

EirGrid Customer Connections Forum

17th May 2012
EirGrid Conference Centre



Agenda – Session 1



14:00 **Welcome and Introduction**, Claire Kane

14:10 **Gate 3 Firm Access Quantities**, Simon Grimes

14:25 **Short Circuit Studies for Connecting Generators**,
Cormac McCarthy

14:40 **Dynamic Analysis** - Why is this important for new generators?
John McGuckin

14:50 **EirGrid's E-Application Project**, Jeffrey Godsell

15:00 **Questions and Answers**, Chaired by Claire Kane

15:15 ***Tea and Coffee***



Agenda – Session 2



15:30 **Grid 25** – What’s happening now? Aidan Corcoran

15:40 **Grid Link**, John Lowry

15:55 **Grid West**, Alan McHugh

16:10 **Questions and Answers**, Chaired by Claire Kane

16:30 ***Close***



Gate 3 Firm Access Quantities (FAQs)

Simon Grimes
Manager Transmission Access Planning



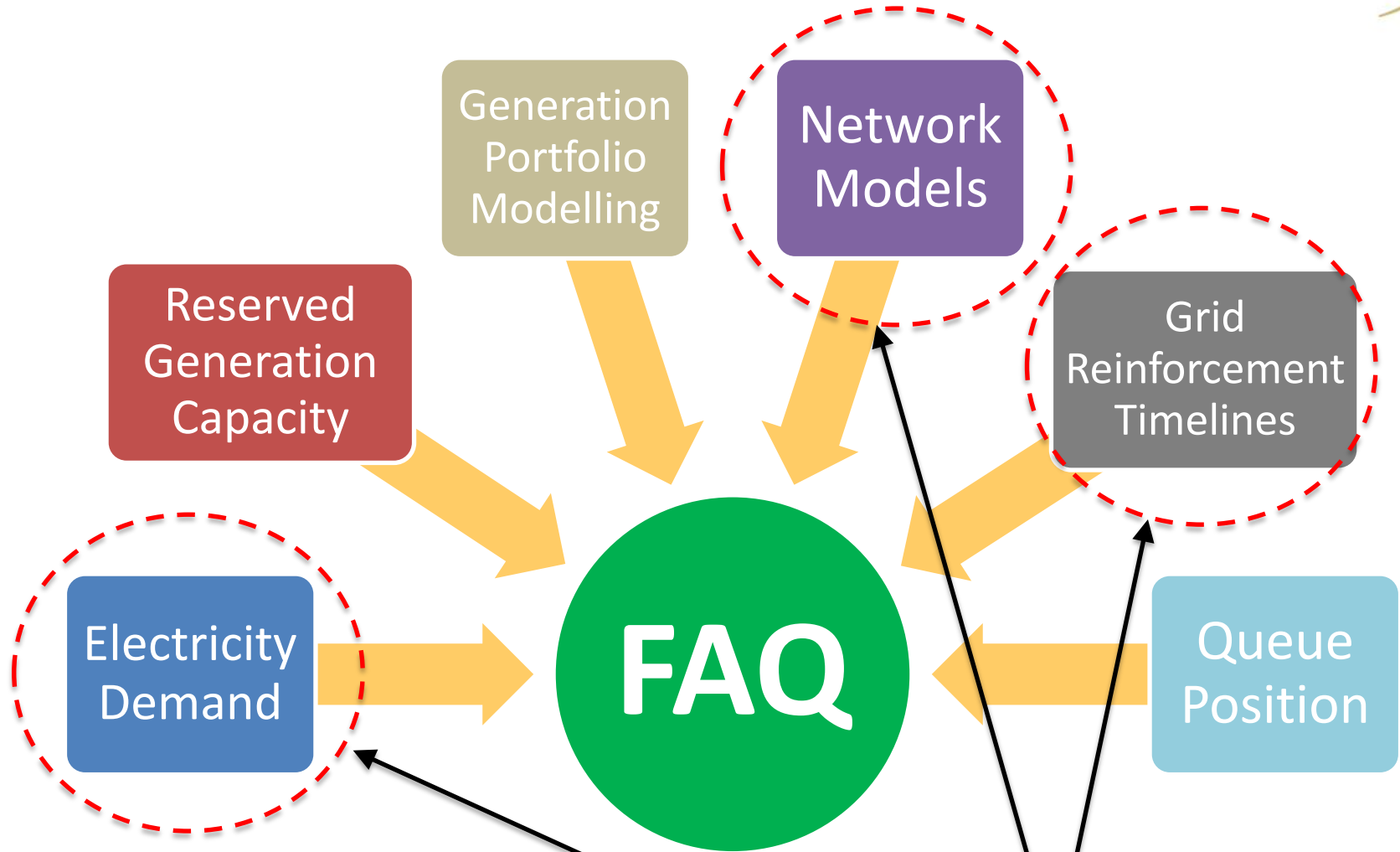
Introduction



- Original Gate 3 FAQ forecasts published January 2010
- Recent studies show lower firm access opportunities in the short term compared to the original forecast
- We believe there is scope for some improvements to firm access opportunities
- Project kicked off investigate these



Key factors influencing FAQs



Contributory factors to recent lower FAQ forecasts for Gate 3 in short term



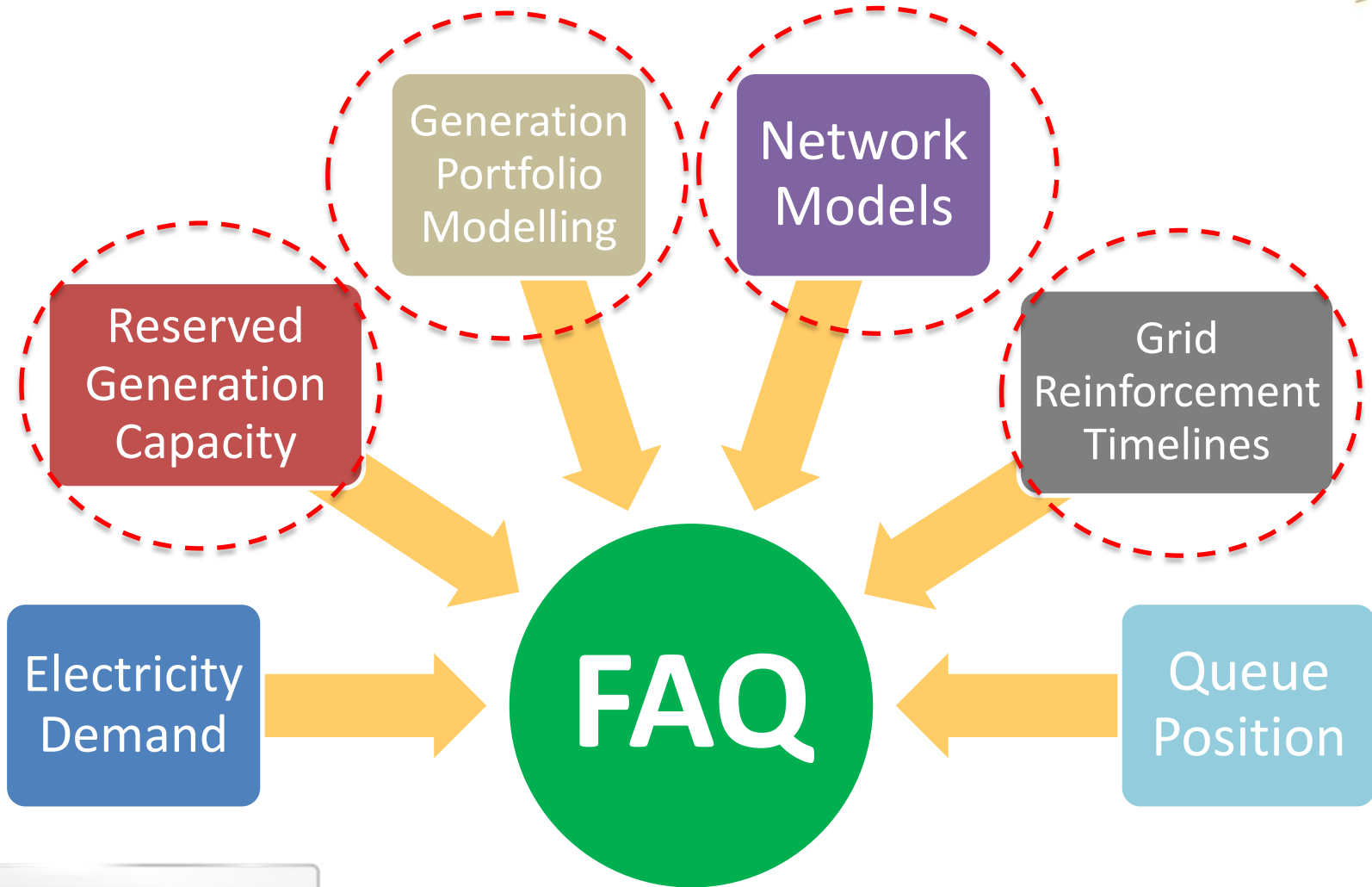
FAQ Review Project Overview



- 1) Identify reinforcements which deliver the most firm access
- 2) If feasible, re-sequence Grid25 delivery programme to expedite firm access opportunities
- 3) Review how we model existing generation portfolio when testing for firm access
- 4) Review deep reinforcement association criteria
- 5) Identify the specific elements limiting firm access in stations and investigate 'outside-the-box' solutions for these
- 6) Investigate the overload capability for transmission station busbars
- 7) Review capacity reservation treatment of certain contracted generation and, if appropriate, develop position for CER approval
- 8) Implement improvements to the *ITC Program* software



Areas under investigation



High level project goals

- Facilitate more **access** to the network
- Make this (and future) year's FAQ forecasts as **accurate** as possible
- Protect the **credibility** of FAQ forecasts
- Ensure **resources** used efficiently and effectively
- **Timeline** dovetails with 'best case' Gate 3 Constraints Analysis schedule

Timelines

	MONTH										
	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	
'FAQ Review Project'	█										
Analysis Set-up				█							
Gate 3 FAQ Analysis					█ *			█ *	█ *		
Gate 2 FAQ Analysis							Final timeline to be decided				
Gate 1 FAQ Analysis							Final timeline to be decided				

* *Publication of available FAQ forecasts*

Summary



- Project commenced to investigate possible ways to improve firm access opportunities
- 6 weeks to complete project
- Gate 3 FAQ analysis Aug – Dec
- Looking to complete Gate 1 & Gate 2 FAQ analysis by Dec/Jan







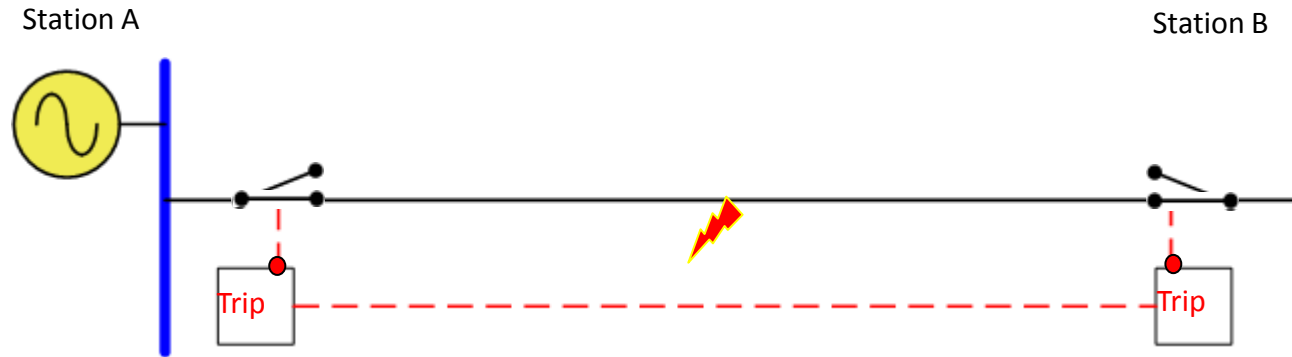
Short Circuit Studies for Connecting Generators

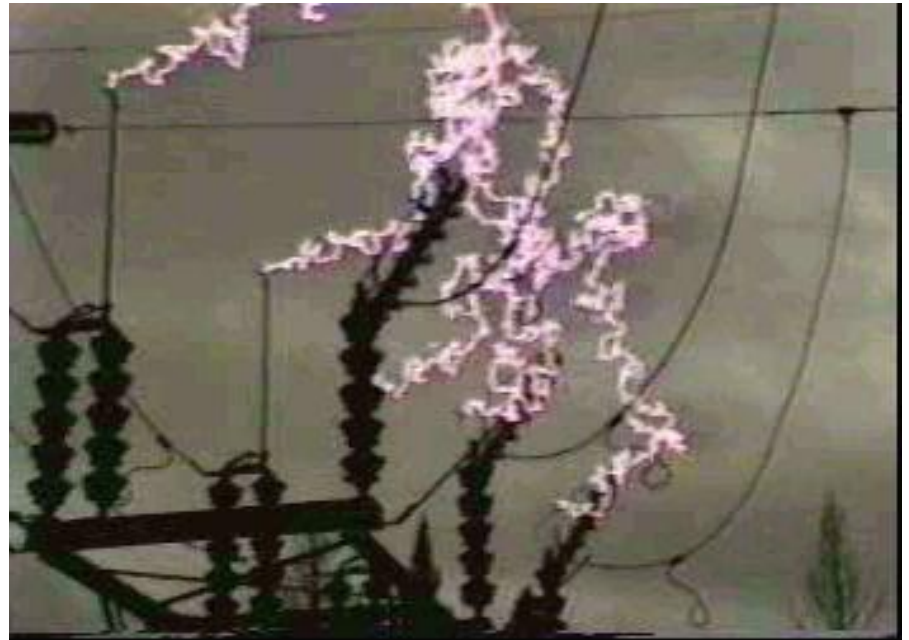
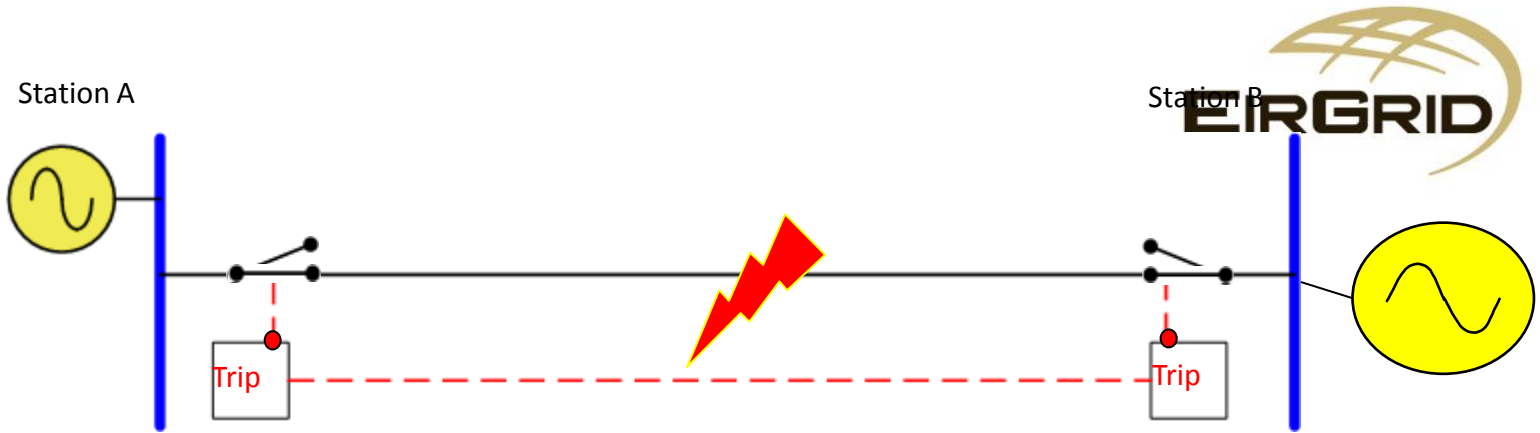
Transmission Access Planning

Cormac Mc Carthy

17th May 2012







Short Circuit Analysis



- Max Short Circuit Level
 - Safe Operation of the System
- Min Expected Short Circuit Level
 - Helping generators clarify their technical performance
- Other
 - Station Design Fault Level
 - Grid Code Fault Level



Industry Engagement



- Technical considerations are complex
- Grid Code and Joint Grid Code
- Delivering a Secure Sustainable Electricity System (DS3)
- European Network Codes
- IEC working group on standard models



Max Short Circuit in the Offer



- Group processing with assumptions
- Applicants in a Gate
- Derived on a group / subgroup basis
- Assumed data

Max Short Circuit – Annual Review

- Now know who has signed & when expected to connect
- Identify real issues and prioritise reinforcements for connections in next 1 to 3 years
- Timeframe chosen to minimise risk borne by connecting parties
- Give all clear to generators – Approval for Energisation
- If our analysis can demonstrate that a generator(s) does not contribute meaningfully to a fault then some / all SC can be disassociated

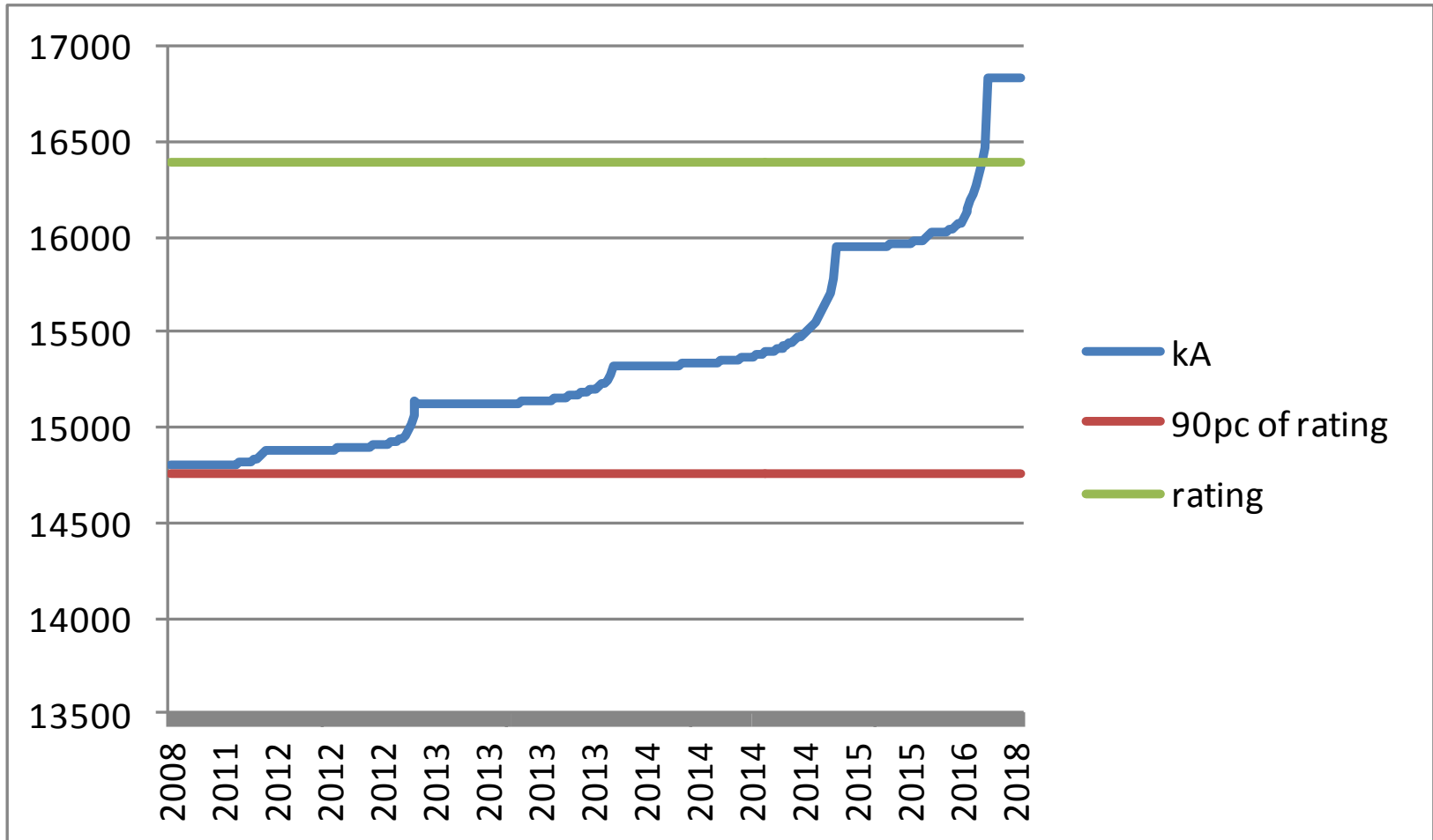
Key Findings From 2012 Analysis



- Network reinforcement identified and prioritised
 - and system operation modified
- Varied impact of generator connections
- Rate of Generator Connection
 - Live Offers – approx 6000 MW
 - Connections - several hundred MW per year
 - At present ...
- All 2012 generators facilitated



Sample – Station Fault Level



- This circuit breaker to be replaced in 2012

Access Planning Notification of Short Circuit and Dynamic Results



- Access Planning is now formalising the communication of Short Circuit and Dynamic study results
- Provides clarity that all dynamic and short circuit issues which otherwise might delay energisation have been addressed
- This is required prior to energisation



Min Expected Short Circuit Level



- Generator technical performance (fault ride through, etc.) depends on system strength or short circuit level
- We provide min expected short circuit levels to conventional generators
- Not the same as values in Forecast Statement
- What about for wind generators?
- Technically complex – what is the interaction of adjacent generators?

Issues Under Review



- Short Circuit threshold
- Allocation of a potentially scarce resource
 - What factors should be taken into account?
- Provision of Min expected Short Circuit for Wind Generation
- Calculation of windfarm equivalent impedances



Timelines



STUDY FOR 2012 CONNECTING GENERATORS	COMPLETE
NOTIFY 2012 CONNECTING GENERATORS	COMPLETE
PRIORITISE REINFORCEMENTS – CAPITAL APPROVALS (FOUR STATIONS)	COMPLETE
RESULTS OF STUDY FOR 2013 AND 2014 CONNECTING GENERATORS	Q2 2012
POLICY PROPOSALS on ISSUES UNDER REVIEW	Q2 and Q3 2012



Summary



- EirGrid is facilitating generator connections
- Formalisation of Notification of Short Circuit and Dynamic Study Results
- Findings for 2013 and 2014 connections due in Q2 2012
- If all 6000 MW was to connect in 2013, there would be an issue. EirGrid does not expect this to happen.
- Proposal on several aspects in Q2 and Q3 2012 (min short circuit levels for wind, transparent access, etc.)
- We need your co-operation (expected connection date, generator technical details, feedback on proposals, etc.)

EirGrid Customer Connections Forum

Dynamic Analysis & Generator Obligations

John McGuckin (TAP)

17th May 2012



Dynamic Analysis Studies



...concerns over dynamic instability present a risk to delay to generator connections

Voltage Stability

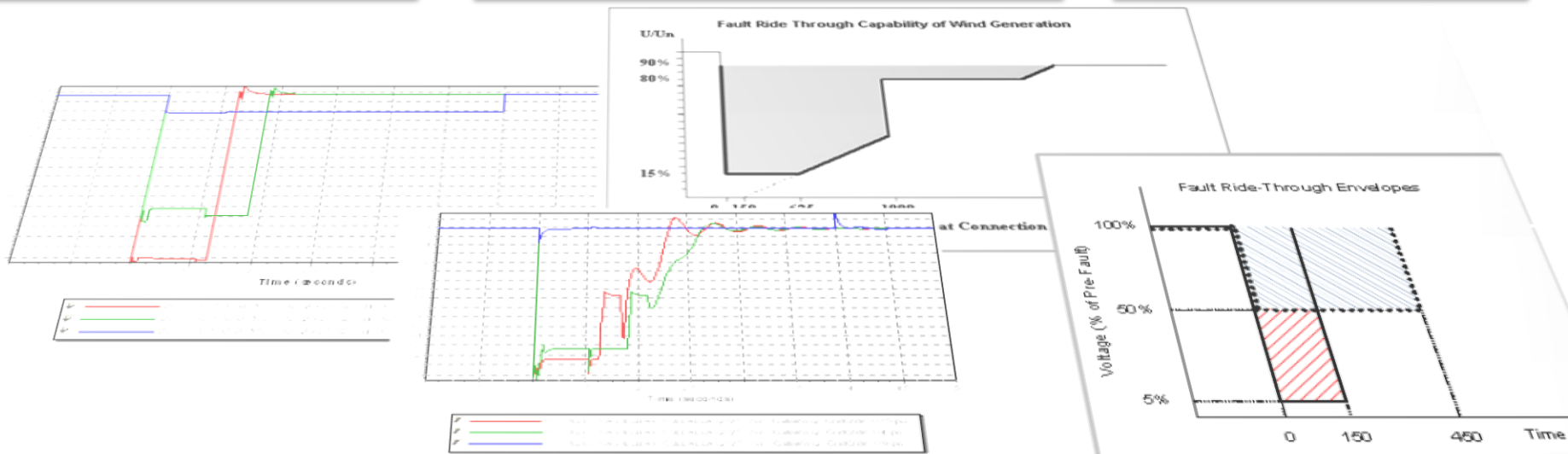
Ability of the system voltage to recover

Transient Stability

Ability of conventional units to remain operational

Frequency Stability

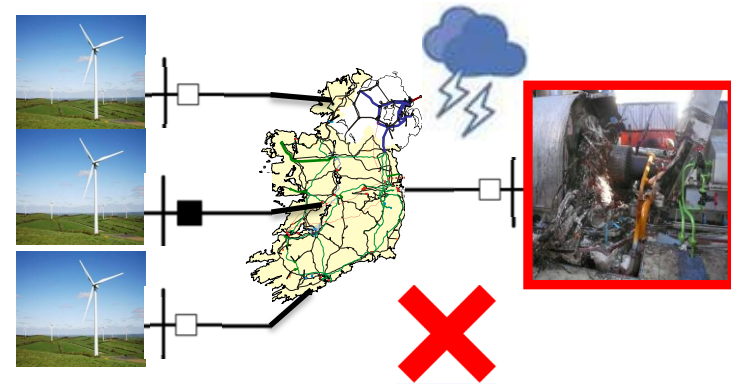
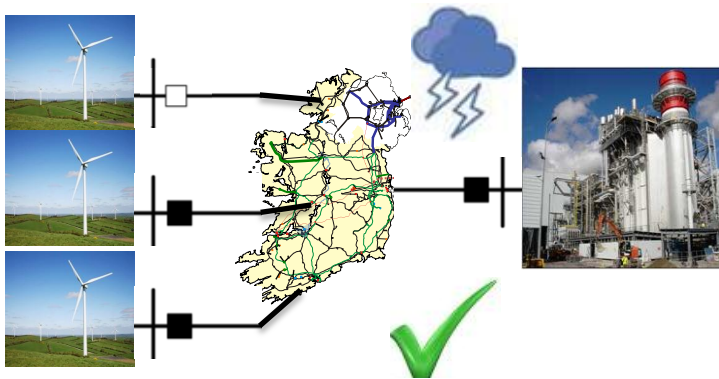
Ability to maintain system frequency



Increasing Importance of Dynamic Studies



- Ensure customers remain connected following onerous yet credible transmission system disturbances:



2012 Studies



- What we are doing ...
 - Assessing the impact of a group of Wind Farms in a specific area for a given year (increased SNSP)
- What we are looking for ...
 - Examine how wind generation responds to faults
 - Examine the synchronous stability of nearby conventional generation
 - Assess voltage response, frequency response, fault ride through



Annual Wind Study



Improved Process

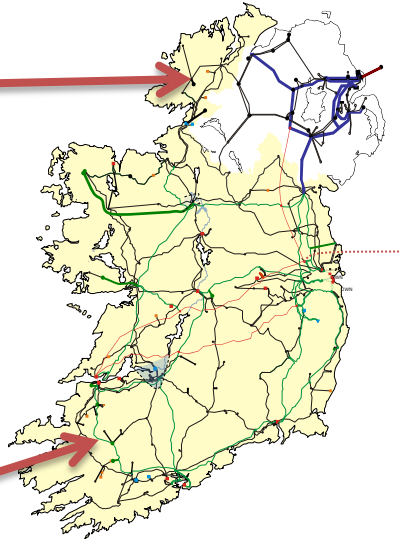


x1 Study

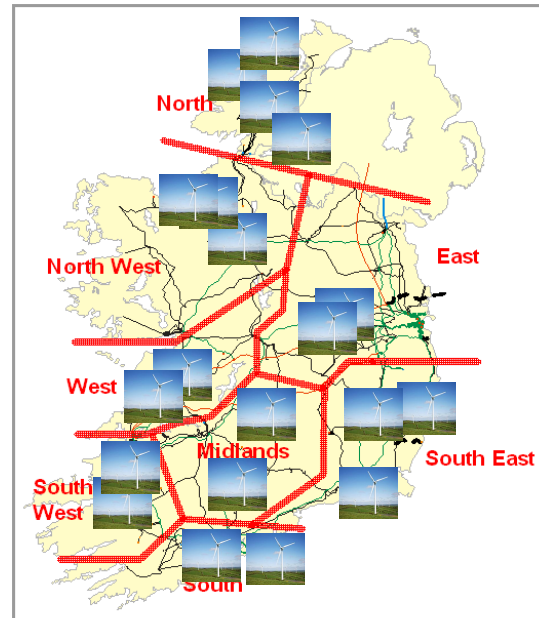
OLD



x1 Study



Connections assessed individually
 Numerous individual studies required each year
 Resource intensive & limited knowledge gained



NEW

Connections assessed in groups – Area Studies

Advantages

- Identification of power system stability issues
- Minimize risk borne by connecting parties
- Reduced time & resource intensive

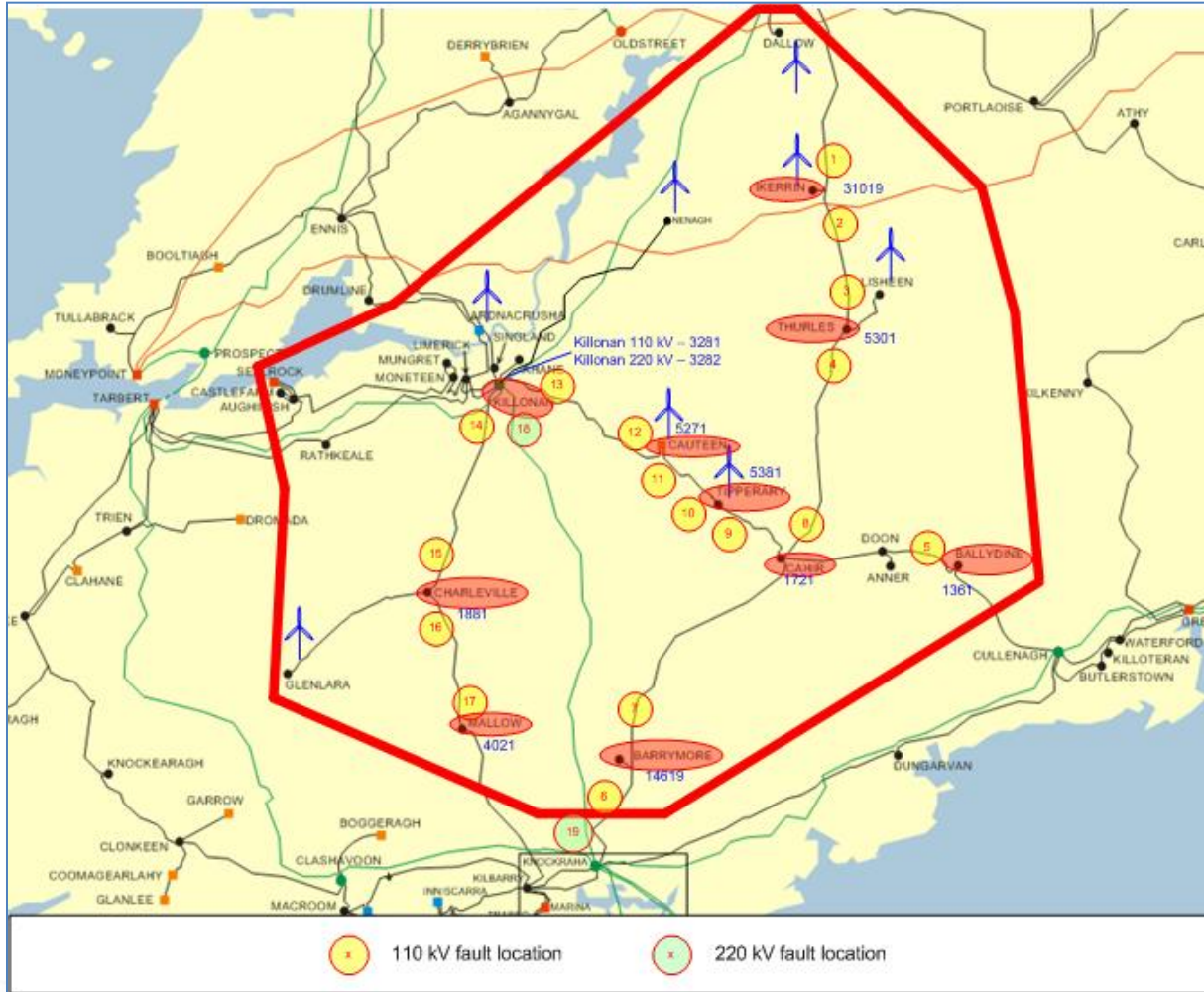
Disadvantages:

- Difficult to build snapshot of system – what assumptions?
- Connection dates / types / reinforcements (system)

Developers can help by providing accurate up-dates on projects



2012 Studies: Accurate Models



2012 Studies



- EirGrid TAP → Detailed dynamic stability assessment 2012
 - Specific WTG models
 - Assessment of interaction of specific models
 - Accurate picture of generator responses to faults (of varying severity)
 - MW's tripped?
 - Stability?
 - Post Fault system conditions
 - FRT performance of models
- Up-date customers on status of pre-connection studies
 - Requirement for energisation



Main Issues



- Cascading over-voltages – Increased loss of MW's
 - Issue with post fault responses causing over voltages
 - Leads to generator trippings
 - Steady-state & transient condition...
 - Case set-up
 - Control modes
 - Protection settings
 - WFPS <5 MW currently no UVRT requirements
- Solution
 - Further investigation
 - Work with DSO to resolve



Main Issues (cont...)



- Specific WTG model responses
 - Transmission / Distribution code compliance
 - Model Validation
 - Control modes
 - Protection settings
 - Reactive compensation devices
- Solution
 - Work with manufacturers to better understand responses & identify possible resolutions*.
 - * may require assistance from developers to ensure manufacturers actively engage with TSO*



What's next?



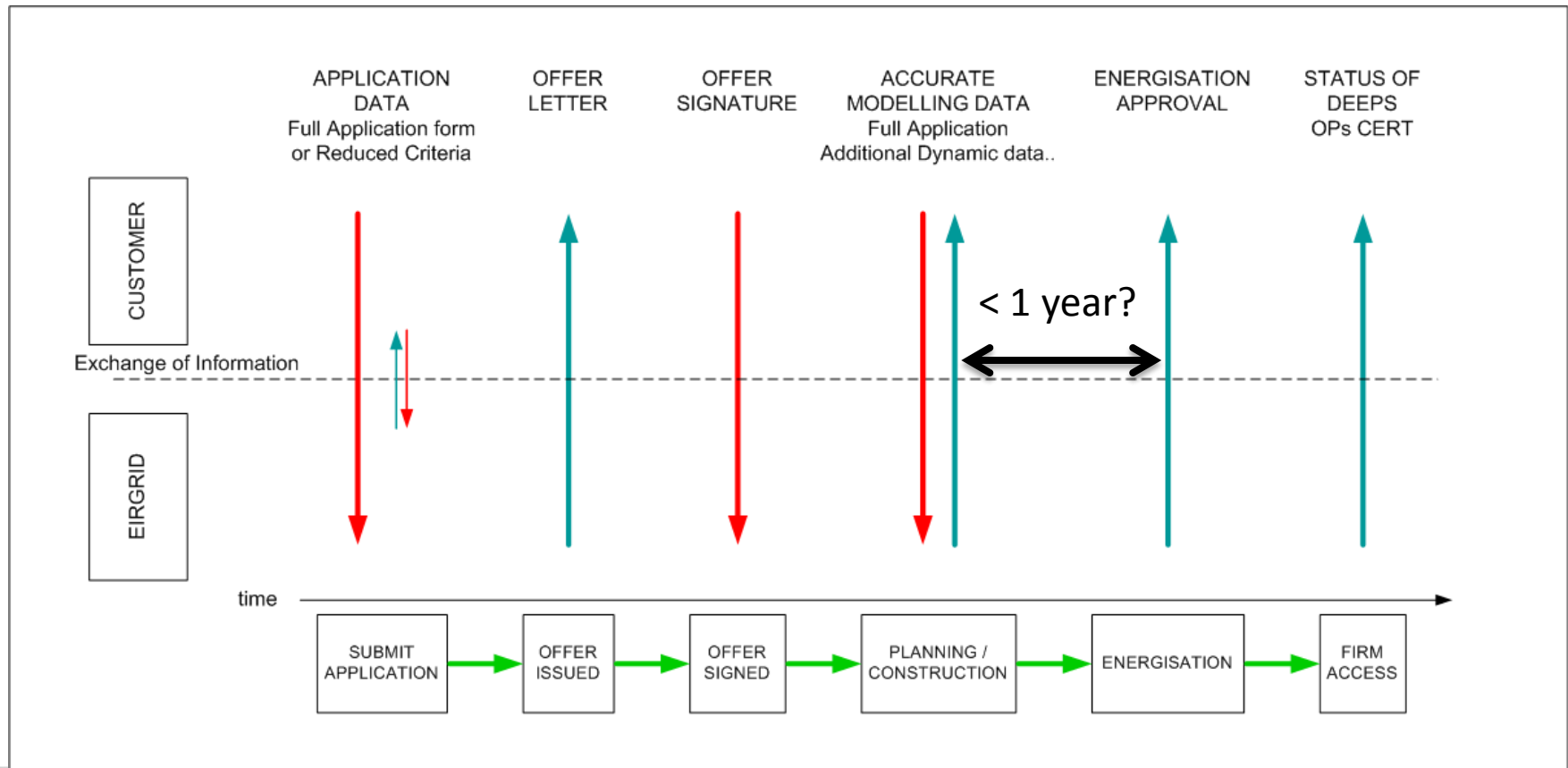
- Efficiencies
 - Improve processes to reduce time spent collating data
- Model Responses
 - Liaise with developers & manufacturers to better understand responses
 - Model Validation
- Voltage Control Strategies
 - Investigate optimum voltage control strategies
 - Identify the appropriate control modes to ensure benefit for the Grid
 - Delivering a Secure Sustainable Electricity System (DS3)



What's next? (2)



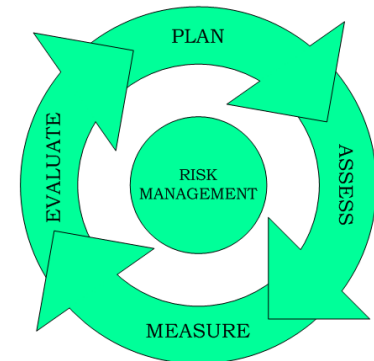
- Develop processes to assist developers



Summary



- Development of Annual Wind Study
 - Using detailed models
 - Identification of stability or FRT issues – minimising risk borne by developers
 - Better understanding of model responses
- 2012 studies complete – What's next?
 - Writing to developers of WFPS's connecting in 2012
 - EirGrid to liaise with manufacturers directly
 - Investigate cascading over voltage issue and work with DSO to resolve
 - Development of additional processes to assist developers
- Generator Obligations
 - Grid Code Compliance at Connection Point over entire operating range
 - Notify System Operator of any non-compliance
 - Provision of Accurate Data
 - Following refurbishment – Submit Modification
 - Update System Operators on Project Lead Time



EirGrid's planned eApplications Initiative

Electronic Forms for Applicant Grid Connection Data

Customer Connections Forum 17/05/2012



Jeffrey Godsell – Transmission Access Planning

Presentation Overview



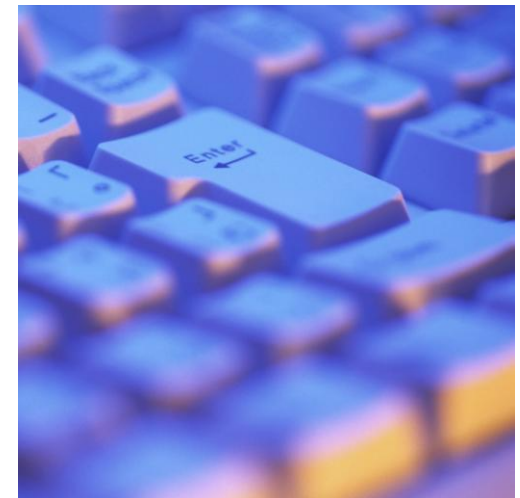
- 1. Project Goal**
- 2. How are Grid Connection applications currently submitted?**
- 3. What is the eApplications Initiative?**
- 4. What are the perceived benefits to industry?**
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Project Goal



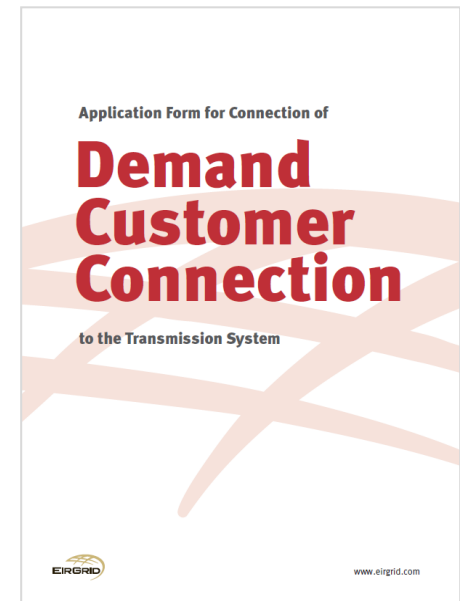
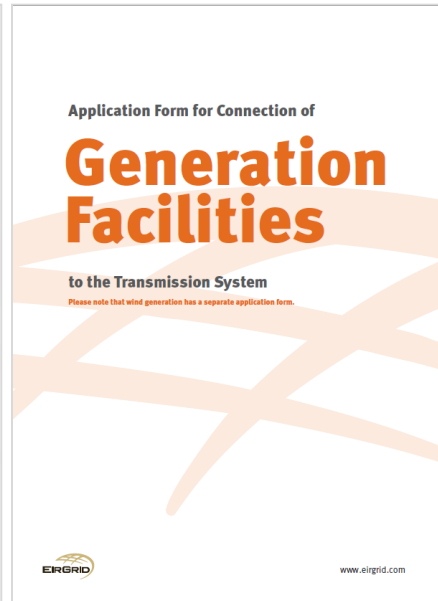
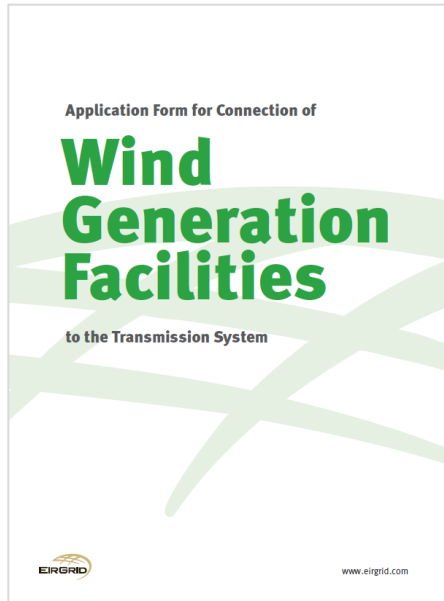
The creation of electronic application forms.



EirGrid's Current Forms



EirGrid has four paper Application Forms



Long Technical Forms




Application Form for Connection of

Generation Facilities

to the Transmission System

Please note that wind generation has a separate application form.



www.eirgrid.com

APPLICATION FORM – GENERATION

DETAILS OF APPLICANT

1. Full name of the applicant(s)

2. Address of the applicant(s) or in the case of a corporate body, the registered address and company registration number

Company ref. no. (if applicable)

3. Telephone Number

4. Telefax Number

5. Contact Person(s)

6. Email Address

7. Contact Address (if different to above)

8. Please nominate a preferred name for this facility. The TSO will take this preferred name into consideration when determining the facilities station name but reserves the right to change it in order to avoid any potential for confusion with other projects or stations.

GENERAL DETAILS

9. It should be noted that it is the applicants responsibility to comply with the technical, design and operational standards detailed in the Grid Code.

Noted

10. Has the Applicant signed a confidentiality agreement with TSO? Yes No
If no, two copies have to be submitted with application form. Confidentiality agreement templates can be found on our website, www.eirgrid.com.

11. Has the Applicant previously had a pre-feasibility study regarding this facility completed by TSO? Yes No
If yes, please specify name and the date of issue of the Pre-feasibility study(s).

Study 1: (D/M/Y)

Study 2: (D/M/Y)

12. Please note that EirGrid has processes in place for the procurement of Ancillary Services from generators. These Ancillary Services include: Black Start, Operating Reserves, Reactive Power.
If you wish to learn more about this and the payments involved, please contact our Customer Relations Team.

Noted

APPLICATION FORM – GENERATION

MAPS AND DIAGRAMS

13. Please provide a 1:50,000 "Discovery Series" Ordnance Survey map, with the location of the facility clearly marked. The electrical connection point must be clearly marked with an "X".
 Name of OS map attachment

Grid co-ordinates of the electrical connection point of your site (In appendix A an example is shown of how to correctly specify the grid co-ordinates):

Easting

Northing

14. Please provide a site plan in an appropriate scale. This site plan should indicate

- the proposed location of the connection point
- generators
- transformers
- site buildings

Note that the connection point is normally at the HV bushings of the grid connected transformer. Space for the transmission compound will have to be clearly marked on the site plan. The exact size of the compound will depend on the connection method defined in the connection offer. Site plan is to be submitted in both hard and soft copy.

Name of site plan attachment (soft copy)

Name of site plan attachment (hard copy)

15. Please provide an electrical Single Line Diagram (SLD) of the proposed facility detailing all significant items of plant and their values including:

- Relevant voltage levels
- Interlocking
- Earthing and synchronising arrangements
- Relay types
- CT/VT ratios
- Generator transformer(s)
- Power factor correction devices
- Location of alternative connection for house load (if applicable)
- Grid connected transformer(s)

The SLD is to be submitted in both hard copy and soft copy.

Name of the SLD attachment (soft copy)

Name of the SLD attachment (hard copy)

16. Please provide a functional block diagram of the main plant components, showing boilers, turbines, heat recovery boilers, alternators, any heat or steam supplies to other processes etc. The functional block diagram must indicate whether single or separate shaft is to be utilised in the case of CCGT.

Submitted

TECHNICAL DETAILS REQUIRED

GENERAL DATA

17. Target Connection Date (this date will be used for connection assessment)

(D/M/Y)

18. Projected period from Target Connection Date to Operational Date: (X months)

Large numbers of questions.
 => potential risk of human error while completing the forms.



Typical Accompanying Documents / Items

- Ordnance Survey Map.
- Site Plan.
- Single Line Diagrams.
- Power Curve.
- Suitable Dynamics Model.
- Power Quality Test Report.
- Additional Peaking Capacity.
- Reactive Capability Curve.
- Functional Block Diagram of Plant.
- MW output vs Ambient Temperature Chart.
- etc.



Attachments are cross checked against forms.

The Current System





APPLICANTS





Information
Sent



Clarifications
(by email and post)



Information
manually checked and data
keyed to software
environment. Clarification
letters typed.
Slow process!



How to make the application submission process easier for applicants - The Concept



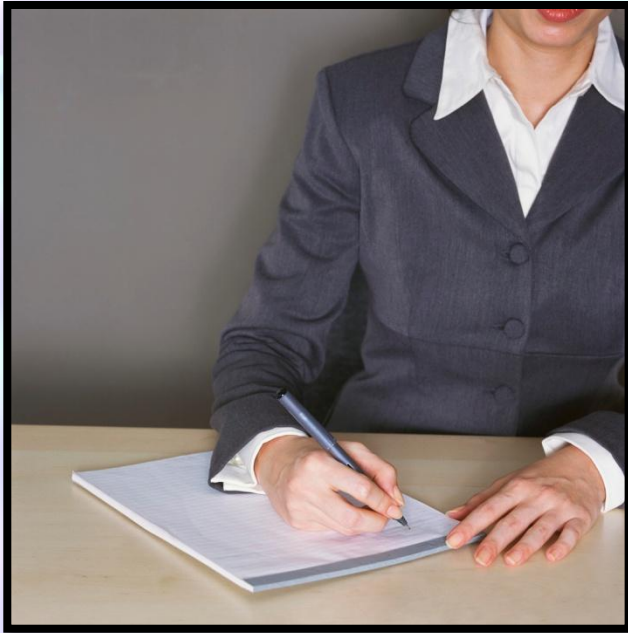
**The concept of introducing
Electronic Forms
also known as
Intelligent Digital Documents
is being considered
to aid applicants submitting
Grid connection applications to EirGrid.**



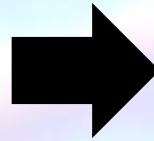
The eApplications concept



To reduce the number of application submission iterations through the use of electronic forms.



**An Alternative to
Hand Written Applications**



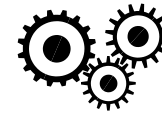
Electronic Solution Planned



How might such a system work?



A measure of Inbuilt Data Checking Automation



Electronic Form



Applicants

(Data is entered into the eApplication system or electronic form by the applicant)



EirGrid Engineer Checks data



Prospective benefits of such a system.



- Reduced processing time for applications and reduced data errors with built-in form validation**
 - Automatically checks that required fields are completed.
 - Providing tool tips to aid the applicants fill in forms.
 - Checks that the values entered are within reasonable tolerances.
 - Questions can be answered quickly by facilitating check boxes.
- Branching will allow respondents to seamlessly skip past questions that do not apply to them.**
- Stored data can be used by applicants at a future date for further analysis, saving time and effort.**
- Improved data management for applicants and EirGrid.**



What are the eForms current stage of development?

- The project is currently at a very preliminary design stage with options being weighted and evaluated.
- Next steps will involve design, implementation and testing.
- It is envisaged that the use of electronic forms will improve the applicant's experience with EirGrid's application submission process.
- The eforms can be expected to be available by 2013.

How will industry be kept appraised?

- The EirGrid website will be updated with details when the electronic forms are nearing completion.
- All users will be notified using the EirGrid mailing list with further details closer to the completion date.
- Future Customer Forum updates.

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Questions

