



# Using Climate Change Risk Assessment Wisely

***“EirGrid and ESB Networks completed a climate change risk assessment and have identified the key climatic risks faced by individual stations. The results, in conjunction with site-specific screening analysis, are used to determine appropriate remedial measures. Policies and procedures are also being updated to help manage this risk for any future development projects. This should ensure the Irish transmission system is secure and robust for the future.”***

John McGuckin, Engineer in Transmission Engineering & Maintenance, EirGrid<sup>1</sup>



Risk assessment, a tool widely used in most industries to identify and manage various potential risks, is proving to be particularly successful in managing climate change risks. Such an assessment was completed by EirGrid, Ireland’s public electricity Transmission System Operator (TSO) and ESB Networks (ESBN), Ireland’s Transmission Asset Owner (TAO).

Flooding was identified as the main risk for the transmission network, therefore, EirGrid and ESBN have initiated remedial projects to mitigate this risk, basing their investment decisions on screening techniques. The risk assessment also helps the companies develop policies and procedures to ensure that new transmission equipment is robust enough to endure expected climatic conditions, to take climate change into consideration during the site-selection process, and to develop an adaptation plan for the electricity sector, as required by law.

## CONTEXT

Does climate change represent a risk for my company? How can my company best manage the risks posed by climate change? Which data—and which climate change scenarios—should we consider? Which investments and initiatives should we prioritize?

These are all important questions that energy companies must answer in the face of climate change. Many Canadian energy companies are at an early stage in addressing these questions. Fortunately, a growing set of helpful tools is available. The PIEVC Protocol from Engineers Canada, for instance, helps assess the risks faced by infrastructure<sup>2</sup>, while the *Electricity Sector Infrastructure Climate Change Adaptation Management Planning Guide* from the Canadian Electricity Association outlines a risk-based framework for adaptation planning.

EirGrid, Ireland's electricity TSO, and ESBN, Ireland's Transmission Asset Owner, began to address these questions a few years ago. As part of the process, they conducted a climate change risk assessment — a tool integrated in the ones cited above — to help plan their adaptation strategy.

## THE CLIMATE CHANGE RISK ASSESSMENT

EirGrid is a state-owned company responsible for planning, developing, operating and ensuring the maintenance of Ireland's national electricity transmission system, along with overseeing the electricity market. To fulfill its mandate, EirGrid works closely with the Transmission

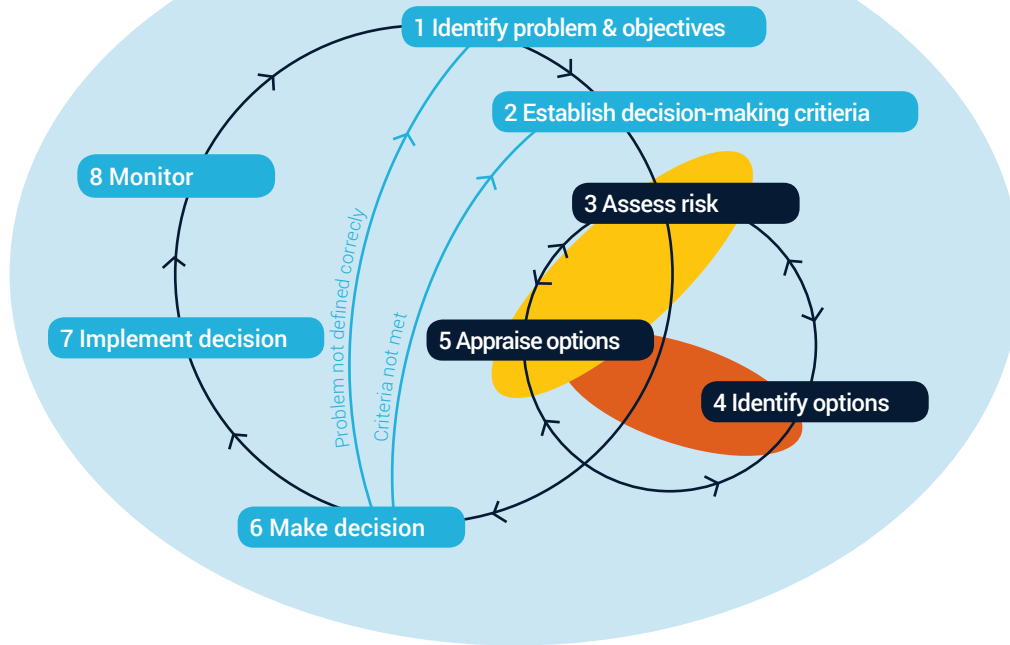
Asset Owner, ESB Networks, in accordance with a contract known as the Infrastructure Agreement. This agreement, as well as a statute, sets out the functions of each organization.

Under the Infrastructure Agreement, EirGrid is responsible for identifying feasible solutions (projects) required to develop the transmission system. EirGrid must design, plan and gain approval for such projects, and negotiate relevant agreements with ESBN.

"To fulfil their mandate, EirGrid and ESBN must be aware of how climate change will impact Ireland, what risks it poses to the transmission system and what adaptation methods are available to reduce these risks."<sup>1</sup> In addition to identifying climate change in its Corporate Risk Framework and recommending that its progress be further evaluated, EirGrid and ESBN launched a climate change risk assessment in 2012. The study aimed to identify appropriate mitigation, adaptation and coping measures over the short, medium and long terms.

EirGrid and ESBN contracted the multinational consulting firm Mott MacDonald to complete their climate change risk assessment and to make evidence-based recommendations for adaptation strategies. Mott MacDonald has worked on many projects on EirGrid's behalf and is therefore very familiar with Ireland's high-voltage power system; the firm can also tap into engineering experts from around the world.<sup>3</sup>

Mott MacDonald suggests to structure climate risk management with the approach described



**Figure CS11.1** UKCIP risk framework

in the UK Climate Impact Programme (UKCIP) risk framework (see figure CS11.1). This step-by-step approach supports risk-based decision-making.<sup>4</sup> The assessment identified several climate variables with the potential to impact the transmission system, including extreme temperatures and precipitation events, wind, salt fog/spray, lightning, sea-level rise and storm surges. To support the analysis of each variable, the assessment relied on projections developed by the Community Climate Change Consortium Project for Ireland<sup>5</sup>. The projections involved two climate change scenarios: one severe and one moderate. Information from current academic literature helped fill any gaps. The assessment also classified each type of transmission asset for which climate change risks would be evaluated: overhead lines,

air-insulated switchgear substations, gas-insulated switchgear substations, cross-linked polyethylene (XLPE) and fluid-filled underground cables.

The assessment projected increases by 2050 in extreme precipitation events, wind, storm surges and lightning, as well as in average and high temperatures. Low-temperature extremes, along with salt fog and spray, were projected to decrease. Overall, the assessment determined that climate change did not significantly threaten transmission infrastructure, and did not increase the risk of a system-wide collapse or partial blackout of the transmission system over the short, medium and long terms. The risk of flood, however, was identified as important and likely to increase in the future,

mostly due to extreme precipitation events, as well as sea-level rises and storm surges. Floods can lead to extended outages because they damage control and protection systems in substations, destabilize the ground under transmission towers, limit access to damaged equipment, etc.

Following the assessment, EirGrid and ESBN decided to investigate in greater detail the main risk identified in the assessment: flooding caused by storm surges, sea-level rises and extreme precipitation events.

This investigation assessed the vulnerability of specific substation locations to flooding. An initial targeted group of stations were subjected to successive screening techniques to prioritize the assessment. The investigation comprised:

- Geographical Information Systems (GIS) and other mapping techniques to provide high-level guidance on the vulnerability of sites to flooding from rivers, lakes, estuaries and the sea, but not from direct rainfall.
- Questionnaires to record the knowledge and memory of operational staff regarding flood levels.

Subsequently, EirGrid and ESBN established a five-year plan to carry out flood-alleviation measures at substations deemed to face the highest levels of risk.

EirGrid has decided to budget for investments in flood alleviation at particular sites based on specific risk assessments. A review of the 2012

climate change risk assessment is also planned to assist in the development of adaptation measures based on continuous assessment of the climate change risks. This is to ensure that “the effects of climate change on transmission infrastructure are reviewed and that potential investment decisions will be supported by current climatic trends and events. The information can also be used to develop technical standards and specifications to ensure that transmission equipment being installed is robust enough to endure the foreseen climatic conditions” says John McGuckin.<sup>3</sup>

## DEVELOPMENT OF THE ADAPTATION STRATEGY

In January 2015, the Irish Government published a Climate Action and Low Carbon Development Bill. The Bill aims, in part, to provide a statutory basis for the national objective of transitioning to a low-carbon, climate-resilient and environmentally sustainable economy by 2050. The Bill sets out proposed statutory provisions requiring that the Minister for the Environment, Community and Local Government (DoECLG) make a National Adaptation Plan and submit it to government for approval.

The National Adaptation Plan will be built on sectoral plans, prepared by relevant government departments and agencies and adopted by relevant Ministers. EirGrid and ESBN are now engaged in the National Climate Change Adaptation Framework Working Group (WG). This working group aims to ensure that adaptation measures are taken across different

sectors and levels of government to reduce Ireland's vulnerability to the negative impacts of climate change.

As part of the National Adaptation Plan, EirGrid and ESBN must develop and submit an adaptation plan for the electricity sector. Given its previous efforts and experience in addressing climate-related issues, both EirGrid and ESBN are well prepared to play an active role in the WG and to continue to explore the evolving risks posed by climate change.

## LESSONS LEARNED

The collaboration between EirGrid, ESBN and Mott MacDonald was successful; it has enabled EirGrid and ESBN to launch their joint

climate change adaptation initiative and produced a sound risk assessment based on the UKCIP framework. "Prior to this risk assessment, EirGrid reacted to 'events' such as flooding to scope remedial actions. The climate change risk assessment helped identify key risks based on predicted climatic conditions, and to screen and prioritize remedial works to ensure that investment is directed to the most appropriate assets in advance of potential events".<sup>1</sup>

EirGrid and ESBN in Ireland may be at the beginning of the adaptation process, but are already at an advantageous position. The creation of the DoECLG-led working group provides a structural framework and will help to consolidate ongoing efforts.

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<sup>1</sup> The Community Climate Change Consortium for Ireland (C4I) Project was established in 2003. Its main objective is to consolidate and intensify the national effort in climate change research.

<sup>2</sup> McGuckin, J. Personal Communication. (2015).

<sup>3</sup> Engineers Canada. Public Infrastructure Engineering vulnerability Committee. (2015). at <<http://www.pievc.ca/>>

<sup>4</sup> Farrell, C. Questionnaire with Conor Farrell. (2015).

<sup>5</sup> UKCIP. UKCIP risk framework. (2003). at <<http://www.ukcip.org.uk/wizard/about-the-wizard/ukcip-risk-framework/#.ViTYin6rTmE>>



## KEY TAKEAWAYS

- 1** Many tools, including assessment of climate change risks, are available and helpful to address questions related to climate change and to structure adaptation efforts.
- 2** Collaborating with an external climate-savvy consultant is a good way to start building adaptation capacity.

### ORGANIZATION(S)

EirGrid (Ireland) and ESBN (Ireland)

### POWER SUB-SECTOR(S)

Electricity transmission

### ADAPTATION TYPE(S)

- Management – Insurance and financial-risk management

### CLIMATE CHANGE IMPACT(S)

- Flood events caused by extreme precipitation, sea level rise and storm surge.

### ADAPTATION COSTS

- The cost of a risk assessment is low.

### ADAPTATION BENEFIT(S)

- Minimization of damages during floods
- Increased network resilience

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### FULL REPORT

<https://ouranos.ca/en/programs/energy-adaptation-case-studies/>

