



# SOEF V1.1 Renewable Surplus Data

Climate Action Plan 2024 Action Item EL/24/19

National Hydrogen Strategy Action 1

Develop and publish data sets showing the likely locations, volumes, and load profile of surplus renewable generation on our electricity grid.

March 2025



# 1. Table of Contents

<b>2. Background</b>	<b>4</b>
2.1. Surplus Renewable Generation .....	4
2.2. Key Data from SOEF v1.1 .....	5
2.2.1. SOEF v1.1 Demand and Supply Assumptions. ....	5
2.2.2. SOEF v1.1 System Flexibility .....	6
2.2.3. SOEF v1.1 Regional Renewable Generation. ....	7
<b>3. SOEF v1.1 Renewable Surplus Data - Format</b>	<b>8</b>
<b>4. SOEF v1.1 Renewable Surplus Data</b>	<b>9</b>
4.1. Area A .....	11
4.2. Area B .....	12
4.3. Area C .....	13
4.4. Area D .....	14
4.5. Area E .....	15
4.6. Area F .....	16
4.7. Area G .....	17
4.8. Area H1.....	18
4.9. Area H2.....	19
4.10. Area I .....	20
4.11. Area J .....	21
4.12. Area K .....	22

## Disclaimer

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## 2. Background

The Climate Action Plan 2024 (CAP24) is the third annual update to Ireland's Climate Action Plan. The Plan was approved by Government on 20 December 2023, subject to Strategic Environmental Assessment and Appropriate Assessment.

CAP24 contains action "EL/24/19 Develop and publish data sets showing the likely locations, volumes, and load profile of surplus renewable generation on our electricity grid".

In addition, the National Hydrogen Strategy published by the Government of Ireland in July 2023 contains an action related to Surplus Renewables as well. Action#1 reads, "Develop and publish data sets showing the likely locations, volumes, and load profile of surplus renewables on our electricity grid out to 2030."

This report is EirGrid's response to these actions.

We have based our response on analysis carried out for Shaping Our Electricity Future v1.1 (SOEF v1.1). The report does not contain any new analysis from SOEF v1.1. This report contains data extracted from the analysis described in the SOEF v1.1 Roadmap.

SOEF v1.1 was prepared by EirGrid in consultation with stakeholders across society, government, industry, market participants and electricity consumers and it builds on the original Roadmap launched in November 2021.

SOEF v1.1 outlines the key developments from network, engagement, operations and market perspectives. These developments are essential to support a secure transition towards government decarbonisation ambitions in Ireland - an important step on the journey to net zero by 2050. We must continue to operate, develop and maintain a safe, secure, reliable and sustainable electricity transmission system with a view to ensuring that all reasonable demands for electricity are met.

### 2.1. Surplus Renewable Generation

Surplus Renewable Generation is one component of generator Dispatch Down, the others being Curtailment and Constraint.

Surplus Renewable Generation occurs when renewable generation supply exceeds market demand and interconnector exports. This surplus renewable generation presents a significant opportunity for innovative energy usage in Ireland.

Development of sufficient volumes of variable renewable generation to achieve Climate Action Plan RES-E and carbon dioxide emissions targets requires high installation resulting in surpluses at times. Surplus renewable generation is a key feature of the analysis in SOEF v1.1, and it has been shown to increase non-linearly at increasingly high levels of renewables. In SOEF v1.1 analysis showed over 20% of available renewable generation is predicted to be dispatched down due to surplus availability of renewable generation when the Climate Action Plan targets are met. There is an opportunity for flexible services and/or innovative solutions to utilise this surplus energy for the benefit of society.

Factors influencing renewable surplus include renewable generation deployment rates, growth in demand for electricity, flexibility of demand, and the deployment of new interconnection and storage. As we get closer to meeting Climate Action Plan targets, these factors will diverge from SOEF v1.1 assumptions, affecting the likely locations, volumes, and load profiles of surplus renewable generation on the electricity grid.

Surplus Renewable Generation is an opportunity which could be exported, stored for later use, or used by demand consumers that can respond to variability in supply. Technologies that can help manage surplus renewable generation are those that are flexible and can respond to the changes in variable renewable generation output.

Analysis in SOEF v1.1 identified flexible technologies that have the greatest benefit at utilising the opportunity around surplus renewable generation, including:

- Further interconnection (beyond Celtic and Greenlink) to neighbouring transmission networks;
- Long duration storage; and
- Flexible demand.

Timely implementation of incentives and frameworks which appropriately and effectively drives the utilisation of this surplus renewable generation require careful consideration and focus by policy makers, regulators, and industry players. The data shown in this report is intended to aid that effort.

The data shown in this report relates to the locations, volumes and load profile of surplus renewable generation are taken from analysis carried out in SOEF v1.1.

The data are shown at the same regional level used in SOEF v1.1. Dispatch down for renewable surplus is applied across the renewable generation on a system-wide basis to match generation with system demand. Utilising renewable surplus closer to where it occurs has the benefit of minimising transmission network congestion by avoiding the need to transport the energy through the network.

## 2.2. Key Data from SOEF v1.1

This section offers essential insights from SOEF v1.1, providing a broader context for understanding the Renewable Surplus data.

### 2.2.1. SOEF v1.1 Demand and Supply Assumptions.

Summary of Main Demand Assumptions		
Demand category	Units	Ireland
Total Electricity Requirement (TER)	TWh	45.1
Peak demand	GW	6.78
Number of electric vehicles	1000s	936
Number of heat pumps	1000s	600
Large Energy User demand	MW	1550

Table 1: SOEF v1.1 Demand assumptions

Summary of Supply Assumptions	
Supply	IE
Offshore wind	5 GW
Onshore wind	9 GW
Solar	5.5 GW
Microgeneration	2.5 GW
Conventional	Additional 2.2 GW

Table 2: SOEF v1.1 Supply assumptions

### 2.2.2. SOEF v1.1 System Flexibility

The following assumptions are made regarding system flexibility in SOEF v1.1;

- 2.8 GW of new long-duration storage assumed.
- 20% assumed demand flexibility.
- 4 new HVDC interconnectors assumed in SOEF v1.1.

Combined flows on the interconnectors detailed in Table 3 below. The Republic of Ireland is a net exporter to Great Britain and a net importer from France.

IE - FR	IE - GB
1.0850 TWh (Import)	-1.0179 TWh (Export)

Table 3: SOEF v1.1 Interconnector flows

### 2.2.3. SOEF v1.1 Regional Renewable Generation.

Refer to Figure 1 for a map illustrating these regions.

Regional Renewable Energy Generation			
Area	Onshore wind (MW)	Offshore wind (MW)	Solar PV (MW)
A	1150	0	150
B	1330	0	470
C	630	0	520
D	380	0	260
E	1830	390	560
F	320	0	90
G	370	370	490
H1	630	0	450
H2	860	1170	1260
I	10	350	460
J	1380	2720	2940
K	110	0	350

Table 4: SOEF v1.1 regional renewable generation



### 3. SOEF v1.1 Renewable Surplus Data - Format

Surplus renewable generation is a key feature of the SOEF v1.1 Roadmap. It occurs when renewable generation supply exceeds market demand and interconnector exports. This surplus renewable generation presents a significant opportunity for innovative energy usage in Ireland. It is important to note that surplus renewable energy does not include curtailed energy or constraints.

Providing information about the locations, volumes, and load profile of surplus renewable generation on the electricity grid will assist those who wish to avail of this opportunity.

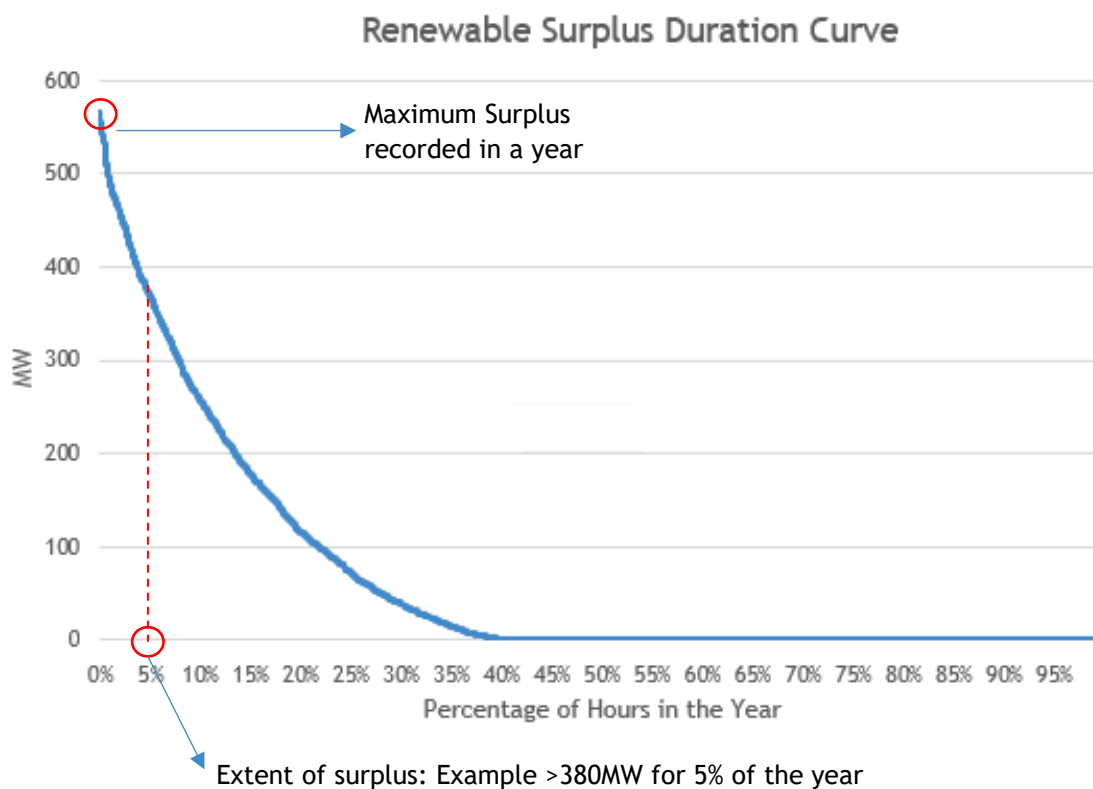
Data related to the locations, volumes, and load profile of surplus renewable generation are taken from analysis carried out in SOEF v1.1.

Factors influencing the data, which are outlined in SOEF v1.1, include renewable generation deployment rates, growth in demand for electricity, flexibility of demand, and the deployment of new interconnection and storage. As we get closer to meeting Climate Action Plan targets, these factors will diverge from SOEF v1.1 assumptions, affecting the likely locations, volumes, and load profiles of surplus renewable generation on the electricity grid.

The data are shown at the same regional level used in SOEF v1.1. See Figure 1, showing a map of the island with the regions outlined.

Time series graphs are shown for each region. The time series graphs represent the magnitude of variation in renewable surplus over a year based on the SOEF v1.1 assumptions.

Surplus Duration Curve plots are shown for each region. These plots illustrate the magnitude of renewable surplus in an area by magnitude, arranged from largest to smallest. In simpler terms, they reveal how often and for how long a certain level of surplus occurs. The following example suggests how a Surplus Duration Curve can be read: the red line is an example to show the deployable portion of the surplus.



# 4. SOEF v1.1 Renewable Surplus Data

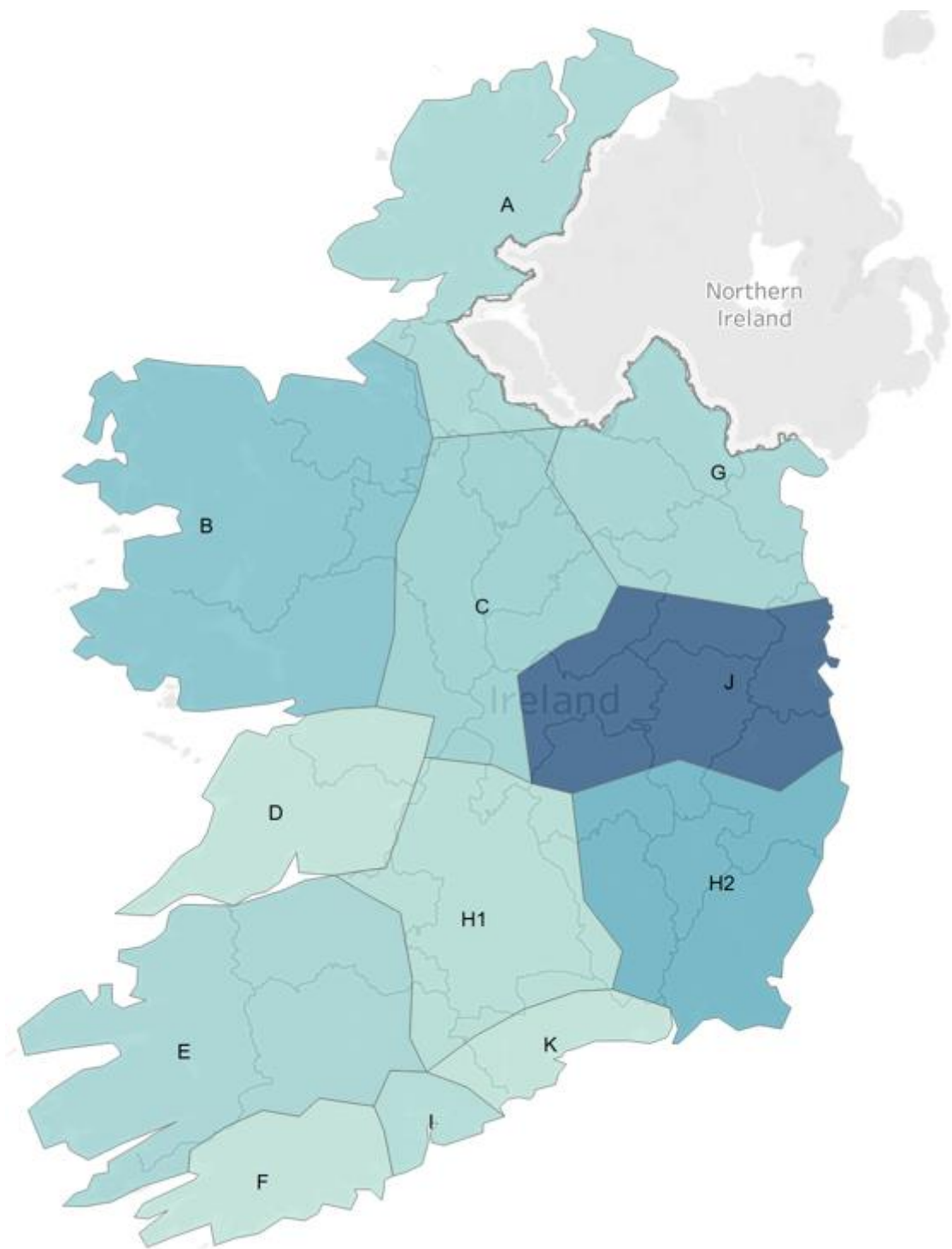


Figure 1: Map of Ireland showing regions used for reporting renewable surplus data.

Total Annual Renewable Surplus by Region	
Area	Renewable Surplus (TWh)
A	0.568
B	1.245
C	0.793
D	0.205
E	0.619
F	0.189
G	0.683
H1	0.377
H2	1.654
I	0.444
J	3.899
K	0.174
<b>Total</b>	<b>10.85</b>

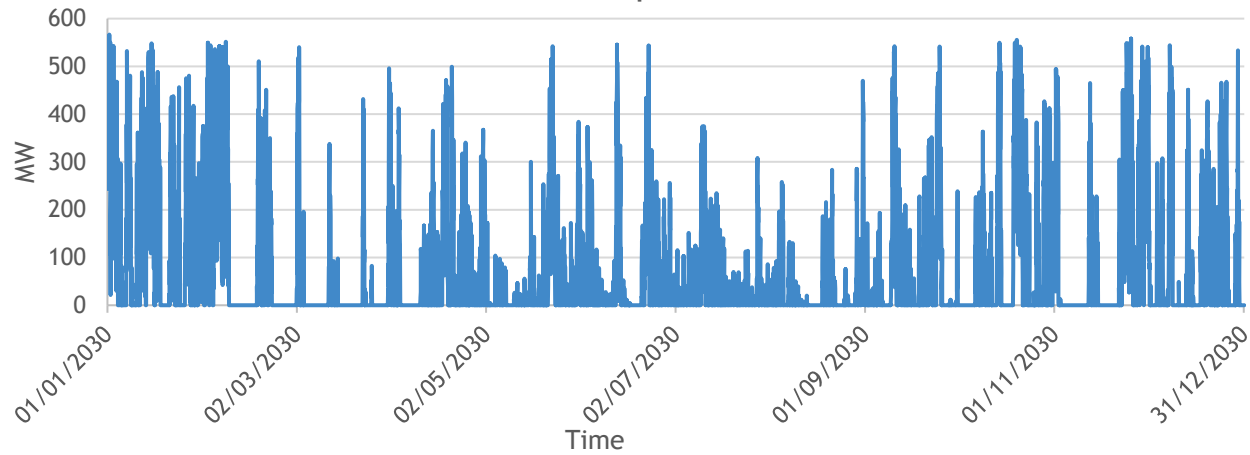
Table 5: SOEF v1.1 Total annual renewable surplus quantity for each region shown in Figure 1.

4.1. Area A

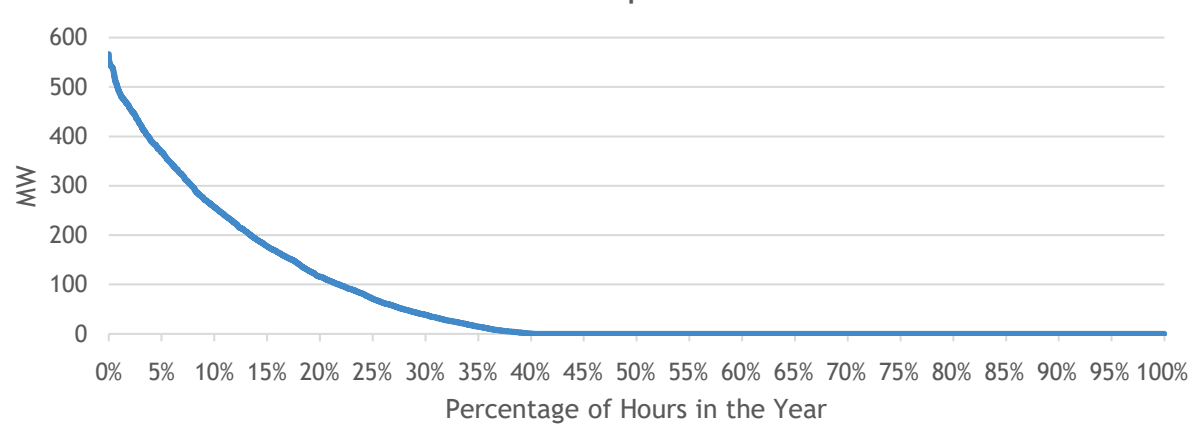


Area A	
Total Renewable Surplus	0.568 TWh

Area A - Renewable Surplus Time Series



Area A - Renewable Surplus Duration Curve

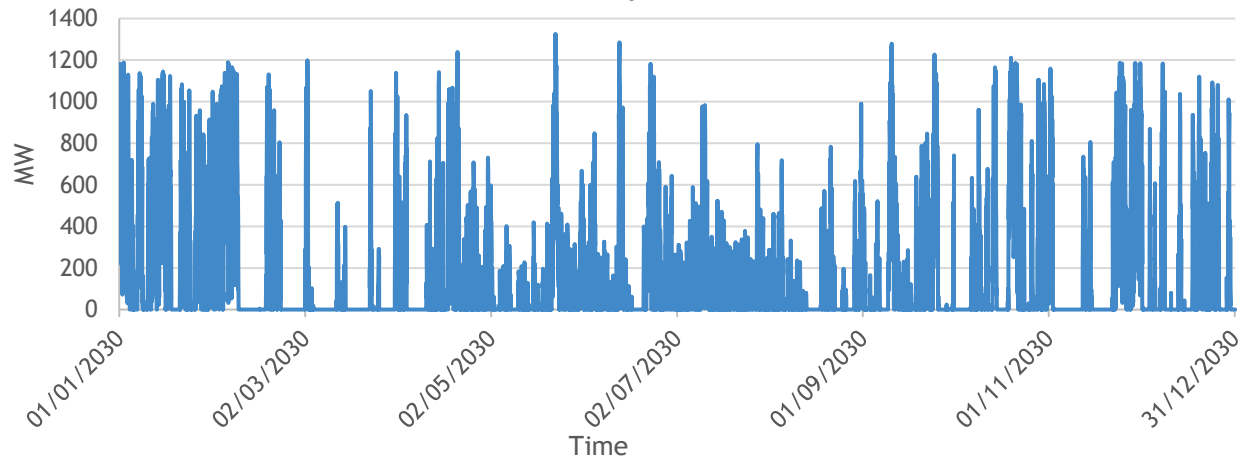


4.2. Area B

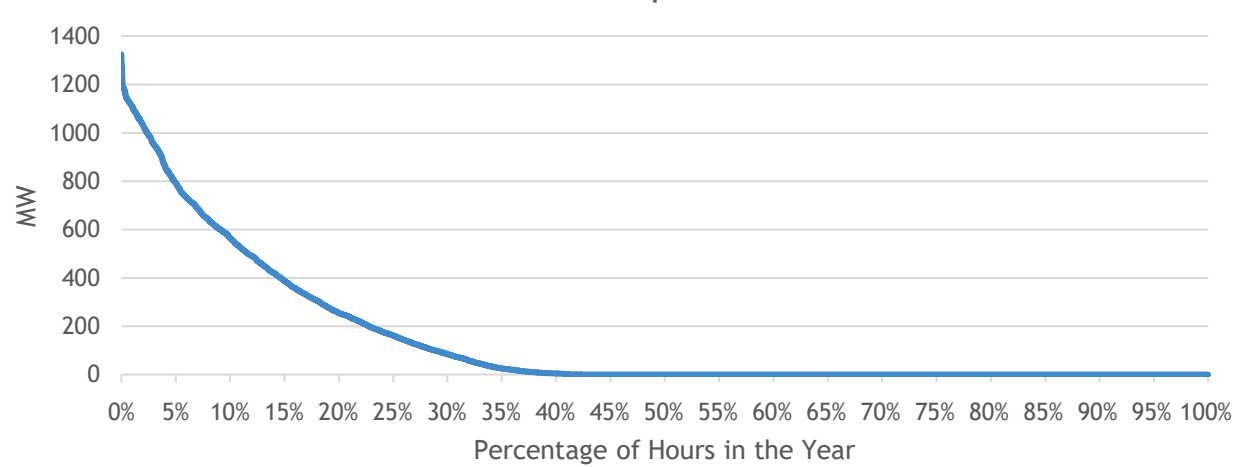


Area B	
Total Renewable Surplus	1.245 TWh

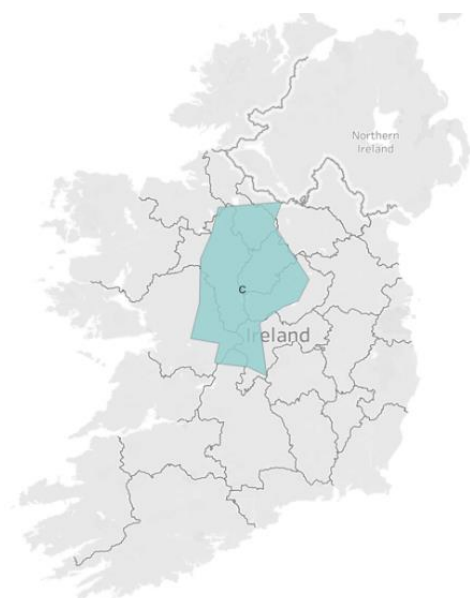
Area B Renewable Surplus Time Series



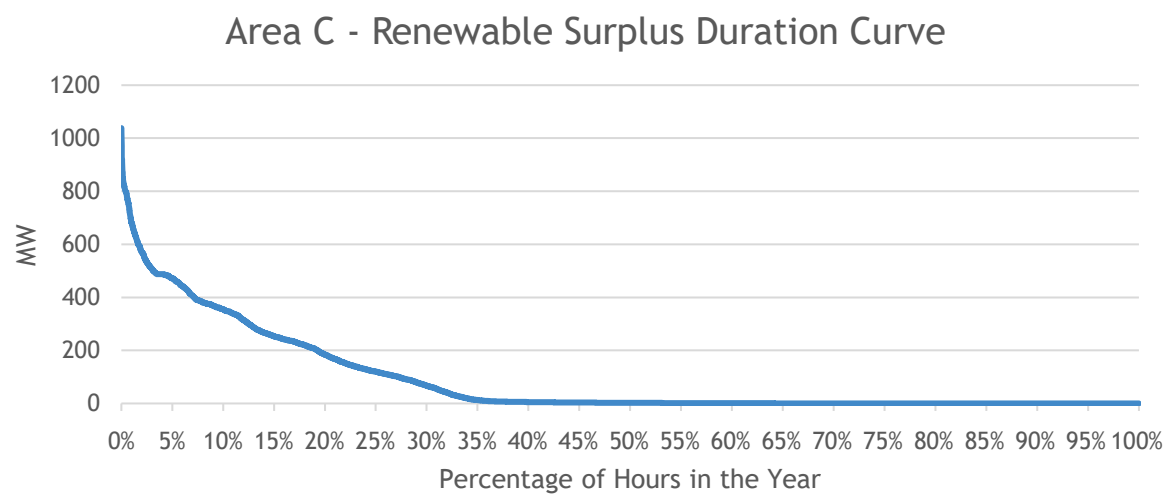
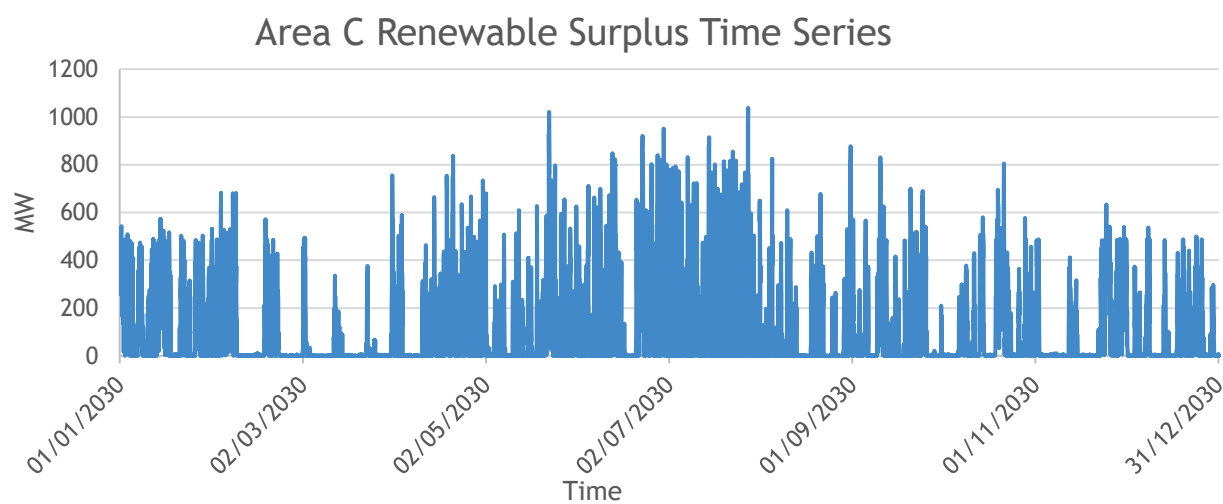
Area B - Renewable Surplus Duration Curve



4.3. Area C



Area C	
Total Renewable Surplus	0.793 TWh

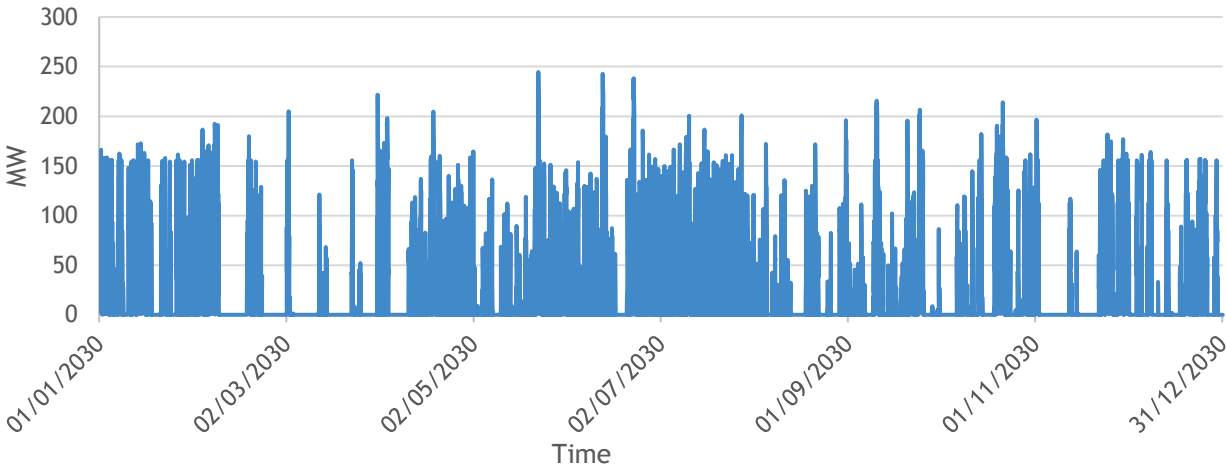


4.4. Area D

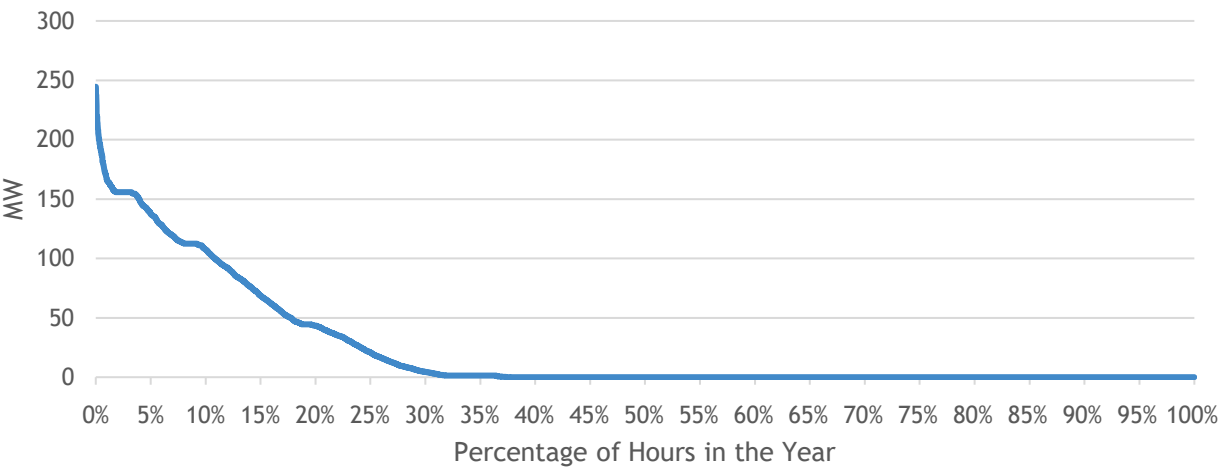


Area D	
Total Renewable Surplus	0.205 TWh

Area D Renewable Surplus Time Series



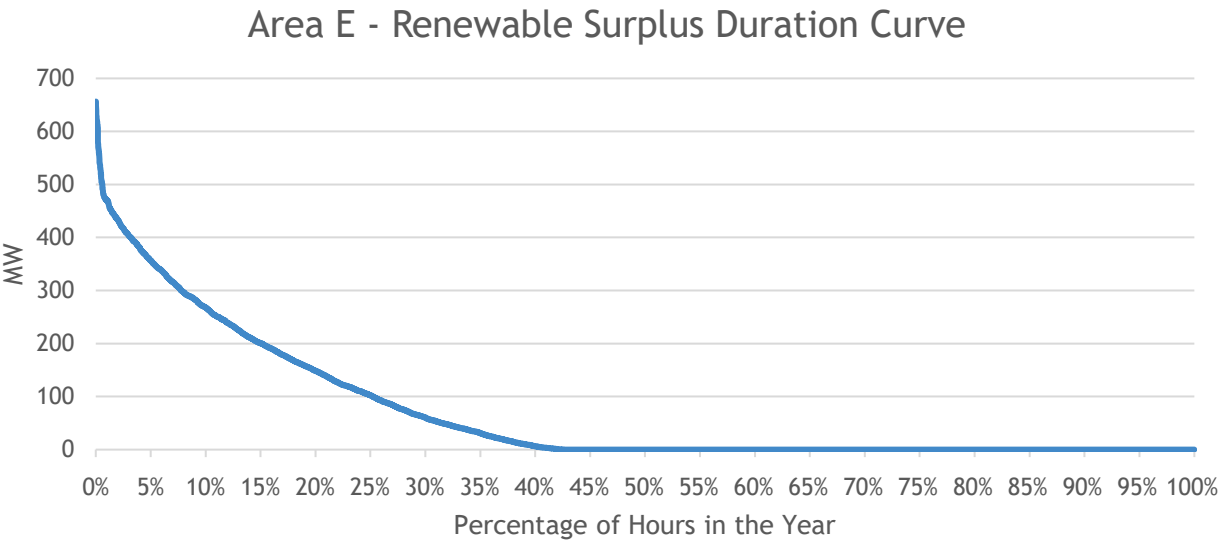
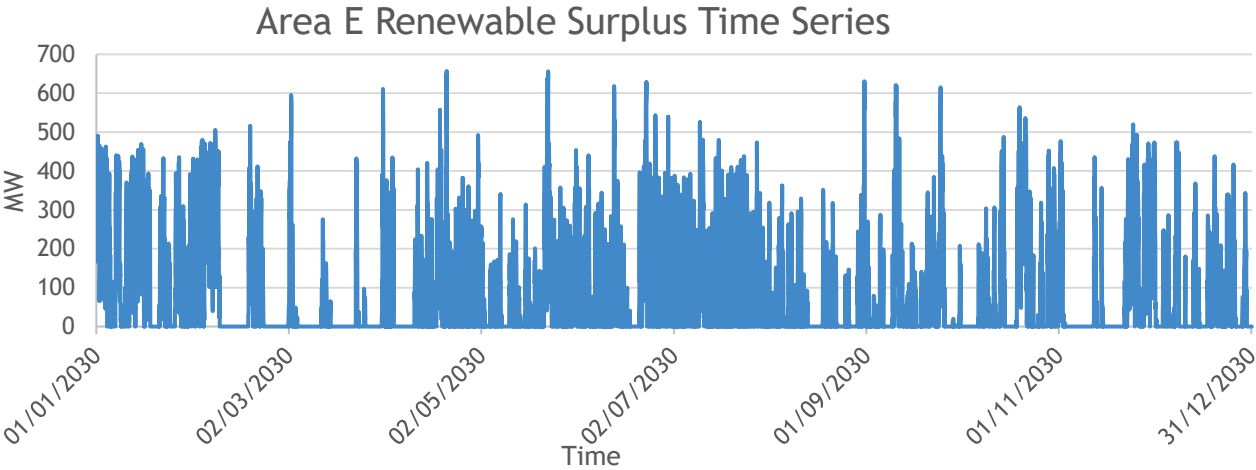
Area D - Renewable Surplus Duration Curve



4.5. Area E



Area E	
Total Renewable Surplus	0.619 TWh

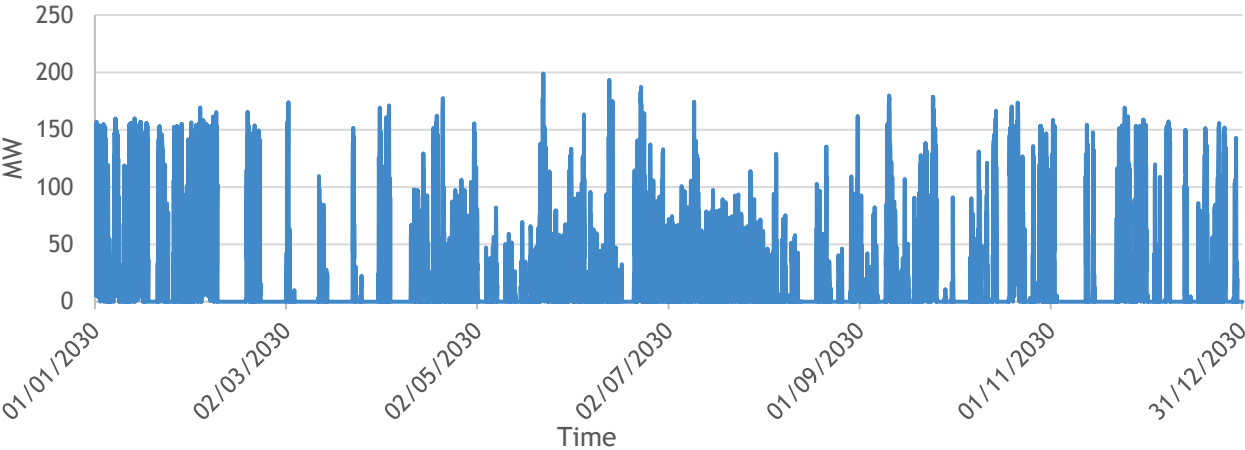


4.6. Area F

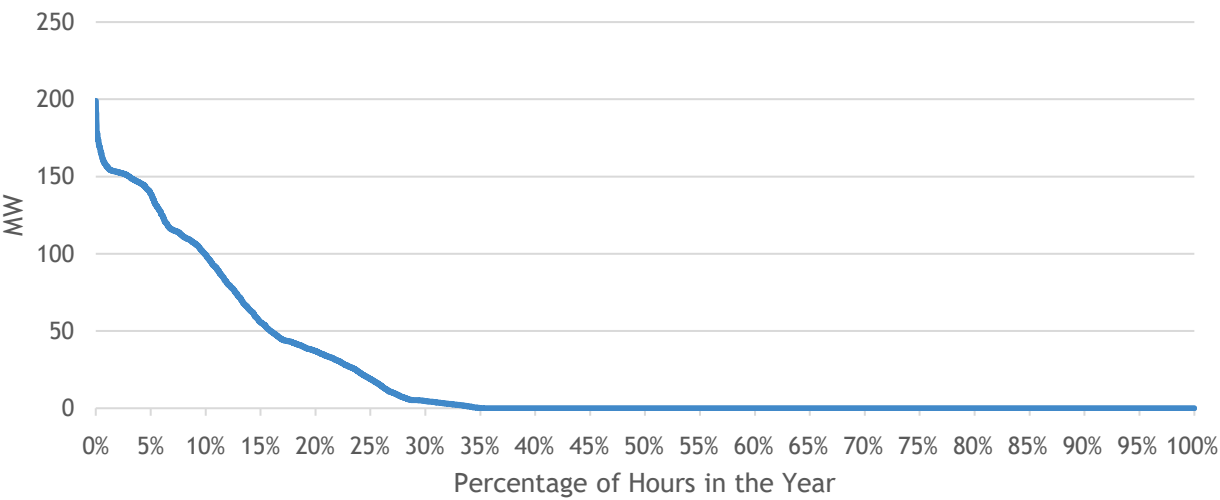


Area F	
Total Renewable Surplus	0.189 TWh

Area F Renewable Surplus Time Series



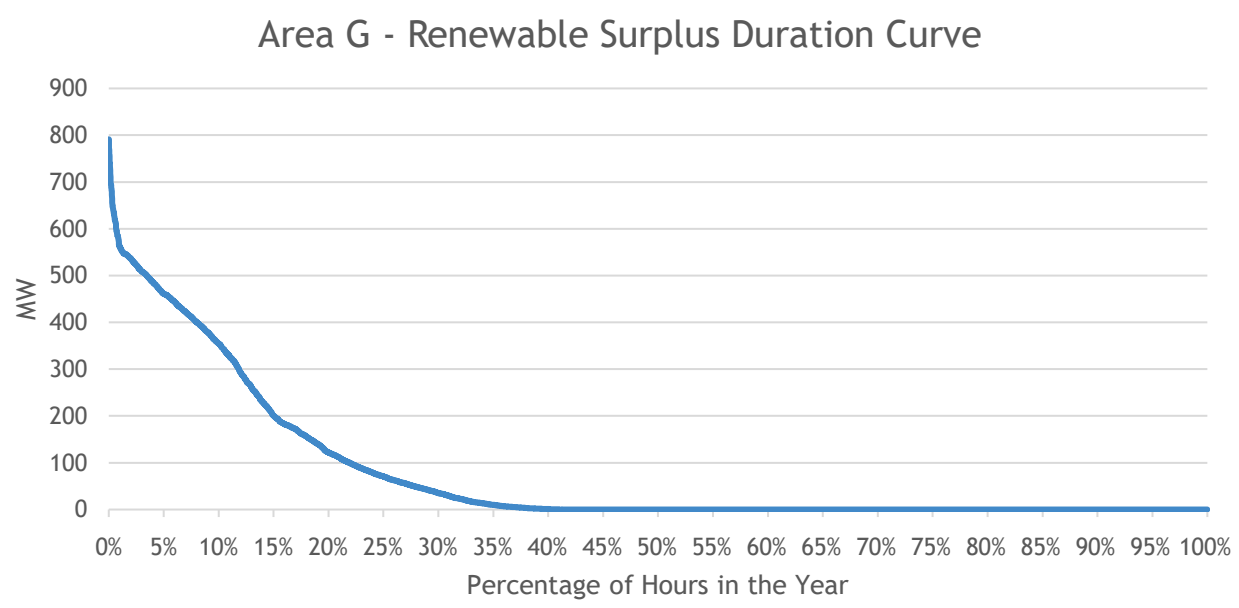
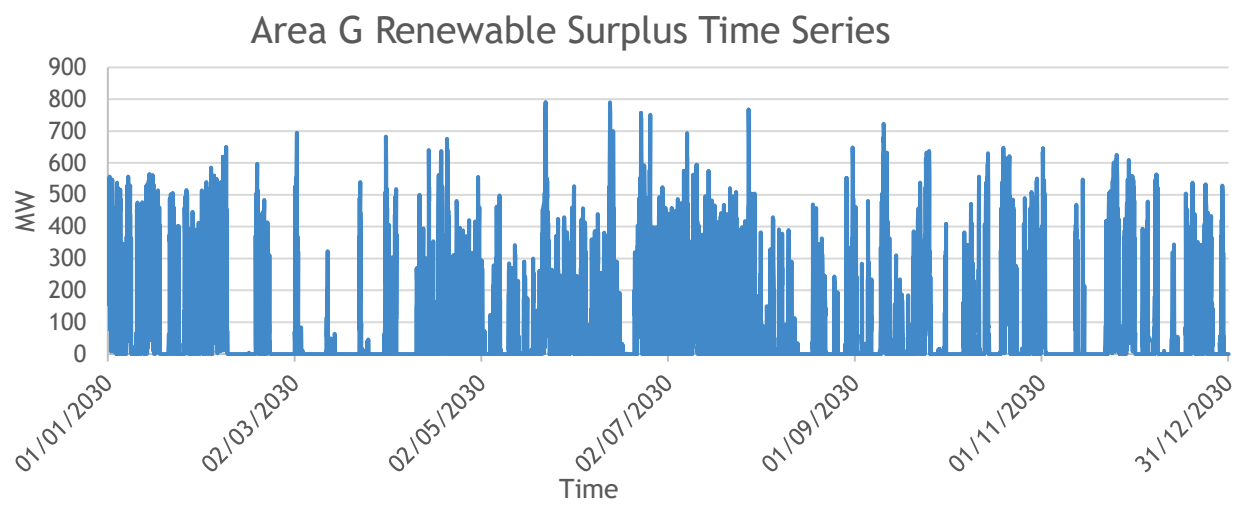
Area F - Renewable Surplus Duration Curve



4.7. Area G



Area G	
Total Renewable Surplus	0.683 TWh

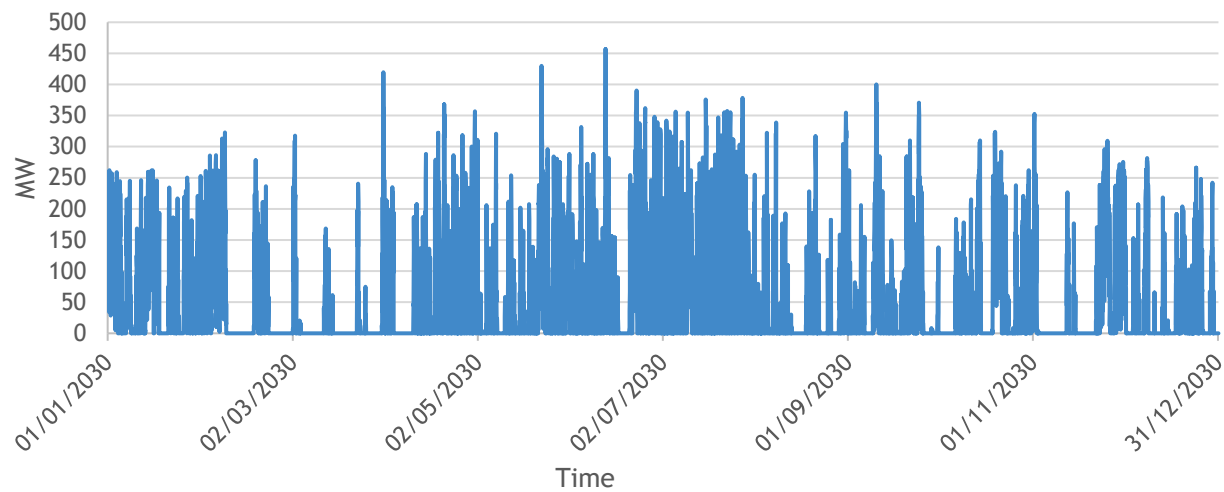


# 4.8. Area H1

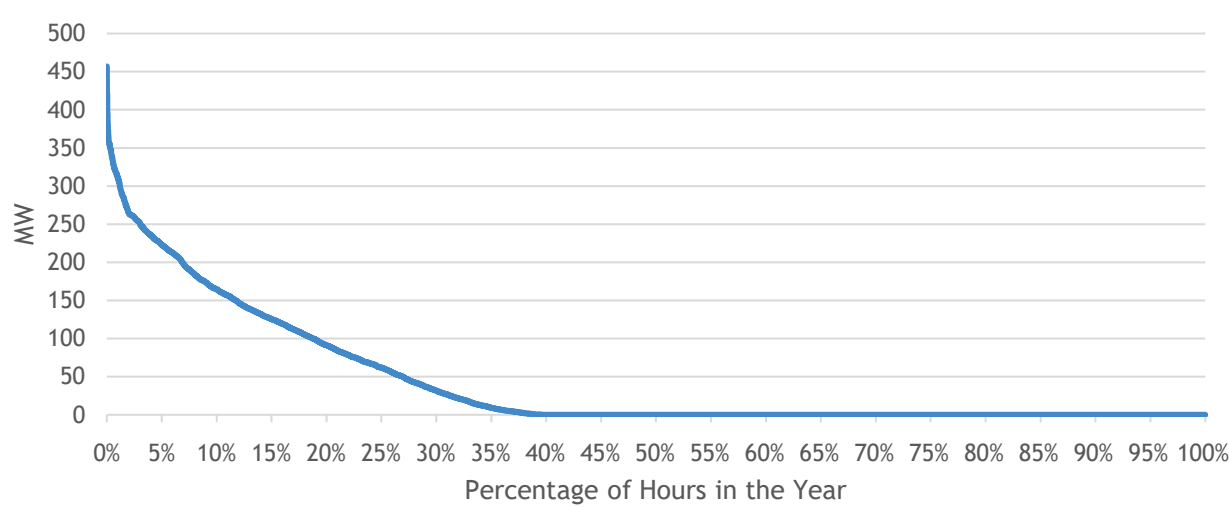


Area H1	
Total Renewable Surplus	0.377 TWh

Area H1 Renewable Surplus Time Series



Area H1 - Renewable Surplus Duration Curve

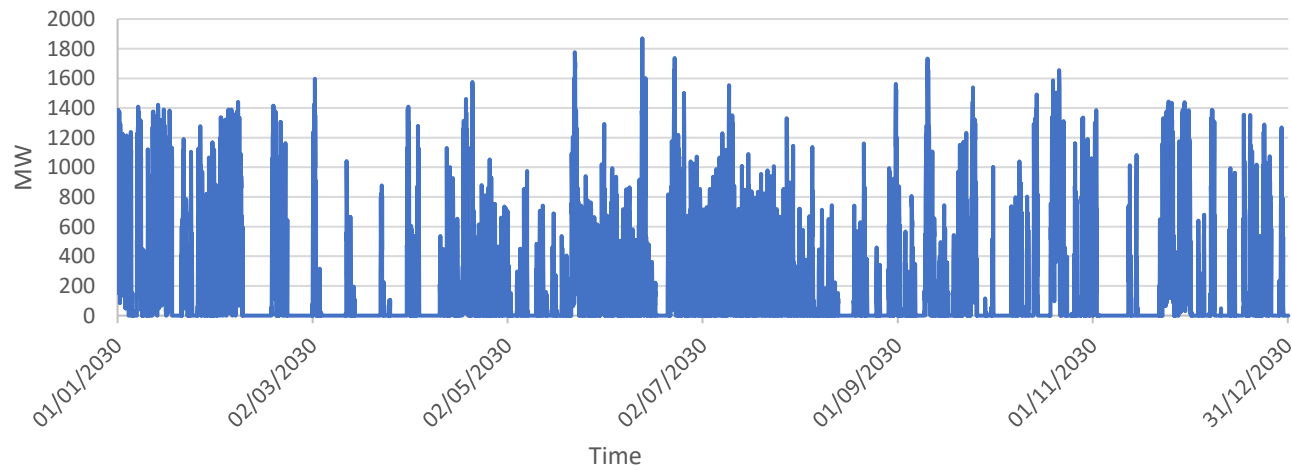


# 4.9. Area H2

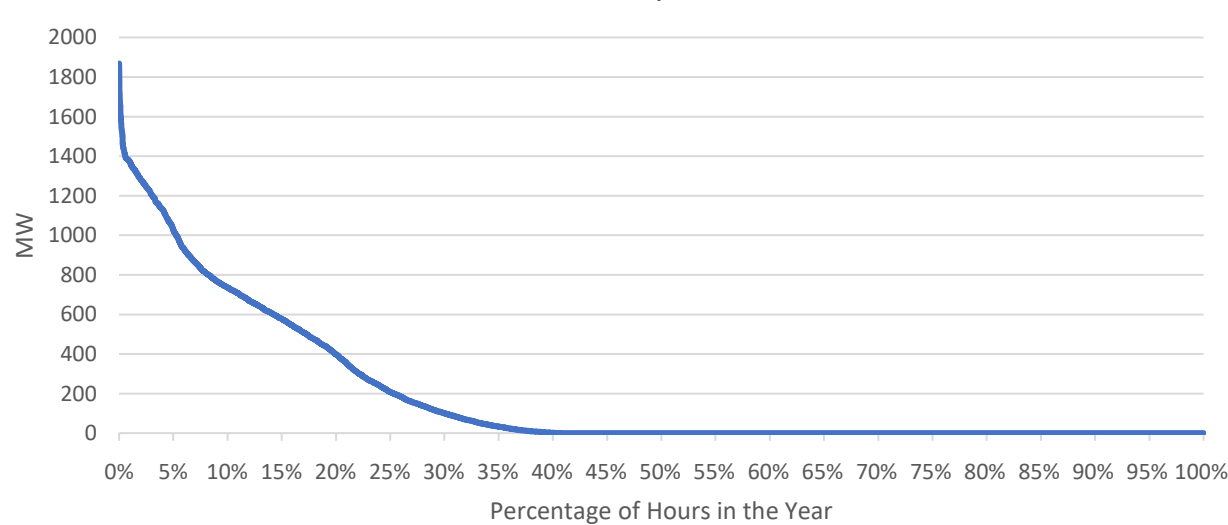


Area H2	
Total Renewable Surplus	1.654 TWh

Area H2 Renewable Surplus Time Series



Area H2 - Renewable Surplus Duration Curve

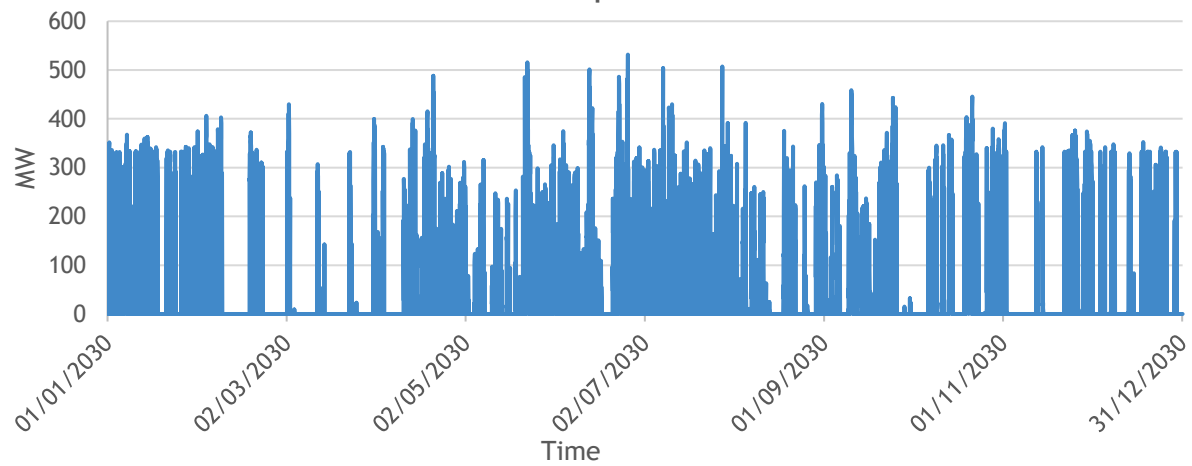


4.10. Area I

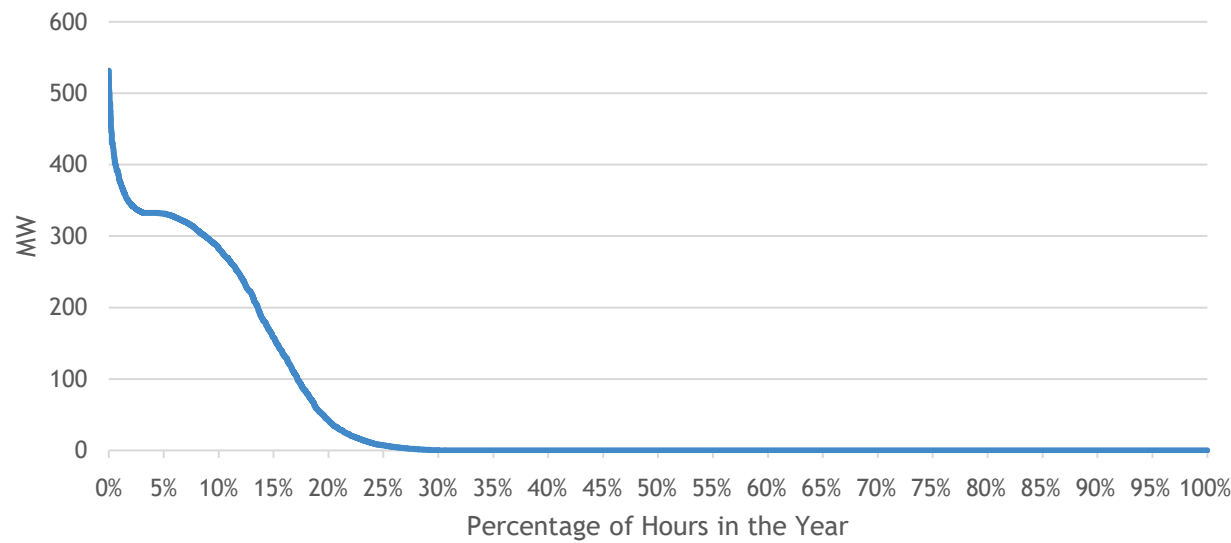


Area I	
Total Renewable Surplus	0.444 TWh

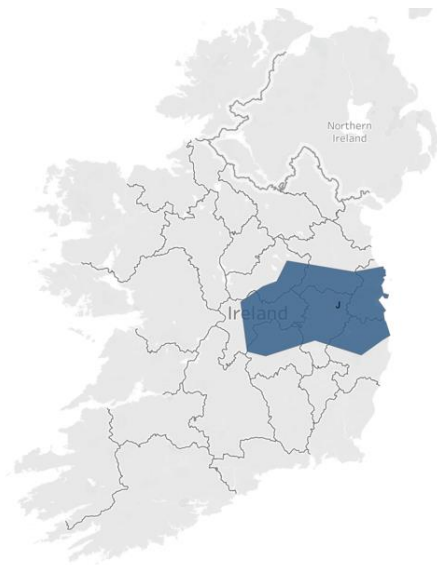
Area I Renewable Surplus Time Series



Area I - Renewable Surplus Duration Curve

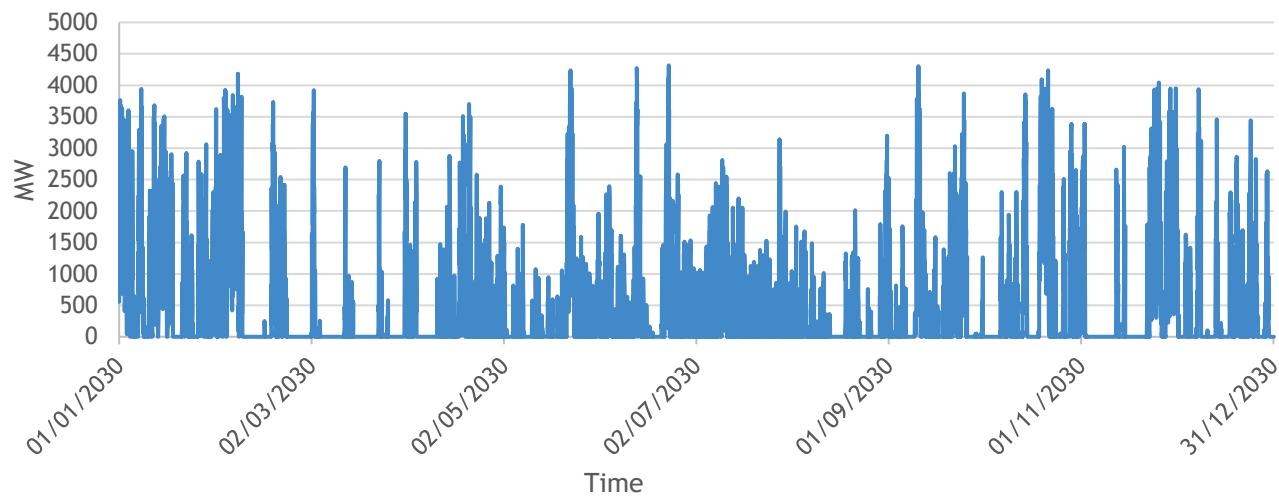


4.11. Area J

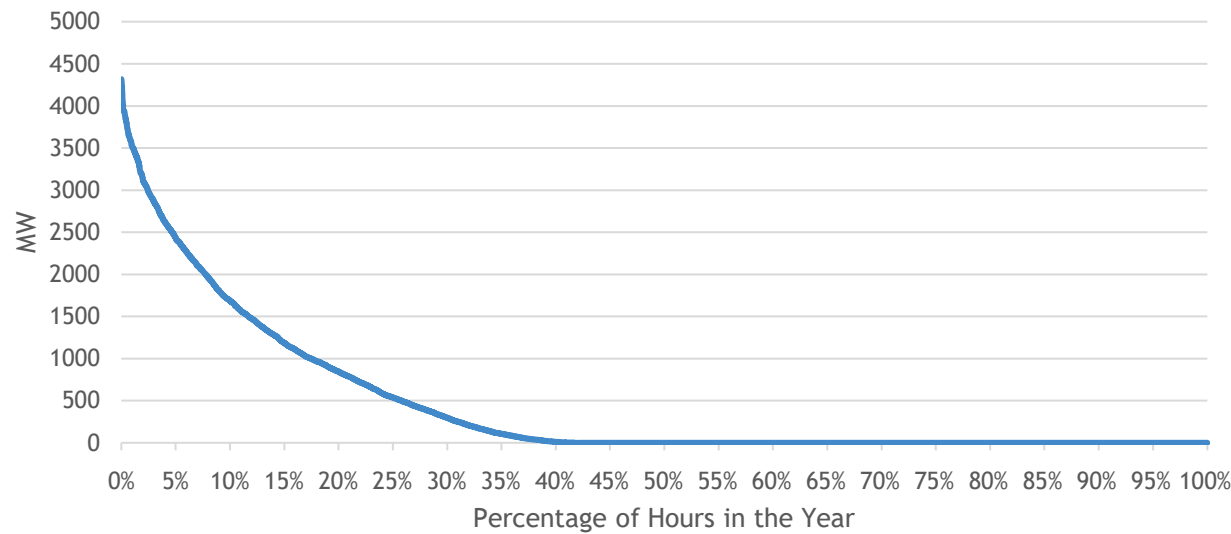


Area J	
Total Renewable Surplus	3.899 TWh

Area J Renewable Surplus Time Series



Area J - Renewable Surplus Duration Curve

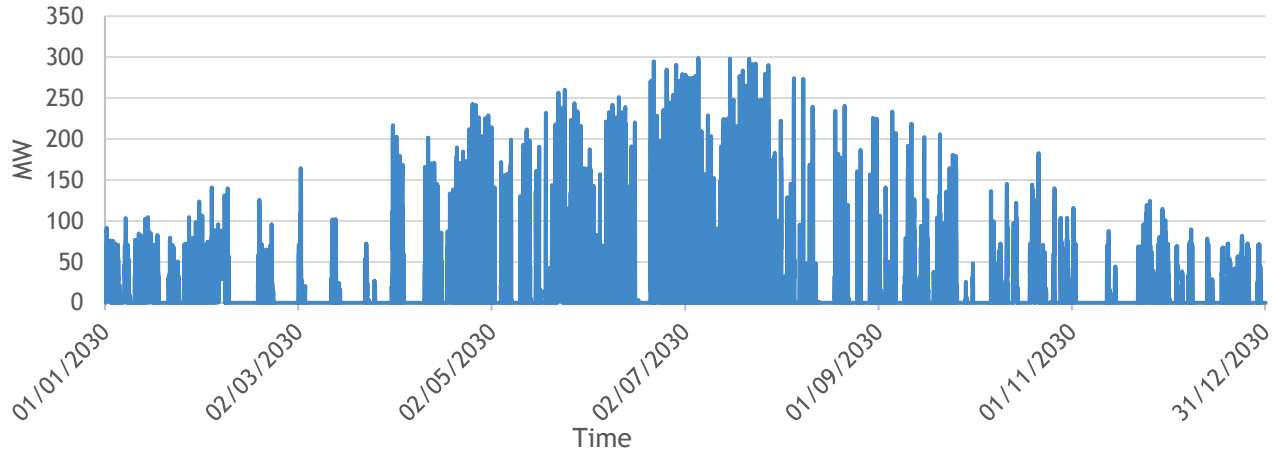


4.12. Area K



Area K	
Total Renewable Surplus	0.174 TWh

Area K Renewable Surplus Time Series



Area K - Renewable Surplus Duration Curve

