

Transmission Network Optimisation

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Transmission Network Planning
EirGrid Customer Conference
November 24th 2011

Overview

- Context: TSO, Grid Development and Grid 25
- Transmission Network Optimisation
- Grid25 Delivery
 - Constructed
 - In construction
 - Being developed

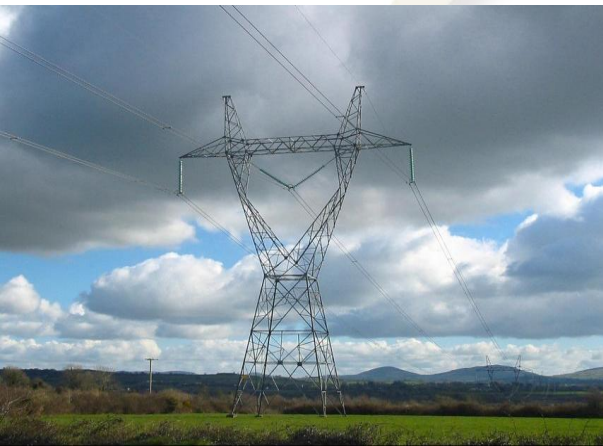
EirGrid

- TSO, licensed by Commission for Energy Regulation
- Semi-state Company
- Operates the real-time system – keeps the lights on!
- ★ Plans and develops the transmission grid
 - Connects renewable and conventional generators
 - Manages the day-to-day operations of the market



Grid Development Imperatives?

- 40% renewable Government target
- Reduce our reliance on imported fuels
- Interconnection with Europe
- Competitive Electricity Market
- Long term demand growth for electricity
- Platform for economic growth and competitiveness – jobs!
- Regional Growth



GRID25

Security &
Reliability



Balance



Costs &
Efficiency



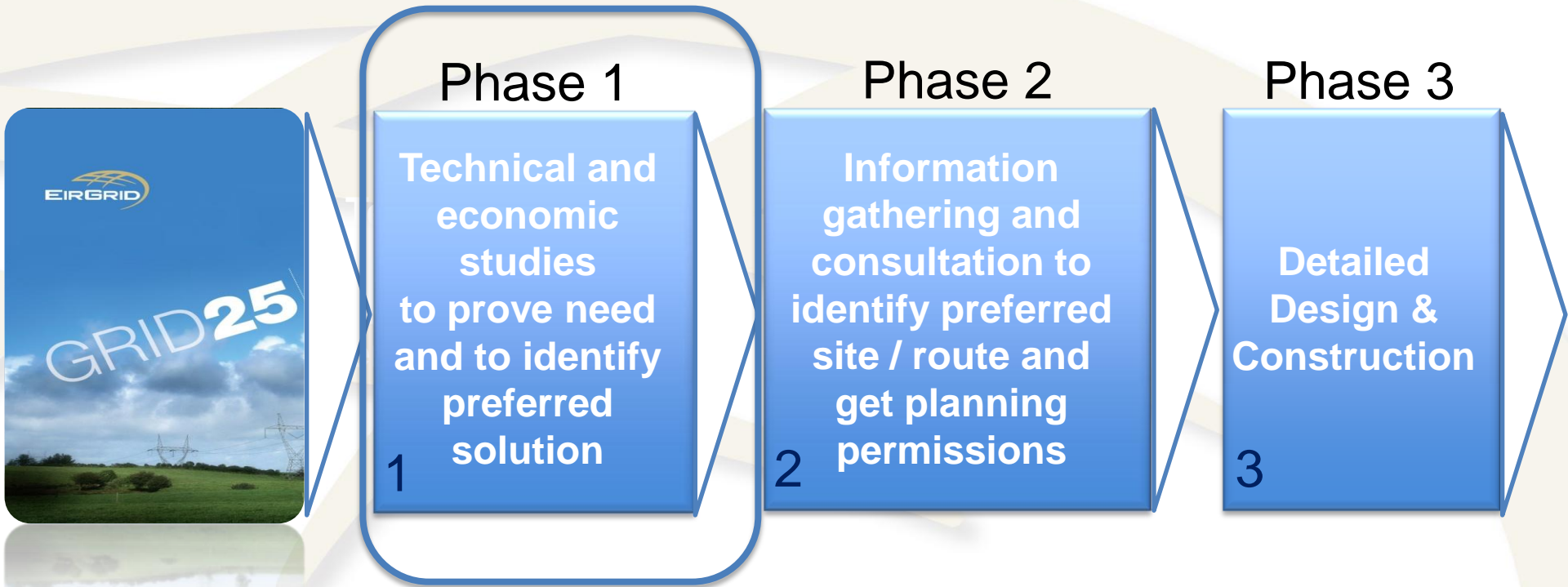
Community &
Environment

- Support energy policies
- Facilitate economic growth
- Connect generation
- Increase interconnectivity

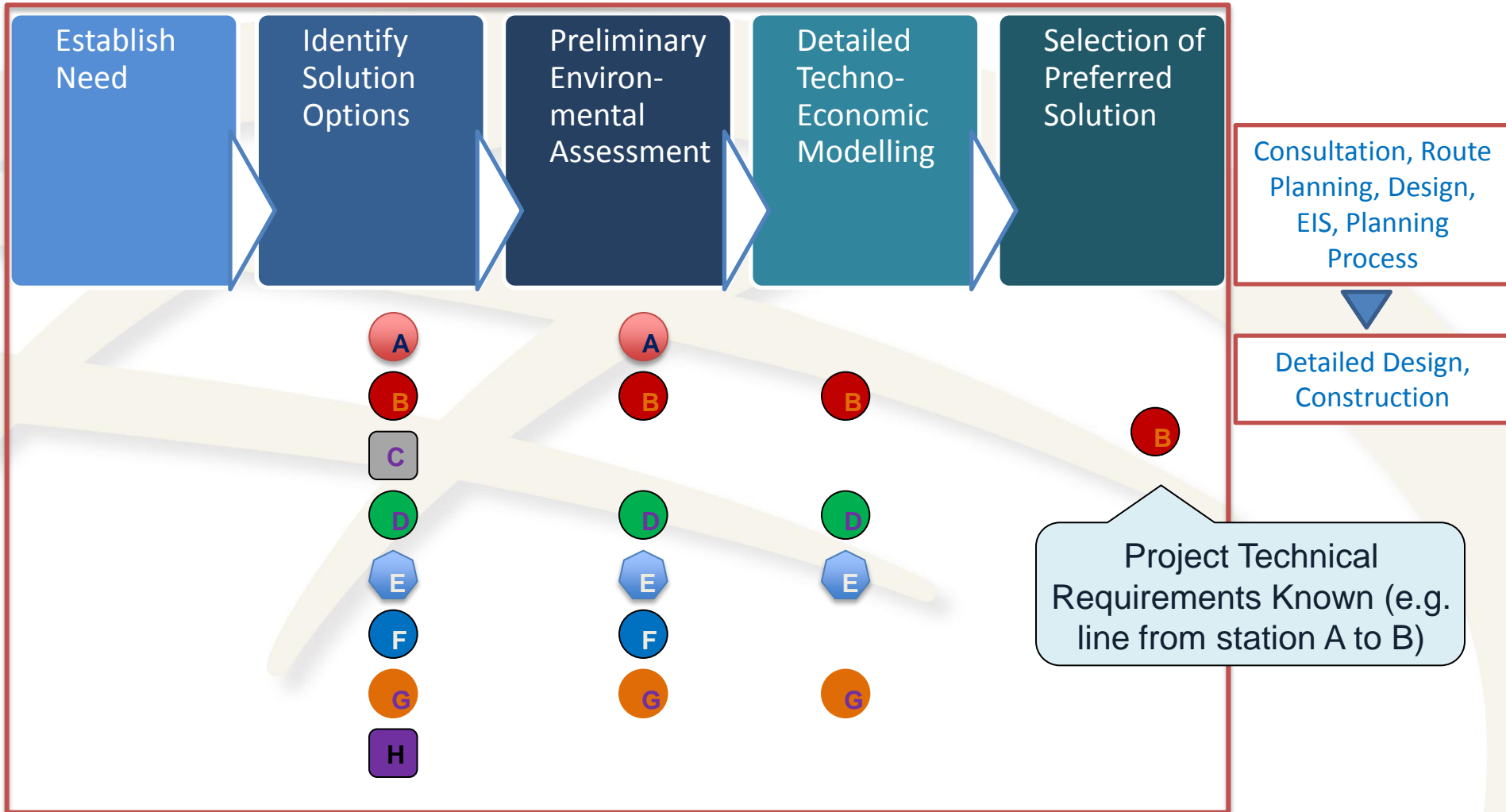
GRID25

A Strategy for the
Development of Ireland's
Electricity Grid for
a Sustainable and
Competitive Future

3 Phases of Project Life Cycle



Internal Project Approval Process



Reduction in Grid25 Costs

- Economic down-turn has eased urgency on some “demand-led” projects
- Cost-Benefit analysis
- New Technologies - High Temperature Low Sag conductor

Scale of Development

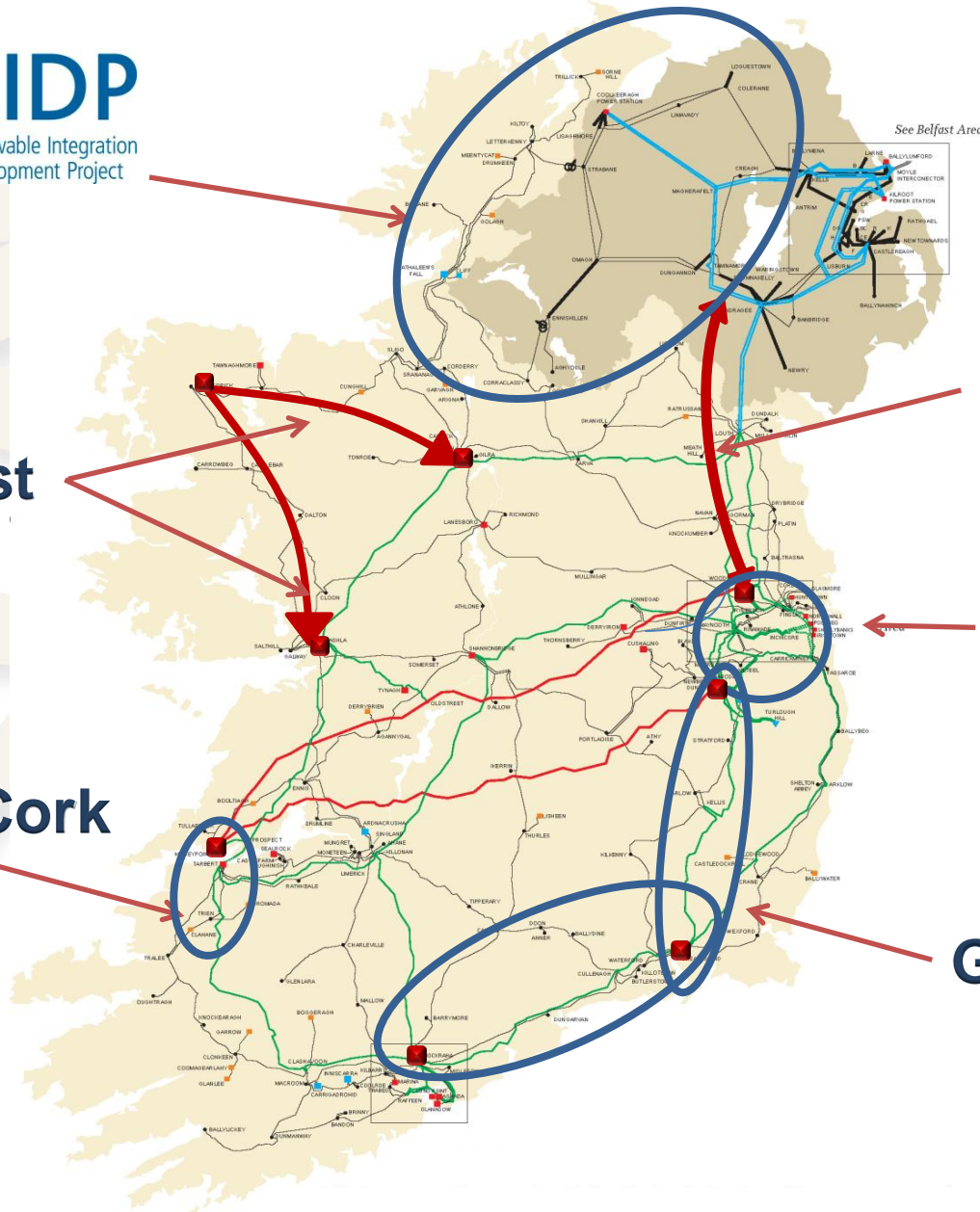
- More than 300 Projects
- 3.2 €billion investment
- 2,400 km uprating
- 1,000 km new build



Grid25 Progress

- 150 km of new circuit completed
- 300 km of existing network uprated
- Plan to uprate 300 km p.a. going forward
- Over 300 km of new build with planning consent and in construction
- 14 major high voltage stations in development

Grid25 Major Backbone Projects



North-South Interconnector
<Phase 2>

Dublin Ring
<Phase 1>

Grid West
<Phase 2>

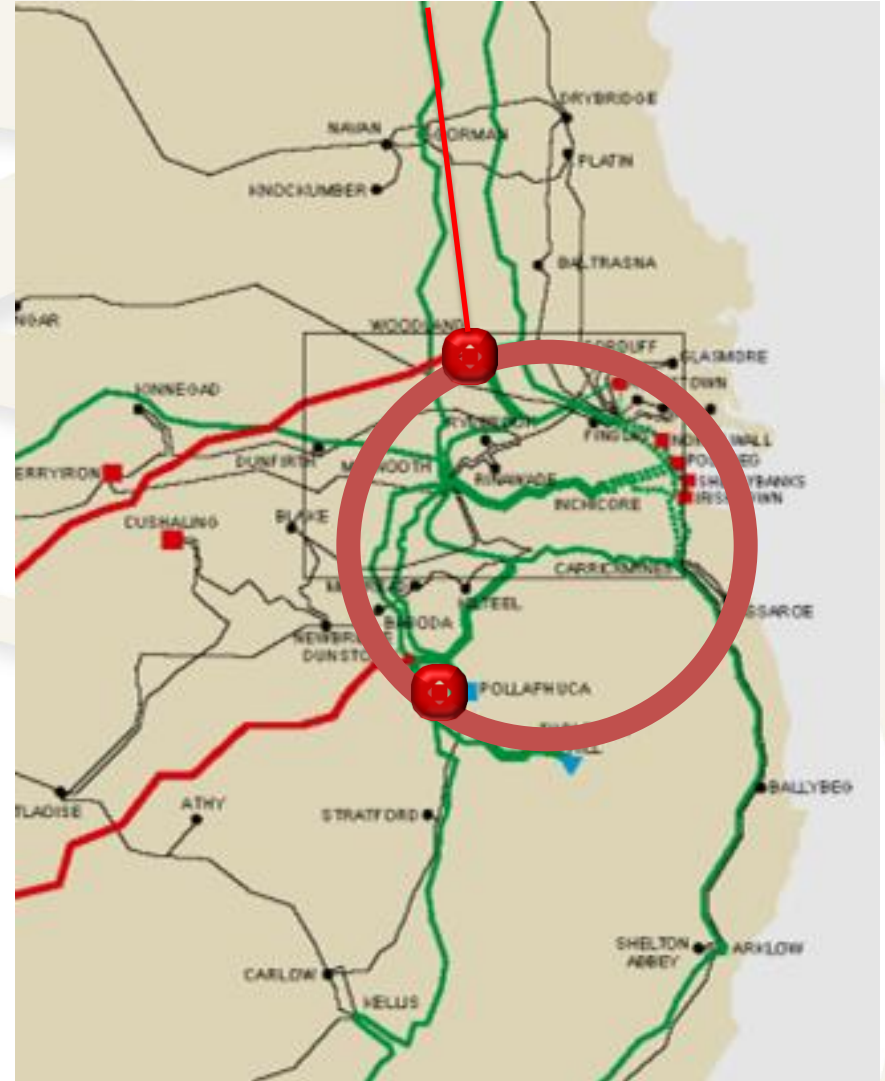
Shannon-Cork
<Phase 2>

Grid Link
<Phase 2>



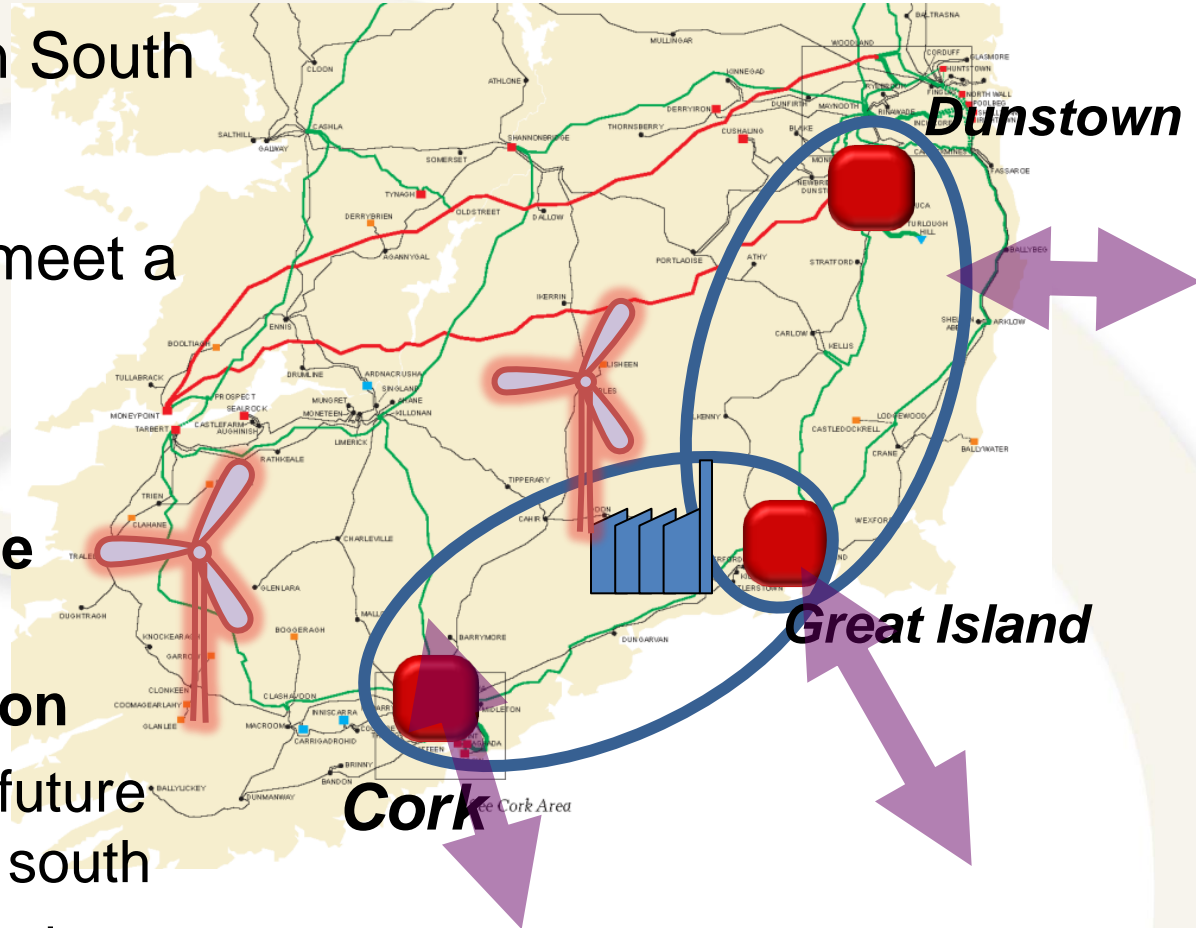
Phase 1 - Dublin Ring

- Long-term strategy is for “ring” around Dublin
 - To secure supplies to Dublin
 - To avoid large flows through Dublin
- Currently re-examining timing in light of down-turn



Phase 2 - "Grid Link": Cork to Dunststown

- 400 kV circuit between South and East
- Optimised solution to meet a broad range of needs
- Facilitates:
 - flows from **renewable** generation
 - future **interconnection**
 - efficient use of new/ future **thermal plant** in the south
 - **economic growth** in the south and east



Circuit Uprates & Refurbishments 2010

**Cathaleen's Falls – Corraclassy
110kV**

**Booltiagh – Ennis
110kV**

**Booltiagh – Moneypoint
/Tullabrack 110kV**

**Charleville - Mallow
110kV**

**Carrigadrohid - Kilbarry
110kV**

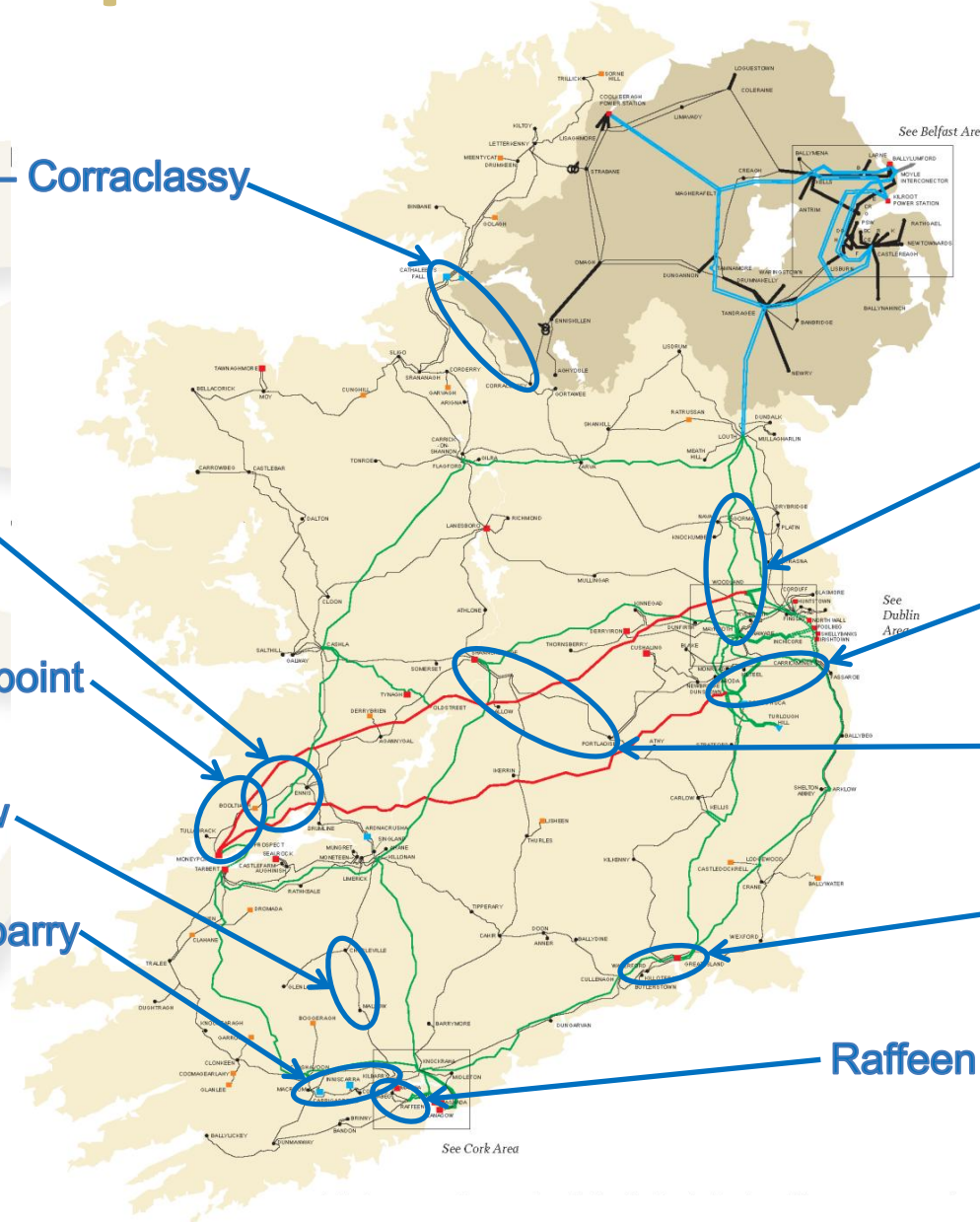
**Gorman - Maynooth
220kV**

**Carrickmines – Dunstown
220kV**

**Dallow – Portlaoise –
Shannonbridge 110kV**

**Great Island – Waterford
No.1 110kV**

Raffeen – Trabeg No.2 110kV



Circuit Upgrades & Refurbishments 2011

**Corraclassy - Gortawee
110kV**

**Athlone - Shannonbridge
No.1 110kV**

**Cashla - Ennis
110kV**

**Limerick - Monteen
110kV**

**Killonan - Knockraha
220kV**

**Coolroe - Inniscarra
110kV**

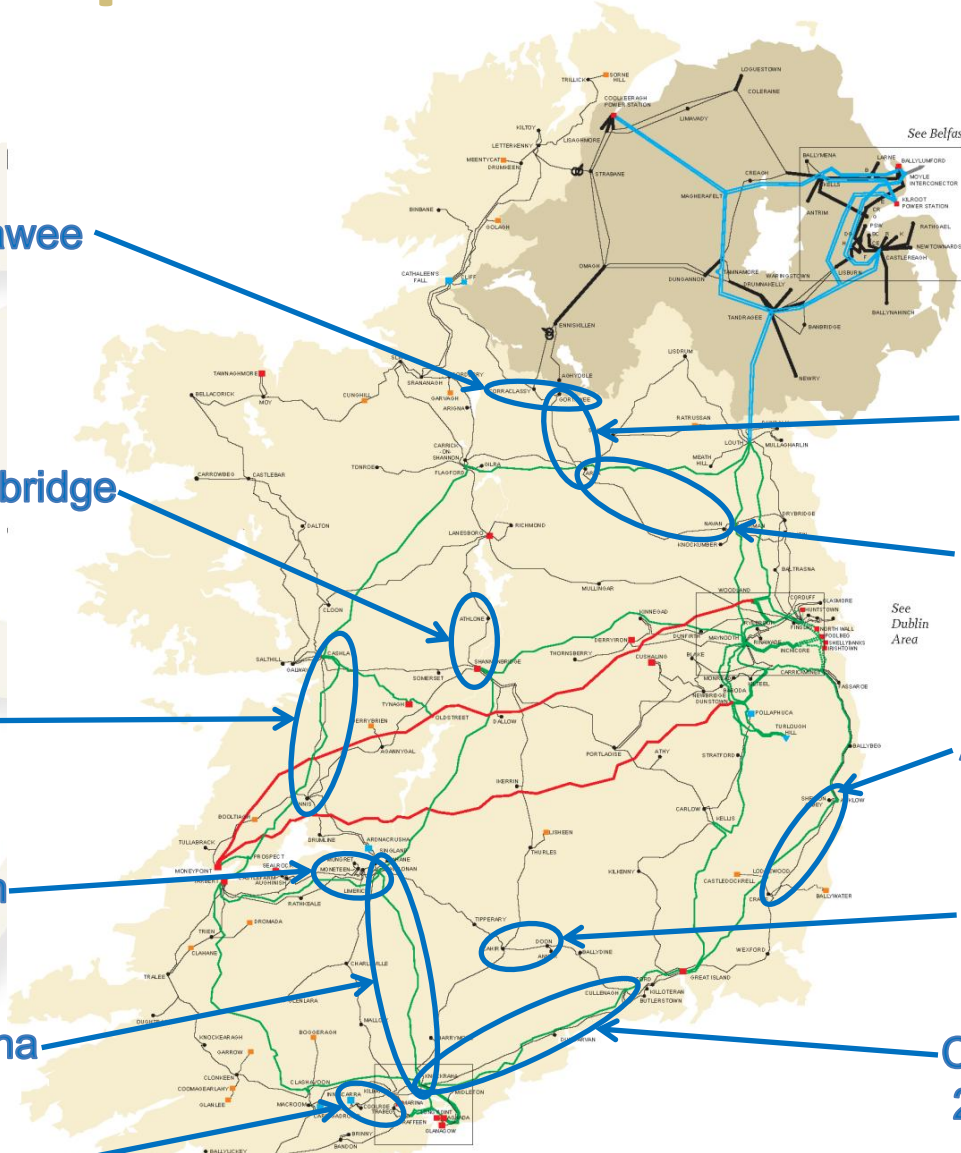
**Arva - Gortawee
110kV**

**Arva - Navan
110kV**

**Arklow - Crane
110kV**

**Cahir - Doon
110kV**

**Cullenagh - Knockraha
220kV**



Projects: Construction

Binbane – Letterkenny 110kV

Flagford-Srananagh 220kV

Dalton – Galway 110kV

Tarbert - Tralee
no. 2 110kV

Arva - Shankhill no. 2
110kV

Gorman - Meath Hill 110kV

Gorman - Navan no. 3 110kV

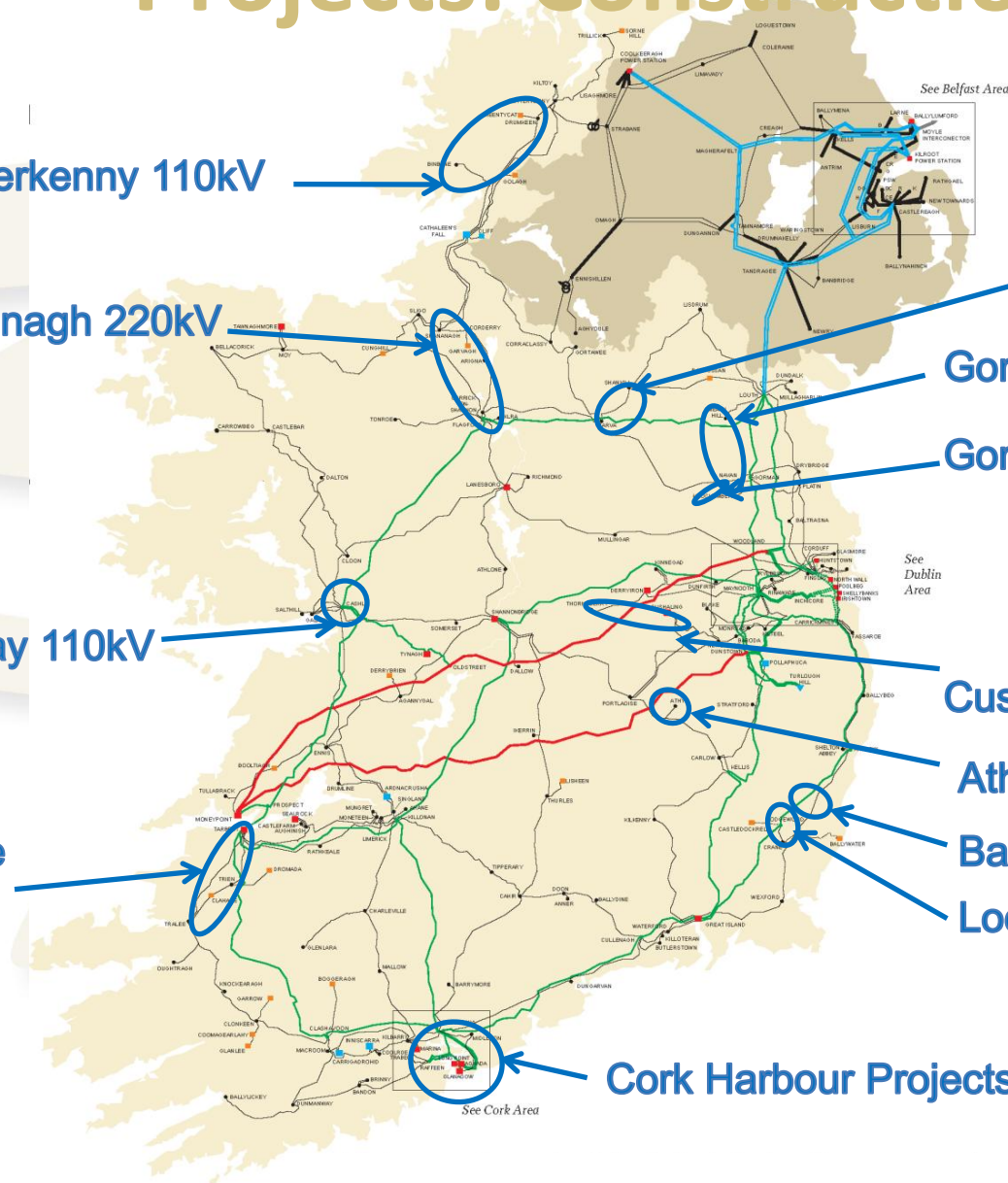
Cushaling –Thornsberry 110kV

Athy 110kV

Banoge 110kV

Lodgewood 220kV Station

Cork Harbour Projects



Projects In Development

Knockranny 110kV

Ardnacrusha Redevelopment

Moneypoint Redevelopment
400/220/110 kV

Tarbert 220/110 kV
Redevelopment

North Kerry 220/110 kV
Station

East Kerry / NW Cork
220/110 kV Station

Millstreet 220/110 kV
Station

Finglas 110kV Station

Dublin North Fringe
220 kV Station

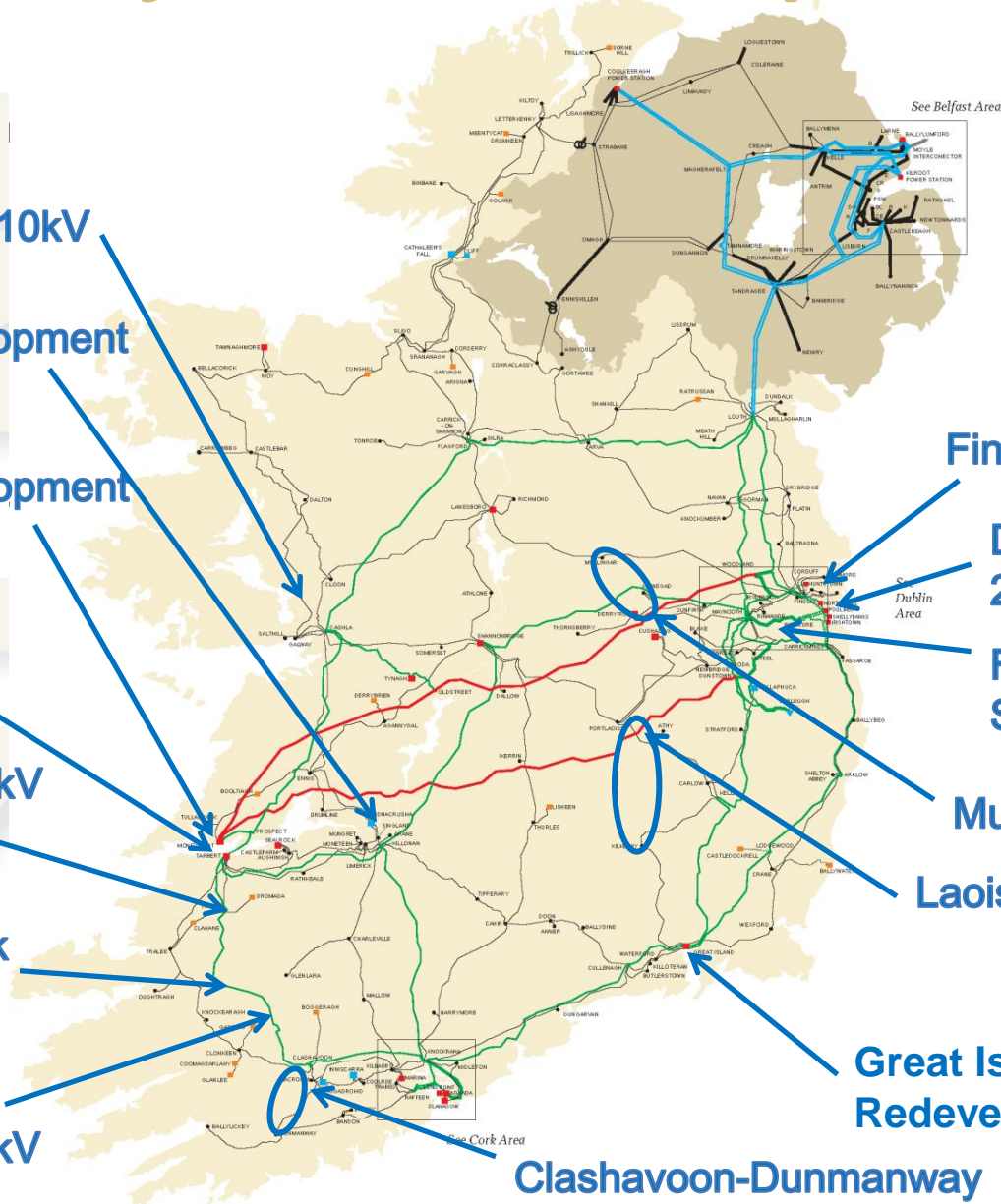
Finstown 220/110kV
Station

Mullingar 110kV

Laois-Kilkenny 400/110kV

Great Island 220/110kV
Redevelopment

Clashavoon-Dunmanway



Summary

- Projects are developed and optimised according to a rigorous process
- Significant progress made on major Grid25 projects
- EirGrid flexing its plans to best meet changing circumstances
- Value for money a key factor



EIRGRID

BACKUP SLIDES



You are Here

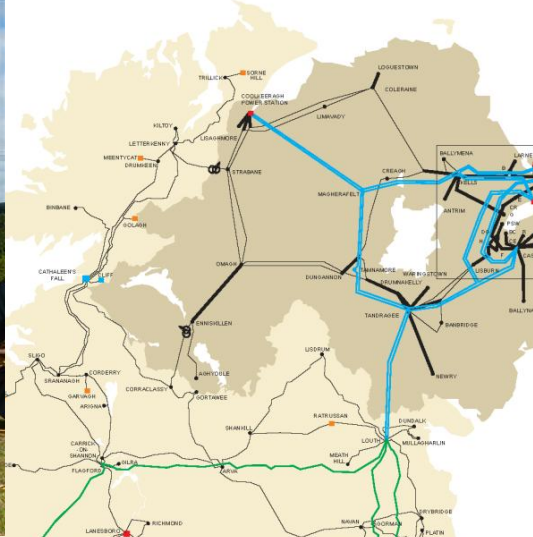
Assessment of Options

- Technical merit
 - Does the option resolve the technical problems identified (thermal loading, voltage, short circuit levels, stability)?
 - Does it comply with all aspects of the transmission planning criteria for a range of plausible scenarios?
- Economic analysis
 - For each option what savings result from reduced constraints and losses?
 - Do these savings exceed the initial capital and ongoing maintenance costs of the investment?

Assessment of Options

- Environmental Evaluation
 - Is there an available route for a circuit between stations?
 - Can a suitable site be found for a station in the study area?
- Flexibility
 - What are the likely future expansion requirements?
 - Can the plant be easily maintained and operated?
- Strategic
 - Can the option resolve multiple issues?
 - Does the option provide other benefits?
 - Security of supply
 - Meeting government's policies

HTLS INSTALLATIONS



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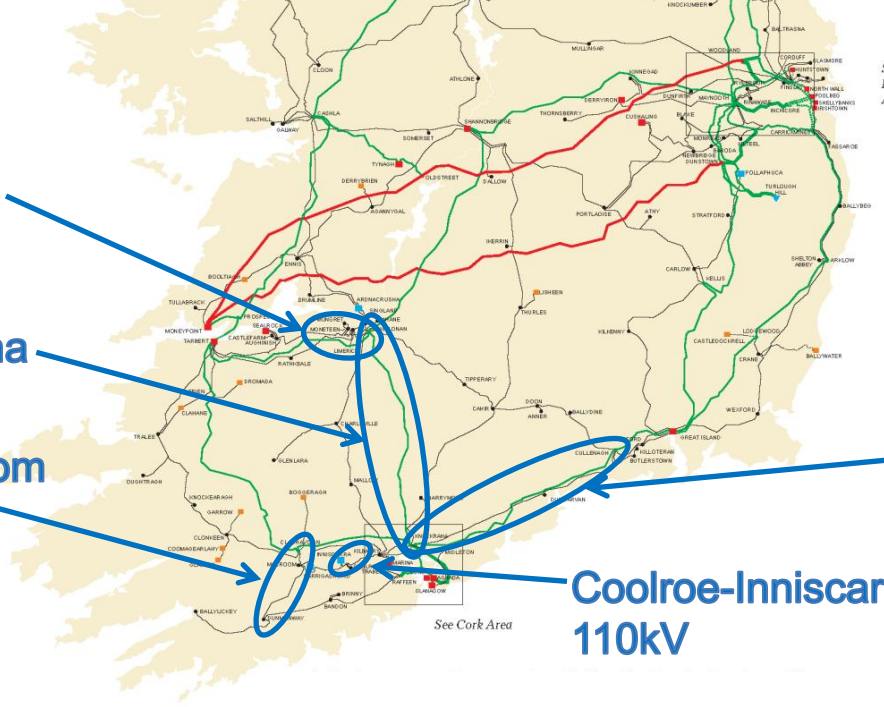
**Limerick – Monteen
110kV**

**Killonan – Knockraha
220kV**

**Dunmanway-Macroom
110kV**

**Cullenagh – Knockraha
220kV**

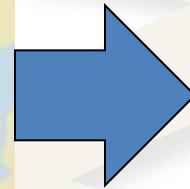
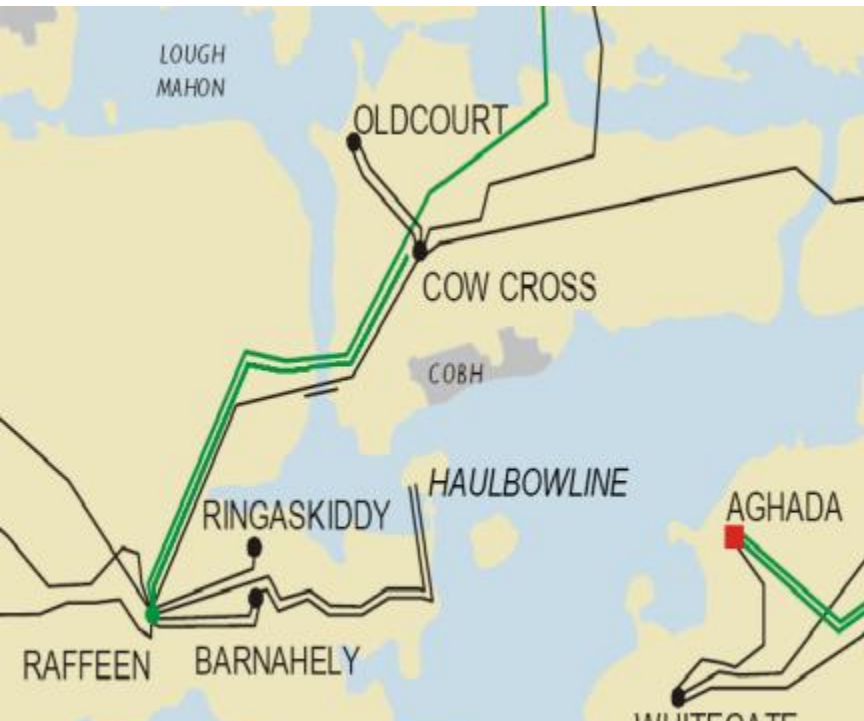
**Coolroe-Inniscarra
110kV**



See Cork Area



Connection of 876MW & reinforcement of network



Connection of ESB Generating Plant
July 2008 – Jan 2009

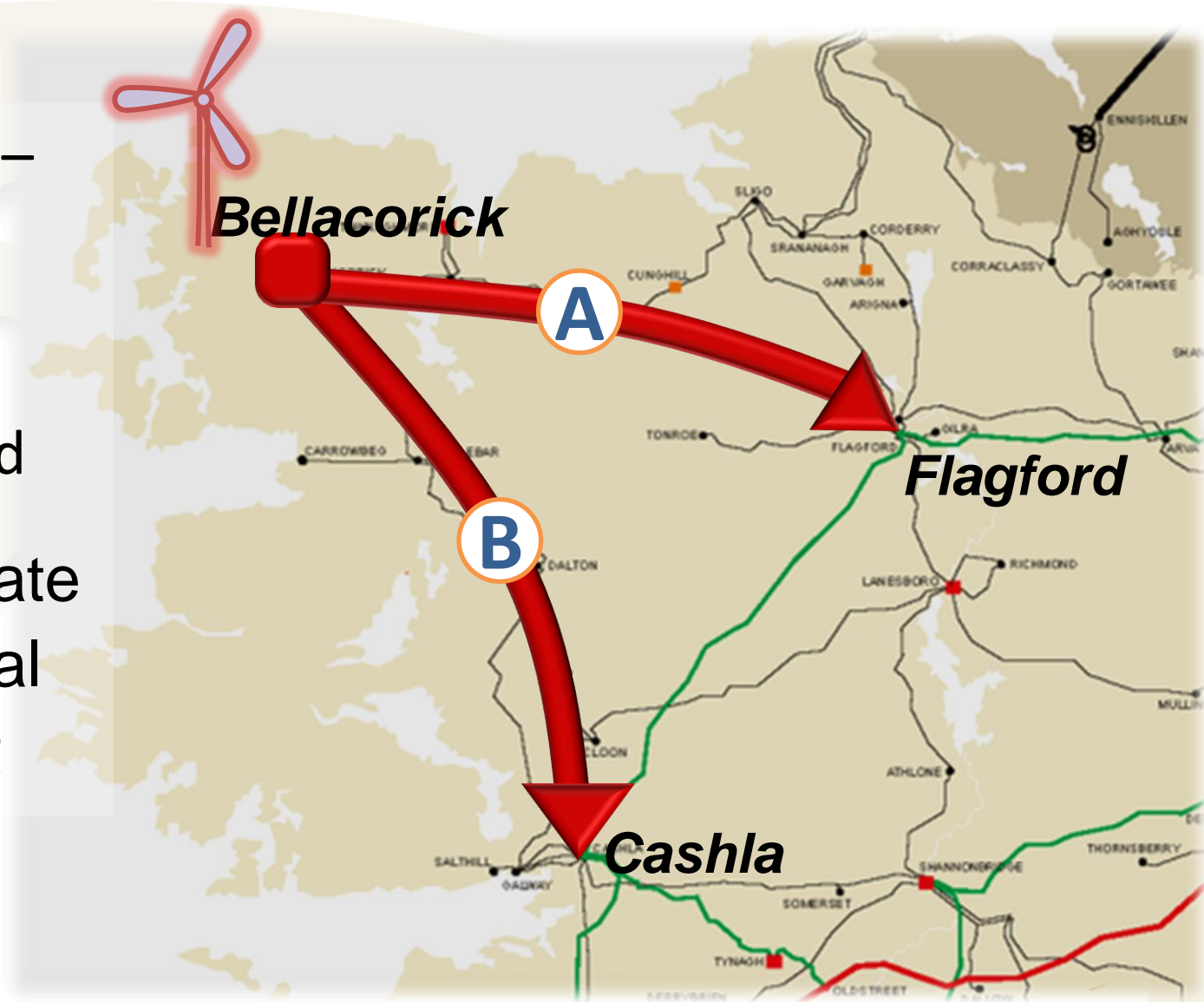
Connection of Bord Gáis Generating Plant
Oct 2008 – July 2009

Completion of Aghada Raffeen
Oct 2009 — July 2010

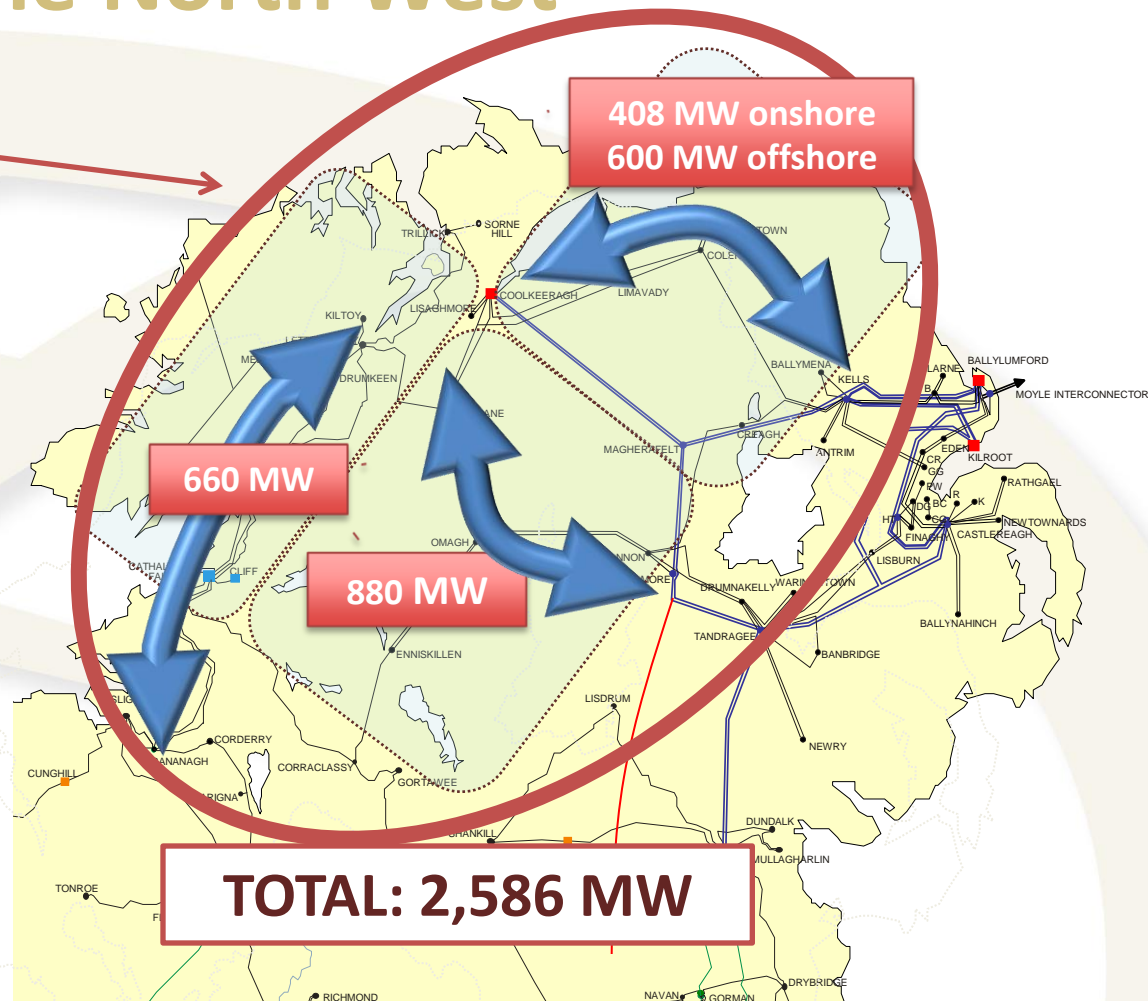
Installation of Glanagow Raffeen & Transfer of Glanagow AIS to GIS
Oct 2010 – Oct 2011

“Grid West” Bellacorick Connection

- 400 kV circuit – A or B
- Some 110 kV works required
- Facilitates Gate 3 and regional development



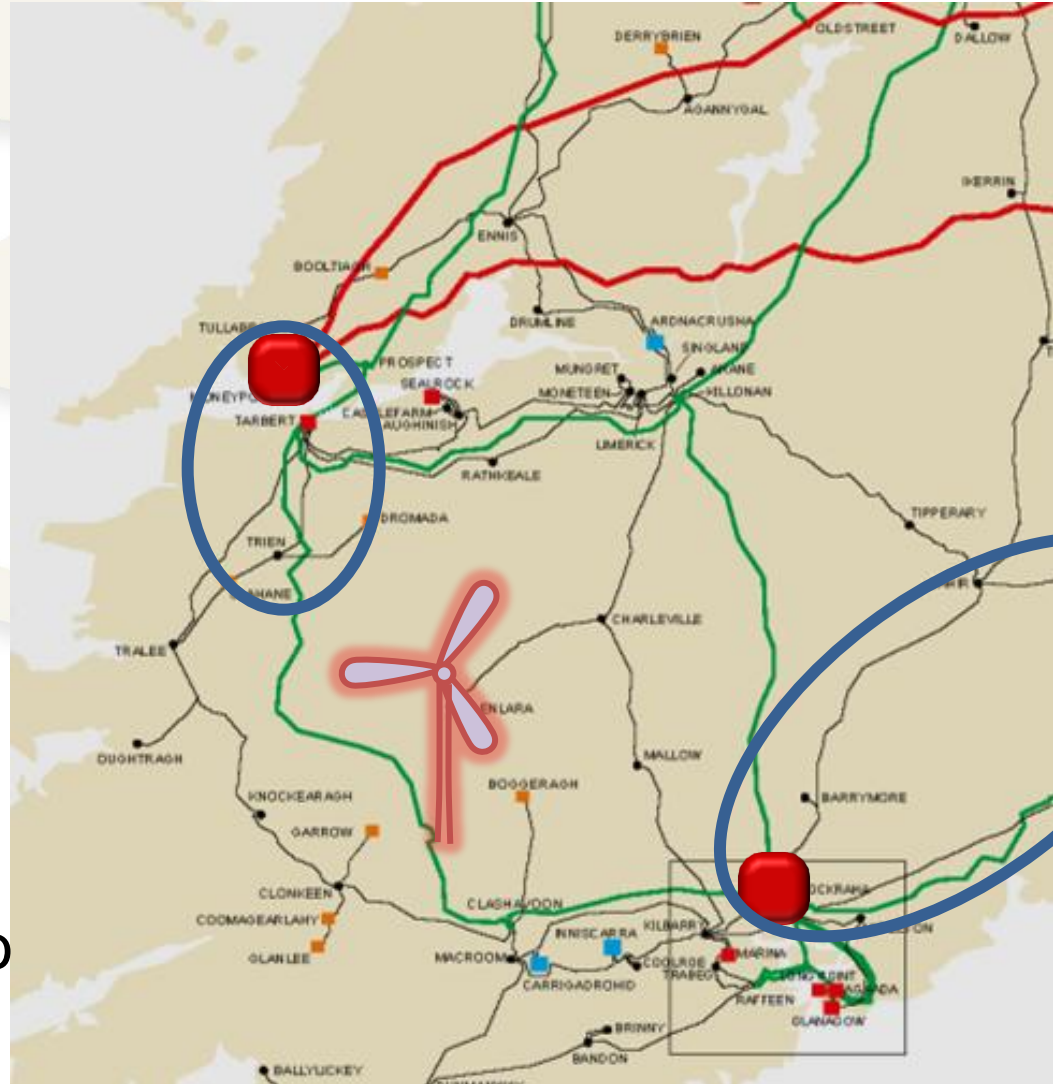
Renewable Integration Development Project in the North West



- Joint study between EirGrid, NIE and SONI
- To identify the best all-island transmission reinforcement scheme to a) meet future demand and b) provide access to renewable generation in the north west of the island

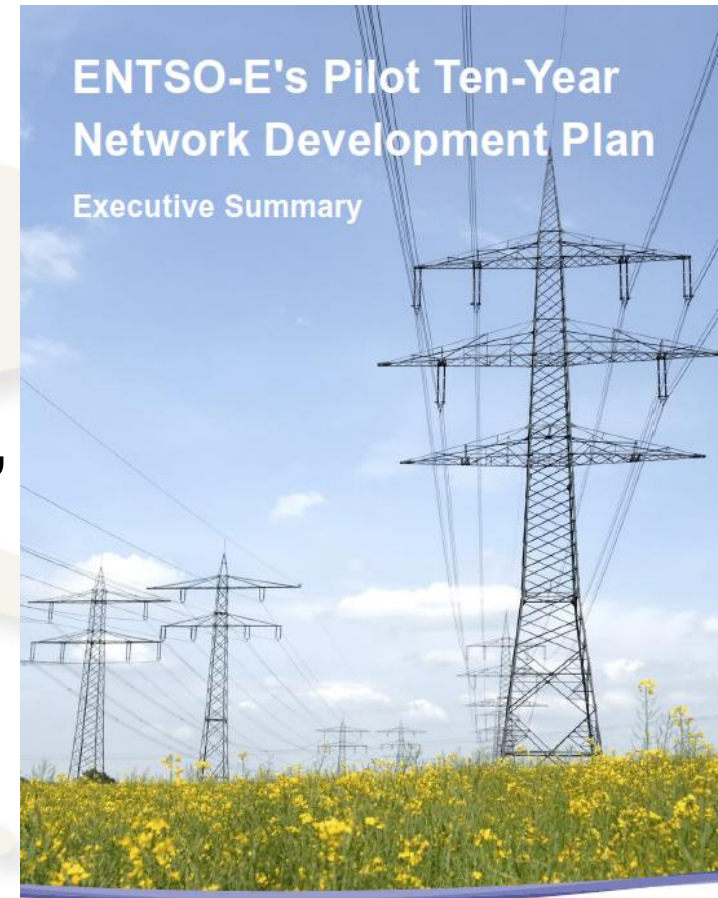
Moneypoint - Cork

- 400 kV circuit in Shannon Area
- Strengthens network between Moneypoint and Cork
- Facilitates **renewable** generation in Kerry and west Cork
- Currently no economic justification for continuing new 400 kV circuit down to Cork



What is happening across Europe

- EirGrid actively involved in ENTSO-E
- Similar grid development needs, drivers & challenges
- Europe building 23,000 kms of >300kV over next 10 years
 - primarily overhead



European Network of
Transmission System Operators
for Electricity



Summary

- Grid25 is a platform for economic growth and job creation
- Grid25 is essential to meet national policy objectives
- Challenges such as public acceptability and awareness must be overcome

