



**Rialtas na hÉireann** Government of Ireland

www.seai.ie

# Sligo Grid Study





#### Agenda

- 1. Review of the Transmission and Distribution networks in Co. Sligo.
- 2. Connection application process for community projects
- 3. How grid capacity can be identified for community projects
- 4. Worked example site (1) near Aghagad 38kV substation, Co. Sligo
- 5. Worked example site (2) near Ballymote 38kV substation, Co. Sligo
- 6. Results of Co. Sligo substation review



# What is a Community Project?

- Community projects are currently permitted to have a maximum export capacity (MEC) between 500kW and 5MW.
- Example of Renewable Generation that could be used in Community Projects:
  - Wind
  - Solar PV
  - Hydro(excluding pumped storage)
  - Waste to Energy,
  - Biomass and Biogas Projects.
- Small Scale, micro and min generators are projects with an MEC between 11-500kW, also zero export auto-production projects



3.99MW Ground Mounted Solar Farm (Co. Waterford)



4.6MW Wind Farm( Co. Limerick)



# The Electricity Network in Ireland



Small Scale & Community Projects



#### **Existing and Planned Transmission Network Co. Sligo**





#### Distribution and Transmission Network in Co. Sligo



#### **New ESB Networks Connection Planning Standards**



ESBN have increased the available capacity for new projects by overloading the transformers by up to 30%

Transformer	New
Rating(MVA)	Rating(MVA)
5	6.5
10	13
15	19.5
31.5	40.95
63	81.9



#### **Capacity Calculation**



Results in more capacity being available at 38kV substations fed from the 110kV substation

#### **ECP-GSS Decision for Community Projects**



https://www.cru.ie/publications/28316/

#### **ECP-GSS Decision for Community Projects**

- Unlike the ECP-2 process, where capacity was held for community projects while the project waited for planning consent, communities will have no certainty on their grid connection until they receive a grid connection offer.
- New connection offer process = more risk on community projects.
- Community projects must be 100% Renewable Energy Community (REC)
- No MEC limitations.
- No cap on the number of applications per batch. 2 Batches per year.
- Planning application deemed complete + a High Level Technical Assessment (HLTA) required to apply for grid.
- HLTA assessment is non-binding.
- The System Operators will process each application and issue connection offers over a 12 month period
- 2-month period to accept the connection offer.
- Importantly, to accept a grid connection offer a community project must have planning consent in place.
- The fee to accept a grid connection offer has reduced from €10,000 per MW to €5,000 for community projects.





Grid

# **ESB Networks Application Requirements**



To apply for a grid connection an applicant must submit a connection application form. The information requested on the form is broken into the following sections:

- Applicant Details
- Site Details:
- Generator Details: MEC, Target Connection Date
- Maps and Diagram
- To apply to for a grid connection the full application fee is required.
   For 1-6MW projects this is €21,964.
- Potential fee for HLTA-this is to be confirmed.
- Potential for application fees to be refundable for withdrawn applications is being considered by ESB Networks/EirGrid

Application for a New Connection           Prod official use over any set of the se		EMBEDDED GENERATION FACILITI
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This application form outlines the information ESB Networks DAC requires to progress an application for concertion to the ED binchulon System. A application must comply with the 2004/00/1, 10/1, 2004/2004, 2004	Introduction	
Please note that this application form only deals with UV (230/400V), 10kV, 20kV, 20kV and in some cases, 110kV connection higher connection voltage is required the applicant should contact the Customer Relations Team in ErGind: +383 1 237 0472 info@ilegrind.com. ESB Networks DAC responsibility to determine distribution connection method. If the applicant should provide such informatio promptly during and post the other process. It is ESB Networks DAC responsibility to determine distribution connection method. If the applicant has a specific request pro- sonadered and resumed in this process. The selected method will be based on the overal least contending to request pro- sonadered and resummed in this process. The selected method will be based to the overal least contending to request pro- tein a considered and resummed to the process. The selected method will be based to the overal least contending to an emainment of MIG or least). Definitions of terms used in the form can be found in the glossary of the Distribution Code. When the application form is fully completed email the form and all relevant documentation to: DSOGenerators@ets.ie If any queries arise ESB Networks DAC can be contacted at 1800 372 757 or DSOgenerators@ets.ie Please notes that is accordance with the Commission for Regulation of Ubilities, pome information from your completed application. Please Note: Information contained within this application form may need to be shared with the TransmissionSystem Operator to unificiently assess your application. The Form NCS should be used where an application that is deplication from NCS is a should be used where an application.	This application form outlines the information ESB Networks D Distribution System. All applications must comply with the Dist Connection to the Distribution System. These can be found on	AC requires to progress an application for connection to the Electric ribution Code and ESB Networks DAC Conditions Governing our website: <u>esbnetworks.ie</u> .
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Please note: Incomplete applications will not be accepted.	Please note: Incomplete applications will not t	be accepted.

# How is Capacity Identified for a Community Project? *MullanGrid*





### **Example 38kV Substation**





#### **Grid Connection Assets**



**On Site Substation** 



Underground Cable



**Overhead Line** 



MV Network Upgrades MEC-500kW-1MW



38kV Network Upgrades



110kV Network Upgrades

# Identifying Capacity with ESB Networks Heat Maps



#### Advantages of the Heat Maps:

- All substations transformer ratings are listed.
- Provides the approximate location of all the substations and transformers.
- The current available capacity at each transformer is provided.
- Excel spreadsheet containing all the mapped information available for download.

#### Not considered on the Heat Map:

- Projects with planning consent or in the planning process.
- MV, 38kV or transmission network capacity is not accounted for.
- Substations may only have capacity due to upgrades already completed at the substation.

Link: https://www.esbnetworks.ie/services/getconnected/renewable-connection/network-capacity-heatmap





### Example (1) of 5MW Solar Farm at Aghagad 38kV Substation



#### New 5MW Solar Farm Aghagad - 38kV/MV Transformer Capacity



		AGHAGAD Transformer configuration: T41  T42 {C4 Generation Available Firm: 6.5 MW Generation Available Non-Firm: 2.4 MW Parent Station: SLIGO: T141  T142 Parent Available MW: 64.2	oupled
Layer	Result	Aghagad	
Capacity	N/A		
38/MV Transformer Capacity	Yes		1
38kV Network Capacity	ТВС	38kV Substation Name	
110/38kV		Aghagad	
Transformer	ТВС	Transformer Rating	2x5
Capacity		ESBN Substation Secondary Voltage	10
110kV Network Capacity	ТВС	MG Available Capacity incl.Transformer Losses(MW)	6
A STATE OF THE OWNER			100 March 100 Ma

# New 5MW Solar Farm Aghagad - 38kV Network Capacity



Layer	Result		
MV Network	NI / A		
Capacity			
38/MV			
Transformer	Yes		
Capacity			
38kV Network Capacity	Yes		
110/38kV			
Transformer	ТВС		
Capacity			
110kV Network	TPC		
Capacity	IDC		



# **New 5MW Solar Farm - Sligo - 110kV Transformer Capacity**



Layer	Result		SI 160						
MV Network Capacity	N/A		SLIUU						
38/MV Transformer Capacity	Yes		Transform Generation	er configuration Available Firm	: T141∥T142 : 64.2 MW	{Coupled 2x63	MVA}		
38kV Network Capacity	Yes		Parent Sta	tion: Transmissio	n Source:				
110/38kV Transformer Capacity	Yes		Parent Ava	ilable MW: N/A,	consult Eirgri	d			
110kV Network Capacity	Yes								
Sligo 110kV Substation									
Project Name	Technology	MEC	38kV Substation	Status	Minimum Demand(MW)	Transformer Capacity(Connected, Contracted)	Transformer Capacity(Connected, Contracted and ECP)	Transformer Capacity(All Generation)	
Carrickheeney	Natural Gas	7.65	Manorhamilton	Connected					
Colloney Manufacturing	Natural Gas	0.5	Collooney	Connected	19	55	55	55	
Rockvgrange Hotel Hvdro (1)	Wind	2.19	Colloonev	Connected			55		
buse Wind (prev. Templehouse Community Wind	Wind	4.08	Ballymote	Contracted					
Subtotal C	onnected and Contracted	20.42							
Subtotal Connec	ted, Contracted and ECP	20.42							
	10lai	20.42							



# Aghagad 38kV Substation Summary

38kV Substation	Aghagad				
Feeding 110kV Substation	Sligo				
Number of Transformers & MVA					
Rating	2x5				
Transformer Configuration	T41  T42				
Secondary Voltage Level	10kV				
Total Generation(MW)	0.0				
Available Firm Capacity(ESB)(MW)	6.5				
Available Capacity(MG)(MW)(All	6.0				
Generation)	0.0				
Risk of Chargeable Transformer	Low				
Upgrades	LOW				
Risk of 38kV Network Upgrades	Low				
Development Potential	High				
	There appears to be available capacity at the 38/MV transformers for new generation. For this reason the development potential is considered high.				
Comment					

### **New 5MW Solar Farm Aghagad - Other Considerations**



- A site beside Aghagad 38kV substation in Co. Sligo as an example
- This is considered a rural area. Finding a site within 1km (green circle) or 2km (orange circle) is important for a successful project.
- A community project within 5km (red circle) of Aghagad 38kV substation is unlikely to be viable from a cost perspective regardless of planning viability.



### **New 5MW Solar Farm Aghagad - Other Considerations**

- Aghagad 38kV Substation has a positive grid review based on available transformer capacity at Aghagad 38kV and Sligo 110kV substations
- However, the MV building at Aghagad and/or the electrical infrastructure in the substation may be old or require a refurbishment to connect new projects. This information will only become known during the connection offer process.-Fortunately the substation appears to be quite new
- A substation refurbishment can add significant costs onto a project that could make it economically unviable



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# Example (2) of 5MW Solar Farm near Ballymote Co. Sligo



# 5MW Solar Farm - 38kV/MV Transformer Capacity

mar and



			BALLYMOTE         Transformer configuration         Generation Available Firm         Parent Station: SLIGO: T14         Parent Available MW: 64.2	: T41 {5 MVA} : 1.2 MW 1  T142
Layer	Result	6-0		
MV Network Capacity	N/A	· C An-31		
38/MV Transformer Capacity	Low	and the second		
38kV Network	TRC	M		
Capacity			38kV Substation Name	
110/38kV	TBC	A THE MA	Ballymote	
Transformer Capacity		a phillip	Transformer Rating	5MVA
110kV Network	TRC		ESBN Substation Secondary Voltage	20kV
Capacity			MG Available Capacity incl. Transformer	1MW
			Losses(MW)	

#### New 5MW Solar Farm Ballymote - 38kV Network Capacity





# New 5MW Solar Farm - Sligo - 110kV Transformer Capacity







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# What is Dispatch Down?

- All existing solar & wind (non- synchronous) generators greater than 5MW have to be controllable. The limit has been reduced to 1MW for all new generation in Ireland.
- Curtailment excessive intermittent and non-synchronous generation on the system
  - Energy Balancing (Oversupply) is a market-based dispatch which occurs when the availability of renewable generation exceeds system demand plus interconnector exports
  - System Curtailment is a non market-based re-dispatch which occurs when system constraints such as SNSP or Min Gen are exceeded
- Constraint generation overloading transmission network
- The Curtailment and Constraint of generation is known collectively as "dispatch down", where the output of the generator is reduced by the System Operator.
- EirGrid publish annual constraint reports estimating dispatch down for projects in different constraint areas

https://www.eirgrid.ie/industry/customer-information/ecpconstraint-forecast-reports



EirGrid Constraint reports for each area

### **Network Constraints**

- There is a low/ moderate levels of solar generation in the county of Sligo. As a result estimated solar constraints are low.
- There is a large amount of wind generation connected to the 110kV network in the north west. As a result the
  estimated wind constraints are extremely high in the some scenarios of the EirGrid studies. This constraints
  present a significant risk to any wind project planning to connect in the North West region.
- EirGrid analysis is somewhat crude, constraints may be higher in some areas of the county.



# Summary of Co. Sligo Grid Potential



38kV Substation	Feeding 110kV Substation	Number of Transformers & MVA Rating	Secondary Voltage Level	Transformer Configuration	Total Generation(MW)	Available Firm Capacity(ESB)(MW) - 2025	Available Capacity(MG)(MW)	Risk of Chargeable Transformer Upgrades	Risk of 38kV Network Upgrades	Development Potential 키
AGHAGAD	Sligo	2x5	10kV	T41  T42	0.00	6.52	6.02	Low	Low	High
BALLYTIVNAN	Sligo	2x10	10kV	T41 & T42	0.00	15.13	13.26	Low	Low	High
OAKFIELD	Sligo	2x10	10kV	T42 & T41	0.00	13.46	13.41	Low	Low	High
FINISKLIN	Sligo	2x5	10kV	T41  T42	0.00	8.67	7.6	Low	Low	High
COLLOONEY	Sligo	2x5	10kV	T41	2.69	4.10	3.7	Moderate	High	Low
BALLYMOTE	Sligo	1x5	10kV	T41	4.08	1.24	1.2	High	High	Low
CRANMORE	Sligo	2x5	10kV	T41  T42	0.00	8.30	6.87	Low	Low	Low
TUBBERCURRY	Tonroe	1x2,1x5	10kV	T41 & T42	0.00	2.87	2.5	High	High	Low
Gurteen	Tonroe	1x5	10kV	T41	4.99	3.68	0	High	High	Low
ENNISCRONE	Moy	2x5	20kV	T421  T422	12.00	1.21	1.2	High	Moderate	Low

# Data freeze April 2025

### **Sligo Summary Results**





### Recommendations



- Further information on HLTA and applications fees to be available later in Q1 2025
- Complete Feasibility Study at an early stage
  - Refer to ESB Networks Heat Map initially
  - Need to consider other planned generators and potential network upgrades-Grid Feasibility very important
- If Community scale project is not viable consider smaller scale renewable energy projects; rooftop, Auto-production, Small Scale Generation(50-200kW), Micro-generation(6kW (Single phase) or 11kW (three phase), Mini-generation (MEC greater than 11kW and less than 50kW).



# **Contact Details**

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