

Generation Connections Seminar

Greenmount College



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Head of Generation Connections

- 1. Government Renewable Targets**
- 2. NIE Generation Connections business**
- 3. Overview: Large Scale Generation (LSG)**
- 4. Overview: Small Scale Generation (SSG)**
- 5. SSG: Activity levels and cost drivers**
- 6. 33kV network investments required (SSG)**
- 7. Observations & Focus Points**

- **NI Assembly Renewables Target**
 - 40% of consumption by 2020
- **Significant incentives**
 - Based on ROCs + payment for exported energy
- **Impact on NIE**
 - 40% target = c1600-1800 MW connected
 - Currently at c15%

Achieving targets presents significant challenges

Large Scale



Mainly Wind Farms

- Typical size - 10MW to 40MW
- 30 Schemes commissioned
- c530MW connected
- Incentivised at 0.9ROC + export energy

Small Scale/Micro




Range of Technologies

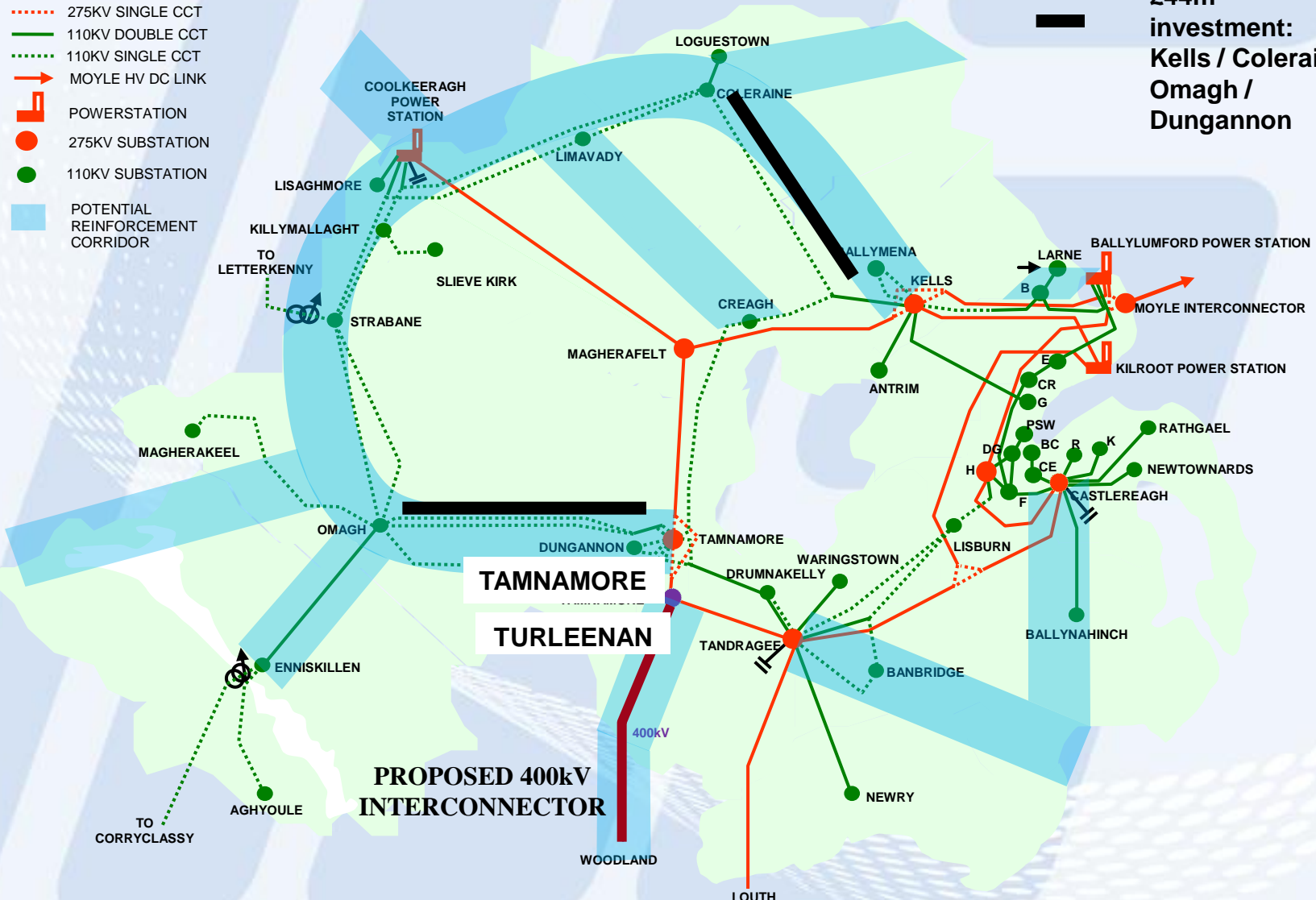
- Wind Turbines <250kW
- Anaerobic Digesters <500kW
- Micro generation – mainly Solar PV - <6.5kW
- Totalling c54MW connected + 60MW committed
- Incentivised at 4.0 ROC + export energy

ROC = Renewable Obligations Certificate – circa 4.5p/kWh

Transmission Network investment

- 275KV DOUBLE CCT
- - - 275KV SINGLE CCT
- 110KV DOUBLE CCT
- - - 110KV SINGLE CCT
- ➔ MOYLE HV DC LINK
-  POWERSTATION
- 275KV SUBSTATION
- 110KV SUBSTATION
- POTENTIAL REINFORCEMENT CORRIDOR

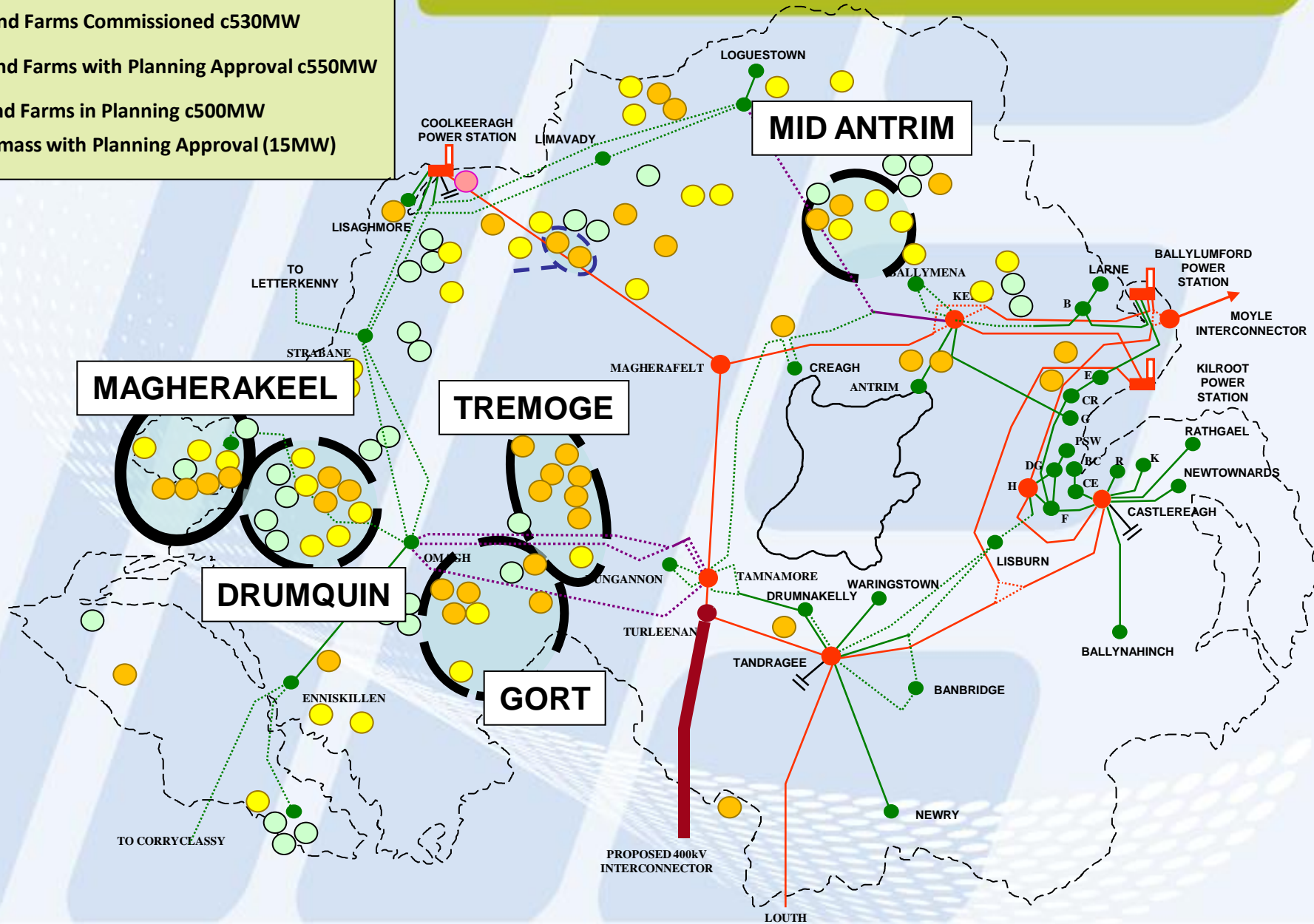
£44m investment:
Kells / Coleraine
Omagh / Dungannon



NIE CLUSTER PLAN

- Wind Farms Commissioned c530MW
- Wind Farms with Planning Approval c550MW
- Wind Farms in Planning c500MW
- Biomass with Planning Approval (15MW)

'Cluster' Connections - LSG

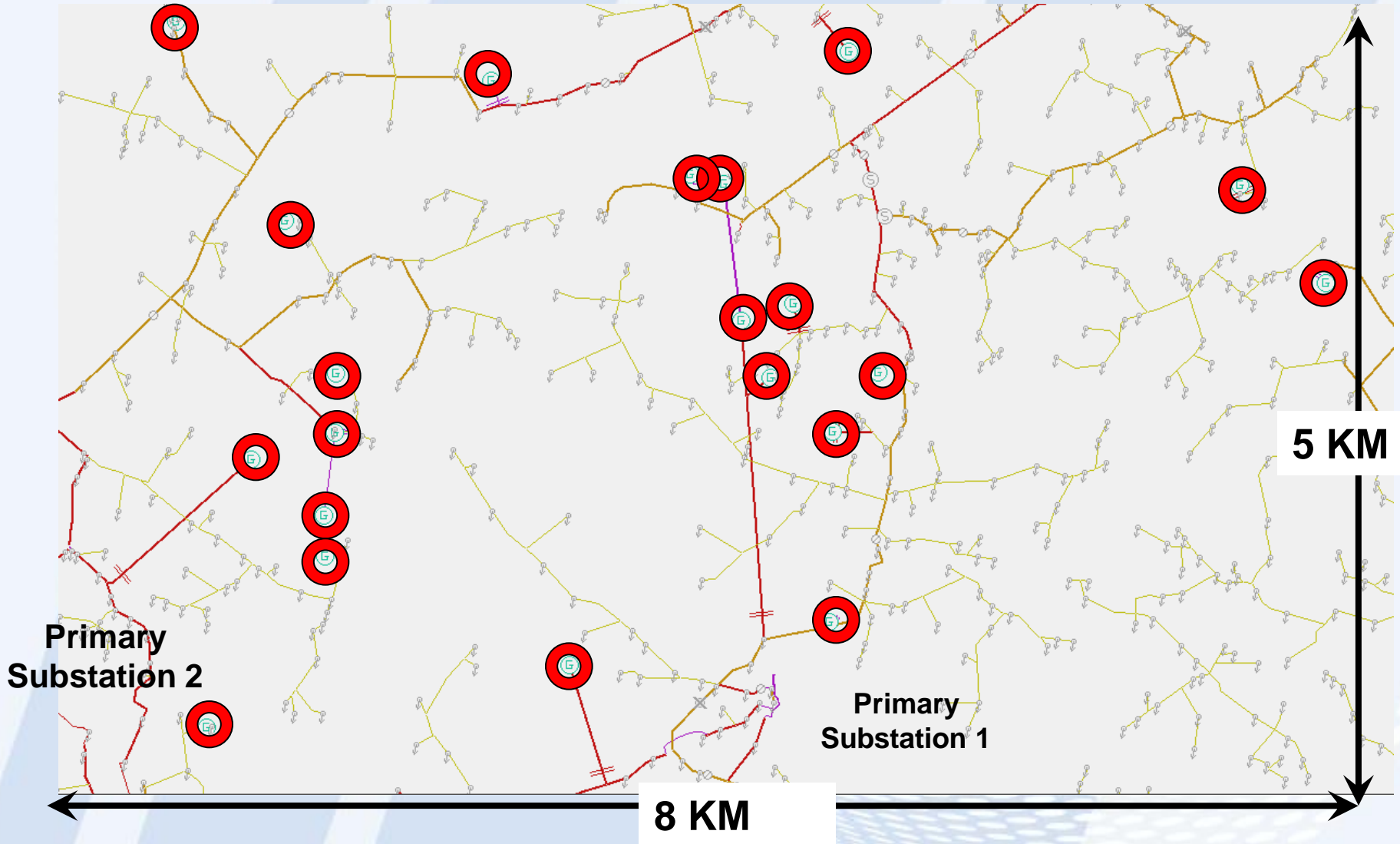


LSG – last 12 month highlights

- **531MW installed vs 471MW last year**
- **Total of 30 schemes commissioned**
- **Agreement on Medium Term Plan initiatives**
- **Key corridors: Kells-Coleraine strengthening underway**
- **Omagh-Dungannon strengthening plans well advanced**
- **Tremoge and Gort Clusters have planning approval**
- **Mid Antrim in planning approval process**
- **Statement of Charges including for Clusters - now approved**
- **‘Pending Quotes’ - now released to the market**

- **Application levels for Small Scale Generation**
 - 50 to 60 applications per month – growing since DETI ROC changes April 2010
 - Planning permission is an agreed pre-requisite for grid application
 - Wind – 87%, Anaerobic Digestion/Biogas – 8%, Hydro/Solar – 5%
- **Design Principles**
 - Least Cost Technically Acceptable (LCTA) connection. (Licence condition)
 - Primary concern is voltage rise – impact on other customers
 - Only upgrade enough network to facilitate generation capacity
 - Subsequent generators will require additional network upgrade
- **Network Status**
 - 11kV largely (70%) single phase - and of 'light' construction
 - Saturation being reached in a number of locations

Generator Density - applications



- **Costs driven by**
 - Size of generator and required export capacity (kW)
 - Distance from the primary substation
 - Number, size and location of other generators already on the circuit
 - Nature of the local network – conductor size and availability of 3 phase network
- **Connection costs – recent trends**
 - Early movers have taken up any spare generation “capacity”
 - Network upgrade is now required for most applicants
 - Connection costs increasing due to reinforcement
 - On site connection costs unchanged – e.g. 3 phase connection, transformer
 - Network rebuild element now adding significantly to connection costs:
 - Upgrade to 50 sq mm conductor – budget cost £35k/km
 - Upgrade to 100 sq mm conductor – budget cost £80k/km
 - Connection costs now above “economically viable” level for some applicants
 - No plans for any 11kV network upgrade funded by general customer base

- **Aggregate SSG at 11kV now impacting upstream 33kV system**
 - Over 100MW of SSG projects already facilitated (54MW connected, 60MW agreed)
 - Reverse Power flow to 33kV system at times of high generation & low demand
 - Offering “Conditional” offers since March 13 in some areas while UR position is confirmed
- **Range of 33kV investments and costs**
 - 33kV/11kV Primary Substation investments
 - 33kV network/line upgrade required in some areas
- **Engagement with Utility Regulator on costs and chargeability**
 - Under existing model 33kV costs are socialised and passed on to all customers
 - Decisions required on whether this charging policy is good value for money

MINIMUM FORWARD POWER FLOW:

With NO Generation: **900KW**

MAXIMUM REVERSE POWER FLOW:

With ALL Generation: **1050KW**

33kV to 11kV Primary Substation

FORWARD POWER FLOW



REVERSE POWER FLOW

11kV CIRCUIT A

11kV CIRCUIT B

1A : 250KW

2A : 500KW

~~5A : 250KW~~

3A : 500KW

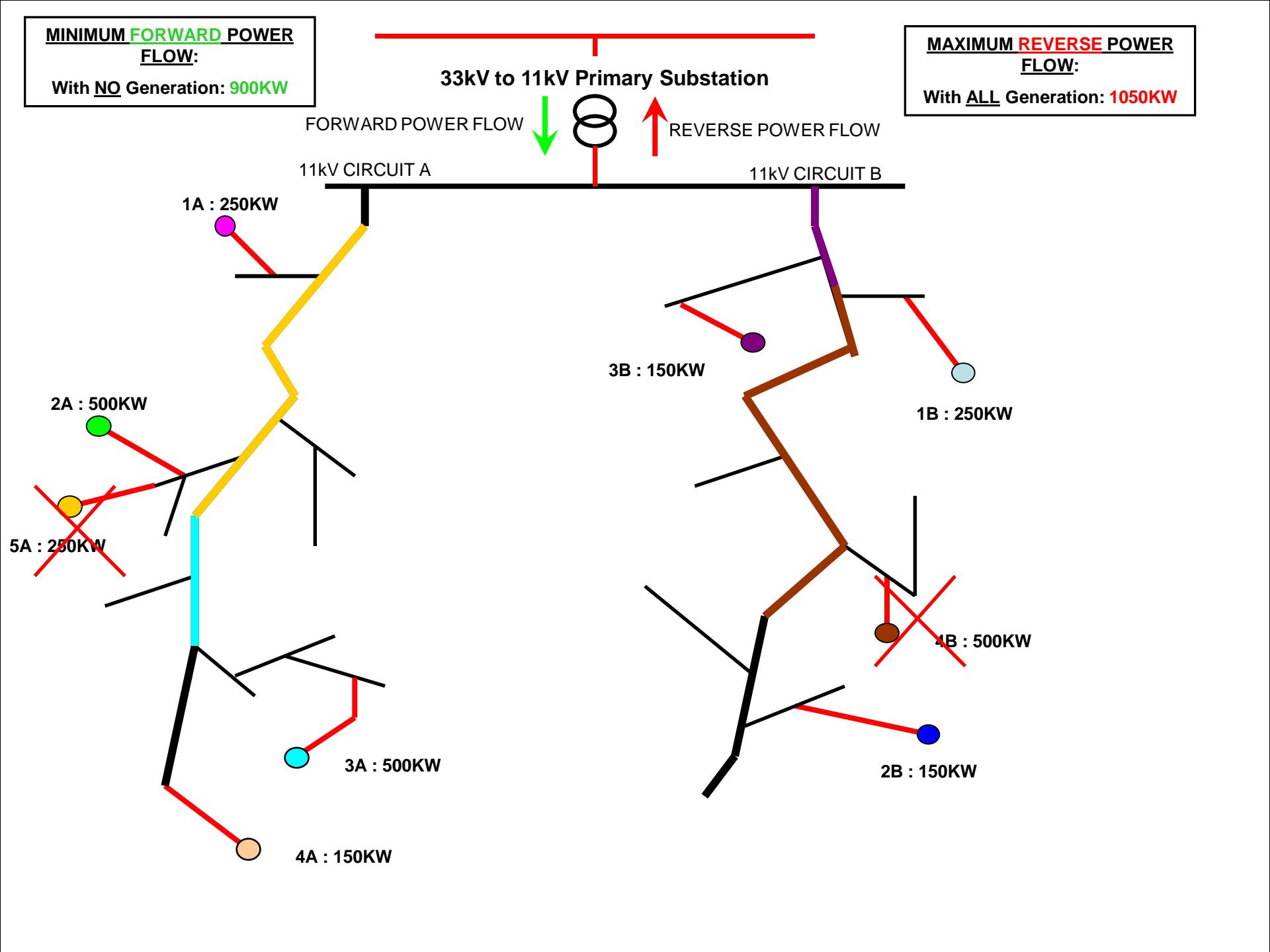
4A : 150KW

3B : 150KW

1B : 250KW

~~4B : 500KW~~

2B : 150KW



Recent position on 33kV investments for SSG

- **More recently**
 - A number of lower cost 33kV investments (at 40 primary substations) were approved by the Utility Regulator last week
 - These will allow Conditional Status to be removed from a number of projects
 - A project plan is being developed to deliver these projects – we will proactively contact customers in this regard
 - However because these investments create only limited additional capacity – this will restrict the number of projects which will proceed
 - Also – removal of Conditional Status will not reduce (or increase) the actual connection cost to developers
 - In respect of higher cost investments – the Utility Regulator has indicated that consultation may be required
 - The above information is referred to in the recent statement issued on 25th October on the NIE Website

Network Heat Map Categories :

The Network Heat Map is categorised at 'PRIMARY SUBSTATION' level with the area associated with the Primary Substation colour coded to provide a simple visual indication of areas already at or reaching saturation point. The colour coding is as follows:

Red-Shaded Area

Significant generation has already been committed and the network is now at saturation point. As a result, connection costs are likely to be very high with only very limited potential remaining for additional generation export.

These areas are likely to already be subject to Conditional Offers due to the requirement for 33kV reinforcement work to facilitate generation export from the 11kV network.

Amber-Shaded Area

Some generation has already been committed and there is now limited potential for connection of additional generation without significant 11kV network upgrade. As a result, connection costs are increasing and will reach saturation point very quickly as additional generation export is committed.

These areas are likely to be subject to Conditional Offers in the near future due to the requirement for 33kV reinforcement work to facilitate generation export from the 11kV network.

Unshaded Area

Only modest levels of generation have already been committed and significant potential remains for connection of additional generation. Connection costs at this time are likely to be lower compared to the Red and Amber shaded areas, dependent on the specific generator location.

General Notes

- (1) Shaded Areas are approximate and should be used for guidance purposes only.
- (2) The impact of microgeneration such as Solar PV is not included in the Network Heat Map at this stage.
- (3) The main urban centres are not currently detailed in the Network Heat Map as most small scale generation activity is focused outside these areas.

11kV Network Heat Map - Small Scale Generation

V1.0 - October 2013

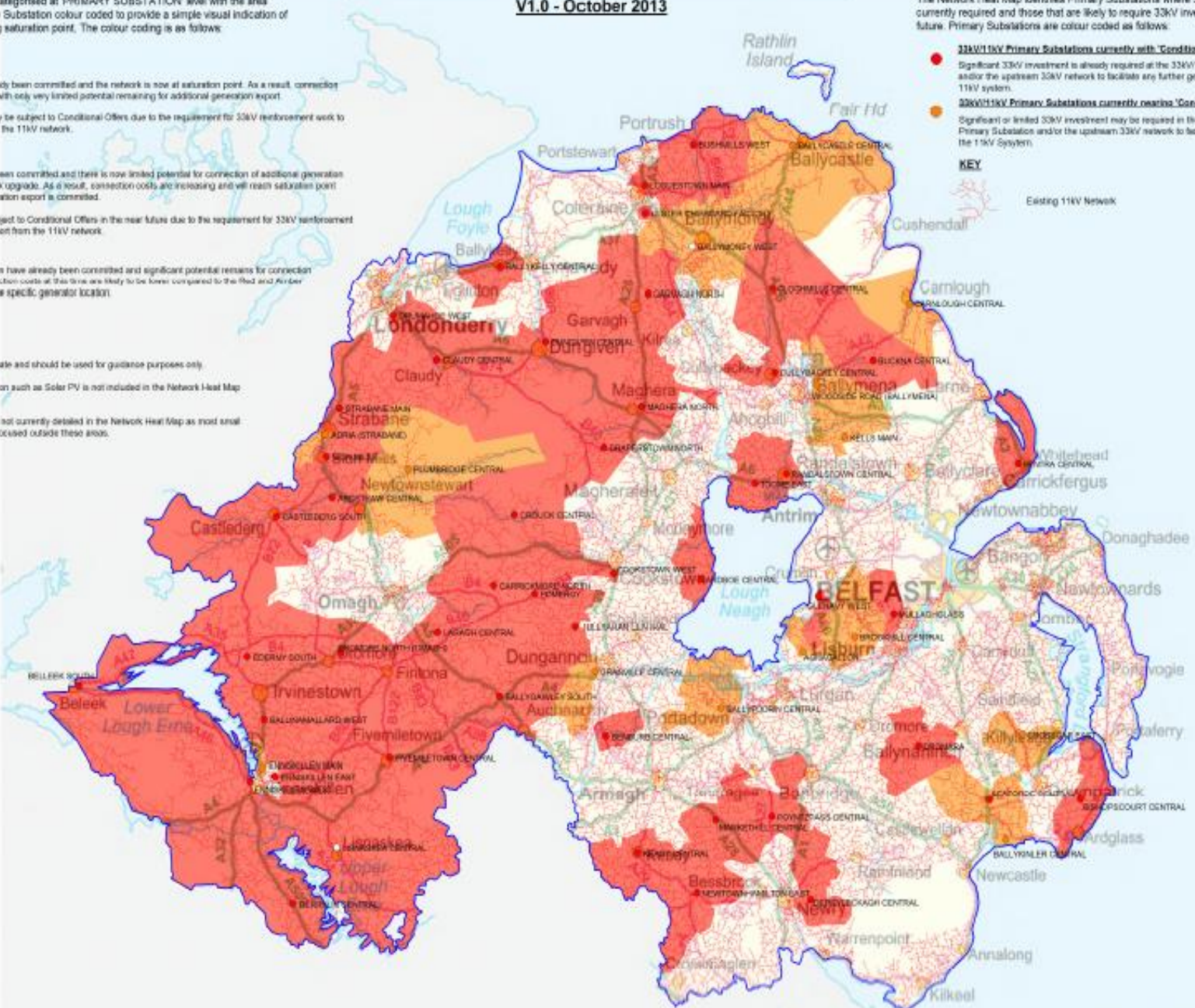
33kV Investments & Primary Substations with Conditional Offer Status

The Network Heat Map identifies Primary Substations where 33kV investment is currently required and those that are likely to require 33kV investment in the near future. Primary Substations are colour coded as follows:

- **33kV/11kV Primary Substations currently with 'Conditional' status**
Significant 33kV investment is already required at the 33kV/11kV Primary Substations and/or the upstream 33kV network to facilitate any further generation export from the 11kV system.
- **33kV/11kV Primary Substations currently reaching 'Conditional' status**
Significant or limited 33kV investment may be required in the near future at the 33kV/11kV Primary Substation and/or the upstream 33kV network to facilitate generation export from the 11kV System.

KEY

Existing 11kV Network



DATE - 25/10/2013
NOT TO SCALE



SSG Progress since last year

- **Connected SSG levels up from 25MW to 54MW since last year**
- **Plus approx 60MW of already committed generation being processed**
- **Additional projects will now also progress due to 33kV investments**
- **Earthing backlog effectively cleared – approx 160 Ground Mounted sites**
- **Steady flow of jobs to construction each month**
- **Large number of jobs now reaching final pre-construction stage**
- **Application activity levels:**
 - **Large increase in G59 applications – up c40% from last year**
 - **Massive increase in G83 applications – up c500% from last year**
- **Increasing resources – for applications and pre-construction activities.**
- **Network Heat Map developed to visualise saturated areas**

SSG - Industry Engagement

- **Current forums include – RGLG; NIRIG; DARD events; MLA Meetings; Council Meetings, Developer meetings, ETI committee**
- **NIE held Industry Event on 9th May with NIRIG to share position with wide range of stakeholders**
- **Discussions centred on ensuring better understanding for stakeholders and information sharing**
- **Also – consideration of any options to improve network access – investment or other ‘SMART’ options**
- **‘Heat Map’ now available on Website – Provider appointed to work with NIE over next 8 weeks on ‘SMART’ analysis**

Observations

- Large developers have moved East to exploit potential
- Existence of other generators increases chances of receiving a high cost connection
- Joined up approach needed to match incentives / network reality
 - NIE stakeholder management: DETI, UR, DARD, UFU, NIRIG
- Feasibility Study option could identify high costs at an earlier stage
- Future applicants may opt for smaller generators - sized specifically to offset electricity usage and minimise export

- 1. Alert industry to network limitations**
- 2. Continue to engage major stakeholders**
- 3. Work through Conditional Offer position**
- 4. Explore all options to improve access**
- 5. Ensure best information available**
- 6. Better communication arrangements**
- 7. Manage high volume of activity**