

Step 3 Best Performing Option Report

The Kildare-Meath Grid Upgrade
Capital Project 966

March 2021



Revision Table:

Revision	Issue Date	Description
01	24 March 2021	Best Performing Option Report in Step 3

This page was intentionally left blank

1 Table of Contents

1	Table of Contents	4
2	Introduction	5
2.1	Previous reports and supporting documentation	5
2.2	Description to frequently used terminology in report	6
3	The Project	7
3.1	Background information	7
3.2	Options assessed in Step 3	7
4	Process followed	9
4.1	Description of process	9
4.2	Scale used to assess each criteria.....	11
5	Stakeholder engagement	12
5.1	Stakeholder engagement activities	12
5.2	Public consultation.....	12
6	Selection of best performing option	13
6.1	Multi-criteria assessment prior to consultation	13
6.2	Assess feedback from public consultation	14
6.3	Review of multi-criteria assessment.....	16
6.3.1	Review of Socio-economic assessment criteria	16
6.3.2	Review of Deliverability criteria Option 1 – Up-voltage option	17
6.3.3	Review of Deliverability criteria Option 4 – New 400 kV UGC	18
6.3.4	Final MCA after review of feedback and inclusion of new information	20
6.4	Further consideration of information to aid the decision making.....	21
6.4.1	Option 1 – Up-voltage	21
6.4.2	Option 4 – New 400 kV underground cable.....	22
6.5	Best performing option.....	24
7	Conclusions	25

2 Introduction

The Kildare Meath Grid Upgrade is a proposed reinforcement of the electricity network between Dunstown 400 kV station in County Kildare and Woodland 400 kV station in County Meath. The project is essential to enable the further integration of renewable energy in line with Government policy ambitions. It will further be a key enabler in meeting the growing demand for electricity in the eastern part of the country. This report describes the outcome of various assessments undertaken with regard to the identified options for the project after the public consultation was closed. It presents the results that underpin the identified best performing option.

EirGrid follows a six step approach when we develop and implement a solution to any identified transmission network problem. This six step approach is described in the document 'Have Your Say' published on EirGrid's website¹. The six steps are shown at a high-level in Figure 1. Each step has a distinct purpose with defined deliverables.

The Kildare - Meath Grid Upgrade project is at the end of Step 3 and this report will detail the final decision and its justification of the Best Performing Option (BPO) which will be developed further in Step 4 in accordance with our six step approach.



Figure 1 High level description of Project Development Process

2.1 Previous reports and supporting documentation

Some of the assessments and investigations of the options or analysis of the feedback from the public consultation have been carried out by external parties. Where relevant,

¹ <http://www.eirgridgroup.com/the-grid/have-your-say/>

this is highlighted in this report and the referenced reports are named and a summary of the findings is presented. There are also reports from previous steps and earlier published Step 3 reports which provide background to the assessments and the process followed and should be read in conjunction with this report. All these reports are available on our website².

2.2 Description to frequently used terminology in report

The remaining Step 3 process references some terminology which will be used throughout this report. For clarity, these terminologies and expressions are introduced and listed below:

- **Multi-criteria assessment (MCA)**
This is the tool we use to compare options against each other. It is a multi-criteria performance matrix and includes five criteria.
- **Emerging Best Performing Option (EBPO)**
This is the option or options that emerge in Step 3 after the five criteria have been assessed using a multi-criteria performance matrix. The EBPO for the Kildare - Meath Grid Upgrade project was announced at the start of the consultation period.
- **Emerging Best Performing Option Report (EBPO Report)**
This is the report detailing the assessment in Step 3 after the five criteria have been assessed using a multi-criteria performance matrix. This assessment was carried out before the consultation period.
- **Best Performing Option (BPO)**
This is the option which will be taken forward into Step 4 for further investigation and development into a proposal that will be the subject of consenting of the relevant consenting authority and subsequently taken forward to construction and energisation.
- **Best Performing Option Report (BPO Report)**
This is the report detailing the assessment in Step 3 after the feedback and other new information have been taken into consideration. This report aims to detail the final decision and its justification of the Best Performing Option (BPO).

² <http://www.eirgridgroup.com/the-grid/projects/capital-project-966/related-documents/>

3 The Project

3.1 Background information

The Kildare Meath Grid Upgrade is a proposed electricity transmission development project that will help transfer electricity to the east of the country and distribute it within the network in Counties Meath, Kildare and Dublin. It involves a suite of transmission network reinforcements centred on strengthening the network between the existing Dunstown 400 kV station in County Kildare and Woodland 400 kV station in County Meath, with a dynamic reactive device required to support the voltage. This project is at the end of Step 3 of our six step approach.

The need for the project was reviewed in Step 3 and it indicates that the previously identified drivers still remain and have further increased the need to strengthen the transmission network between Dunstown and Woodland stations, and that the need for the reinforcement is still robust. The project is essential to enable the further integration of renewable energy in line with Government policy ambitions. It will further be a key enabler in meeting the growing demand for electricity in the east region, by improving the capacity of the network in this region. This forecasted growth within the region is due to increased economic activity and the planned connection of new large scale energy users. The confirmation of need report can be found on our website³.

3.2 Options assessed in Step 3

In Step 3 five different options were assessed and evaluated representing three different technologies, namely:

- A new technology which would involve an increase in the operating voltage of existing 220 kV circuits, called an up-voltage of existing 220 kV towers.
- Overhead line (OHL);
- Underground cable (UGC).

All options involve a suite of transmission network reinforcements centred on strengthening the network between the existing Dunstown 400 kV station in County Kildare and the Woodland 400 kV station in County Meath.

³ <http://www.eirgridgroup.com/the-grid/projects/capital-project-966/related-documents/>

The five options assessed and evaluated in Step 3 were:

1. Option 1: Up-voltage existing 220 kV OHL circuits
 - Using a new technology which would enable two existing 220 kV circuits connecting to Dunstown and Woodland stations to be modified, primarily by means of replacing existing 220 kV conductors (and associated tower structures if necessary) with 400 kV conductors to create a new Dunstown – Woodland 400 kV circuit.
 - The circuits selected to achieve this are the Gorman – Maynooth 220 kV circuit and the Dunstown – Maynooth 2 220 kV circuit.
2. Option 2: New 400 kV OHL circuit
3. Option 3: New 220 kV UGC circuit⁴
4. Option 4: New 400 kV UGC circuit: one circuit constructed along one route⁵
5. Option 5: New 400 kV UGC circuit: two circuits constructed along two separate routes⁶

⁴ Note that Option 3 was called option 3A in previous reports

⁵ Note that Option 4 was called option 3B in previous reports

⁶ Note that Option 5 was called option 3C in previous reports

4 Process followed

4.1 Description of process

This report details the decision and its justification with regards to the Best Performing Option (BPO) for the Kildare - Meath Grid Upgrade project in Step 3.

In Step 3, the options presented in Section 3.2 were investigated in more detail and a multi-criteria performance matrix was used to compare the options against each other. The multi-criteria assessment (MCA) in Step 3 identified an Emerging Best Performing Option (EBPO) and an emerging best performing alternative. The assessment and evaluation of the options were documented in the EBPO report which was published on our website⁷.

The process provides for public participation and stakeholder engagement in the decision-making process. A 10-week consultation, lasting between October and December 2020, was held on the process followed and the options evaluated in Step 3.

To arrive at the Best Performing Option (BPO) for the Kildare - Meath Grid Upgrade and to conclude the Step 3 process there was three remaining activities that needed to be completed after the consultation period closed. Figure 2 shows the high level process identifying these activities. These three activities and their outcomes will be considered in the decision making process. A short description of each activity is provided below.

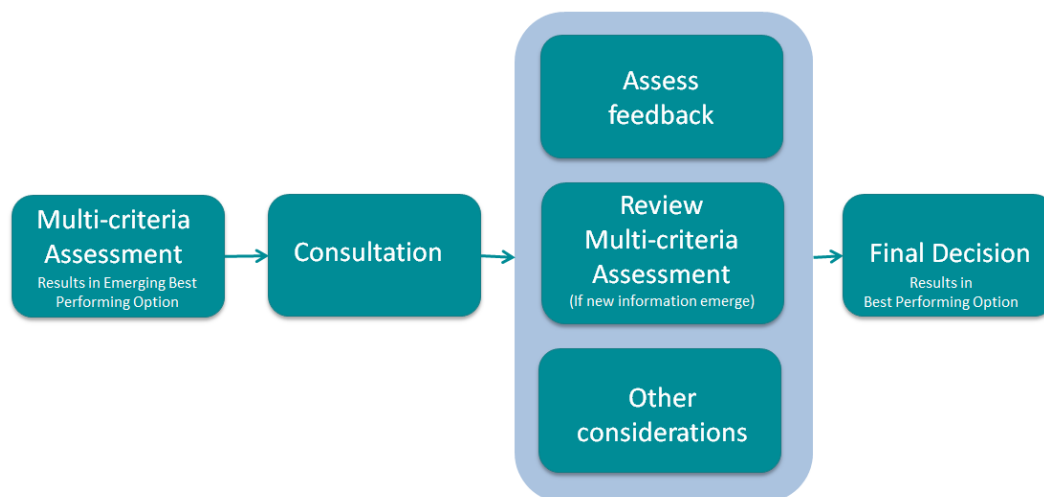


Figure 2 High level process describing remaining activities in Step 3 after public consultation closed

⁷<http://www.eirgridgroup.com/the-grid/projects/capital-project-966/related-documents/>

- Task 1 – Assess feedback from public consultation

The feedback received during the consultation period will be carefully considered and analysed using a coding framework. This coding framework will be based on the responses received to display and capture views and concerns raised during the consultation period. The feedback analysis will be conducted by an independent consultancy specialising in stakeholder engagement analysis and published on our website in a consultation feedback report.

The feedback will be incorporated in the multi-criteria assessment (MCA) or be dealt with outside the MCA depending on the nature of the feedback. If the feedback concerns the criteria assessed in the MCA, it will be considered and incorporated in the review of the MCA as explained in Task 2. If the feedback does not concern the criteria assessed in the MCA it will also be incorporated and considered in the decision making process, but outside the MCA as described in Task 3.

In addition, the feedback will inform us how to best to progress the BPO in the next step with regard to the views and concerns raised.

- Task 2 – Review of the multi-criteria assessment

The review will incorporate the feedback and other new information received that concerns the criteria assessed in the MCA. A clear description of the new information received will be provided. If the review results in a change to the previous assessment a justification will be outlined.

- Task 3 – Other considerations

In some cases information emerges that is not covered by the criteria in the MCA. In such cases the information will be considered outside the MCA and may influence the identification of the BPO for the project. A clear description of the new information received and a justification for any changes made to the original assessment will be provided.

In other cases the MCA may result in an outcome with equal performance of options and other measures may have to be used to distinguish between the options. These measures may relate to technical and/or operational issues of the transmission system, strategic decisions in terms of the developments of the Irish transmission system in a timely manner and any risks that these items may impose to the transmission system. A clear description of the factors influencing the decision will be provided.

The above three activities, Task 1 – 3, and their outcomes will be considered in order to inform the decision of the BPO for the project. At the end of Step 3 the Best Performing Option Report will be published.

In accordance with our six step approach, the BPO will be developed further in Step 4. It will then be the subject of a planning application in Step 5. If the application is consented by the relevant consenting authority, the permitted development will then be subject to detailed design, construction and energisation.

4.2 Scale used to assess each criteria

The effect on each criterion parameter is qualitatively determined using expert judgement and experience. This is presented by means of colour coding, along a range from “more significant”/“more difficult”/“more risk” to “less significant”/“less difficult”/“less risk”.

The following scale is used to illustrate the performance of each criterion.:

More significant/difficult/risk

Less significant/difficult/risk



In the text, this colour-coded scale is qualified by text comprising:-

- Low (Cream);
- Low-Moderate (Green);
- Moderate (Mid-level) (Dark Green);
- Moderate-High (Blue);
- High (Dark Blue).

5 Stakeholder engagement

5.1 Stakeholder engagement activities

The aim of stakeholder engagement in Step 3 is to transparently communicate our findings so far to key stakeholders and to ensure opportunities for public participation in the development of the project. In particular, this comprises taking on board feedback on the assessment and emerging conclusions, which will then inform EirGrid's decision-making prior to announcement of a BPO.

The stakeholder engagement for Kildare - Meath Grid Upgrade in Step 3 was divided into two phases: an information phase and a public consultation phase.

In the information phase, we informed and engaged with relevant regional and national stakeholders such as Government Departments, Meath County Council, Kildare County Council, Elected Representatives, the IDA, Chambers of Commerce, and the Public Participation Networks. This phase also included an information campaign in local newspapers, radio, online advertising, social media video animations, the publication of investigative reports and technical assessments, an information leaflet to all homes in the study area, an online interactive map and webinars. This phase covered the period between 20 July and 5 October 2020. At the end of the information phase, the EBPO was announced and a 10 week public consultation period commenced.

5.2 Public consultation

The public consultation requested feedback on the five options presented in Section 3.2, including the emerging best performing option and the emerging best performing alternative. The consultation also sought feedback on the study area, ideas for the proposed community fund, and the consultation process.

The consultation phase included awareness raising measures as outlined in 5.1 with the addition of a virtual exhibition room and additional formal meetings with the local authority, public participation networks and chambers of commerce. A Community Liaison Officer was in regular contact with stakeholders and dealt with incoming queries about the project on an on-going basis. Freepost questionnaires were distributed to all homes in the study area in order to encourage the public to participate in the consultation process safely in the context of Covid-19 and to minimise any potential digital divide in the provision of information.

An overview of the consultation feedback and the review of this information is provided in section 6.

6 Selection of best performing option

As described in section 4, three activities had to be completed in order to confirm the BPO for the Kildare - Meath Grid Upgrade project after the public consultation closed. This section will outline the assessments carried out for these activities and provide justification if this resulted in changes to the previous assessments.

To provide some background and context, the outcome of the MCA that was announced before the public consultation will be presented in section 6.1. The EBPO report published on our website⁸ will provide more detail of the evaluation of the individual options and their sub-criteria prior to the public consultation. Section 6.2 gives an overview of the consultation feedback. Section 6.3 and 6.4 outline the assessments made in regards to the review of the MCA and other considerations influencing the identification of the BPO. In section 6.5, the Best Performing Option (BPO) for the Kildare - Meath Grid Upgrade project is presented and the justification given.

6.1 Multi-criteria assessment prior to consultation

In line with EirGrid's roles and responsibilities, we have an obligation to develop a safe, secure, reliable, economical, and efficient electricity transmission system while having due regard for the environment of Ireland. In our decision making, these fundamentals are captured in the five criteria considered in the multi-criteria assessment (MCA).

The MCA in Step 3 identified an Emerging Best Performing Option (EBPO) and an emerging best performing alternative and these were announced at the start of the consultation period.

Table 1 shows the outcome of the MCA which indicate the EBPO as Option 1 – Up-voltage and the emerging best performing alternative as Option 4 – 400 kV underground cable (UGC).

⁸ <http://www.eirgridgroup.com/the-grid/projects/capital-project-966/related-documents/>

	Option 1 Up-voltage	Option 2 400 kV OHL	Option 3 220 kV UGC	Option 4 400 kV UGC	Option 5 400 kV UGC (2 routes)
Technical Performance	Light Green	Yellow	Dark Blue	Green	Blue
Economic Performance	Light Green	Yellow	Blue	Light Green	Dark Blue
Deliverability	Blue	Dark Blue	Blue	Blue	Dark Blue
Environmental	Light Green	Green	Green	Green	Blue
Socio-economic	Green	Dark Blue	Blue	Blue	Dark Blue
Combined Performance	Green	Dark Blue	Dark Blue	Blue	Dark Blue

Table 1 Overall comparison (MCA) of options using five criteria in Step 3 prior to consultation

6.2 Assess feedback from public consultation

The consultation process was owned and managed by EirGrid. Traverse, an independent consultancy specialising in stakeholder engagement analysis, was commissioned to analyse responses to the consultation and report on the findings. Their report (Kildare-Meath Grid Upgrade Step 3 Consultation Final Report) provides detailed information on the analysis process and the responses received. This report is available on our website⁹. The public consultation received a total of 178 responses from stakeholders. Each response was analysed and reported on. A summary of the findings are provided below.

Many respondents express support for Option 1 (Up-voltage existing 220 kV OHL circuits), often saying that they do so because this option would make use of existing infrastructure. Some respondents feel that this option would be less disruptive to the environment and to local people and communities than other options. Opposition to and concerns about Option 1 focus on the presence of overhead lines. Some respondents express concern that electric and magnetic fields (EMFs) from overhead lines might have a potential negative impact on the health of local people, that overhead lines could

⁹ <http://www.eirgridgroup.com/the-grid/projects/capital-project-966/related-documents/>

be placed too close to properties or affect their value, and that overhead lines could have a potential negative impact on the local landscape.

Many respondents express support for Option 4 (New 400 kV UGC circuit). Respondents frequently said that they prefer underground cables to overhead lines. Some respondents believe that Option 4 would be safer for human health, saying that they believe that there would be less of a potential impact on local people from EMFs, and that cables would be less vulnerable to damage from storms. Some respondents also support Option 4 because they feel it would have less of a potential impact on the environment than the other options. Some respondents express opposition to Option 4 without providing additional details. Several respondents express concern about the cost of this option, while several others raise fears about its deliverability and performance, saying that it could incur delays or cost overruns, or be difficult to maintain. Several respondents express concern about the possible disruption this option could cause to local people and communities, and a small number of those who responded say that this option could potentially impact upon the local environment.

More generally, there were a small number of supporters for Options 2, 3 and 5. Several respondents supported the project generally, noting the economic and sustainability necessities. There was a general preference for putting cables underground and general opposition to overhead lines. A small number of respondents expressed that they would support both Option 1 and 4 and agree with EirGrid's assessment that these are the best options available. Some of the concerns expressed by respondents focused on electric and magnetic fields, biodiversity, historical sites, visual impact and traffic disruption.

The responses from the consultation can be summarised as follows:

- Provided valuable insight into views and opinions about the proposals.
- Will influence our approach to consultation in next step of this project.
- Identified both support and concerns for all five options, the consultation process and the study area.
- Included feedback across a broad range of issues.
- Included feedback indicating little opposition to any of the options at this point.
- Identified no new information that would influence the multi-criteria assessment.
- Revealed several respondents support the project generally, noting the economic and sustainability necessities.
- Indicated general concerns that focused on issues such as EMF, wildlife, historical sites, visual impact and traffic disruption.

6.3 Review of multi-criteria assessment

After the feedback had been carefully reviewed and documented by our expert in stakeholder engagement analysis, Traverse, EirGrid and our consultants Jacobs incorporated the outcome of the feedback into the MCA. In addition, any new information presented during the consultation period was also assessed and incorporated.

This section will describe which of the five criteria in the MCA were affected by the consultation feedback or new information and provide justification for any change.

6.3.1 Review of Socio-economic assessment criteria

In Step 3, in line with EirGrid's Social Impact Assessment Methodology, a draft Strategic Social Impact Assessment (SIA) Scoping Report was compiled. It included all of the assessments and investigations in relation to potential socio-economic impacts and was prepared by our external consultant Jacobs. It was published on our website during the Information Stage in July 2020, before the start of the Public consultation period which began in October 2020. The draft report presented an initial signpost of likely social impact and, in accordance with our SIA Methodology, it was required to be updated once the maximum amount of information has been gathered, including from stakeholder engagement.

The feedback from the Public Consultation and Landowner Engagement has now been assessed and taken into account by Jacobs in the preparation of a final Strategic SIA Scoping report, which will inform the SIA to take place during Step 4. The final Jacobs report (32108AE-REP-003 – Kildare-Meath Grid Upgrade Step 3 Strategic SIA Scoping Report Final) is available on our website¹⁰.

Feedback from stakeholders has been included in the final Strategic SIA Scoping Report and discussed in relation to the initial assessment and whether any changes might be required. The feedback didn't highlight any social or economic aspects that hadn't already been identified and assessed in the draft Strategic SIA Scoping Report and used in the previous MCA. Further, no feedback was received on the draft Strategic SIA Report itself. As such, the preliminary findings in the draft report are confirmed and no changes have been made to the methodology proposed, the potential impacts identified or the conclusions of the previous MCA assessment.

¹⁰ <http://www.eirgridgroup.com/the-grid/projects/capital-project-966/related-documents/>

6.3.2 Review of Deliverability criteria Option 1 – Up-voltage option

The deliverability criterion assesses transmission equipment outage length required to implement the option. It also considers general inter-dependence with other projects. In total there are five sub-criteria considered when the overall deliverability performance is assessed for each option.

In relation to Option 1, one sub-criterion under deliverability was reviewed namely, 'Dependence on other projects (outages)'.

The final feasibility report¹¹ in relation to how Option 1 could be implemented was received during the consultation period. The report also included durations of the required outages, which we did not have in the original assessment. This new information was assessed in regards to the acceptability of the required outage durations.

The outcome of the review is that the outages and the required durations will be very difficult to grant and will require a specific sequence of the outages to limit their potential impact on the system integrity. Prioritisation between required outages for this option and other projects is necessary to complete Option 1. Prioritisation of outages occur in today's transmission system as well, but it is anticipated that this will become more challenging due to further new connections of customers and other planned reinforcements and tighter generation capacity margins¹². For Option 1 to be delivered in a timely manner a prioritisation decision would be necessary over at least three consecutive outage seasons and this would create delays for other project works such as other planned reinforcements, new connections, maintenance works and required generation outages.

The implementation of Option 1 would mean that some existing 220 kV circuits between Dunstown and Woodland stations would have to be taken out of service for the duration of the works. This will further contribute to the inflexibility of the transmission system to accommodate other outages and this in turn will have an impact on the risk to security of supply. The risk is very high that the duration of the required outages would over run due to the nature of the innovative construction method and complexity of the works or due to land access issues.

The required outages and their duration, to implement Option 1, have a greater potential impact than previously considered. As a result in regards to the sub-criteria 'Dependence on other projects (outages)', this new information means an increased potential impact

¹¹ <http://www.eirgridgroup.com/the-grid/projects/capital-project-966/related-documents/>

¹² <http://www.eirgridgroup.com/site-files/library/EirGrid/All-Island-Generation-Capacity-Statement-2020-2029.pdf>

for Option 1. This sub-criteria has been assigned a high impact (**Dark Blue**) to reflect this, instead of the previously assigned moderate to high impact (**Blue**).

Table 2 shows the overall deliverability performance in the previous MCA and the outcome of the review. With the new information incorporated it is considered that Options 1 is still deemed to have moderate to high impact (**Blue**) from a combined deliverability performance point of view when this change is incorporated.

Deliverability performance of Up-voltage (Option 1)			
	Original MCA		Review of MCA
Implementation timelines	Blue		Blue
Project plan flexibility	Blue		Blue
Risk of untried technology	Blue		Blue
Dependence on other projects	Blue		Dark Blue
Supply chain constraints, permits, wayleaves etc.	Green		Green
Combined Deliverability Performance	Blue		Blue

Table 2 Deliverability performance for Option 1 in Original MCA and after review

6.3.3 Review of Deliverability criteria Option 4 – New 400 kV UGC

The deliverability criterion assesses transmission equipment outage length required to implement the option. It also considers general inter-dependence with other projects. In total there are five sub-criteria considered when the overall deliverability performance is assessed for each option.

In relation to Option 4, two sub-criteria under deliverability received more detailed information during the consultation period namely, ‘Project Plan Flexibility and Supply Chain Constraints Permits, Wayleaves’.

During the consultation period, new information was received in the form of advice from the Asset Owner cable specialists suggesting that UGC can be constructed in a more efficient manner than was previously assumed. This new information gives rise to opportunities to reduce the width of the trench required from 4 metres to approximately 2 metres, and still maintain the required thermal rating of the UGC. In turn, this change is

more likely to result in less potential community / traffic impacts during construction, less need to enter third party lands and more options available to mitigate routing constraints. It is also considered that further improvements in relation to permitting and wayleave can be achieved with proactive engagement during the pre-planning stage of the UGC route. For these reasons Option 4 is deemed to have a reduced potential impact in regards to the sub criteria 'Project plan flexibility' and 'Supply chain constraints, permits, wayleaves' compared to the previous assessment. Both sub-criteria have been assigned a moderate impact (**Dark Green**) in the review assessment compared to the previous moderate to high (**Blue**) impact.

It should be noted that the previous assessment of these two sub-criteria were assessed based on existing term contracts for UGC and the standard cable laying methods. The new information is based on potential new cable types and different laying and construction techniques which may result in a reduced trench width. This information was not available to us at the start of Step 3.

Table 3 shows the overall deliverability performance in the previous MCA and the outcome of the review. With the new information incorporated it is considered that Options 4 has an improved deliverability performance compared to the previous assessment and has been deemed to have a moderate impact (**Dark Green**) from a deliverability performance point of view.

Deliverability performance of new 400 kV UGC (Option 4)			
	Original MCA		Review of MCA
Implementation timelines	Light Green		Light Green
Project plan flexibility	Blue		Dark Green
Risk of untried technology	Blue		Blue
Dependence on other projects	Light Green		Light Green
Supply chain constraints, permits, wayleaves etc.	Blue		Dark Green
Combined Deliverability Performance	Blue		Dark Green

Table 3 Deliverability performance for Option 4 in Original MCA and post consultation MCA

6.3.4 Final MCA after review of feedback and inclusion of new information

Having assessed the consultation feedback and new information received and considered the impact that this has had on the overall MCA, the final Step 3 MCA is presented in Table 4.

The final Step 3 MCA combined performance indicates one material change from the original MCA.

- **Option 4:** Due to an improvement of the Deliverability performance of this option the overall combined performance for Option 4 changes from a moderate to high (Blue) to a moderate risk (Dark Green).

The final Step 3 MCA results in the two options, Option 1 and Option 4, having an equal overall combined performance across the criteria considered in the MCA.

	Option 1 Up-voltage	Option 2 400 kV OHL	Option 3 220 kV UGC	Option 4 400 kV UGC	Option 5 400 kV UGC (2 routes)
Technical Performance	Light Green	Yellow	Dark Blue	Green	Blue
Economic Performance	Light Green	Yellow	Blue	Light Green	Dark Blue
Deliverability	Blue	Dark Blue	Blue	Green	Dark Blue
Environmental	Light Green	Green	Green	Green	Blue
Socio-economic	Green	Dark Blue	Blue	Blue	Dark Blue
Combined Performance	Green	Dark Blue	Dark Blue	Green	Dark Blue

Table 4 Final MCA after review of feedback and inclusion of the new information received

6.4 Further consideration of information to aid the decision making

The outcome of the revised MCA for the Kildare Meath Grid Upgrade indicates that two of the options, Option 1 – Up-voltage and Option 4 – New 400 kV underground cable, have an equal combined performance across all of the criteria.

An equal combined MCA performance does not mean that the options have the same risks or impact on the transmission system. In fact the options may be very different and may create different challenges for us as the licenced Irish Transmission System Operator (TSO). Although these issues are taken into account in the MCA, all sub-criteria are treated with an equal value in the MCA to initially evaluate the options.

We focus on technical risk and deliverability challenges to help distinguish between the options. Ultimately, the decision comes down to a fine balance of these considerations.

The sections below discuss the balance between technical and deliverability risk of the two options in turn.

6.4.1 Option 1 – Up-voltage

Option 1 is technically more straight forward but it is more difficult to deliver. This option requires significant transmission circuit outages and the facilitation of these outages will be very challenging in a transmission system that is already facing challenges in term of plant margins and the granting of outages for required work such as maintenance, connection of new customers or network reinforcements.

There are a number of factors contributing to the difficulty in granting outages. The network on the east coast is lacking in alternative pathways for electricity to be transported to where it is needed when circuits are out of service. The system demand is growing, mainly due to increases in electricity demand from large energy users on the east coast. This increase in demand is forecast to continue in the period out to 2030. In addition, generation margins are reducing significantly as older generators are retiring from the system. Tighter generation margins make it more difficult to grant outages as transmission outages can also reduce flexibility of generation dispatch.

For Option 1, long duration outages of the Gorman – Maynooth 220 kV circuit and the Dunstown – Maynooth 2 220 kV circuit would be required to complete the works. These two circuits are key paths between the north and south greater Dublin network, and outages of either of these circuits would prevent other outages on the 220 and 400 kV network taking place. It is not expected that the simultaneous planned outage of both these circuits could be facilitated and therefore the works would need to be carried out in sequence. Additionally, due to the requirement to carry out other essential maintenance works on the 220 kV and 400 kV network, and also to facilitate other upgrade or

connection works, it is anticipated that the works would need to be split over a number of outage seasons. This could potentially cause delays to the urgently needed Kildare-Meath Grid Upgrade project.

The intention at the start of Step 3, for Option 1 – Up-voltage, was to use as many of the existing tower locations as possible. New information indicates that in order to minimise (as much as possible) the required circuit outages and their duration, the location of the majority of the towers would need to be offset from their current location¹³.

The construction of this option will require access to third party land. Although, this option is using an existing circuit, past experience of new build and uprate of overhead lines is that they have often experienced delays in completion of projects for a variety of reasons. If this were to occur on this project, it would have a knock-on impact on other projects and the maintenance programme in the region and would reduce operational flexibility of the transmission system particularly around high load periods.

Taking these factors into account, there is deemed to be a high risk that there would be delays to the project schedule if Option 1 was progressed

6.4.2 Option 4 – New 400 kV underground cable

Option 4 is more straight forward to deliver but is more technically challenging to integrate onto the transmission system. There are very few examples of 400 kV underground cable circuits installed in meshed transmission systems internationally. Typically, long lengths of high voltage underground cable circuits are installed in larger systems where a greater level of alternative pathways already exists. Because of their characteristics, 400 kV underground cables can introduce technical challenges to the system such as temporary over voltages or power quality issues related to harmonic voltage distortion.

Each high voltage underground cable project is unique and can't be compared with other cable projects either in Ireland or internationally. Each project has to be individually assessed to determine its technical impact on the transmission system and requires advanced system analysis to determine if it can be accommodated. The technical feasibility of underground cables depend on the need of the reinforcement, existing circuit redundancy or alternative pathways, the strength of the system or the stations that are being connected, among other things. As a result of this, the acceptable length of high voltage UGC may be different for different projects depending on where the project is located in the transmission network. Some parts of the transmission system are

¹³ ESB Engineering and Major Projects feasibility report for Option 1 (PE610-F0045-R00-001-000)
<http://www.eirgridgroup.com/the-grid/projects/capital-project-966/related-documents/>

stronger than other parts and have a more meshed configuration and may as such be better able to accommodate UGCs.

The analysis¹⁴ carried out to-date indicates that we can mitigate the technical challenges that high voltage UGC introduces for this project. Notwithstanding this, there remains a risk that technical issues could potentially be identified during the lifetime of the project as further information on the evolution of the network becomes available. Detailed technical studies based on the latest network information will be carried out at each stage of the project to ensure the technical challenges can be effectively mitigated.

Another challenge is the evolving nature of the Irish transmission system where many new network reinforcements will be required over the next 10 years to integrate new generation and accommodate new transmission reinforcements in order to meet the Government's energy policy ambitions. Selecting 400 kV UGC for the Kildare-Meath Grid Upgrade project, may mean that other future projects in this vicinity may face limitations on the length of UGC that can be accommodated. It is not possible to sufficiently predict the future evolution of the network to rule out this potential impact.

The new information from the asset owner in relation to cable trench width has further improved the deliverability assessment for Option 4 per the updated MCA. A reduced cable trench width makes it more feasible for the existing public road network to accommodate the proposed new cable route. It allows for easier access should the cable need repair or maintenance in the future. Where cables are installed in the public road, there may be some local traffic restrictions required such as temporary road closures, diversions during the construction works and use of certain temporary measures such as passing bays to mitigate the impact to traffic caused by the cable installation works. Cross country routing on third party lands will be considered where cable routing constraints arise. The cable route, while not yet designed is likely to require use of regional, local roads and involve crossings of the national road network. Discussions with key stakeholders such as local authorities and Transport Infrastructure Ireland will be required in the coming months before we are able to confirm a specific route for the project. Early and regular engagement with individuals, stakeholders and communities impacted will be an important part of the our engagement process.

The interaction of the cable route with works by other infrastructure providers will be an important consideration and may make installation of the cable more difficult at some points along the route and may require a cross-country route for parts of the circuit.

¹⁴ <http://www.eirgridgroup.com/site-files/library/EirGrid/Cable-integration-studies-for-Kildare-Meath-Grid-Upgrade-Step-3.pdf>

The potential deliverability challenges of implementing an underground cable can be mitigated by appropriate design solutions.

Taking all of the above factors into account, it is deemed that Option 4 has a low risk in terms of timely delivery, noting that it will still be a challenging option to deliver, and it is anticipated that the technical challenges in relation to integration of high voltage underground cable can be mitigated.

6.5 Best performing option

Having reviewed the consultation feedback and the new information received since October 2020, and considered the balance between technical and deliverability risks of the two equal performing options, Option 4 the 400 kV Underground Cable (UGC) has been selected as the Best Performing Option (BPO) in Step 3.

It is concluded that Option 4 has a lower risk in terms of the delivery timeline when compared to the Option 1 and has lower impact on the existing transmission system in terms of outages and other maintenance and capital works that are routinely required on the system. Option 4 will introduce a new transmission pathway between Dunstown and Woodland stations while keeping the existing 220 kV circuits intact. This means that the existing 220 kV circuits between Dunstown and Woodland stations, which is essential for supplying the greater Dublin network, can remain in service during the implementation of the project. This would provide flexibility to the system operator to accommodate other outages (generation and transmission) whilst also minimising the risk to security of supply. The additional transmission pathway creates greater capacity on the network to accommodate growth.

As the need for greater capacity grows on the transmission system into the future it is possible that it may be necessary to progress the Option 1 - Up-voltage at some point. It is envisaged that Option 1 - Up-voltage would present a lesser risk to the existing system at that point as the new 400 kV cable option would have been successfully delivered creating an additional pathway for redundancy. If we were to look to progress the Up-voltage option at some point in the future it would follow our six step approach to developing the grid and would include engagement with stakeholders as part of the process.

7 Conclusions

The Kildare Meath Grid Upgrade is a proposed reinforcement of the electricity network between Dunstown 400 kV station in County Kildare and Woodland 400 kV station in County Meath. The project is at the end of Step 3 of the six step approach that we use when we develop and implement a solution to any identified transmission network problem.

The project is essential to enable the further integration of renewable energy in line with Government policy ambitions. It will also be a key enabler in meeting the growing demand for electricity in the east region. The options investigated reinforce between Dunstown 400 kV station in County Kildare and Woodland 400 kV station in County Meath. In Step 3, there were five options investigated.

- Option 1: Up-voltage existing 220 kV OHL circuits;
- Option 2: New 400 kV OHL circuit;
- Option 3: New 220 kV UGC circuit;
- Option 4: New 400 kV UGC: one circuit constructed along one route;
- Option 5: New 400 kV UGC: two circuits constructed along two separate routes

Each of these options has been assessed against the five criteria covering technical performance, economic performance, deliverability performance, environmental impacts and socio-economic impacts to compare the options against each other. The multi-criteria assessment (MCA) in Step 3 identified an Emerging Best Performing Option (EBPO) and an emerging best performing alternative. The assessment and evaluation of the options were documented in the EBPO report which was published on our website¹⁵.

The process provided for public participation and stakeholder engagement in the decision-making process. A 10-week consultation, lasting between October and December 2020, was held on the process followed and the options evaluated in the EBPO report.

To arrive at the Best Performing Option (BPO) for the Kildare - Meath Grid Upgrade and to conclude the Step 3 process, the MCA was updated to incorporate the consultation feedback and any new information received since October 2020. The updated MCA resulted in two options, Option 1 and Option 4, having an equal overall combined performance across the criteria considered in the MCA. We focused on the technical risk

¹⁵<http://www.eirgridgroup.com/the-grid/projects/capital-project-966/related-documents/>

and deliverability challenges to help distinguish between the two options. Option 1 is technically more straight forward but it is more difficult to deliver. Option 4 is more straight forward to deliver but is more technically challenging to integrate onto the system. Ultimately, the decision came down to a fine balance of these considerations.

The conclusion of Step 3 is that Option 4 (400 kV Underground Cable) has been identified as the Best Performing Option (BPO) to be developed further in Step 4. It will then be the subject of a planning application in Step 5. In the event that the application is consented by the relevant consenting authority, the permitted development will be subject to detailed design, construction and energisation.