

# Presentation to the March 2012 Meeting of Monaghan County Council

EirGrid's views on the -

*'Meath – Tyrone Report  
Review by the International Expert Commission'.*

In attendance -

Andrew Cooke, Director, Grid Development, EirGrid Plc  
Aidan Geoghegan, Project Manager,  
Shane Brennan, Project Engineer,  
David Martin, EirGrid Communications



05<sup>th</sup> March 2012

# EirGrid's Position on Technology Options (2010)

## AC Overhead Lines/Undergrounding

- 400 kV AC overhead line (OHL) is the least cost option and the best technical option for the North South Interconnector.
- AC underground cable (UGC) is not possible for this length at 400 kV (approx. 140 km).

# EirGrid's Position on Technology Options (2010)

## AC Partial Undergrounding

- **A hybrid 400 kV AC OHL/UGC option is technically possible but only if –**
  - i. The length of the UGC is restricted to a maximum of about 10 km and
  - ii. The large additional cost of the section of UGC can be justified on the basis of an environmental or technical constraint.
- **No section of the route has been identified, at this stage, as requiring or justifying UGC other than a short section in Woodland Substation.**

# EirGrid's Position on Technology Options (2010)

## HVDC

- There have been advances in HVDC Technology.
- New HVDC VSC version was considered for the Interconnector and discounted on the basis of –
  - i. Its High Cost
  - ii. The difficulty it would present for future extensions to the grid and
  - iii. The level of technical risk it would introduce into the system.

# EirGrid's Position on Technology Options (2010)

- Summary of EirGrid's position at the time of the last oral hearing.
- Table extracted from the previous EIS (2009).

Objective	Description	Technical Options		
		AC Overhead	AC Underground	DC
<b>1</b>	<b>Comply with EirGrid's Statutory and Regulatory Obligations</b>			
1.1	Safety	***	***	***
1.2	Reliability and security	***	**	**
1.3	Cost effectiveness	***	*	*
1.4	Due regard for the environment	**	**	**
<b>2</b>	<b>Meet the Specific Objectives of this Project</b>			
2.1	1500 MVA Capacity and appropriately strong points of interconnection	***	***	**
2.2	Reinforce the North East transmission network	***	***	***
<b>3</b>	<b>Meet the General Objectives for all projects of this type</b>			
3.1	Facilitate future grid connections and reinforcements	***	***	*
3.2	Good Technical Solution - Be 'best international practice' with proven technology	***	*	*



\*\*\* Acceptable for this project  
 \*\* A concern for this project  
 \* Unacceptable for this project

***
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*

# EirGrid's Position on Technology Options (2011) **Preliminary Re-Evaluation Report**

- Technology options reviewed again in 2011.
- Findings published in the Preliminary Re-evaluation Report.
- Advances in Technology did not change the overall conclusions.

# Findings of the Expert Commission (2012) AC Overhead Lines (OHL)

- AC Overhead lines are the “*traditional technical solution for the European grid*”.
- They are “*well proven*” and the “*cheapest solution in most cases*”.
- There have been delays in the past but in recent years “*there has been a significant acceleration*”. “*More overhead line projects have been commenced and built.*”

# Findings of the Expert Commission (2012) **AC Overhead Lines (OHL)**

- There have been developments in AC OHL technology in recent years.
- Some of these are –
  - The use of compact designs to reduce visual impact.
  - The use of HTLS (high temperature low sag) conductor.



## Findings of the Expert Commission (2012) AC Underground Cables (UGC)

- A 100% underground AC cable option cannot be “*seriously considered*” for reasons of “*costs, technical complexity and difficult installation*”.
- AC UGC is only considered “*for shorter distances (10 – 20 km) often as part of a hybrid AC solution.*”
- UGC is significantly more expensive ( e.g. Randstad Project; €10 million more per km than standard AC OHL).

## Findings of the Expert Commission (2012) HVDC

- Significant developments in HVDC VSC technology in recent years –
  - Converter losses have been reduced.
  - Higher capacities now possible.
  - Eight contracts were awarded in Europe in 2010-2011. Seven of these are submarine cable projects. Only one project, the France/Spain Interconnector, is entirely on-land.

## Findings of the Expert Commission (2012) HVDC (UGC)

- HVDC VSC with UGC is technically possible for the distance required here.
- Requires a narrower construction swathe than AC UGC.
- Due to the high cost of the converters it will however be significantly more expensive than standard AC OHL.
- It is also a “*less mature and more complex technology that can lead to increased operational risk*”.

# Installing 150 kV AC Cables in Denmark





# Installing 150 kV AC Cables in Denmark



# Repairing a fault on the Moyle HVDC Land Cable



Excavating and preparing the joint bay



# Repairing a fault on the Moyle HVDC Land Cable



# Repairing a fault on the Moyle HVDC Land Cable



Inside the tent preparing the cable for repair



## Findings of the Expert Commission (2012)

- If the Interconnector must be put underground then “*with today’s technology the best solution is a VSC HVDC solution*”.
- That HVDC option is however estimated to cost €333 million more than the standard 400 kV AC overhead line.

# Points of Discussion : cost

- The cost estimate of the Commission's HVDC option is understated –
  - Substation near Kingscourt excluded.
  - Life cycle costs excluded.
  - Cable cost appears low
  - Cable cost “*is based on favourable installation conditions*”.
- The real cost difference between the HVDC and the standard 400 kV AC OHL is in excess of €500 million.

# Points of Discussion : technology

- If the Interconnector must be put underground then *“with today’s technology the best solution is a VSC HVDC solution”*.
- The Commission notes that *“increasing the inertia by coupling the Northern Ireland and Republic of Ireland system increases reliability”*.
- A HVDC option does not achieve that important requirement.

# Summary and Conclusion

- There are now two options under discussion –
  - Standard 400 kV AC overhead line with limited potential for partial undergrounding.
  - 100% undergrounding using HVDC technology.

# Summary and Conclusion

- Both the Expert Commission and EirGrid agree that the HVDC option will cost hundreds of millions of Euro more than the standard AC overhead line.
- The Commission and EirGrid agree that VSC HVDC is a “*less mature and more complex technology that can lead to increased operational risk*”.

End

