Integration of Distributed Energy Resources: Irish Case

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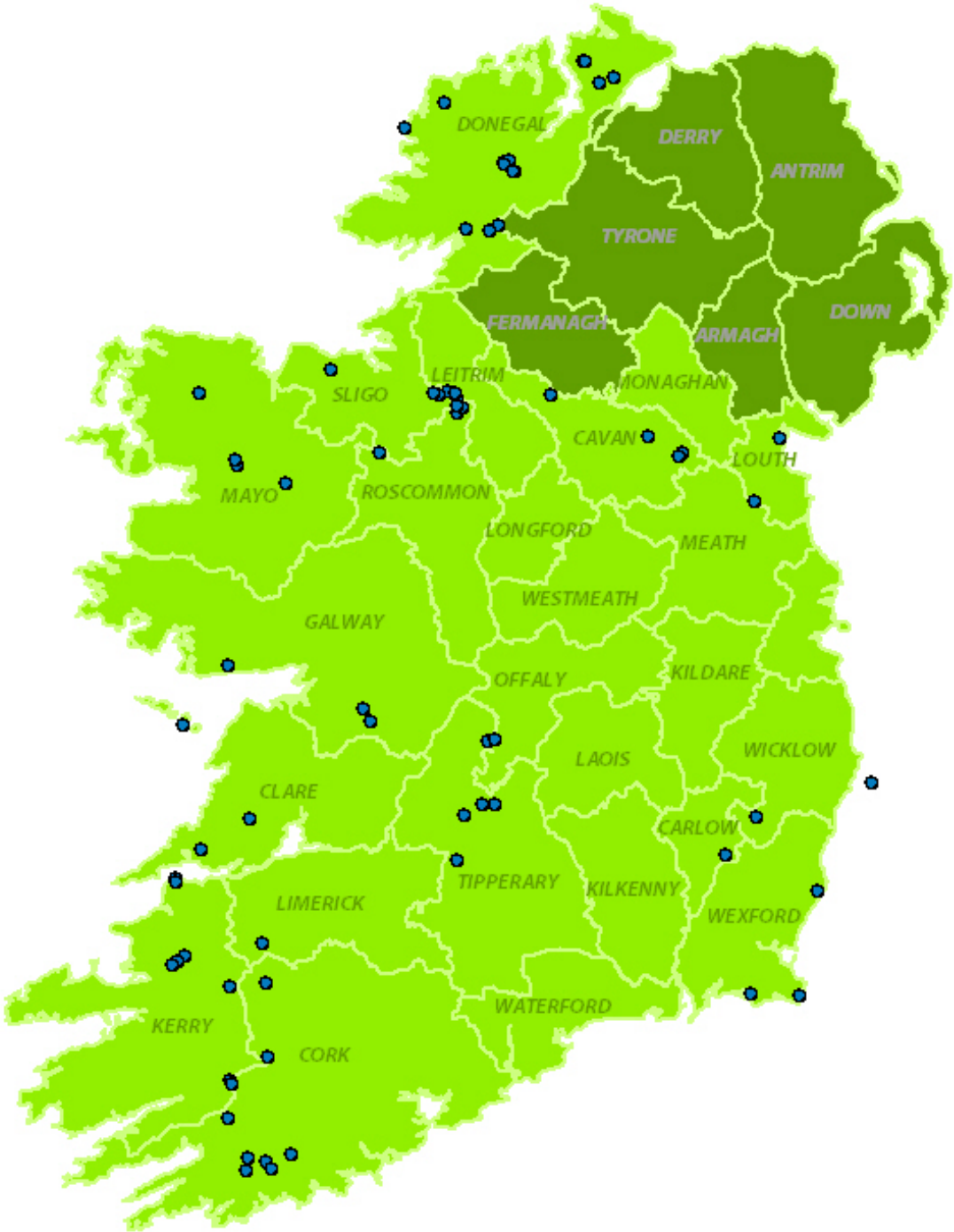
Irish DRES

- Utility Scale Distributed Resources
- Distributed Generation < 30 MW


DONEGAL
DERRY
ANTRIM
TYRONE
DOWN
FERMANAGH
ARMAGH
LEITRIM
MONAGHAN
SLIGO
CAVAN
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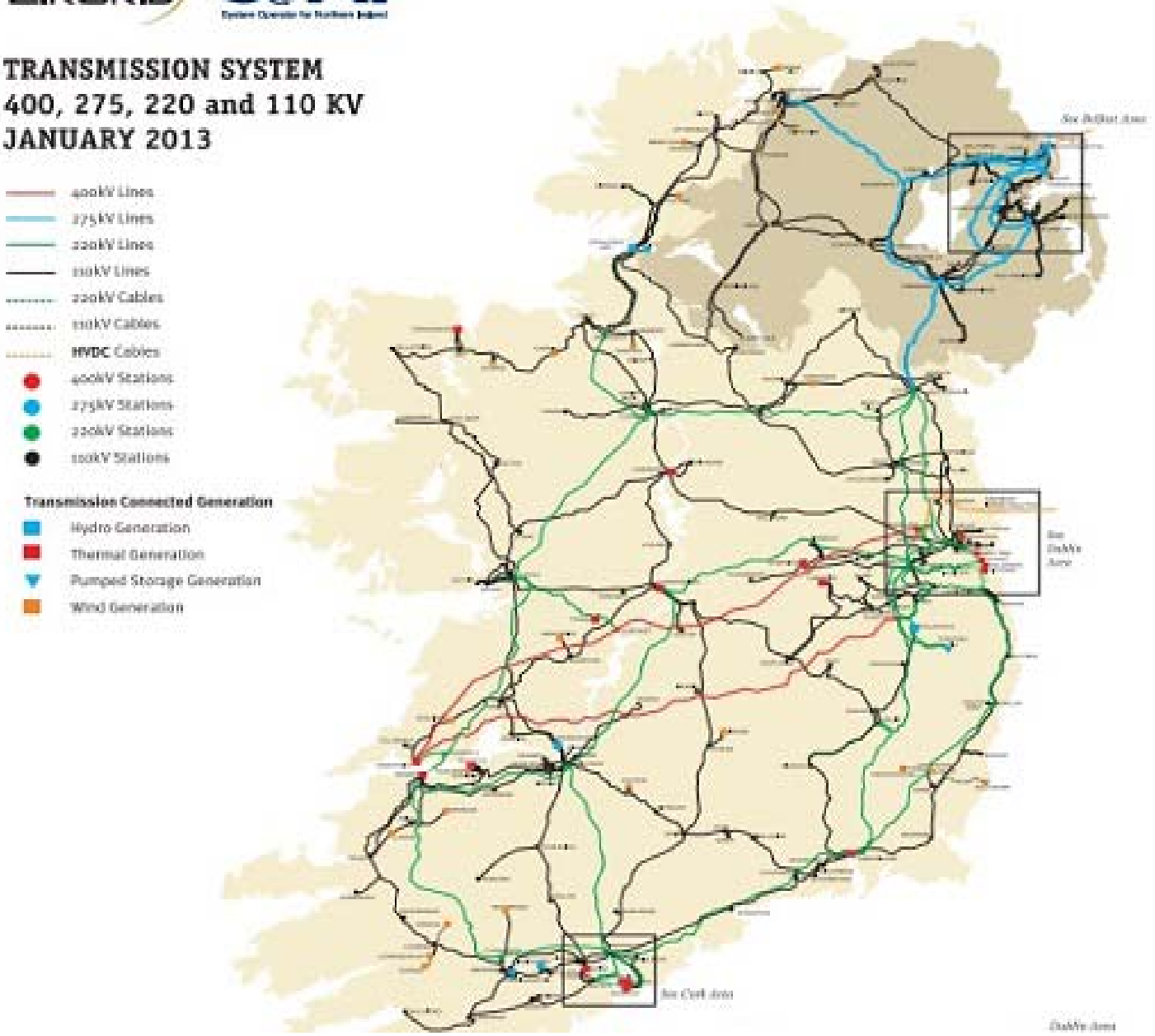
MAYO
ROSCOMMON
LONGFORD
MEATH
WESTMEATH
GALWAY
OFFALY
KILDARE
LAOIS
WICKLOW
CLARE
CARLOW
TIPPERARY
KILKENNY
LIMERICK
WEXFORD
WATERFORD
KERRY
CORK

EIRGRID SONI

TRANSMISSION SYSTEM
400, 275, 220 and 110 KV
JANUARY 2013

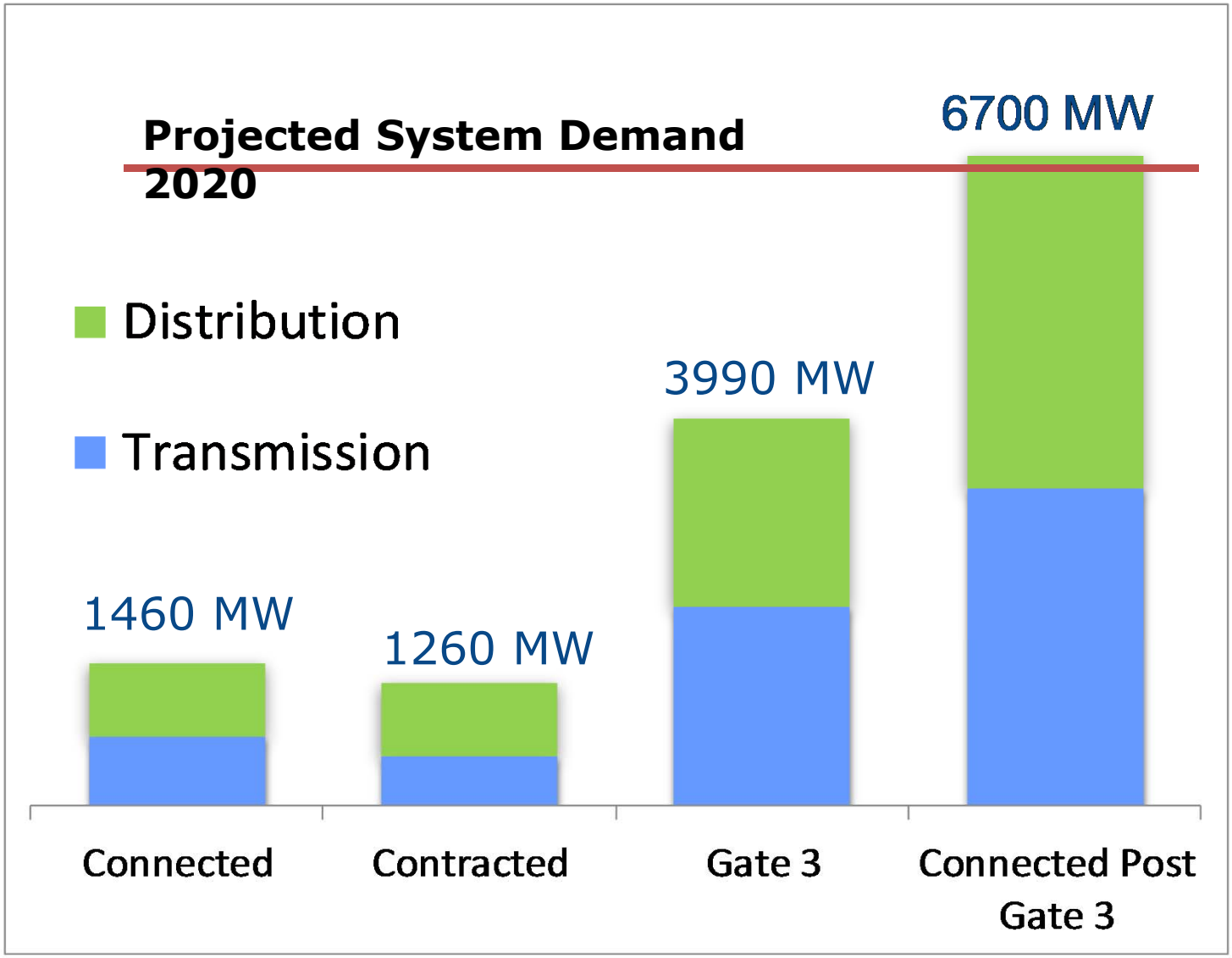


Utility Context

- Active facilitator of renewable energy
- Balancing act of obligations
  - Primarily to demand customers
  - Also now to generation customers

- 2020 RE Target is 40% of electricity to be renewable (~6,000 MW)
- Approximately half of which will be Distributed RES

Ireland Wind Connections (MW)



Policy and Regulatory Challenges

- Financing of projects is challenging for developers due to high upfront capital costs
  - Certainty around revenue improves this situation
  - Drives governments to establish Feed in Tariff mechanisms
- Priority export for renewable energy

- **Intersection between technical and policy requirements and objectives**

Group Processing Approach

- Policies and regulations supporting DER need to (in some way) reflect technical reality of electrical network

- Areas of high density energy resource
- Multiple generators seeking to connect

- Consider network design for cluster as a whole
- Guarantees that wind power available is able to be utilised
- Largely eliminates issues related to variability

Challenges Faced

2003
System Operator placed a moratorium on all wind connections due to concerns over system security

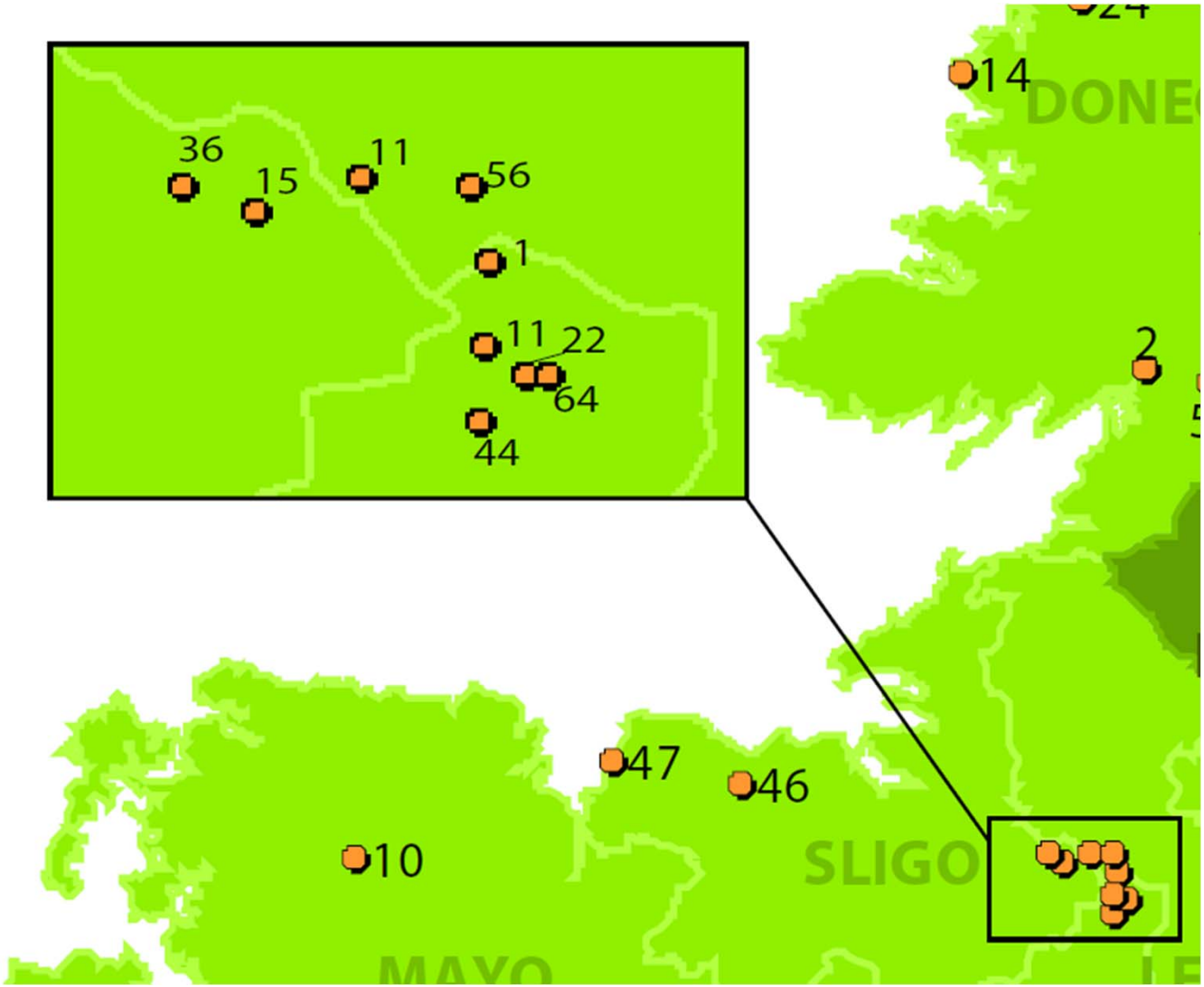
December 2004
Moratorium lifted

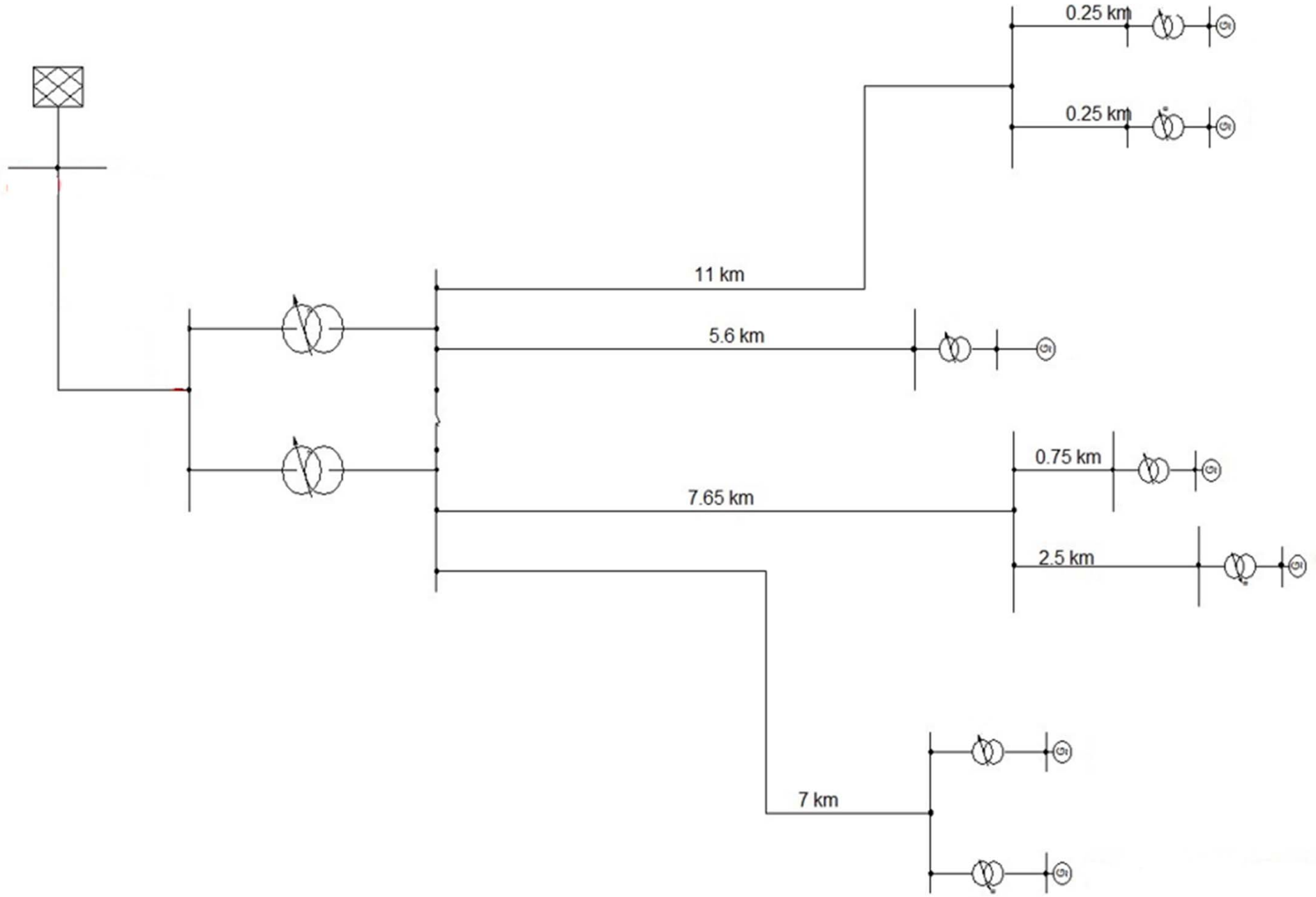
January 2005
Group Processing Approach launched
Gate 1: 373 MW

January 2007
New Round of Connections processed and offered
Gate 2: 1300 MW

January 2011
New Round of Connections processed and offered
Gate 3: 4000 MW

Group Processing




0.25 km
0.25 km
11 km
5.6 km
0.75 km
7.65 km
2.5 km
7 km

Advantages and Disadvantages

- Rapid connection of large volume of renewable generators
- Provision of high quality connections to the grid

- Relatively large upfront capital network investment
  - Cost absorbed by electricity customer and wind farm developers

New Challenges

- Growing public opposition to wind turbines and overhead lines
- Growing public opposition to renewables incentives
  - Macroeconomic environment
- Connection of micro-generation (Solar PV)
  - Deeper into the grid generation is located, fewer existing technology options to integrate it
- Complex technical limitations

Innovation Options

- Real time management of resources
  - Centralised or distributed
- New connection arrangements for DER
  - Potential removal of right to export all power
  - Potential to provide lower cost connections
  - Requires greater ongoing monitoring and management
- Network automation and control

Summary

- Unique technical innovation coupled with appropriate policy and incentives
- High reliability of bulk system has limited drive towards microgrids (so far)
- Coordination of operation between utility operators, developers and regulators on island is central to achievements to date and further progress