Beauly-Denny line is argued to be a key infrastructure development project to maintain competition and enable development of renewable energy it is not officially considered a national necessity for promoting competition and protection of consumers, and is thus outside the price control allowance. However, in 2004, Ofgem devised a mechanism to fund transmission projects specific to connecting renewable generation. The Transmission Investment for Renewable Generation mechanism (TIRG) comprises four projects, one of them is Beauly-Denny. The mechanism allows for an accelerated process to fund these projects and thus fast-tracking the connection of renewable energy sources to the national grid (Ofgem, 2011).

3.4.3 The Energy Consents Unit

In Scotland, applications to construct new or modify existing electricity grids are made to the Scottish Ministers. The Energy Consents Unit (ECU) considers all developments relating to electricity generation facilities and overhead power-lines. Both cases for and against an application are considered before giving consent, although particularly sensitive projects are subject to public inquiry.

The ECU received the applications from SHETL and SPT to construct the Beauly-Denny line in September 2005. One year later, the unit announced that the proposed upgrade would be subject to a public inquiry. Public consultations, environmental and technical statements, and evidence from nearly 200 witnesses collected during the public inquiry were all considered when making their recommendation of consent.

SHETL and SPT

Through their transmission licences, TSOs are responsible for providing a secure and reliable service to their customers. Part of this service is identifying, planning and designing new power-lines, which also requires them to produce an environment report to show Ofgem and the ECU that their proposal is justified and that all possible alternatives have been considered.

The incentives for efficiency in the private sector are more powerful relative to the public sector because of external competition. Private companies typically follow the objective of minimising short-term costs and maximising long-term profits. However, TSOs are natural monopolies and despite Ofgem's regulation, following Dixit (2002), it seems realistic to suggest that where there is a lack of competition, little attention is paid to consumer preferences. Therefore on the surface it seems as though the TSOs incentives for substantial public engagement are weak.

SHETL maintains that the construction of the Beauly-Denny line is vital to the future of the Scottish transmission network. Further developments, including generation facilities and further transmission lines, depend on a successful and timely construction. As licence holders, SHETL are responsible for ensuring a secure and reliable supply of electricity at reasonable prices and they argue that their license could be in jeopardy if they do not deliver (Personal interview 1, 2012). Although the Beauly-Denny line is mainly covered by SHETL's area of responsibility, SPT realises the importance of the project for future connections, many of which will be in SPT area (Personal interview 2, 2012). Consequently, Ofgem has granted SHETL and SPT the right to recover the cost of the project from their customers through transmission levies. The nature of the industry makes investments in transmission lines relatively safe although there is a certain regulatory risk. Such major investments, where the value is in the actual asset rather than its usage, will be at risk if the regulator decides to change the rules of the sector.

Communities

Community involvement in the planning process is relatively limited. Although invited to comment on draft proposals, communications with local stakeholders are more educational than a two-way information exchange. The communities are heterogeneous and belong to the public sector. They consist of many individuals and local firms with different preferences that change over time. Their targets and objections are therefore difficult to contract and customers

may not be willing or able to adequately reflect the interests of present and future customers (Littlechild, 2012).

The general consent among the communities was that not enough effort was directed towards identifying alternative solutions to the routing, such as sub-sea cables or not enough measures to mitigate adverse effects. Community groups, including Stirling before pylons (2010) and Pylon pressure (2010), argued for undergrounding as the only reasonable level to mitigate the impact on wildlife, environment, and the visual landscape. The communities felt unfairly treated as the new developments only infer costs for them and the benefits are enjoyed somewhere else. They consider the transmission line as substantially reducing the quality of the environment they live in and thus a reduction in quality of life. The long-term objectives of the government to export electricity through a Scotland-England connection intensify the resistance. Further concerns relate to a loss of tourism and therefore a loss of business.

The potential direct benefits of transmission lines for the communities include local job creation and the increased demand of local goods and services throughout the construction phase. However, as the construction of transmission lines is a highly specific task that requires skilled labour, it is clear that the level of local jobs actually created were limited.

Third party interests

At a general level, there is strong support for green technology but at local levels there has been frequent controversy and opposition in relation to the actual developments. This has become a phenomenon known as NIMBYism ('not in my back yard'). However it is wrong to assume that proximity to the developments is the only factor determining opposition. Often there are objections to developments being too costly; having potentially damaging effects on wildlife and ecosystems; and having a visual burden on the landscape. Such third party objections lead to stalling at the planning stage and reduce the speed of development. For example, non-governmental organisations often develop blanket policies in relation to infrastructural development. Therefore even when

they are not directly affected, their experience and resources can provide robust opposition to controversial developments.

A number of NGOs and environmental preservation groups became involved in the Beauly-Denny project. Based on the economic case for the project and the possibilities for green energy, organisations such as "friends of the earth Scotland" and WWF were supportive of the new development. However the support shown by NGOs with interests in preserving wildlife, biodiversity and a scenic landscape objecting to the construction of the new power-line was more substantial. The NGOs challenge the necessity of the project to a greater extent relative to the communities. The John Muir trust argued that the need for the new line was poorly justified and that the strategic case for the chosen route lacked backing. Rather than a new line, they wanted to see an update of current lines, such as the east coast line. The John Muir trust maintains a general renewable energy developments policy, which is for a greater focus on small-scale, sensitively sited renewable energy schemes close to existing settlements (JMT, 2011). Moreover, the Beauly-Denny Landscape Group[8] took part in the public inquiry and produced a parliamentary briefing, arguing against the case. Part of their concern was related to the future effects of the transmission line, such as the upsurge of applications to develop wind farms along its path.

3.5 Public engagement in the planning process of the Beauly-Denny project

3.5.1 Applications, notifications and objections to the Beauly-Denny line

Statutory requirements oblige SHETL and SPT to advertise their applications in the local press and planning authorities must be notified: Along the Beauly-Denny line these include Stirling Council, Perth and Kinross Council, the Highland Council and the Cairngorms National Park Authority. Further notifications were sent to Scottish Natural Heritage (SNH) and the Scottish Environment Protection Agency (SEPA). Objections were received from Stirling Council, Perth and Kinross Council, the Highland Council and the Cairngorms

[8] The John Muir trust joined the Association for the Protection of Rural Scotland, Mountaineering Council of Scotland, National Trust for Scotland, Ramblers Association Scotland and the Scottish Wild Land Group to form the Beauly-Denny Landscape group.

National Park Authority and 17250 others. A further 2994 objections were received after the Inquiry closed (Scottish Government, 2011).

3.5.2 Heterogeneity of understanding among communities

The communication with the communities at an initial stage of the planning process is a way to introduce the planned extension and increase the communities understanding and knowledge of the project. Public understanding of transmission networks and TSOs are generally low, as identified by Devine-Wright *et al.* (2010), and as experienced by both SHETL and SPT in the Beauly-Denny project. However, members of the SSE Community Liaison Team[9] noticed a great difference among the communities. The communities that were more familiar with electricity transmission and generation facilities, such as renewable energy host communities, were generally more understanding and sympathetic to the idea of the new power-line. This supports the findings of Soini *et al.* (2011) and Atkinson *et al.* (2006), which suggests that the negative attitudes towards overhead power-lines dissipates over time.

3.5.3 Financial compensation to achieve acceptance

However, it could also be that their acceptance had come at a price: Given their experience of generation facilities, they often expected some level of financial compensation (Personal interview 1, 2012). The question of compensation was also raised during the public inquiry and on community blogs (Pylon pressure, 2010). The communities pointed towards successful cases of community benefits provided to host communities of wind farms in Denmark and expressed disappointment that compensatory measures were not even considered for Beauly-Denny and transmission lines generally. Representatives from SPT argue that there was no revenue margin to absorb increased expenditures from community compensations. Since it is essentially the UK consumers that finance the project, asking them to pay for something that is not economically viable will not be approved in the Ofgem framework (Personal interview 1, 2012). As part of the consent, SHETL were ordered to pay compensation to two communities.

[9] Following the identification of the need for a close working relationship between the TSOs and the communities, SSE implemented the community liaison team in 2009.

These measures were mandatory and thus Ofgem approved the cost of compensations to be recovered through transmission levies.

3.5.4 Uneven playing field among stakeholders

Apart from the adverting in the local press, SHETL and SPT are only required to notify planning authorities of the affected communities in the public consultations. As such, the communities are communicated to rather than consulted. Without a formal forum to make their voices heard, communities organise themselves in local groups, hold community meetings, run blogs, sign petitions and write letters to decision-makers. Communities along the Beauly-Denny line invested a great amount of time and money in their attempt to affect the planning process. During the public inquiry, communities had the opportunity to present their statements.

However, many community representatives found the process intimidating and extremely stressful. They were under the impression that the inquiry was simply something for show rather than a chance to reach agreement. The Beauly-Denny Landscape Group engaged both engineers and economists to prepare objections against the technical and economic cases; however it was felt that these were not adequately taken into account (Personal interview 3, 2012).

The process is thus not allowing for public participation where the public and members of the planning unit can effectively consult and negotiate on a level playing field. This view is shared by a member of the ECU, who reports of the public inquiry as an inefficient practice where bargaining power is mainly with the project developers (Personal interview 4, 2012). Although local stakeholders are invited to give their views, there is uncertainty regarding how much the government and developers listen. This confirms the findings of North (1994) mentioned earlier that it is the party with the better bargaining power that will benefit most from such institutional rule like a public inquiry.

3.6 Discussion

3.6.1 Failed participation in Beauly-Denny

The study of the Beauly-Denny project supports the findings of previous studies where the public contribution is at a stage downstream in the decision-making process and thus of little influence (Littlechild, 2012; Cotton and Devine-Wright, 2010). The communities did not consider the public inquiry as a sufficient forum to argue their case and saw it as an empty façade, simply an attempt to calm local opposition. In order for public engagement to be effective, it has to enter the early stages of a project, at a stage upstream the decision-making process. SSE realised the need for increased community engagement and created the Community Liaison Team. However, not until after the public inquiry had taken place and thus long after the main bulk of oppositions had been received.

3.6.2 Benefits of early participation

Engagement at the later stages of planning provides little scope for the potential to influence the outcome and leaves communities feeling ignored. Meanwhile, if introduced at the early stages, the integration of public engagement can improve the possibility of a successful and excelled implementation of projects (Cotton and Devine-Wright, 2010). Local involvement in the design and implementation of a project increases local understanding and support, and may assist in accelerating planning and development (Herbertson *et al.*, 2009).

Furthermore Arrow (1974) notes that decision making, particularly for issues where no market exists to determine a price, requires collective action. A number of cases are discussed in Littlechild (2012) where negotiated settlements have proven highly successful in the U.S. and Canadian regulated markets; agreements are reached faster more efficiently and at a greater social outcome. An important aspect is the level of trust between communities, government and developers. If communities are taken seriously and listened to at the start of a project and throughout, the level of trust for developers increases. In turn, this increases the likelihood of successful communications and lowers the rise of conflicts.

3.6.3 Relevance of property rights

The lack of assigned property rights makes the communities easy to ignore as the value of their losses are not accurately estimated. Meanwhile, landowners are consulted at the first stage of a proposed project in order to negotiate the optimal placing of pylons and agree on a reasonable compensation. Property-rights institutions can therefore be argued to dictate who will be included in the planning process.

3.6.4 Specific knowledge as a precondition for effective contribution

Allowing communities to take a more active role in the planning process should be done if the benefits, e.g. accelerated development, outweigh the costs, e.g. potential financial increases from the negotiation process. Communities along the Beauly-Denny line felt as if their opinions were not taken seriously and felt left out, partly because they simply did not have the relevant information and knowledge about the planning process. It has been recognised that consumers at a general level lack knowledge of electricity transmission networks, which is argued to limit the value of their contribution in the planning process (Devine-Wright *et al.*, 2010 and Soini *et al.,* 2011; Littlechild, 2012).

Knowledge and experience are two important aspects of transmission line development and planning yet the consumers do not require more know-how than the responsible planning unit. It may therefore be a case for educating, perhaps not a whole community, but representatives from the community forming a community consultation group. More importantly though is that the future framework and process is transparent and that information is easily available to all stakeholders. The roles and tasks of stakeholders should be clearly stated before commencing new projects, an undertaking which may involve policy changes on a governmental level. This minimises information asymmetries and thus transaction costs.

4. Conclusions

Increased electricity generation from renewable sources is expected to play a key role in achieving climate change policy objectives. However, the current network infrastructure is not well suited for the purpose, requiring both expansion and modernisation to allow a connection of the new facilities to the network. Public opposition to transmission network developments causes uncertainty as well as financial, political and social strains across Europe, with some projects ultimately being aborted. The conventional decision-making and planning seem to have failed to incorporate the relevant stakeholders effectively, thus generating opposition from affected communities.

The case study of the Scottish Beauly-Denny project, conducted through both, first hand interviews and secondary information confirms the findings of the previous studies and showcase a representative modern transmission development. The communities along the transmission line felt ignored, excluded and disappointed of lacking communication from developers and government alike. Communities and involved NGOs wished to have been informed of the planned project and consulted at an earlier stage, allowing them more time to process the available information, prepare their own statements and put forward own evidence. These testimonies illustrate the importance of increased community involvement at an early stage of the planning process.

Furthermore, the paper detected that the planning process of grid developments is highly specific and requires knowledge and experience. For communities to understand and effectively contribute, as a consequence, it could be reasonable to specifically educate representatives from the community forming a community consultation group. Transparency in the process is likely to increase trust between stakeholders, which would increase the potential success of future consultations. In policy developments, governments must recognise the link between strong public engagement and public support and allow communities the possibility to influence planning and development.

However, it is yet to be observed how similar projects proceed and whether or not the same problems and difficulties occur. It is to be expected that from a larger number of case studies more general conclusions can be drawn. Moreover, the potential for financial compensation in transmission projects provides the basis for further research in the future. In principle, the redistribution of costs and benefits to reach a more socially optimal outcome is a viable and seeming solution, yet its application in practice provides numerous obstacles. Further research is needed to establish the scope and perhaps the most efficient form of financial compensation, including the separation of assets. This offers a platform for further research into the economic aspects of the issues faced in infrastructural development.

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Personal interview 4. (2012, October). ECU representative.

Appendix 1: Types of landscape along the Beauly-Denny line route

Beauly to Fort Augustus

This 50km section is predominantly routed in unpopulated moorland and forests. Several rivers and valleys are crossed the current substations at Beauly, Fasnakyle and Fort August will all be redeveloped.

Fort August to Tummel Bridge

This 77km section crosses the Grampian Mountains, areas of remote moorland, coniferous forests and river valleys. The route will follow the A9 a new substation near Tummel Bridge will be constructed.

Tummel Bridge to Braco

This 63km section crosses moorland, rivers, valleys and the low-lying landscape near Crieff and Muthill. A new substation will be constructed near Braco, surrounded by forest and moorland.

Braco to Denny

This 30km section crosses the Allan Water and the A9 before crossing moorland and the Ochil Hills. The route will cross a flat valley of the River Fourth but will avoid the main settlements as this is the most populated section of the route. A new substation will be constructed to the north-east of Denny.

Appendix 2: Timeline of the Beauly-Denny project

2002/2003:

- Identification of the need for the power-line, planning design

2004:

January and June

- SPT and SHETL publish documents and draft routs for public consultations and initial conversations with landowners.

December

- The community group Stirling Before Pylons is constituted

2005:

July

- SPT and SHETL publish proposed route of the line

September

- SPT and SHETL submitted application to the Scottish Ministers under Section 37 or the Electricity Act 1989, to construct the line in their respective licensed areas.

2006:

April

- Formal process of consolation concluded
- Cairngorms National Park objects the proposed line
- Falkirk Council objects the proposed line
- The Highland Council raises the possibilities of health concerns and asks for further evidence.
- Perth and Kinross council object the proposal
- Stirling Council object the proposal
- SEPA support the application provided that certain matters are satisfactorily addressed.
- SNH supports the application yet requires further information of environmental impacts of certain sections of the route.

August

- Scottish ministers announce that the proposed upgrade will be referred to a public inquiry.

September

- Public Local Inquiry ordered

2007:

February

- The Beauly-Denny Landscape Group is formed opposing the project
- Public Inquiry commenced – Five local discussion sessions

December

- Public Inquiry ended

2010:

January

- Scottish Ministers grants consent to the project
- SPT consult with and meet stakeholders and community to inform the preparation of the Stirling Visual Impact Mitigation Scheme (SVIMS) Consultation Report.

September

- SPT publish the SVIMS Consultation Report and SVIMS Consultation Leaflet

November

- Pre-construction work begins
- SPT undertake voluntary consultation with stakeholders and community on the SVIMS Consultation Report

2011:

February

- SPT submit SVIMS

August

- SPT submit updated SVIMS and Stirling Council given 45 days to comment on SVIMS

December

- Final consents given by Scottish Ministers
- Woodlands and access track constructed

2012:

February

- First tower completed

2015

- Expected delivery of the project