Enduring Connection Policy 2.4

Solar and Wind Constraints Report: Results for Area K

Version 1.0

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Revision History						
Revision	**Date**	**Description**	**Originator**	**Reviewer**	**Checker**	**Approver**

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Document Structure

This document is for customers wishing to see the estimated Total Dispatch Down for Area K. For information on the study assumptions, methodology, abbreviations and terms used for the Constraint Analysis reports, please see the area non-specific Assumptions and Methodology report found on the ECP-2.4 webpage[1].

This document contains two main sections:

Section 1: Results for Area K: outlines the area covered by this report. This section provides a network diagram of Area K and an overview of the results for Area K.

Section 2: Area K Node Results: provides a table of results for every node in the area. This table documents the installed capacity, available energy, surplus, curtailment and constraint for every node in Area K.

[1] https://www.eirgrid.ie/industry/customer-information/ecp-constraint-forecast-reports#ecp-2.4-constraint-reports-for-solar-and-wind

Important Note

This ECP-2.4 constraints report presents an estimate of the reduction in available solar and wind generation based on the study assumptions described. The reduction in available generation has been split into three categories for the purposes of this study: surplus, curtailment, and constraint.

Following the Judicial decision on the SEM-22-009 Decision Paper on Dispatch, Redispatch and Compensation Pursuant to Regulation EU 2019/943, the detailed design for implementing Articles 12 and 13 is yet to be determined and may differ from the implementation for Total Dispatch Down used in this study. Therefore, an assumed interpretation will be used for ECP-2.4 Constraint Analysis that applies a grandfathering[2] approach to resolving Surplus and Constraint conditions. However, in addition to the Core ECP 2.4 constraint forecast studies a set of sensitivity studies are also included in the study scenarios which employs pro-rata allocation of constraints.

This report uses the term "Total Dispatch Down" to refer to the total reduction in available solar and wind generation i.e., the sum of surplus, curtailment, and constraint, and is considered the key indicator for the results. However, it is important to note that the term "dispatch down" is more correctly applicable only to TSO instructions to reduce generation output from a market position, as is the case for curtailment and constraint, and is not necessarily applicable to a generator reducing its own output from its availability to a market position so that supply and demand are balanced, as is the case for surplus.

The results presented in this report are based on the simulation and modelling assumptions described. The findings are indicative only and this report should in no way be read as a guarantee as to future levels of surplus, curtailment, and constraint. The modelling of interconnectors is kept consistent with ECP 2.3 constraint forecast.

The battery sensitivity is termed as "ECP Battery", in which the non-connected batteries from the ECP scenario has been removed.

[2] 'Grandfathering' is where an old rule continues to apply to some existing situations while a new rule will apply to future cases. In the context of Article 12 and Article 13, grandfathering refers to the distinction between how priority dispatch renewable generators (those installed prior to 4th July 2019) and non-priority dispatch renewable generators (those installed on and after 4th July 2019) are treated in the SEM.

1 Results for Area K

1.1 Introduction

This section provides the surplus, curtailment and constraint results for Area K that are estimated by this analysis. There is a total of six core ECP-2.4 studies and nine sensitivity studies (including without maintenance) presented in this report. The study scenarios and the associated assumptions can be found in the Assumptions and Methodology report. An overview and discussion of the results is provided in this Section. The surplus, curtailment, and constraint results for each node in Area K are provided in Section 2 of this report.

1.1 Study Notes

A list of the major study assumptions is provided in the Assumptions and Methodology report. For Area K, there are a number of key assumptions which drive the results, including network outages and capacity factors. These are thus reiterated here. Similarly, it is worth highlighting again the differences between the various components of Total Dispatch Down.

1.1.1 Network Outages

The scenarios in this report are intended to give a view of average long-term levels of surplus, curtailment, and constraint, subject to installed generation, demand, interconnection, operational constraints, and reinforcement delivery.

The ECP-2.4 constraints forecast analysis applies a similar transmission outage schedule to the ECP-2.3 constraints analysis. This was kept consistent with last year's schedule following positive feedback from industry. This schedule allows a representation of outage impact in each geographical area to be included in the studies.

This representative transmission outage schedule is given in Appendix A of the Assumptions and Methodology report. However, at times, longer duration outages may be required for certain connections, reinforcement works or forced outages work. These are not considered in this analysis and may result in higher wind and solar constraints in reality.

1.1.2 Benefit of Capacity Factor

In practice, a specific windfarm may be located at a site with higher wind speeds or may have a better performing type of wind turbine; the result is a higher capacity factor than neighbouring windfarms. This report does not reflect such localised diversity between windfarm sites. In reality, a windfarm with a higher capacity factor may see lower percentage surplus, curtailment, or constraint levels than an adjacent windfarm with a lower capacity factor. This is because at times of medium or low wind speed, the high-capacity factor windfarm can generate power when the low-capacity factor windfarm cannot.

1.1.3 Notes on Surplus, Curtailment and Constraint Modelling

1.1.3.1 Surplus

During generation reduction for surplus, a distinction is made between the treatment of priority and non-priority renewable generators, with non-priority generators being dispatched down ahead of priority generators. Within these two categories of generation, surplus is applied pro-rata across the all-island system for all non-priority renewable generators.

For any hour of the study, the surplus level will depend on system demand and interconnector flow capacity. In general, surplus is expected to increase with increasing installed renewable capacity.

It is expected that the further interconnection of the all-Island network with mainland UK and Europe will decrease the frequency of surplus conditions occurring.

In general, increased interconnector capacity with mainland UK may not necessarily eliminate surplus generation as solar and wind profiles in mainland UK will largely be in line with those in Ireland. In the Future Grid study year however, when both the Celtic and 2nd Ireland-France interconnectors are connected, there will be a greater export capacity during times of abundant renewable generation to mainland Europe where similar wind and solar generation in Ireland and mainland Europe is not expected.

Therefore, dispatch down due to surplus generation may not occur as frequently once both the Celtic and 2nd Ireland-France interconnectors are connected.

1.1.3.2 Curtailment

In this report, for each hour of the study, the curtailment is shared pro-rata on a system-wide basis with no distinction made between priority and non-priority generators. This means that both curtailment reductions and curtailment increases are shared system wide.

Solar generation has different reported levels of curtailment compared to wind due to different capacity factors and annual profile shapes.

The applied curtailment is broadly constant across the system. However, due to differences in wind and solar profiles and capacity factors between areas, the percentage of average curtailment differs between areas.

1.1.3.3 Constraints

The constraints on the renewable generation are treated differently in different years. In 2029 and Future Grid scenario, for the constraint of renewable generation, a distinction is made between priority and non-priority generators, with non-priority generators being dispatched down ahead of priority generators across the relevant transmission nodes within the subgroup. Such application is termed as grandfathering of constraints. However, in 2027 study the constraints are allocated pro-rata to all renewable generator nodes within the subgroup. Additionally, in relevant sensitivity scenarios, grandfathering or pro-rata constraints allocation are applied accordingly. More details on the approach assumed in this study for the application of constraints to renewable generation can be found in the main ECP 2.4 Assumptions and Methodology report.

In general, there is a tendency for renewable bulk power to flow towards the demand in Dublin and the interconnectors. These flow patterns are relevant when seeking to understand constraint apportionment in the simulation.

When presented as percentage values, the constraint results look different for solar and wind, as they have a low correlation due to different profile shapes driven by weather patterns.

1.2 Generation Overview

A detailed system-level overview of the renewable generation scenarios used in these studies is given in Section 2 of the area non-specific Assumptions and Methodology report. The distribution of generation in each scenario based on technology, area and node is given in Appendix B of the Assumptions and Methodology report. The node-level installed wind and solar generation for Area K in the "ECP" scenario is given in Table 1-1.

Node	SO	Status	Solar	Wind
Butlerstown	DSO	due to connect	55	
Butlerstown	DSO	connected		2
Dungarvan	DSO	due to connect	57	
Dungarvan	TSO	due to connect	80	
Dungarvan	DSO	connected		5
Rathnaskilloge	TSO	due to connect	95	
Woodhouse	TSO	due to connect		119
Woodhouse	TSO	connected		20
Total			287	146

Table 1-1 Wind and Solar Generation Summary (MW) in Area K for Generation Scenario "ECP"

Table 1-2 and Table 1-3 show installed solar and wind generation for Ireland and Area K, and the available solar and wind generation for Area K for each generation scenario.

Solar	ECP	ECP + 3.1GW Offshore	ECP + 5GW Offshore	ECP + 5GW Offshore IC
Installed Ireland (MW)	7005	7005	7005	7005
Installed Area K (MW)	287	287	287	287
Installed Controllable Area K (MW)	287	287	287	287
Available Controllable Area K (GWh)	336	336	336	336

Table 1-2 Installed MW and Available GWh for Area K - Solar

Wind	ECP	ECP + 3.1GW Offshore	ECP + 5GW Offshore	ECP + 5GW Offshore IC
Installed Ireland (MW)	7358	10432	12358	12358
Installed Area K (MW)	146	146	146	146
Installed Controllable Area K (MW)	139	139	139	139
Available Controllable Area K (GWh)	422	422	422	422

Table 1-3 Installed MW and Available GWh for Area K - Wind

1.3 Network Overview

The transmission network in Area K and the surrounding areas is shown in Figure 1-1. The 220 kV circuits are shown in green and the 110 kV circuits in black. Possible future transmission stations and lines for the connection of new generation are also shown on the map below.

Figure 1-1 Network Map for Area K

For Area K, the dominant power flows tend to be towards the load centres on the east coast and the interconnectors. These flow patterns are relevant when seeking to understand constraint apportionment in the simulation. Constraints in Area K can be caused both by local and wider system issues.

Constraints in the model are optimised on a system-wide basis so, in theory, an increase in the installed generation in another area may increase constraints in Area K.

In addition to the power flows out of Area K, there are also power flows across or through Area K. Renewable power from the south-west will flow across the transmission network and at least some of this power will flow through Area K.

The power flowing out of Area K meets and joins with power flows from other areas, as the power flows towards the demand centres and interconnectors. A transmission bottleneck between Area K and the east is shared with power flows coming from other areas.

1.4 Future Grid Sensitivity Scenario

In line with the previous ECP constraint forecasts, and in response to feedback from industry, the Future Grid scenario is included in the analysis. All reasonable efforts have been made to align the network assumptions in the Future Grid scenario to the Shaping Our Electricity Future (SOEF) 1.1 Roadmap. The network projects included in the study are given in Appendix A of the Assumptions and Methodology report found on the ECP-2.4 webpage. Additionally, any project that has progressed to stage three of the six stage project planning process after the publication of the SOEF 1.1 Roadmap are also included in the Future Grid studies. Note however, that the wind and solar generation portfolio in the ECP-2.4 Future Grid scenario differs from the wind and solar portfolio considered in the SOEF 1.1 Roadmap. This is done to maintain alignment with the ECP-2.4 process. The ECP study scenario includes all wind and solar projects which have applied through connection processes, whereas the SOEF 1.1 study includes prospective list of generators to achieve the capacity volumes stated in the Climate Action Plan 23.

The Future Grid study includes a base renewable generation scenario (ECP), along with four sensitivity generation scenarios (ECP + 3.1 GW offshore, ECP + 5 GW offshore, ECP + 5 GW offshore without LirIC and 2nd France IC, and a maintenance sensitivity study). The scenarios with additional offshore wind have been included to show the potential impact of increasing offshore wind on Total Dispatch Down levels.

The demand modelled for the Future Grid scenario is based on the medium demand scenario for 2030 as published in the All-Island Resource Adequacy Assessment 2025-2034.

The purpose of the Future Grid scenario is to provide insights on the potential impact of the SOEF 1.1 Roadmap network reinforcement portfolio on the dispatch down of wind and solar generators. This study is not intended to be exhaustive; it is not intended to remove all transmission constraints and it does not give individual generators guarantee that their Total Dispatch Down will change to the estimated levels.

1.5 Area K – Average Results

The Total Dispatch Down results for Area K are provided below in Table 1-5 to Table 1-10 and Figure 1-3 to Figure 1-5. These include the breakdown between surplus, curtailment, and constraint. The Table 1-6, Table 1-8, and Table 1-12 gives the results of constraint sensitivity scenario. The Total Dispatch Down percentages are based on the total available energy. The Total Dispatch Down is the sum of surplus, curtailment, and constraint. The node level breakdown of surplus, curtailment and constraint are given in Section 2. The results show that the system level Total Dispatch Down increases with additional installed capacity due to a significant increase in surplus. However, the Total Dispatch Down reduces when the 2029 studies are compared with 2027 and there is a further reduction in the Future Grid scenario owing to increased demand, network reinforcement, interconnection, and relaxed system level operational limits.

For each generation type in Area K (solar non-priority, wind non-priority and wind priority), the total installed capacity in MW and total available generation in GWh are given in Table 1-5 to Table 1-10. The total generation in GWh after dispatch down and the corresponding percentage Total Dispatch Down are also included in the tables for each scenario. Details on the generation and network scenarios are given in Section 2 of the Assumptions and Methodology report.

1.5.1 Offshore Wind Sensitivity Studies

Results for the offshore wind-based sensitivity studies are included, along with results for the core scenarios. The general trend is that with increasing levels of offshore wind, Total Dispatch Down increases due to significant increases in the available wind energy, which in turn leads to increased levels of surplus.

1.5.2 Impact of Article 12 and 13

Higher Total Dispatch Down is observed for non-priority generators due to the impact of the implementation of grandfathering of surplus and constraints, which results in non-priority generators being reduced ahead of priority generators for surplus and constraint reasons. More detail on the Article 12 clause is available in Section 3.6 of the Assumptions and Methodology report.

Another factor that contributes to the higher total dispatch down for non-priority wind and solar units is the proportion of priority to non-priority units within a subgroup. If a subgroup has a high volume of priority wind/solar units to non-priority wind/solar units, then this can result in the constraints that would usually be allocated to the priority units only allocated to the non-priority units (due to the grandfathering of constraints). This can result in high constraints percentage for non-priority units within a subgroup.

1.5.3 Battery Sensitivity

The ECP 2.4 constraint forecast study scenarios include a battery sensitivity study. The installed capacity of wind and solar is same as that of ECP scenario while the network and demand are of 2029 study year. The constraint allocation is based on grandfathering. The results show a higher level of Total Dispatch Down especially contributed by the surplus component. During higher RES conditions, with the batteries included, the excess energy available are stored and utilized during low RES available. A detailed breakdown of the Total Dispatch Down components with batteries are given in the section 2 of this report.

1.5.4 Future Grid Sensitivity Study

The results of the Future Grid scenario show a notable reduction in Total Dispatch Down over the core study years (2027 and 2029) due to the impact of the SOEF 1.1 Roadmap network reinforcements, increased

demand levels, increased interconnection, and the relaxation of operational constraints. However, increases in installed wind and solar generation, as seen in the offshore wind scenarios, result in rising surplus levels, causing an increase in Total Dispatch Down levels. A detailed breakdown of the Total Dispatch Down components for Area K under the Future Grid scenarios and associated sensitivity case is given in Table 1-5 to Table 1-10. Further node level details can be viewed in Section 2.

1.5.5 Area Subgroups

The constraint forecast study, which is performed using PLEXOS software, applies mathematical optimisation to find the lowest cost generator dispatch schedule to meet demand, subject to a number of system and transmission level constraints. To ensure the model is impartial, the assumptions on the cost of renewable generators remain the same, irrespective of technology or location, and are always lower than that of conventional plants. This ensures renewable generators are given priority in the PLEXOS optimisation. However, due to network congestion caused by line limits and N-1 contingency security checks, the power flows in certain lines are limited, causing dispatch down in RES generators which may affect one generator or multiple generators chosen by PLEXOS' internal logic. During various initial studies, it was observed that PLEXOS may repeatedly choose the same generator(s) to dispatch down to manage an issue in a region shared by multiple generators.

There is often a post-processing step between the PLEXOS simulation and this report to ensure an appropriate allocation of constraints among generators sharing the bottlenecks. This is done by creating constraint subgroups within an area or spanning multiple different areas. The subgroups are selected based on an assessment of the raw PLEXOS results and based on our experience of dispatch down on the real system. The subgroups are chosen to group those generators into a constraint group that are expected to experience similar constraint levels. The subgroups are selected on the basis that they share a common transmission bottleneck, or they are electrically close to a congested area within the network.

Area K is affected by issues in other areas and especially in the Area H2 through which the power flows towards the load centres or to interconnectors. The loss of connecting circuits can cause overloading on other neighbouring circuits. The Greenlink and Celtic interconnectors provide additional extraction points during high-RES scenarios. Thus, generation in Area K and H2 tries to push power towards the Dublin load centres and interconnectors through the 220 kV and 110 kV circuits. The contingencies and overloaded lines associated with the area are included in Appendix C of the Assumptions and Methodology report.

The review of Area K results identified constraint subgroups for solar and wind generation combining Area K and Area H2. The subgroup nodes are given in Table 1-4. The constraints are shared on a pro-rata basis amongst the non-priority generators in the subgroup ahead of priority generators. The individual node level dispatch down is given in Section 2.

Subgroup	Nodes
H2 & K	Butlerstown
	Dungarvan
	Rathnaskilloge
	Woodhouse

Table 1-4 Area K generator nodes and their subgroups

Figure 1-2 Subgroup H2 & K (subgroups outlined by blue dashed line)

The solar non-priority data is given in the following table.

Area K (H2 & K)	Year	Initial	50%	ECP	ECP Battery	ECP + 3.1GW Offshore	ECP + 5GW Offshore	ECP + 5GW Offshore IC
Installed Capacity (MW)	2027	123	205	287				
Installed Capacity (MW)	2029	123	205	287	287			
Installed Capacity (MW)	FG			287		287	287	287
Available Energy (GWh)	2027	144	240	336				
Available Energy (GWh)	2029	144	240	336	336			
Available Energy (GWh)	FG			336		336	336	336
Generation (GWh)	2027	137	212	263				
Generation (GWh)	2029	142	224	287	249			
Generation (GWh)	FG			305		288	272	253
Surplus (%)	2027	1 %	6 %	14 %				
Surplus (%)	2029	0 %	3 %	9 %	15 %			
Surplus (%)	FG			5 %		11 %	16 %	21 %
Curtailment (%)	2027	1 %	2 %	4 %				
Curtailment (%)	2029	0 %	1 %	3 %	5 %			
Curtailment (%)	FG			1 %		2 %	2 %	2 %
Constraint (%)	2027	3 %	4 %	4 %				
Constraint (%)	2029	1 %	2 %	3 %	6 %			
Constraint (%)	FG			3 %		2 %	2 %	1 %
Total Dispatch Down (%)	2027	4 %	12 %	22 %				
Total Dispatch Down (%)	2029	2 %	7 %	15 %	26 %			
Total Dispatch Down (%)	FG			9 %		14 %	19 %	25 %

Table 1-5 Surplus, Curtailment and Constraint for Solar Non-Priority in Area K (H2 & K)

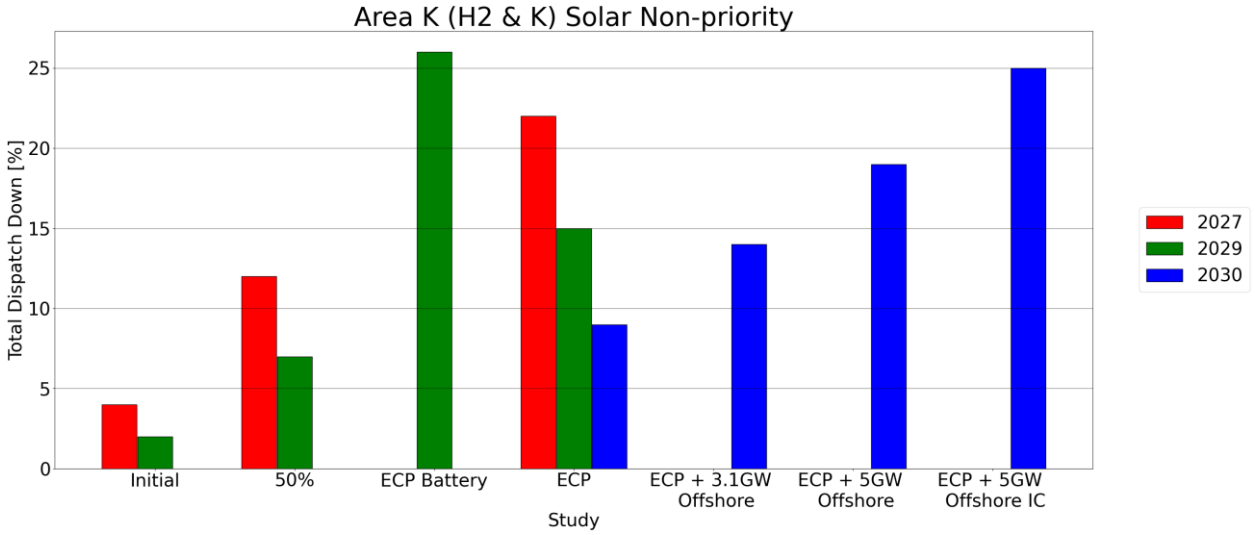

Figure 1-3 Results Solar Non-Priority Area K (H2 & K)

Area K (H2 & K)	Year	50%	ECP + 3.1GW Offshore
Installed Capacity (MW)	2027 (GF)	205	
Installed Capacity (MW)	2029 (pro-rata)	205	
Installed Capacity (MW)	FG (pro-rata)		287
Available Energy (GWh)	2027 (GF)	240	
Available Energy (GWh)	2029 (pro-rata)	240	
Available Energy (GWh)	FG (pro-rata)		336
Generation (GWh)	2027 (GF)	212	
Generation (GWh)	2029 (pro-rata)	224	
Generation (GWh)	FG (pro-rata)		288
Surplus (%)	2027 (GF)	6 %	
Surplus (%)	2029 (pro-rata)	3 %	
Surplus (%)	FG (pro-rata)		11 %
Curtailment (%)	2027 (GF)	2 %	
Curtailment (%)	2029 (pro-rata)	1 %	
Curtailment (%)	FG (pro-rata)		2 %
Constraint (%)	2027 (GF)	4 %	
Constraint (%)	2029 (pro-rata)	2 %	
Constraint (%)	FG (pro-rata)		2 %
Total Dispatch Down (%)	2027 (GF)	12 %	
Total Dispatch Down (%)	2029 (pro-rata)	7 %	
Total Dispatch Down (%)	FG (pro-rata)		14 %

Table 1-6 Surplus, Curtailment and Constraint for Solar Non-Priority with Sensitivity in Area K (H2 & K)

The wind non-priority data is given in the following table.

Area K (H2 & K)	Year	Initial	50%	ECP	ECP Battery	ECP + 3.1GW Offshore	ECP + 5GW Offshore	ECP + 5GW Offshore IC
Installed Capacity (MW)	2027	34	76	119				
Installed Capacity (MW)	2029	34	76	119	119			
Installed Capacity (MW)	FG			119		119	119	119
Available Energy (GWh)	2027	103	232	361				
Available Energy (GWh)	2029	103	232	361	361			
Available Energy (GWh)	FG			361		361	361	361
Generation (GWh)	2027	97	204	288				
Generation (GWh)	2029	93	219	326	307			
Generation (GWh)	FG			340		306	263	234
Surplus (%)	2027	1 %	6 %	13 %				
Surplus (%)	2029	0 %	2 %	6 %	9 %			
Surplus (%)	FG			3 %		13 %	23 %	32 %
Curtailment (%)	2027	1 %	3 %	4 %				
Curtailment (%)	2029	0 %	1 %	2 %	3 %			
Curtailment (%)	FG			1 %		2 %	2 %	3 %
Constraint (%)	2027	3 %	3 %	3 %				
Constraint (%)	2029	9 %	2 %	1 %	3 %			
Constraint (%)	FG			2 %		1 %	1 %	1 %
Total Dispatch Down (%)	2027	5 %	12 %	20 %				
Total Dispatch Down (%)	2029	10 %	6 %	10 %	15 %			
Total Dispatch Down (%)	FG			6 %		15 %	27 %	35 %

Table 1-7 Surplus, Curtailment and Constraint for Wind Non-Priority in Area K (H2 & K)

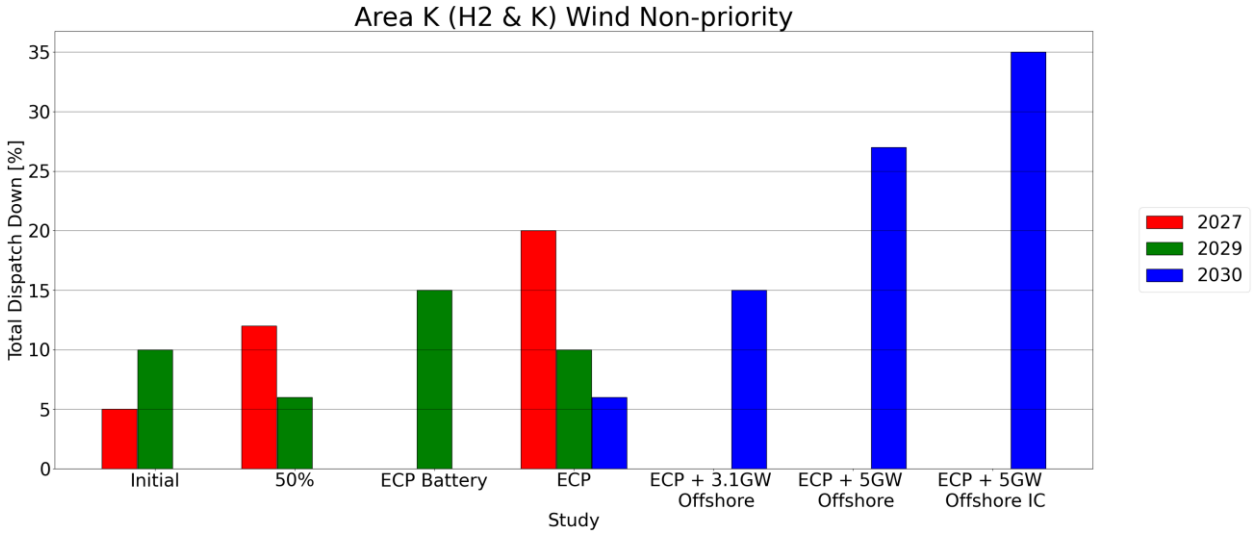

Figure 1-4 Results Wind Non-Priority in Area K (H2 & K)

Area K (H2 & K)	Year	50%	ECP + 3.1GW Offshore
Installed Capacity (MW)	2027 (GF)	76	
Installed Capacity (MW)	2029 (pro-rata)	76	
Installed Capacity (MW)	FG (pro-rata)		119
Available Energy (GWh)	2027 (GF)	232	
Available Energy (GWh)	2029 (pro-rata)	232	
Available Energy (GWh)	FG (pro-rata)		361
Generation (GWh)	2027 (GF)	197	
Generation (GWh)	2029 (pro-rata)	222	
Generation (GWh)	FG (pro-rata)		307
Surplus (%)	2027 (GF)	6 %	
Surplus (%)	2029 (pro-rata)	2 %	
Surplus (%)	FG (pro-rata)		13 %
Curtailment (%)	2027 (GF)	3 %	
Curtailment (%)	2029 (pro-rata)	1 %	
Curtailment (%)	FG (pro-rata)		2 %
Constraint (%)	2027 (GF)	6 %	
Constraint (%)	2029 (pro-rata)	1 %	
Constraint (%)	FG (pro-rata)		0 %
Total Dispatch Down (%)	2027 (GF)	15 %	
Total Dispatch Down (%)	2029 (pro-rata)	4 %	
Total Dispatch Down (%)	FG (pro-rata)		15 %

Table 1-8 Surplus, Curtailment and Constraint for Wind Non-Priority with Sensitivity in Area K (H2 & K)

The wind priority data is given in the following table.

Area K (H2 & K)	Year	Initial	50%	ECP	ECP Battery	ECP + 3.1GW Offshore	ECP + 5GW Offshore	ECP + 5GW Offshore IC
Installed Capacity (MW)	2027	20	20	20				
Installed Capacity (MW)	2029	20	20	20	20			
Installed Capacity (MW)	FG			20		20	20	20
Available Energy (GWh)	2027	61	61	61				
Available Energy (GWh)	2029	61	61	61	61			
Available Energy (GWh)	FG			61		61	61	61
Generation (GWh)	2027	58	56	55				
Generation (GWh)	2029	60	60	59	58			
Generation (GWh)	FG			60		59	58	58
Surplus (%)	2027	0 %	0 %	0 %				
Surplus (%)	2029	0 %	0 %	0 %	0 %			
Surplus (%)	FG			0 %		0 %	0 %	0 %
Curtailment (%)	2027	2 %	4 %	6 %				
Curtailment (%)	2029	0 %	2 %	3 %	4 %			
Curtailment (%)	FG			1 %		3 %	4 %	5 %
Constraint (%)	2027	3 %	3 %	3 %				
Constraint (%)	2029	0 %	0 %	0 %	0 %			
Constraint (%)	FG			0 %		0 %	0 %	0 %
Total Dispatch Down (%)	2027	5 %	7 %	9 %				
Total Dispatch Down (%)	2029	0 %	2 %	3 %	4 %			
Total Dispatch Down (%)	FG			1 %		3 %	4 %	5 %

Table 1-9 Surplus, Curtailment and Constraint for Wind Priority in Area K (H2 & K)

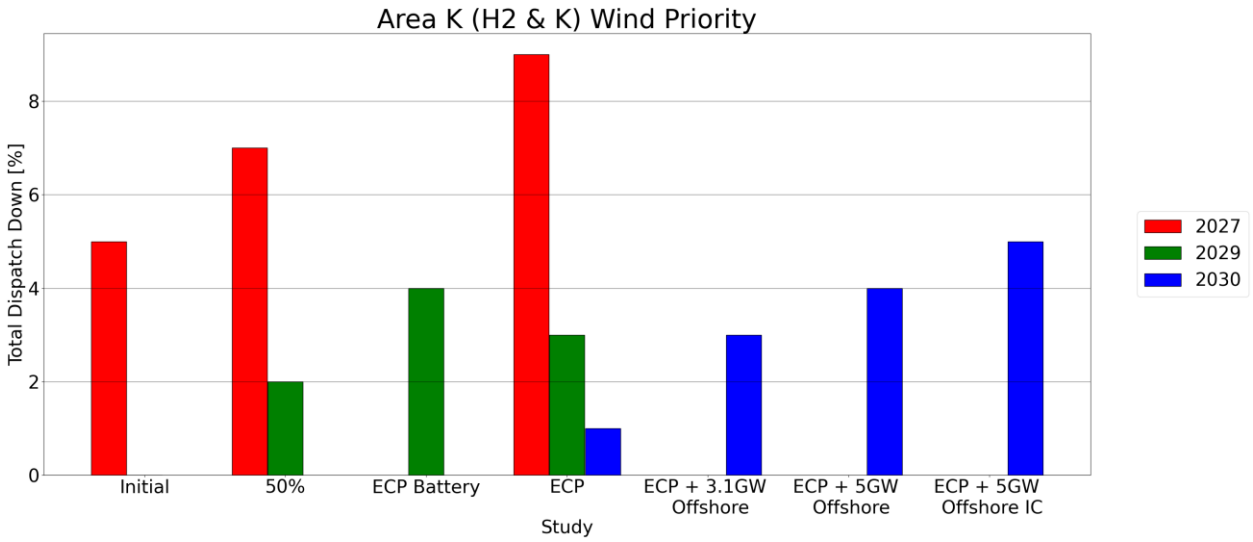

Figure 1-5 Results Wind Priority Area K (H2 & K)

Area K (H2 & K)	Year	50%	ECP + 3.1GW Offshore
Installed Capacity (MW)	2027 (GF)	20	
Installed Capacity (MW)	2029 (pro-rata)	20	
Installed Capacity (MW)	FG (pro-rata)		20
Available Energy (GWh)	2027 (GF)	61	
Available Energy (GWh)	2029 (pro-rata)	61	
Available Energy (GWh)	FG (pro-rata)		61
Generation (GWh)	2027 (GF)	58	
Generation (GWh)	2029 (pro-rata)	59	
Generation (GWh)	FG (pro-rata)		59
Surplus (%)	2027 (GF)	0 %	
Surplus (%)	2029 (pro-rata)	0 %	
Surplus (%)	FG (pro-rata)		0 %
Curtailment (%)	2027 (GF)	4 %	
Curtailment (%)	2029 (pro-rata)	2 %	
Curtailment (%)	FG (pro-rata)		3 %
Constraint (%)	2027 (GF)	0 %	
Constraint (%)	2029 (pro-rata)	1 %	
Constraint (%)	FG (pro-rata)		0 %
Total Dispatch Down (%)	2027 (GF)	4 %	
Total Dispatch Down (%)	2029 (pro-rata)	3 %	
Total Dispatch Down (%)	FG (pro-rata)		3 %

Table 1-10 Surplus, Curtailment and Constraint for Wind Priority with Sensitivity in Area K (H2 & K)

1.6 Conclusion – Results for Area K

This section provides an overview of the estimated surplus, curtailment and constraint values for Area K for a range of scenarios based on a number of installed generation assumptions (generation scenarios) and the study year (network and demand assumptions). The results highly depend on the study assumptions, which are described in the Assumptions and Methodology report.

Section 2 contains the detailed results consisting of available energy (GWh) and percentage surplus, curtailment, and constraint values for each node for both solar and wind in Area K.

2 Area K Node Results

This section presents the results of the modelling analysis for Area K. The levels of surplus, curtailment and constraint that controllable solar and wind generators in Area K might expect to experience are reported on a nodal basis for the study scenarios. Details on the generation capacity at each node are also provided along with the assumed amount of controllable generation.

This section also presents a list of the generators at each node that are included in the study.

Figure 2-1 Area K

2.1 Butlerstown

Figure 2-2 - Location of node Butlerstown

Generator	SO	Capacity	Type	Status
Beallough (1)	DSO	1.7	wind uncontrolled	connected
Keiloge Solar (Prev Coolnagapogue Solar Farm Phase 1)	DSO	3.95	solar not priority	due to connect
Carriglong Solar Park	DSO	32.7	solar not priority	due to connect
Pickardstown PV	DSO	8.8	solar not priority	due to connect
Amberhill Community Solar Farm	DSO	4.99	solar not priority	due to connect
Clashganny Community Solar Farm	DSO	4.99	solar not priority	due to connect

Table 2-1- Generation Included in Study for Node Butlerstown

The solar not priority data is given in the following table.

Area K	Year	Initial	50%	ECP	ECP Battery	ECP + 3.1GW Offshore	ECP + 5GW Offshore	ECP + 5GW Offshore IC
Installed Capacity (MW)	2027		28	55				
Installed Capacity (MW)	2029		28	55	55			
Installed Capacity (MW)	FG			55		55	55	55
Available Energy (GWh)	2027		32	65				
Available Energy (GWh)	2029		32	65	65			
Available Energy (GWh)	FG			65		65	65	65
Generation (GWh)	2027		29	51				
Generation (GWh)	2029		30	55	48			
Generation (GWh)	FG			59		56	53	49
Surplus (%)	2027		6 %	14 %				
Surplus (%)	2029		3 %	9 %	15 %			
Surplus (%)	FG			5 %		11 %	16 %	21 %
Curtailment (%)	2027		2 %	4 %				
Curtailment (%)	2029		1 %	3 %	5 %			
Curtailment (%)	FG			1 %		2 %	2 %	2 %
Constraint (%)	2027		4 %	4 %				
Constraint (%)	2029		2 %	3 %	6 %			
Constraint (%)	FG			3 %		2 %	2 %	1 %
Total Dispatch Down (%)	2027		12 %	22 %				
Total Dispatch Down (%)	2029		7 %	15 %	26 %			
Total Dispatch Down (%)	FG			9 %		14 %	19 %	25 %

Table 2-2 - Surplus, Curtailment and Constraint for Solar non-priority for Node Butlerstown

Area K	Year	50%	ECP + 3.1GW Offshore
Installed Capacity (MW)	2027 (GF)	28	
Installed Capacity (MW)	2029 (pro-rata)	28	
Installed Capacity (MW)	FG (pro-rata)		55
Available Energy (GWh)	2027 (GF)	32	
Available Energy (GWh)	2029 (pro-rata)	32	
Available Energy (GWh)	FG (pro-rata)		65
Generation (GWh)	2027 (GF)	29	
Generation (GWh)	2029 (pro-rata)	30	
Generation (GWh)	FG (pro-rata)		56
Surplus (%)	2027 (GF)	6 %	
Surplus (%)	2029 (pro-rata)	3 %	
Surplus (%)	FG (pro-rata)		11 %
Curtailment (%)	2027 (GF)	2 %	
Curtailment (%)	2029 (pro-rata)	1 %	
Curtailment (%)	FG (pro-rata)		2 %
Constraint (%)	2027 (GF)	4 %	
Constraint (%)	2029 (pro-rata)	2 %	
Constraint (%)	FG (pro-rata)		2 %
Total Dispatch Down (%)	2027 (GF)	12 %	
Total Dispatch Down (%)	2029 (pro-rata)	7 %	
Total Dispatch Down (%)	FG (pro-rata)		14 %

Table 2-3 - Surplus, Curtailment and Constraint for Solar non-priority with sensitivity for Node Butlerstown

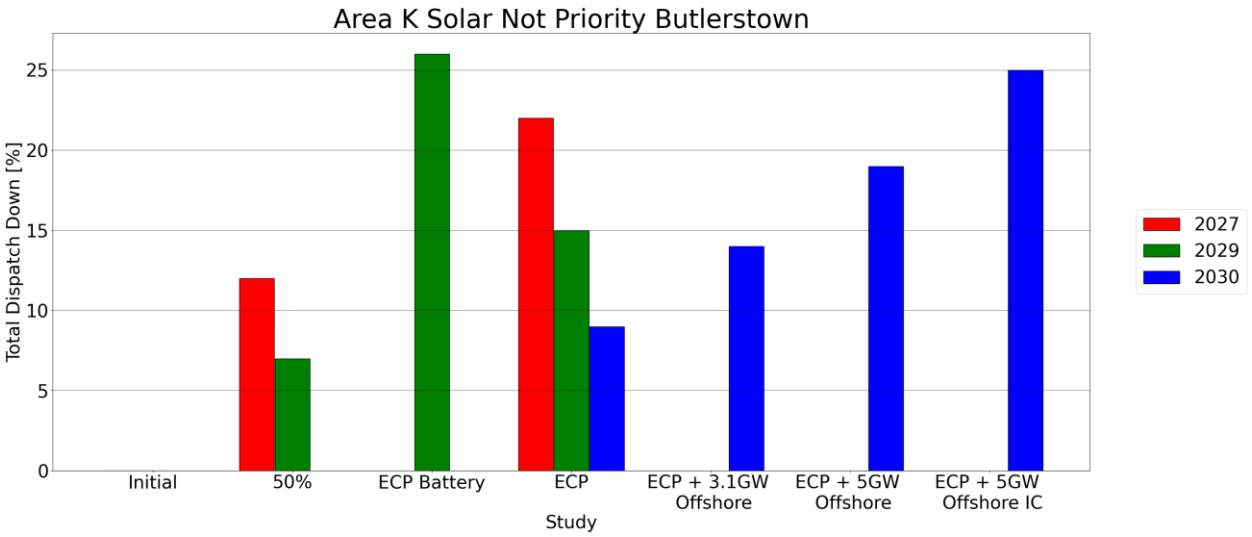

Figure 2-3- Total Dispatch Down for Solar not priority for Node Butlerstown

2.2 Dungarvan

Figure 2-4 - Location of node Dungarvan

Generator	SO	Capacity	Type	Status
Ballycurreen (1)	DSO	4.99	wind uncontrolled	connected
Drumroe East Solar Farm	DSO	15.0	solar not priority	due to connect
Foxhall PV	DSO	3.99	solar not priority	due to connect
Cooltubbrid West Solar	DSO	4.0	solar not priority	due to connect
Kilcannon	DSO	4.95	solar not priority	due to connect
Ardsallagh Solar Farm	DSO	4.99	solar not priority	due to connect
Poulbautia Solar Farm	DSO	19.0	solar not priority	due to connect
Ballymac (Solar)	DSO	5.0	solar not priority	due to connect
Modelligo Solar Farm	TSO	80.0	solar not priority	due to connect

Table 2-4 - Generation Included in Study for Node Dungarvan

The solar not priority data is given in the following table.

Area K	Year	Initial	50%	ECP	ECP Battery	ECP + 3.1GW Offshore	ECP + 5GW Offshore	ECP + 5GW Offshore IC
Installed Capacity (MW)	2027	28	82	137				
Installed Capacity (MW)	2029	28	82	137	137			
Installed Capacity (MW)	FG			137		137	137	137
Available Energy (GWh)	2027	33	97	160				
Available Energy (GWh)	2029	33	97	160	160			
Available Energy (GWh)	FG			160		160	160	160
Generation (GWh)	2027	31	85	125				
Generation (GWh)	2029	32	90	137	119			
Generation (GWh)	FG			145		137	130	120
Surplus (%)	2027	1 %	6 %	14 %				
Surplus (%)	2029	0 %	3 %	9 %	15 %			
Surplus (%)	FG			5 %		11 %	16 %	21 %
Curtailment (%)	2027	1 %	2 %	4 %				
Curtailment (%)	2029	0 %	1 %	3 %	5 %			
Curtailment (%)	FG			1 %		2 %	2 %	2 %
Constraint (%)	2027	3 %	4 %	4 %				
Constraint (%)	2029	1 %	2 %	3 %	6 %			
Constraint (%)	FG			3 %		2 %	2 %	1 %
Total Dispatch Down (%)	2027	4 %	12 %	22 %				
Total Dispatch Down (%)	2029	2 %	7 %	15 %	26 %			
Total Dispatch Down (%)	FG			9 %		14 %	19 %	25 %

Table 2-5 - Surplus, Curtailment and Constraint for Solar non-priority for Node Dungarvan

Area K	Year	50%	ECP + 3.1GW Offshore
Installed Capacity (MW)	2027 (GF)	82	
Installed Capacity (MW)	2029 (pro-rata)	82	
Installed Capacity (MW)	FG (pro-rata)		137
Available Energy (GWh)	2027 (GF)	97	
Available Energy (GWh)	2029 (pro-rata)	97	
Available Energy (GWh)	FG (pro-rata)		160
Generation (GWh)	2027 (GF)	85	
Generation (GWh)	2029 (pro-rata)	90	
Generation (GWh)	FG (pro-rata)		137
Surplus (%)	2027 (GF)	6 %	
Surplus (%)	2029 (pro-rata)	3 %	
Surplus (%)	FG (pro-rata)		11 %
Curtailment (%)	2027 (GF)	2 %	
Curtailment (%)	2029 (pro-rata)	1 %	
Curtailment (%)	FG (pro-rata)		2 %
Constraint (%)	2027 (GF)	4 %	
Constraint (%)	2029 (pro-rata)	2 %	
Constraint (%)	FG (pro-rata)		2 %
Total Dispatch Down (%)	2027 (GF)	12 %	
Total Dispatch Down (%)	2029 (pro-rata)	7 %	
Total Dispatch Down (%)	FG (pro-rata)		14 %

Table 2-6 - Surplus, Curtailment and Constraint for Solar non-priority with sensitivity for Node Dungarvan

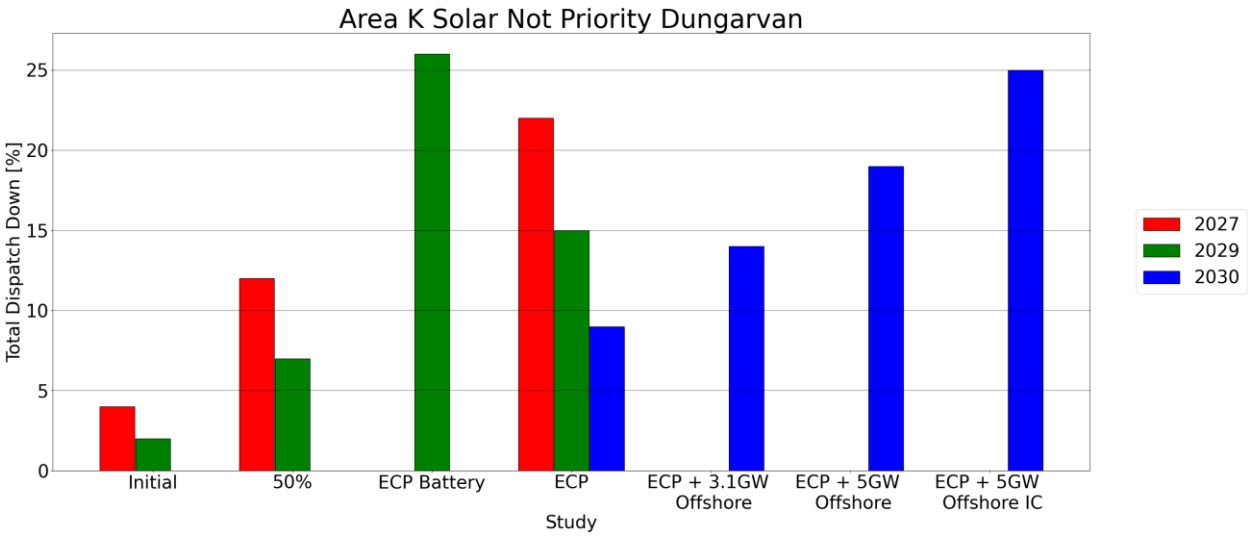

Figure 2-5 - Total Dispatch Down for Solar not priority for Node Dungarvan

2.3 Rathnaskilloge

Figure 2-6 - Location of node Rathnaskilloge

Generator	SO	Capacity	Type	Status
Rathnaskilloge	TSO	95.0	solar not priority	due to connect

Table 2-7- Generation Included in Study for Node Rathnaskilloge

The solar not priority data is given in the following table.

Area K	Year	Initial	50%	ECP	ECP Battery	ECP + 3.1GW Offshore	ECP + 5GW Offshore	ECP + 5GW Offshore IC
Installed Capacity (MW)	2027	95	95	95				
Installed Capacity (MW)	2029	95	95	95	95			
Installed Capacity (MW)	FG			95		95	95	95
Available Energy (GWh)	2027	111	111	111				
Available Energy (GWh)	2029	111	111	111	111			
Available Energy (GWh)	FG			111		111	111	111
Generation (GWh)	2027	106	98	87				
Generation (GWh)	2029	109	104	95	82			
Generation (GWh)	FG			101		95	90	83
Surplus (%)	2027	1 %	6 %	14 %				
Surplus (%)	2029	0 %	3 %	9 %	15 %			
Surplus (%)	FG			5 %		11 %	16 %	21 %
Curtailment (%)	2027	1 %	2 %	4 %				
Curtailment (%)	2029	0 %	1 %	3 %	5 %			
Curtailment (%)	FG			1 %		2 %	2 %	2 %
Constraint (%)	2027	3 %	4 %	4 %				
Constraint (%)	2029	1 %	2 %	3 %	6 %			
Constraint (%)	FG			3 %		2 %	2 %	1 %
Total Dispatch Down (%)	2027	4 %	12 %	22 %				
Total Dispatch Down (%)	2029	2 %	7 %	15 %	26 %			
Total Dispatch Down (%)	FG			9 %		14 %	19 %	25 %

Table 2-8 - Surplus, Curtailment and Constraint for Solar non-priority for Node Rathnaskilloge

Area K	Year	50%	ECP + 3.1GW Offshore
Installed Capacity (MW)	2027 (GF)	95	
Installed Capacity (MW)	2029 (pro-rata)	95	
Installed Capacity (MW)	FG (pro-rata)		95
Available Energy (GWh)	2027 (GF)	111	
Available Energy (GWh)	2029 (pro-rata)	111	
Available Energy (GWh)	FG (pro-rata)		111
Generation (GWh)	2027 (GF)	98	
Generation (GWh)	2029 (pro-rata)	104	
Generation (GWh)	FG (pro-rata)		95
Surplus (%)	2027 (GF)	6 %	
Surplus (%)	2029 (pro-rata)	3 %	
Surplus (%)	FG (pro-rata)		11 %
Curtailment (%)	2027 (GF)	2 %	
Curtailment (%)	2029 (pro-rata)	1 %	
Curtailment (%)	FG (pro-rata)		2 %
Constraint (%)	2027 (GF)	4 %	
Constraint (%)	2029 (pro-rata)	2 %	
Constraint (%)	FG (pro-rata)		2 %
Total Dispatch Down (%)	2027 (GF)	12 %	
Total Dispatch Down (%)	2029 (pro-rata)	7 %	
Total Dispatch Down (%)	FG (pro-rata)		14 %

Table 2-9 - Surplus, Curtailment and Constraint for Solar non-priority with sensitivity for Node Rathnaskilloge

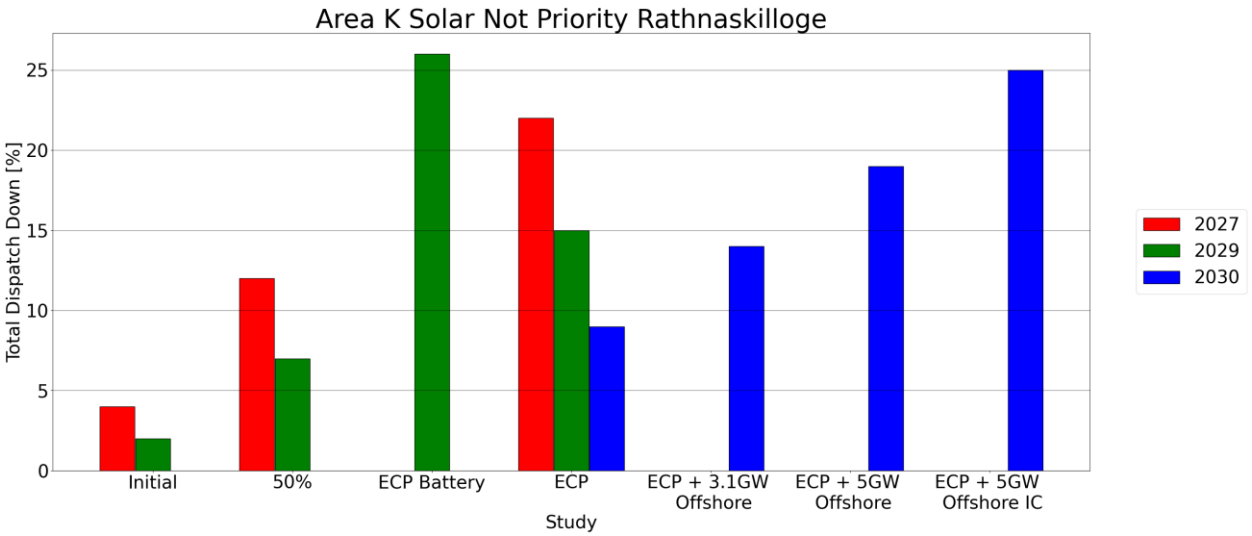

Figure 2-7 - Total Dispatch Down for Solar not priority for Node Rathnaskilloge

2.4 Woodhouse

Figure 2-8 - Location of node Woodhouse

Generator	SO	Capacity	Type	Status
Woodhouse (1)	TSO	20.0	wind priority	connected
Knocknamona Wind Farm (Prev. Crohaun)	TSO	34.0	wind not priority	due to connect
Lyrenacarriga Windfarm and BESS	TSO	85.0	wind not priority	due to connect

Table 2-10 - Generation Included in Study for Node Woodhouse

The wind not priority data is given in the following table.

Area K	Year	Initial	50%	ECP	ECP Battery	ECP + 3.1GW Offshore	ECP + 5GW Offshore	ECP + 5GW Offshore IC
Installed Capacity (MW)	2027	34	76	119				
Installed Capacity (MW)	2029	34	76	119	119			
Installed Capacity (MW)	FG			119		119	119	119
Available Energy (GWh)	2027	103	232	361				
Available Energy (GWh)	2029	103	232	361	361			
Available Energy (GWh)	FG			361		361	361	361
Generation (GWh)	2027	97	204	288				
Generation (GWh)	2029	93	219	326	307			
Generation (GWh)	FG			340		306	263	234
Surplus (%)	2027	1 %	6 %	13 %				
Surplus (%)	2029	0 %	2 %	6 %	9 %			
Surplus (%)	FG			3 %		13 %	23 %	32 %
Curtailment (%)	2027	1 %	3 %	4 %				
Curtailment (%)	2029	0 %	1 %	2 %	3 %			
Curtailment (%)	FG			1 %		2 %	2 %	3 %
Constraint (%)	2027	3 %	3 %	3 %				
Constraint (%)	2029	9 %	2 %	1 %	3 %			
Constraint (%)	FG			2 %		1 %	1 %	1 %
Total Dispatch Down (%)	2027	5 %	12 %	20 %				
Total Dispatch Down (%)	2029	10 %	6 %	10 %	15 %			
Total Dispatch Down (%)	FG			6 %		15 %	27 %	35 %

Table 2-11 - Surplus, Curtailment and Constraint for Wind non-priority for Node Woodhouse

Area K	Year	50%	ECP + 3.1GW Offshore
Installed Capacity (MW)	2027 (GF)	76	
Installed Capacity (MW)	2029 (pro-rata)	76	
Installed Capacity (MW)	FG (pro-rata)		119
Available Energy (GWh)	2027 (GF)	232	
Available Energy (GWh)	2029 (pro-rata)	232	
Available Energy (GWh)	FG (pro-rata)		361
Generation (GWh)	2027 (GF)	197	
Generation (GWh)	2029 (pro-rata)	222	
Generation (GWh)	FG (pro-rata)		307
Surplus (%)	2027 (GF)	6 %	
Surplus (%)	2029 (pro-rata)	2 %	
Surplus (%)	FG (pro-rata)		13 %
Curtailment (%)	2027 (GF)	3 %	
Curtailment (%)	2029 (pro-rata)	1 %	
Curtailment (%)	FG (pro-rata)		2 %
Constraint (%)	2027 (GF)	6 %	
Constraint (%)	2029 (pro-rata)	1 %	
Constraint (%)	FG (pro-rata)		0 %
Total Dispatch Down (%)	2027 (GF)	15 %	
Total Dispatch Down (%)	2029 (pro-rata)	4 %	
Total Dispatch Down (%)	FG (pro-rata)		15 %

Table 2-12 - Surplus, Curtailment and Constraint for Wind non-priority with sensitivity for Node Woodhouse

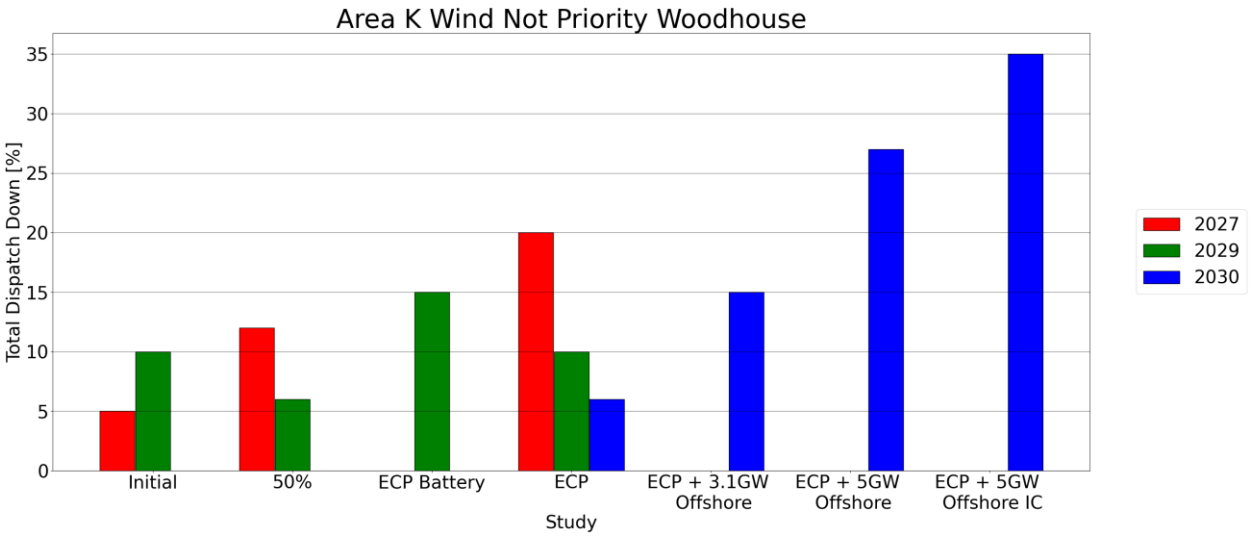

Figure 2-9 - Total Dispatch Down for Wind not priority for Node Woodhouse

The wind priority data is given in the following table.

Area K	Year	Initial	50%	ECP	ECP Battery	ECP + 3.1GW Offshore	ECP + 5GW Offshore	ECP + 5GW Offshore IC
Installed Capacity (MW)	2027	20	20	20				
Installed Capacity (MW)	2029	20	20	20	20			
Installed Capacity (MW)	FG			20		20	20	20
Available Energy (GWh)	2027	61	61	61				
Available Energy (GWh)	2029	61	61	61	61			
Available Energy (GWh)	FG			61		61	61	61
Generation (GWh)	2027	58	56	55				
Generation (GWh)	2029	60	60	59	58			
Generation (GWh)	FG			60		59	58	58
Surplus (%)	2027	0 %	0 %	0 %				
Surplus (%)	2029	0 %	0 %	0 %	0 %			
Surplus (%)	FG			0 %		0 %	0 %	0 %
Curtailment (%)	2027	2 %	4 %	6 %				
Curtailment (%)	2029	0 %	2 %	3 %	4 %			
Curtailment (%)	FG			1 %		3 %	4 %	5 %
Constraint (%)	2027	3 %	3 %	3 %				
Constraint (%)	2029	0 %	0 %	0 %	0 %			
Constraint (%)	FG			0 %		0 %	0 %	0 %
Total Dispatch Down (%)	2027	5 %	7 %	9 %				
Total Dispatch Down (%)	2029	0 %	2 %	3 %	4 %			
Total Dispatch Down (%)	FG			1 %		3 %	4 %	5 %

Table 2-13 - Surplus, Curtailment and Constraint for Wind priority for Node Woodhouse

Area K	Year	50%	ECP + 3.1GW Offshore
Installed Capacity (MW)	2027 (GF)	20	
Installed Capacity (MW)	2029 (pro-rata)	20	
Installed Capacity (MW)	FG (pro-rata)		20
Available Energy (GWh)	2027 (GF)	61	
Available Energy (GWh)	2029 (pro-rata)	61	
Available Energy (GWh)	FG (pro-rata)		61
Generation (GWh)	2027 (GF)	58	
Generation (GWh)	2029 (pro-rata)	59	
Generation (GWh)	FG (pro-rata)		59
Surplus (%)	2027 (GF)	0 %	
Surplus (%)	2029 (pro-rata)	0 %	
Surplus (%)	FG (pro-rata)		0 %
Curtailment (%)	2027 (GF)	4 %	
Curtailment (%)	2029 (pro-rata)	2 %	
Curtailment (%)	FG (pro-rata)		3 %
Constraint (%)	2027 (GF)	0 %	
Constraint (%)	2029 (pro-rata)	1 %	
Constraint (%)	FG (pro-rata)		0 %
Total Dispatch Down (%)	2027 (GF)	4 %	
Total Dispatch Down (%)	2029 (pro-rata)	3 %	
Total Dispatch Down (%)	FG (pro-rata)		3 %

Table 2-14 - Surplus, Curtailment and Constraint for Wind priority with sensitivity for Node Woodhouse

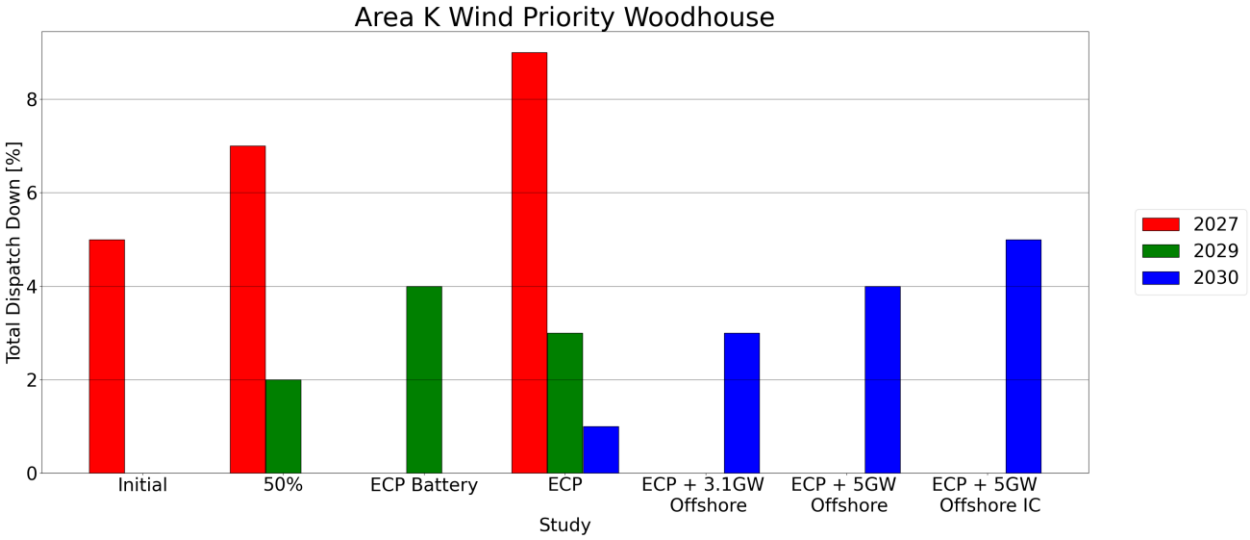

Figure 2-10 - Total Dispatch Down for Wind priority for Node Woodhouse