Renewable Generation Report

Q4

Oct 2023 – Dec 2023

Public Utilities Commission of Sri Lanka

Introduction:

This report offers comprehensive insights into the quarterly performance of renewable energy generation in Sri Lanka. The data and analysis presented herein aim to guide investment decisions within the country's electricity sector. The main focus is on Non-Conventional Renewable Energy (NCRE) sources, including Mini Hydro, Wind, Solar PV, Biomass, and Municipal Solid Waste.

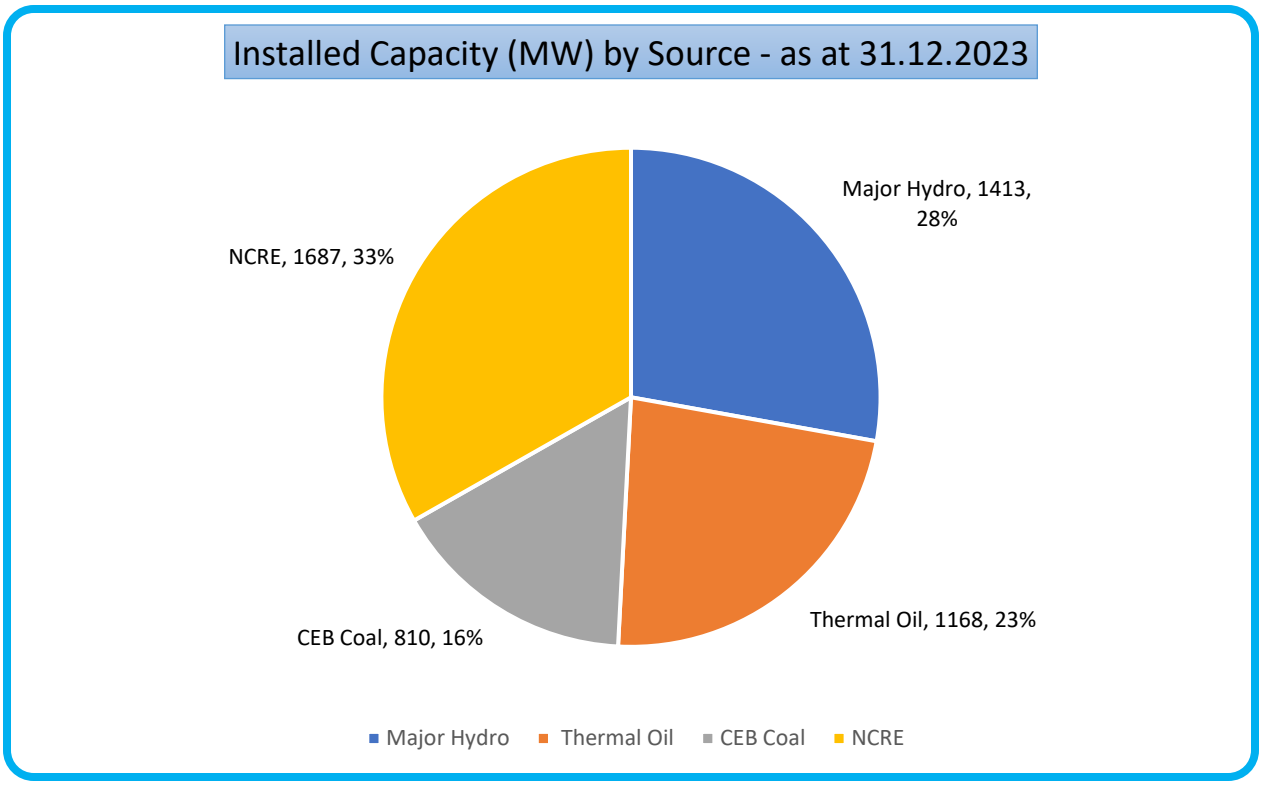
Most solar PV systems tend to be either utility-scale installations with a capacity usually above 1 megawatt (MW) or rooftop PV typically below 1 MW. Residences may be limited to small systems usually up to 20 kilowatts (kW), while larger public, commercial, and industrial buildings may have systems with a capacity as large as 1 MW or even more. Land based wind power projects have been implemented so far while offshore wind projects are considered in the pipeline.

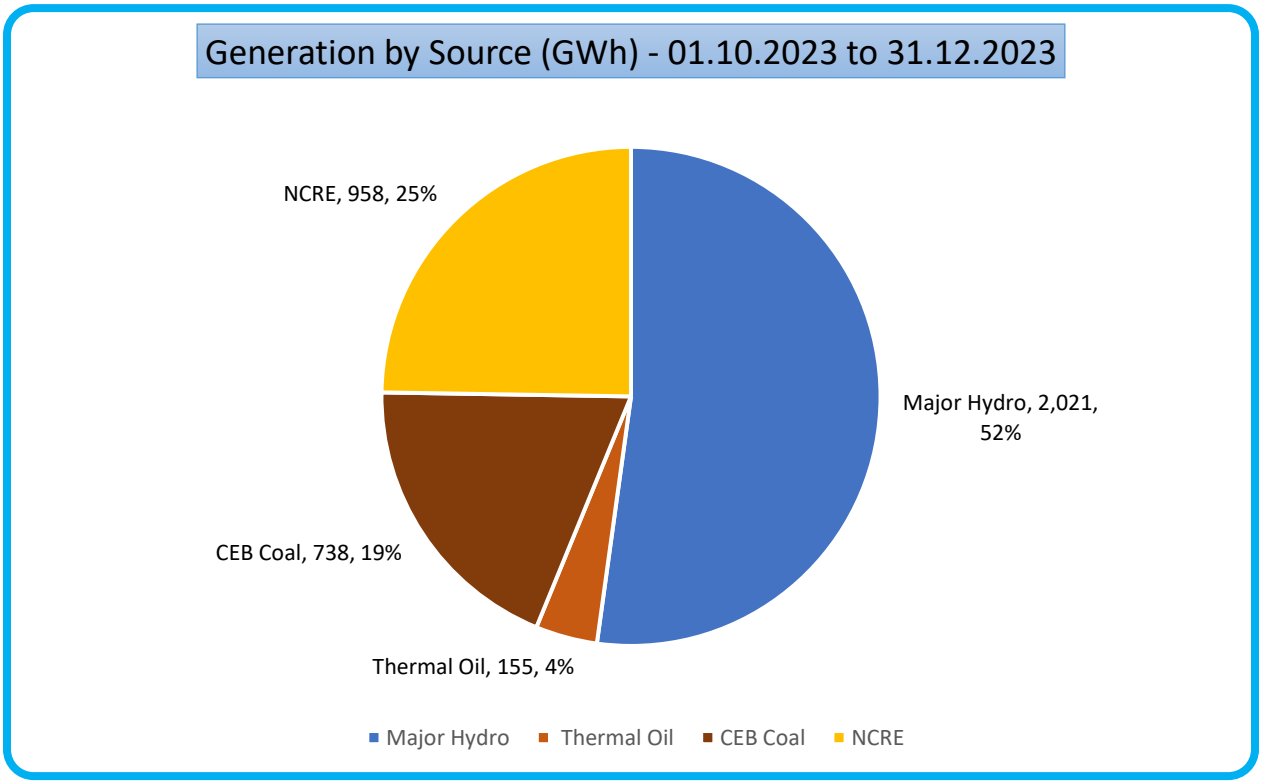
In 2019, the Minister of Power, Energy, and Business Development published the National Energy Policy & Strategies of Sri Lanka, prepared after reviewing and revising the National Energy Policy and Strategies of Sri Lanka published in the Gazette Extraordinary No. 1553/10 of 10.06.2008. The primary objective of the energy policy is to ensure energy security through supplies that are cleaner, secure, economical, and reliable, and to provide convenient, affordable energy services to support the socially equitable development of Sri Lanka.

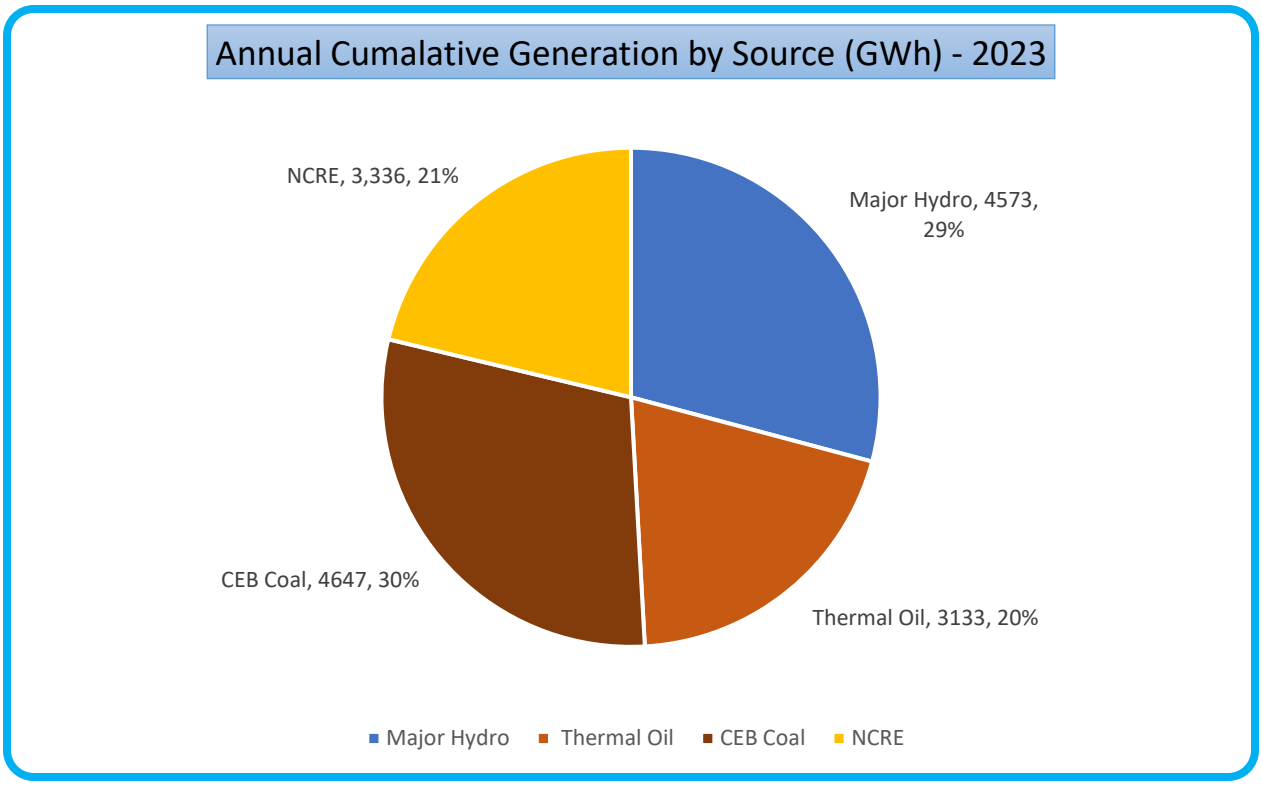
Policy guidelines such as the 'General Policy Guidelines on the Electricity Industry' as required under Sri Lanka Electricity Act No. 20 of 2009 statutorily required to be issued for each sub-sector, are expected to be prepared and issued, based on this national energy policy.

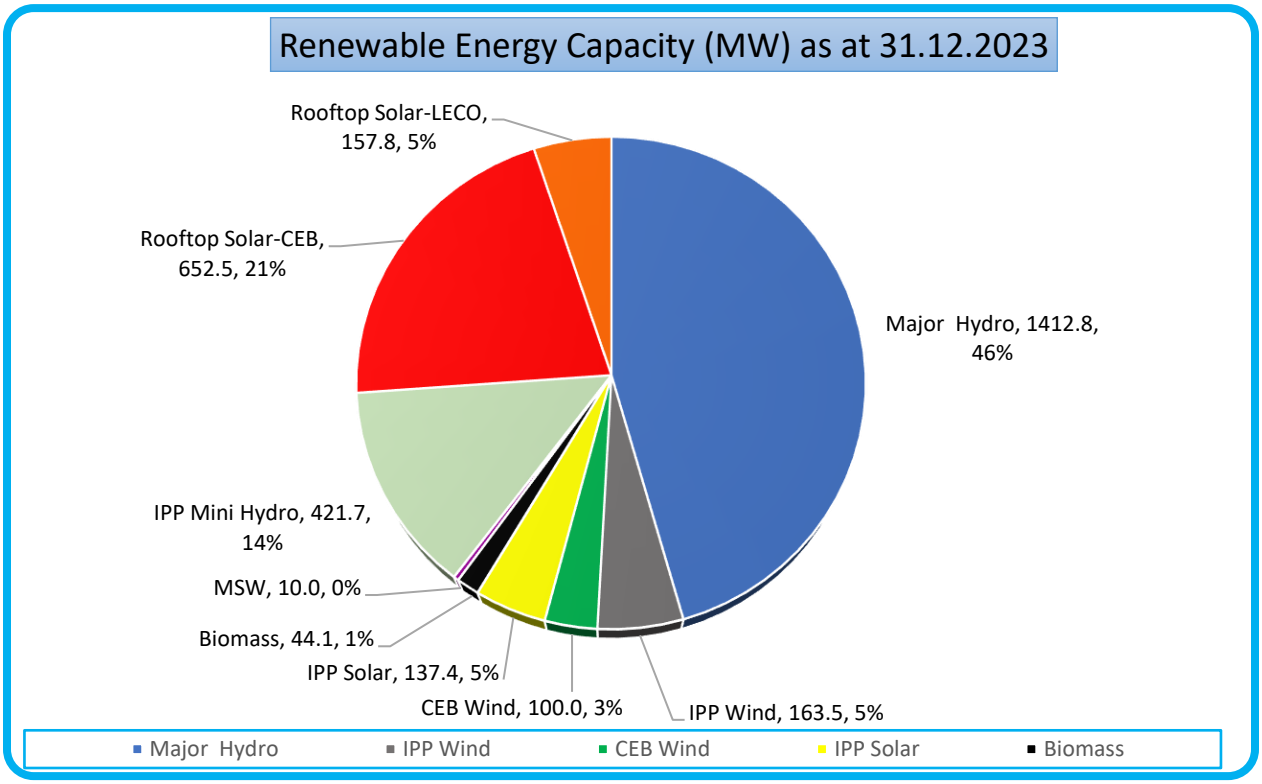
Sri Lanka's power sector development is carried out based on the Long-term generation expansion plan (LTGEP) prepared by the Transmission Licensee (ie. Ceylon Electricity Board (CEB)) and approved by the Public Utilities Commission of Sri Lanka (PUCSL). LTGEP is a rolling plan prepared in every two years incorporating the changes introduced by the varying economic and technical parameters used in the planning process.

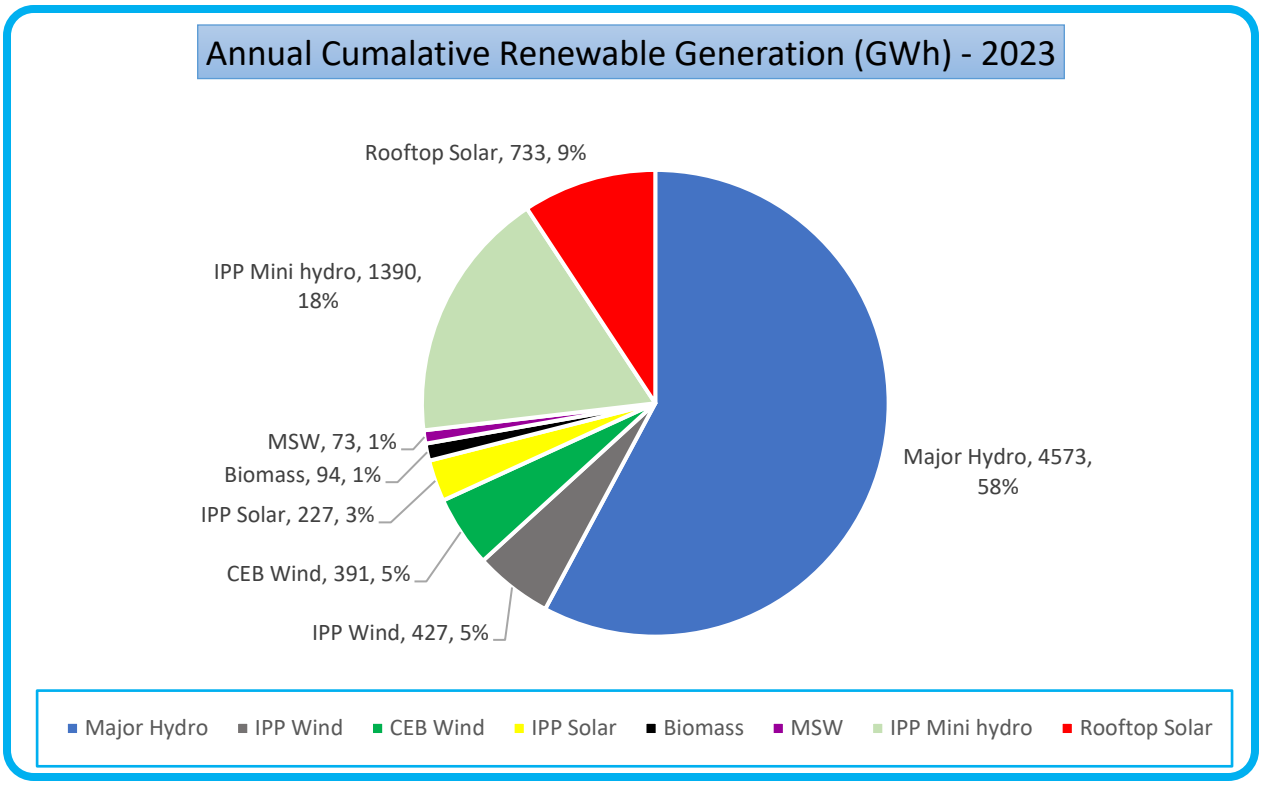
Target: To increase the renewable energy (RE) share from 50% to 70% by 2030.

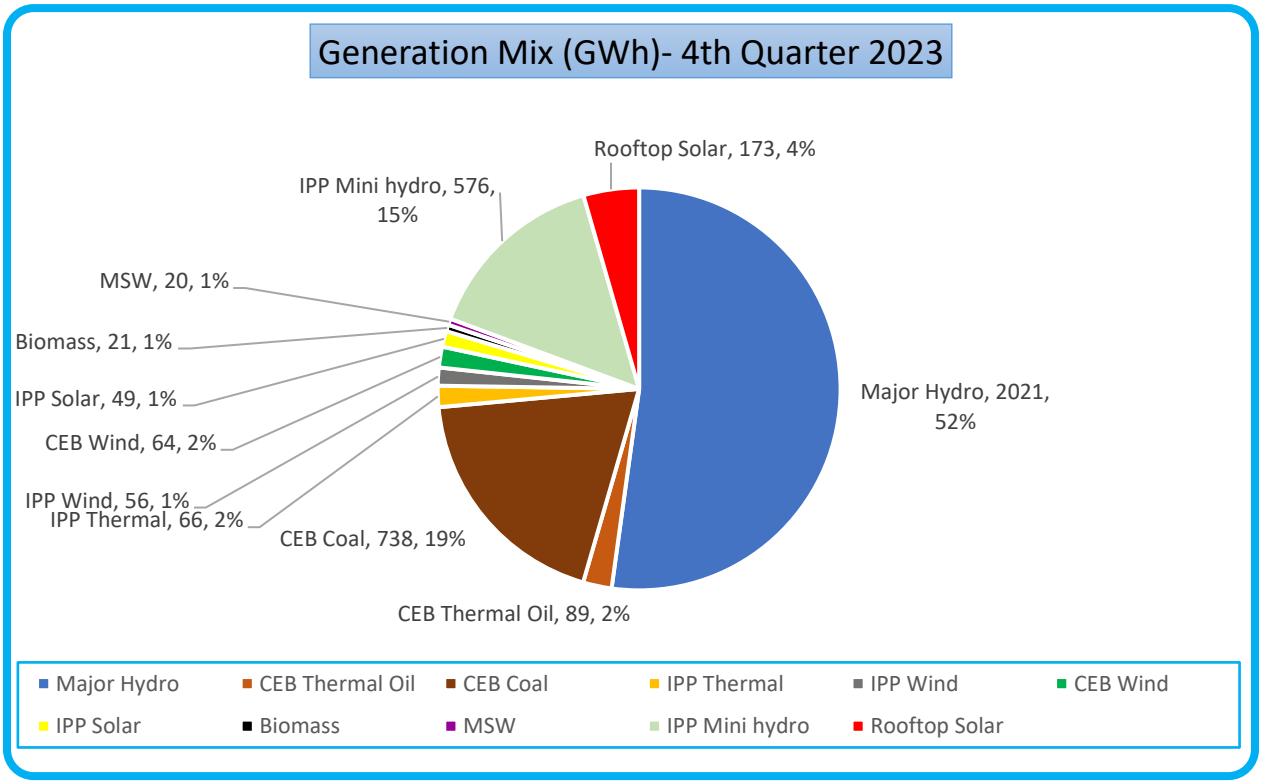

Installed Capacity (MW) by Source - as at 31.12.2023
Major Hydro, 1413, 28%
Thermal Oil, 1168, 23%
CEB Coal, 810, 16%
NCRE, 1687, 33%
Major Hydro
Thermal Oil
CEB Coal
NCRE

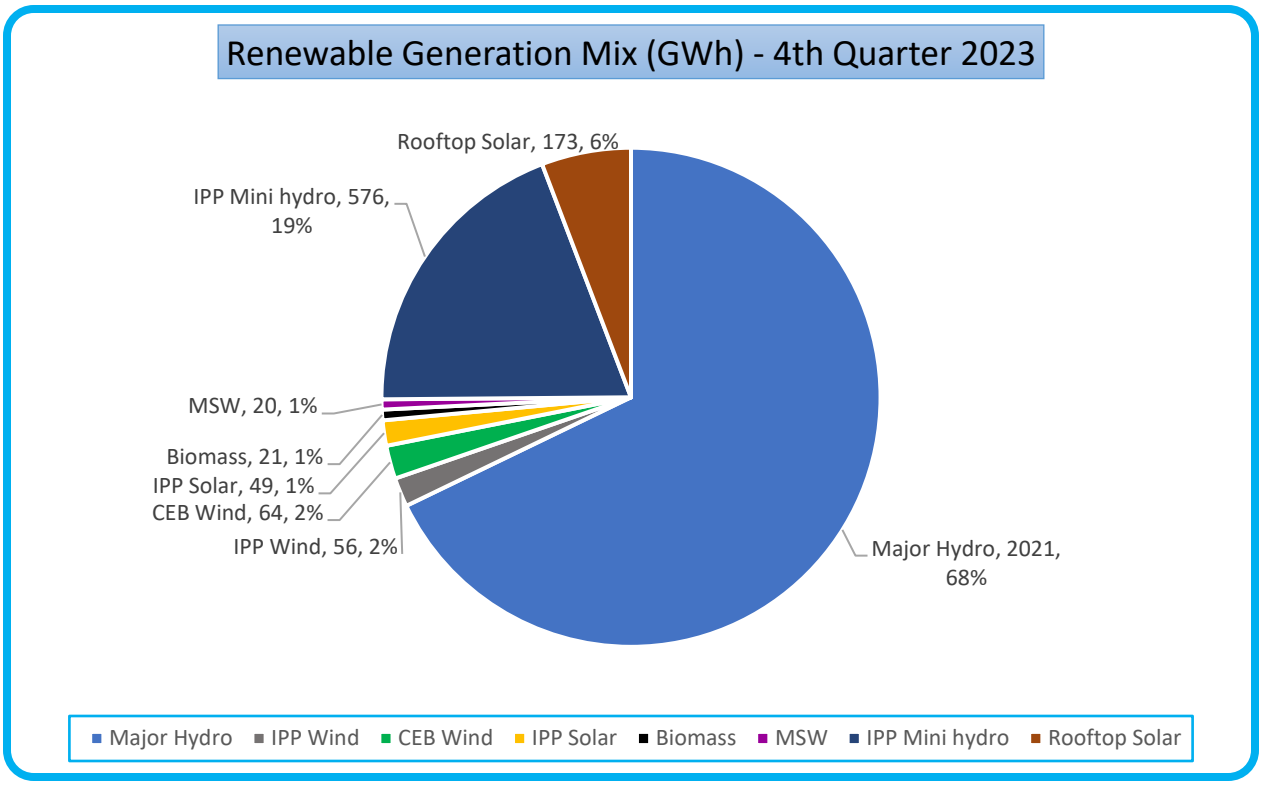

Generation by Source (GWh) - 01.10.2023 to 31.12.2023
Major Hydro, 2,021, 52%
Thermal Oil, 155, 4%
CEB Coal, 738, 19%
NCRE, 958, 25%
Major Hydro
Thermal Oil
CEB Coal
NCRE

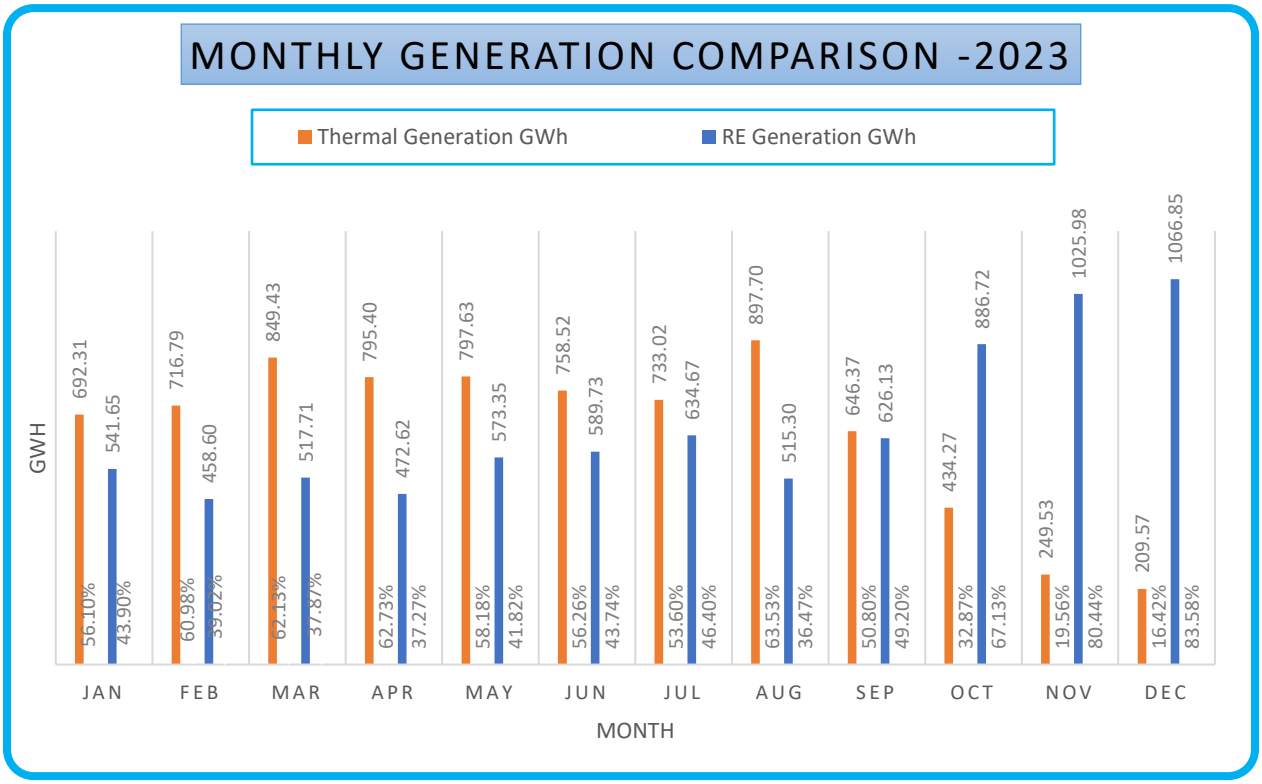

Annual Cumalative Generation by Source (GWh) - 2023
NCRE, 3,336, 21%
Major Hydro, 4573, 29%
CEB Coal, 4647, 30%
Thermal Oil, 3133, 20%
Major Hydro
Thermal Oil
CEB Coal
NCRE

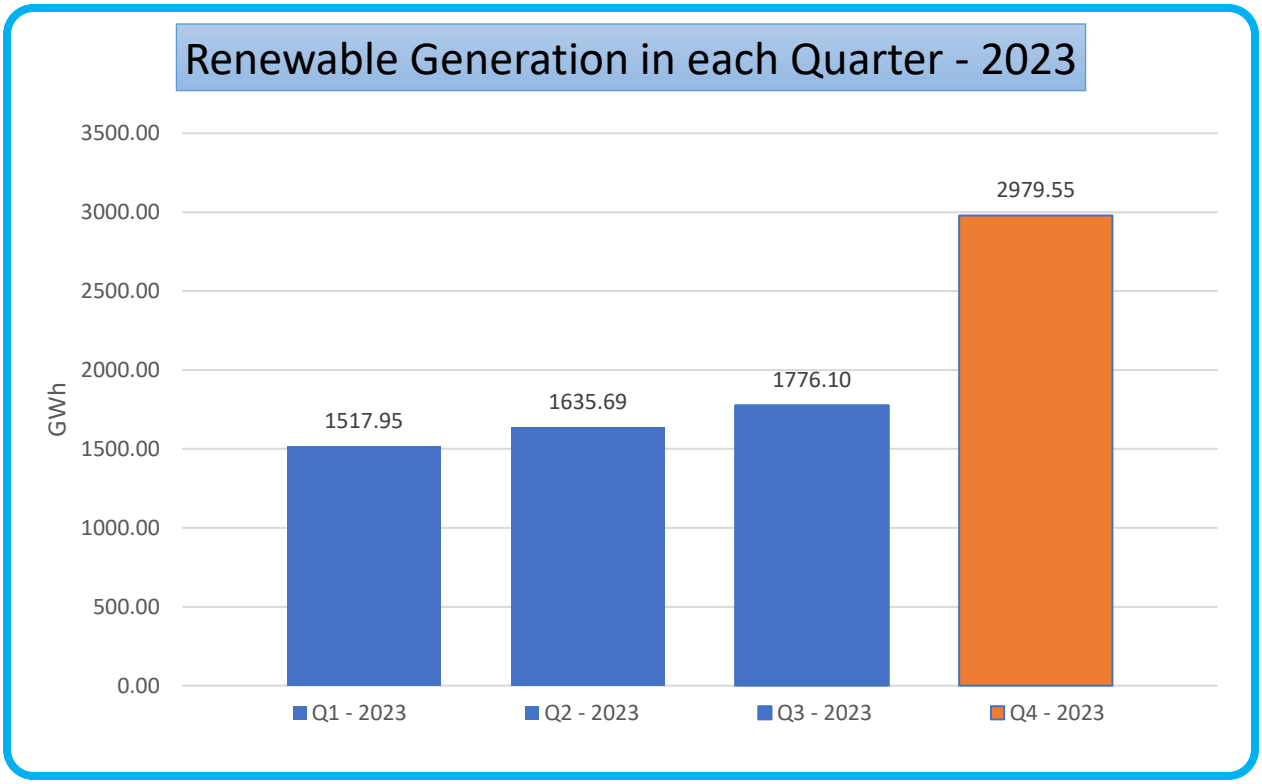

Renewable Energy Capacity (MW) as at 31.12.2023
Rooftop Solar-LECO, 157.8, 5%
Rooftop Solar-CEB, 652.5, 21%
Major Hydro, 1412.8, 46%
IPP Mini Hydro, 421.7, 14%
MSW, 10.0, 0%
Biomass, 44.1, 1%
IPP Solar, 137.4, 5%
CEB Wind, 100.0, 3%
IPP Wind, 163.5, 5%
Major Hydro
IPP Wind
CEB Wind
IPP Solar
Biomass


Annual Cumalative Renewable Generation (GWh) - 2023
Rooftop Solar, 733, 9%
IPP Mini hydro, 1390, 18%
MSW, 73, 1%
Biomass, 94, 1%
IPP Solar, 227, 3%
CEB Wind, 391, 5%
IPP Wind, 427, 5%
Major Hydro, 4573, 58%
Major Hydro
IPP Wind
CEB Wind
IPP Solar
Biomass
MSW
IPP Mini hydro
Rooftop Solar


Generation Mix (GWh)- 4th Quarter 2023
Rooftop Solar, 173, 4%
IPP Mini hydro, 576, 15%
MSW, 20, 1%
Biomass, 21, 1%
IPP Solar, 49, 1%
CEB Wind, 64, 2%
IPP Wind, 56, 1%
IPP Thermal, 66, 2%
CEB Coal, 738, 19%
CEB Thermal Oil, 89, 2%
Major Hydro, 2021, 52%
Major Hydro
CEB Thermal Oil
CEB Coal
IPP Thermal
IPP Wind
CEB Wind
IPP Solar
Biomass
MSW
IPP Mini hydro
Rooftop Solar


Renewable Generation Mix (GWh) - 4th Quarter 2023
Rooftop Solar, 173, 6%
IPP Mini hydro, 576, 19%
MSW, 20, 1%
Biomass, 21, 1%
IPP Solar, 49, 1%
CEB Wind, 64, 2%
IPP Wind, 56, 2%
Major Hydro, 2021, 68%
Major Hydro
IPP Wind
CEB Wind
IPP Solar
Biomass
MSW
IPP Mini hydro
Rooftop Solar


MONTHLY GENERATION COMPARISON -2023
Thermal Generation GWh
RE Generation GWh
GWH
JAN 692.31 541.65 56.10% 43.90%
FEB 716.79 458.60 60.98% 39.02%
MAR 849.43 517.71 62.13% 37.87%
APR 795.40 472.62 62.73% 37.27%
MAY 797.63 573.35 58.18% 41.82%
JUN 758.52 589.73 56.26% 43.74%
JUL 733.02 634.67 53.60% 46.40%
AUG 897.70 515.30 63.53% 36.47%
SEP 646.37 626.13 50.80% 49.20%
OCT 434.27 886.72 32.87% 67.13%
NOV 249.53 1025.98 19.56% 80.44%
DEC 209.57 1066.85 16.42% 83.58%
MONTH



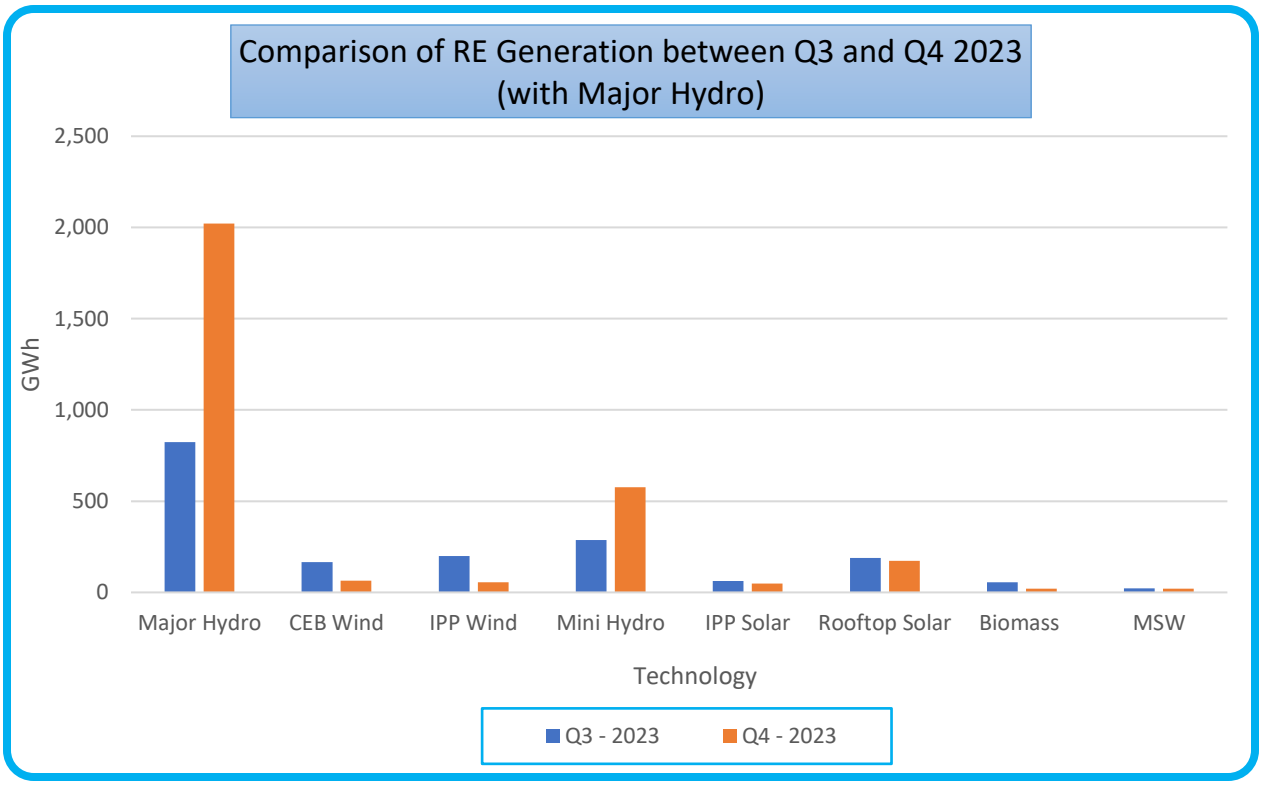
RE Generation in Q4 Increased by 64.9% as compared to Q1 in 2023

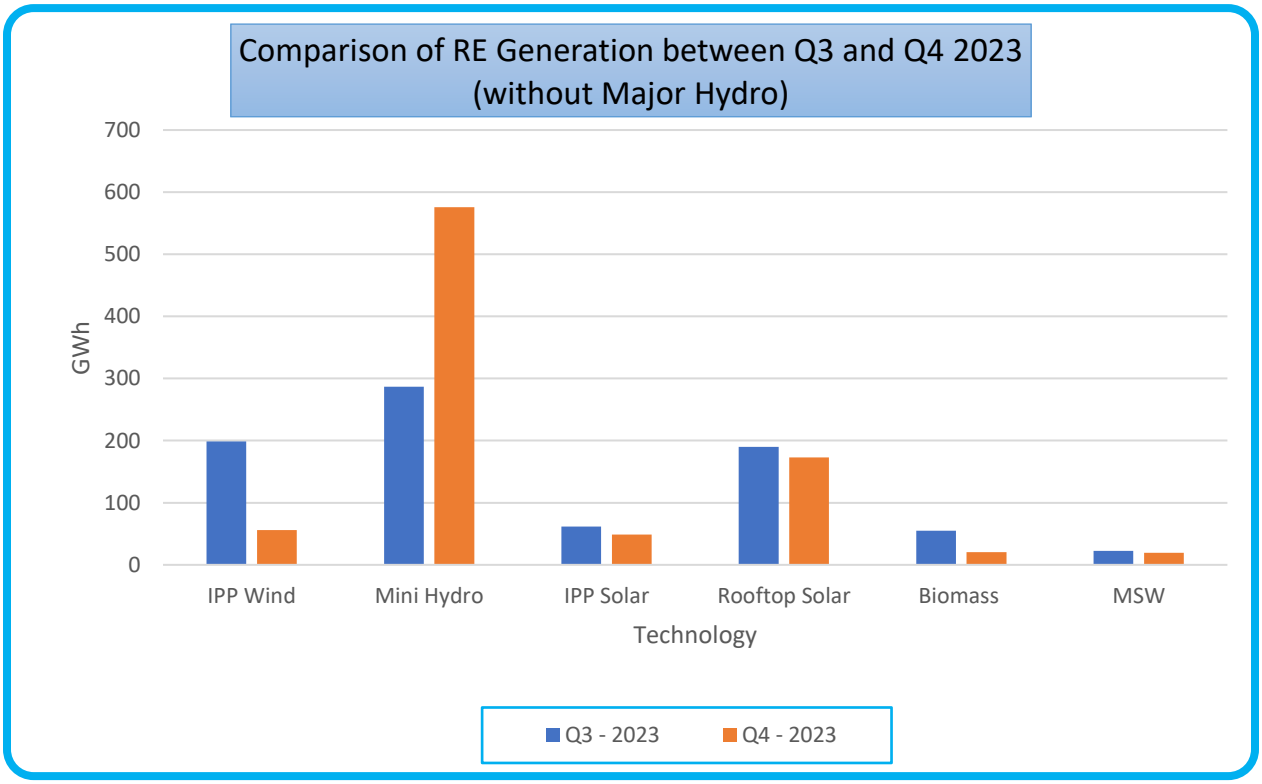
RE Generation in Q4 Increased by 58.2% as compared to Q2 in 2023

RE Generation in Q4 Increased by 50.6% as compared to Q3 in 2023

Renewable Generation (GWh) – 3rd Quarter 2023 Vs 4th Quarter 2023

Technology	Q3 - 2023	Q4 - 2023	Deviation (%)
Major Hydro	823	2,021	146%
CEB Wind	166	64	-61%
IPP Wind	199	56	-72%
Mini Hydro	287	576	101%
IPP Solar	62	49	-21%
Rooftop Solar	190	173	-9%
Biomass	55	21	-62%
MSW	23	20	-14%

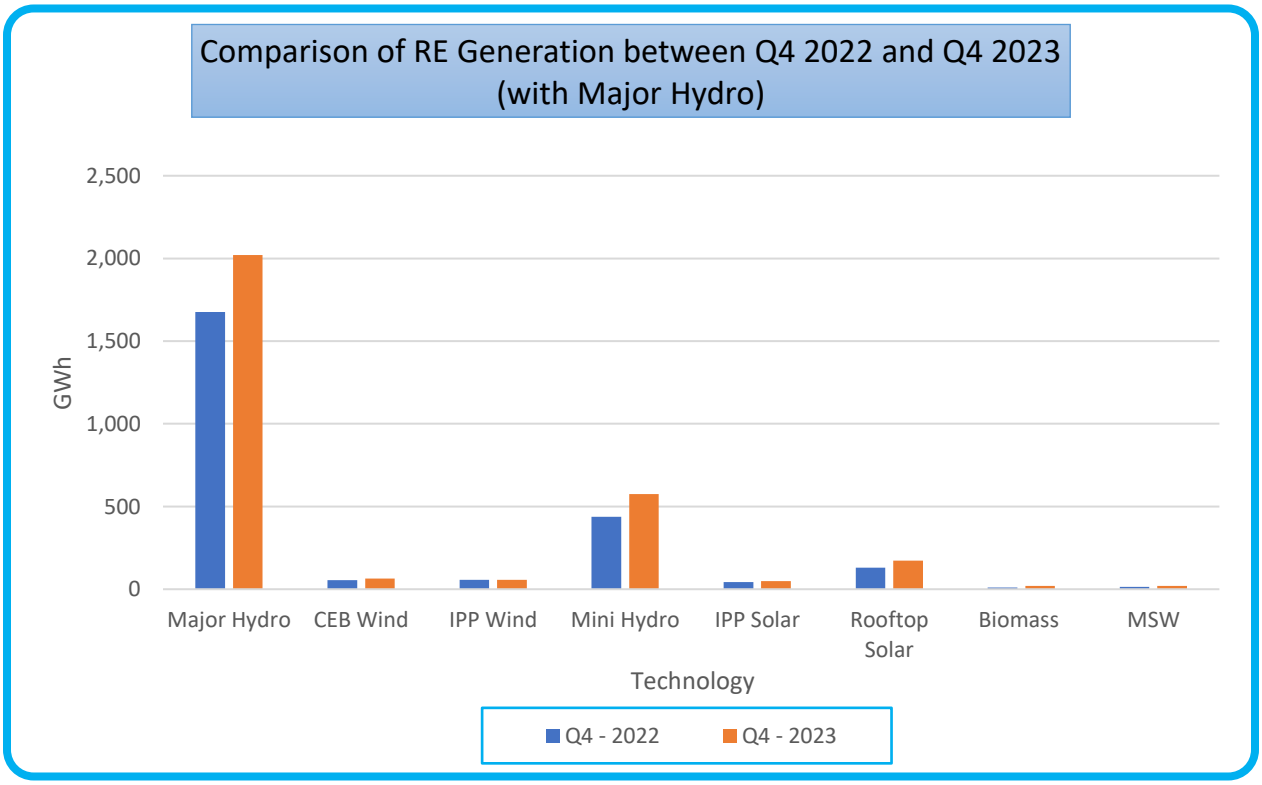

Comparison of RE Generation between Q3 and Q4 2023 (with Major Hydro)
2,500
2,000
1,500
1,000
500
0
GWh
Major Hydro
CEB Wind
IPP Wind
Mini Hydro
IPP Solar
Rooftop Solar
Biomass
MSW
Technology
Q3 - 2023
Q4 - 2023

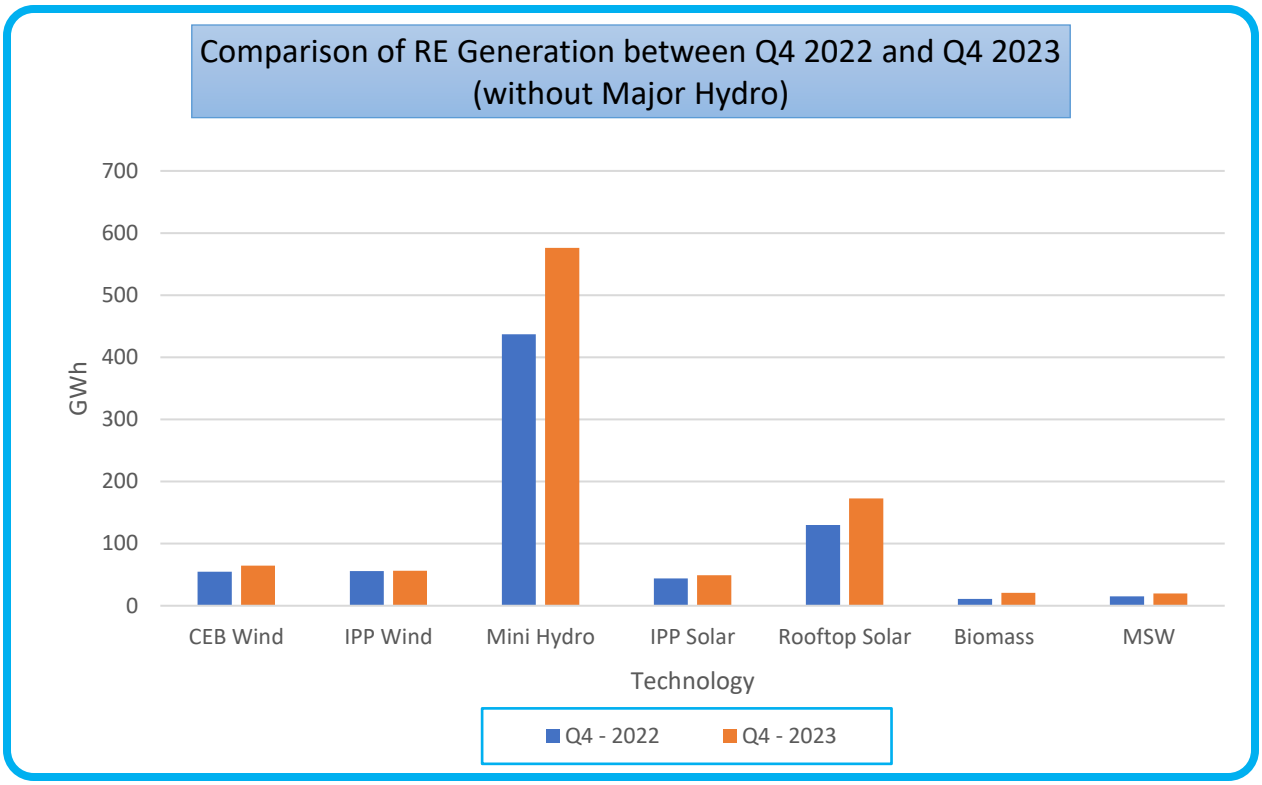

Comparison of RE Generation between Q3 and Q4 2023 (without Major Hydro)
700
600
500
400
300
200
100
0
GWh
IPP Wind
Mini Hydro
IPP Solar
Rooftop Solar
Biomass
MSW
Technology
Q3 - 2023
Q4 - 2023

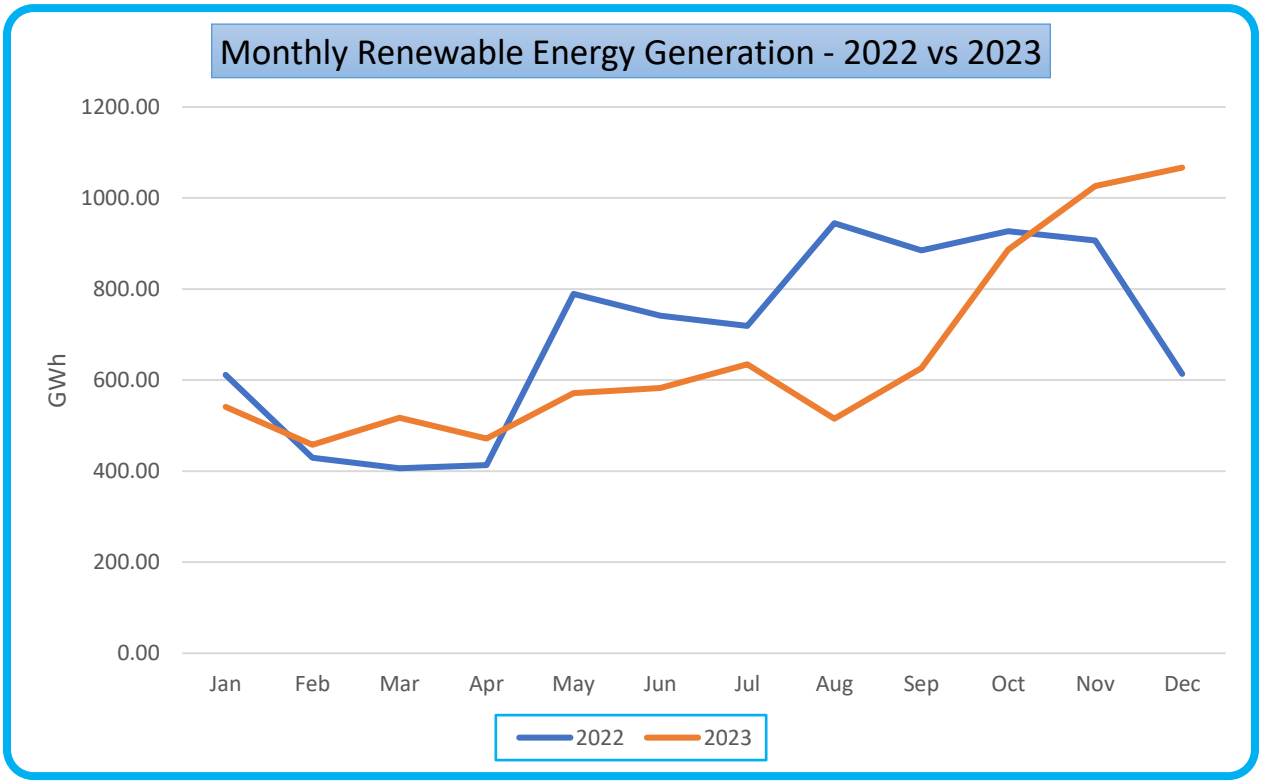
Renewable Generation Comparison

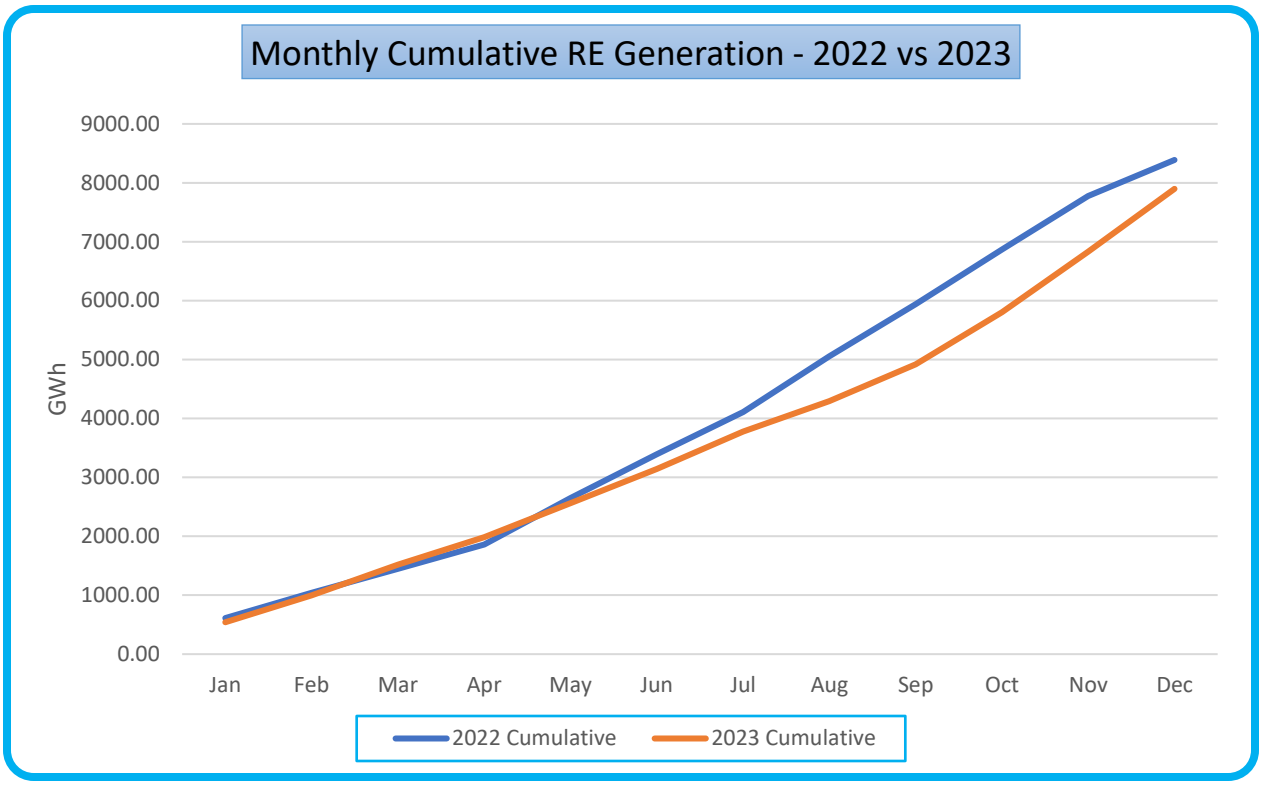
Renewable Generation (GWh) – 4th Quarter 2022 vs 4th Quarter 2023

Technology	Q4 - 2022	Q4 - 2023	Deviation
Major Hydro	1,677	2,021	21%
CEB Wind	55	64	17%
IPP Wind	56	56	0%
Mini Hydro	437	576	32%
IPP Solar	44	49	11%
Rooftop Solar	130	173	33%
Biomass	11	21	87%
MSW	15	20	31%

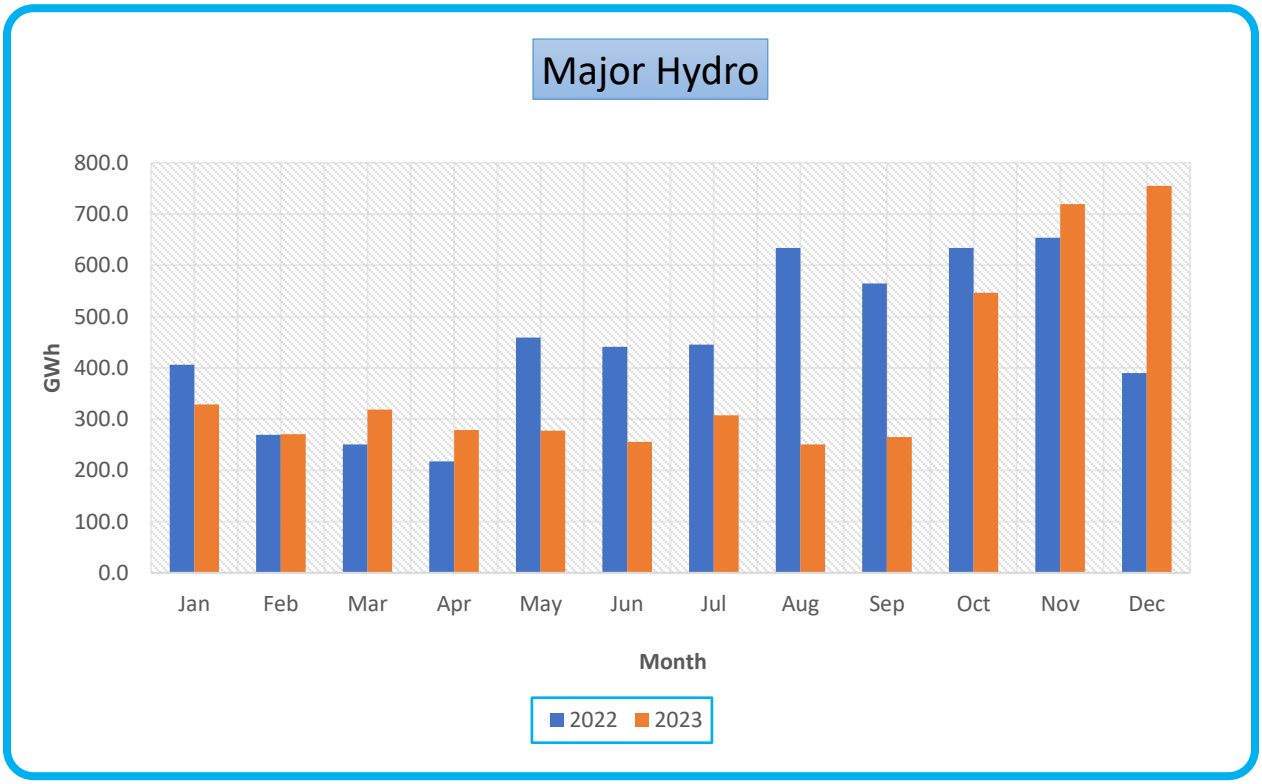


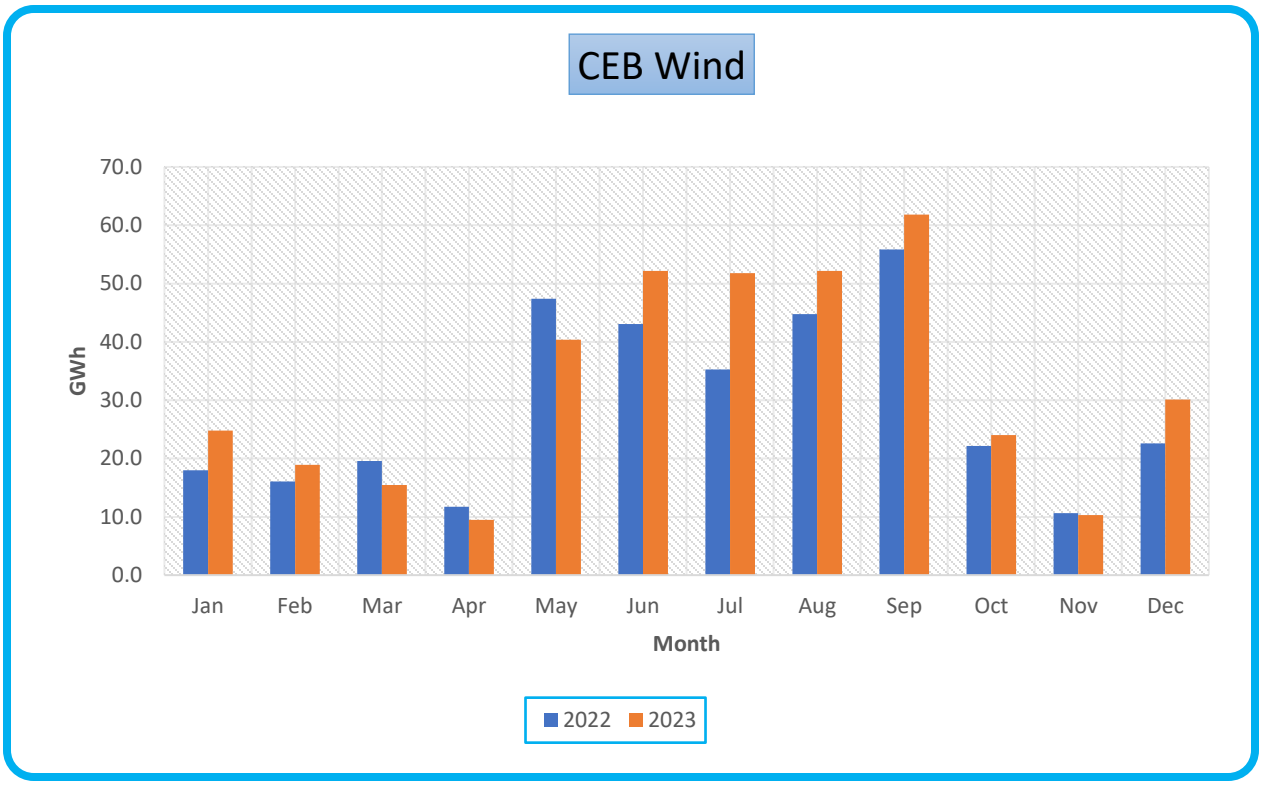

Comparison of RE Generation between Q4 2022 and Q4 2023 (without Major Hydro)
700
600
500
400
300
200
100
0
GWh
CEB Wind
IPP Wind
Mini Hydro
IPP Solar
Rooftop Solar
Biomass
MSW
Technology
Q4 - 2022
Q4 - 2023

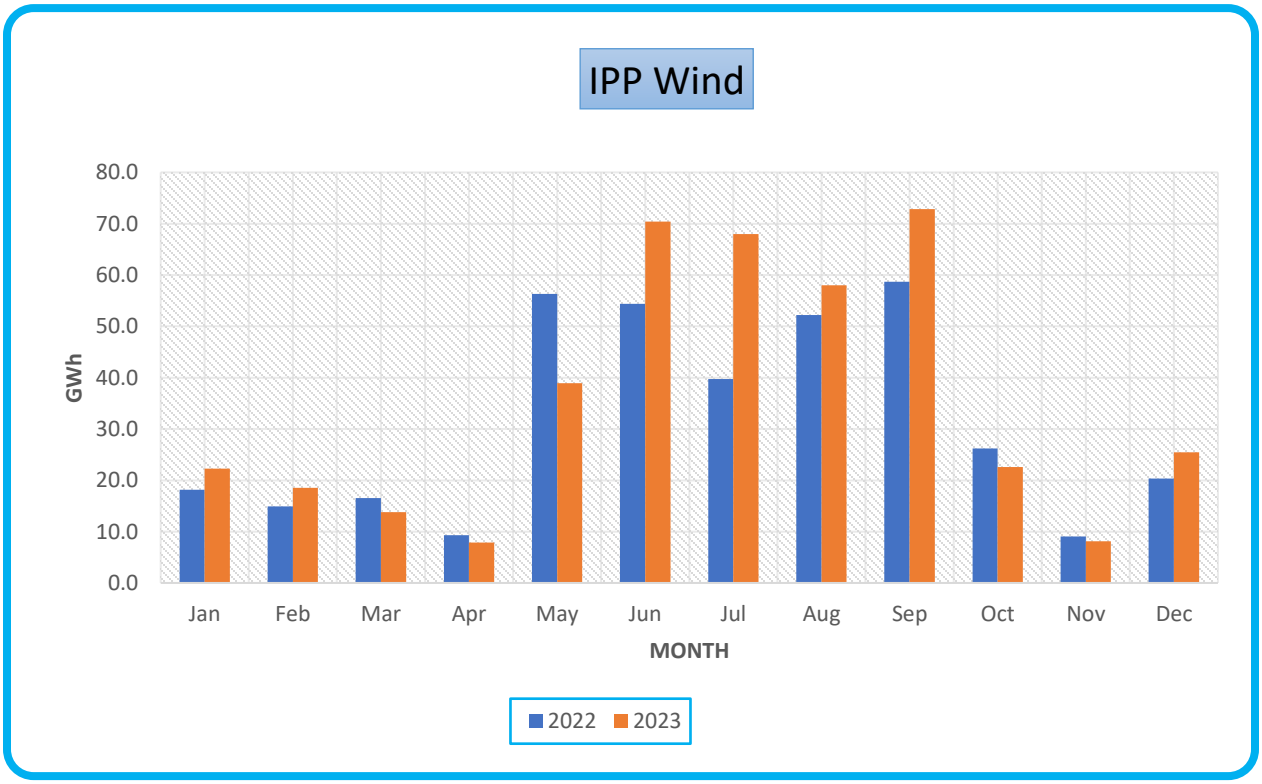

Monthly Renewable Energy Generation - 2022 vs 2023
1200.00
1000.00
800.00
600.00
400.00
200.00
0.00
GWh
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
2022
2023

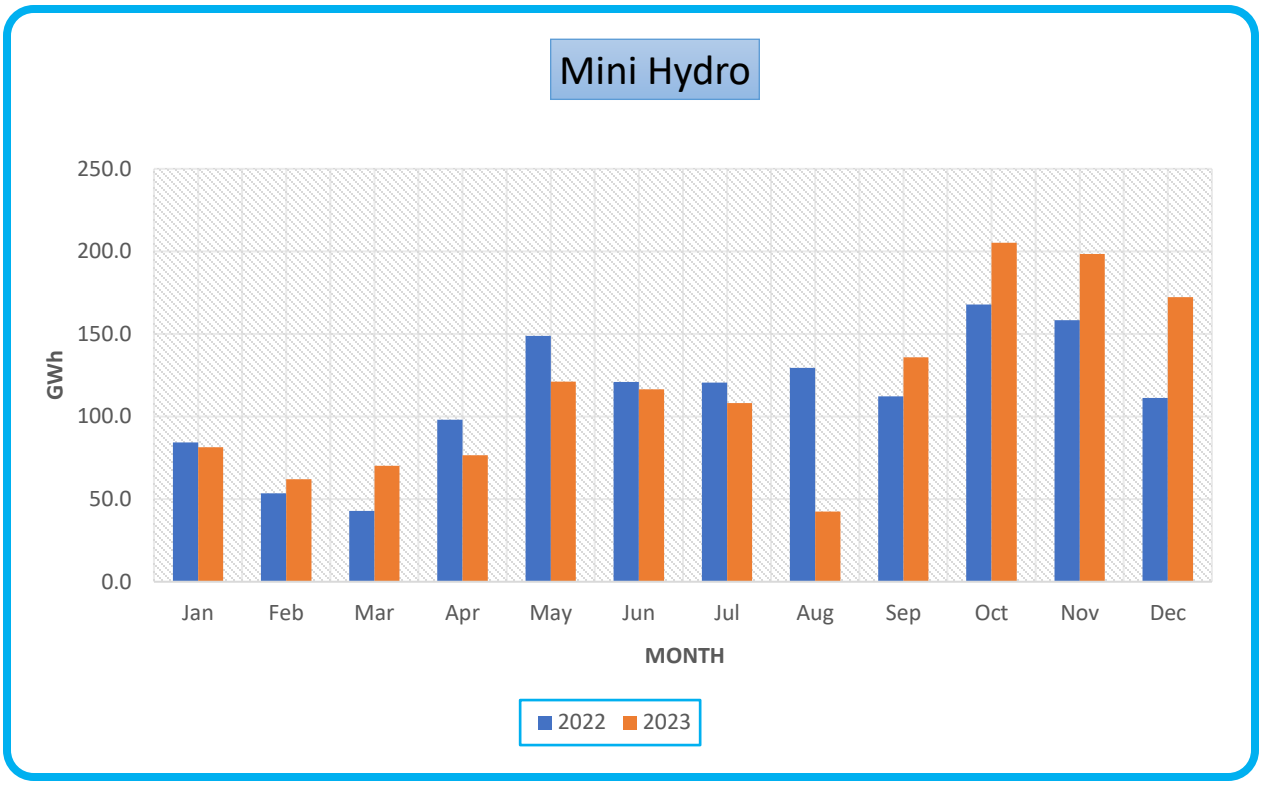


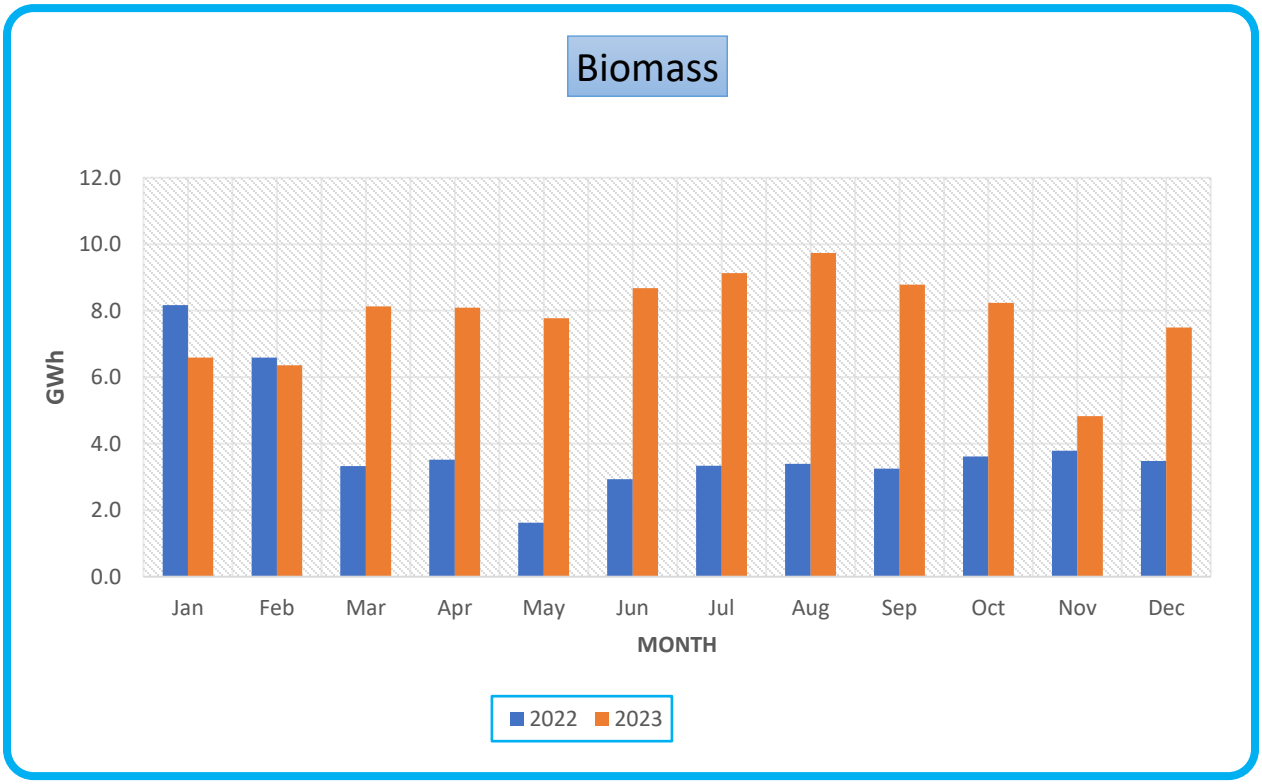
Monthly Variation of RE Generation - 2022 vs 2023 – Technology Wise




CEB Wind
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
GWh
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month
2022
2023


IPP Wind
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
GWh
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
MONTH
2022
2023


Mini Hydro
250.0
200.0
150.0
100.0
50.0
0.0
GWh
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
MONTH
2022
2023


Biomass
12.0
10.0
8.0
6.0
4.0
2.0
0.0
GWh
Jan
Feb
Mar
Apr
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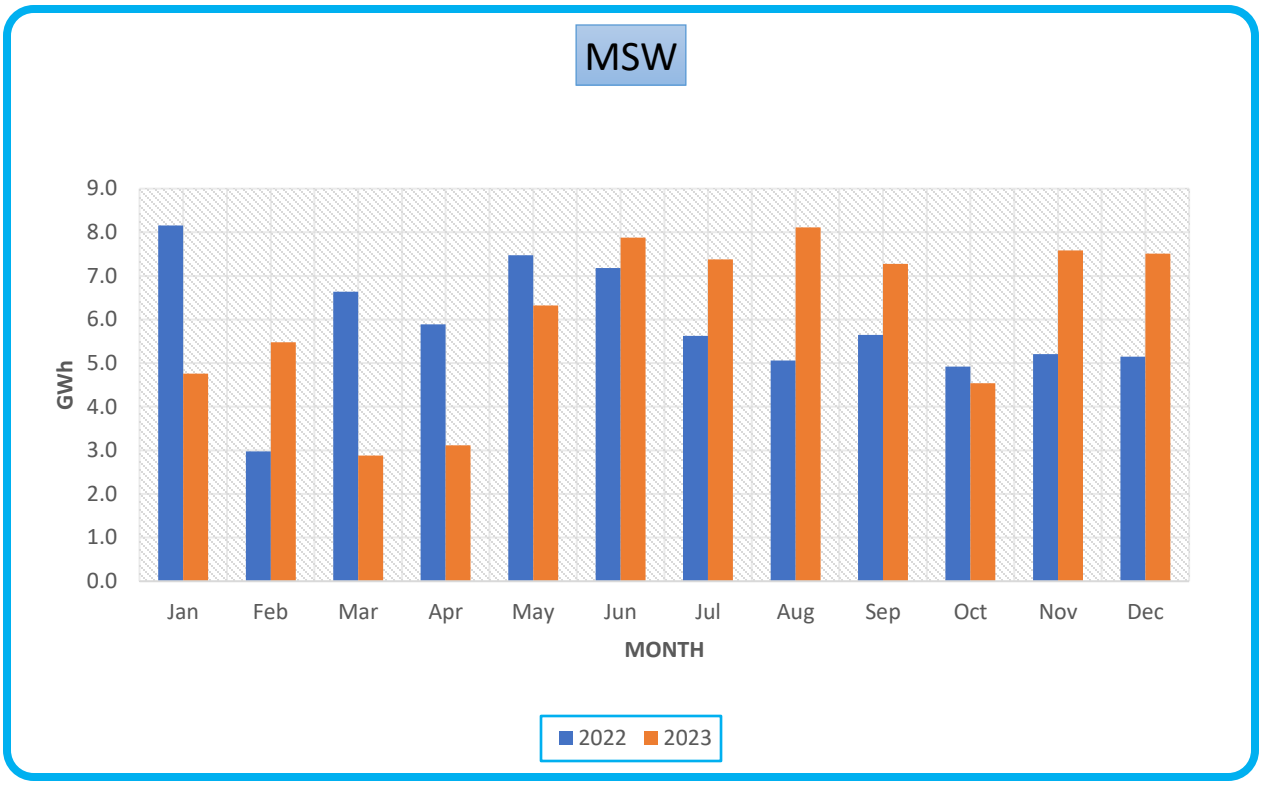
Nov
Dec
MONTH
2022
2023


MSW
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
GWh
Jan
Feb
Mar
Apr
May
Jun
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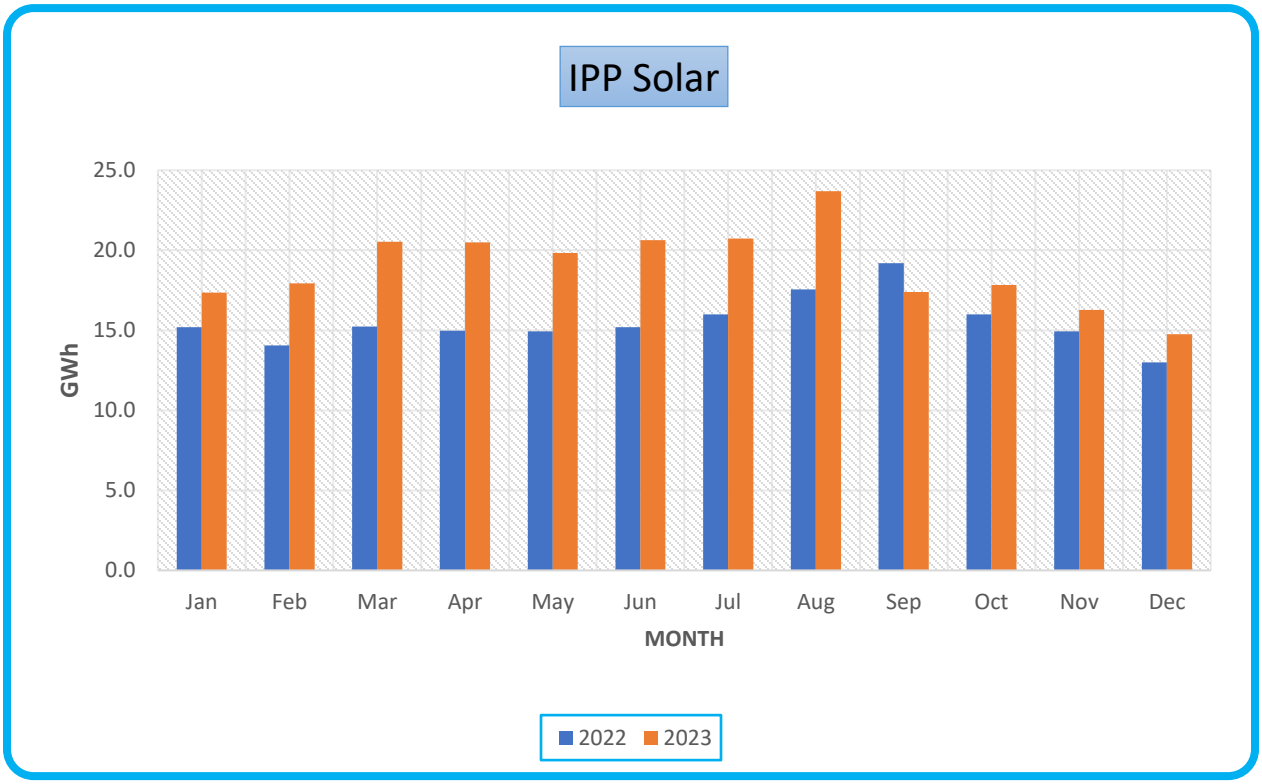
Oct
Nov
Dec
MONTH
2022
2023


IPP Solar
25.0
20.0
15.0
10.0
5.0
0.0
GWh
Jan
Feb
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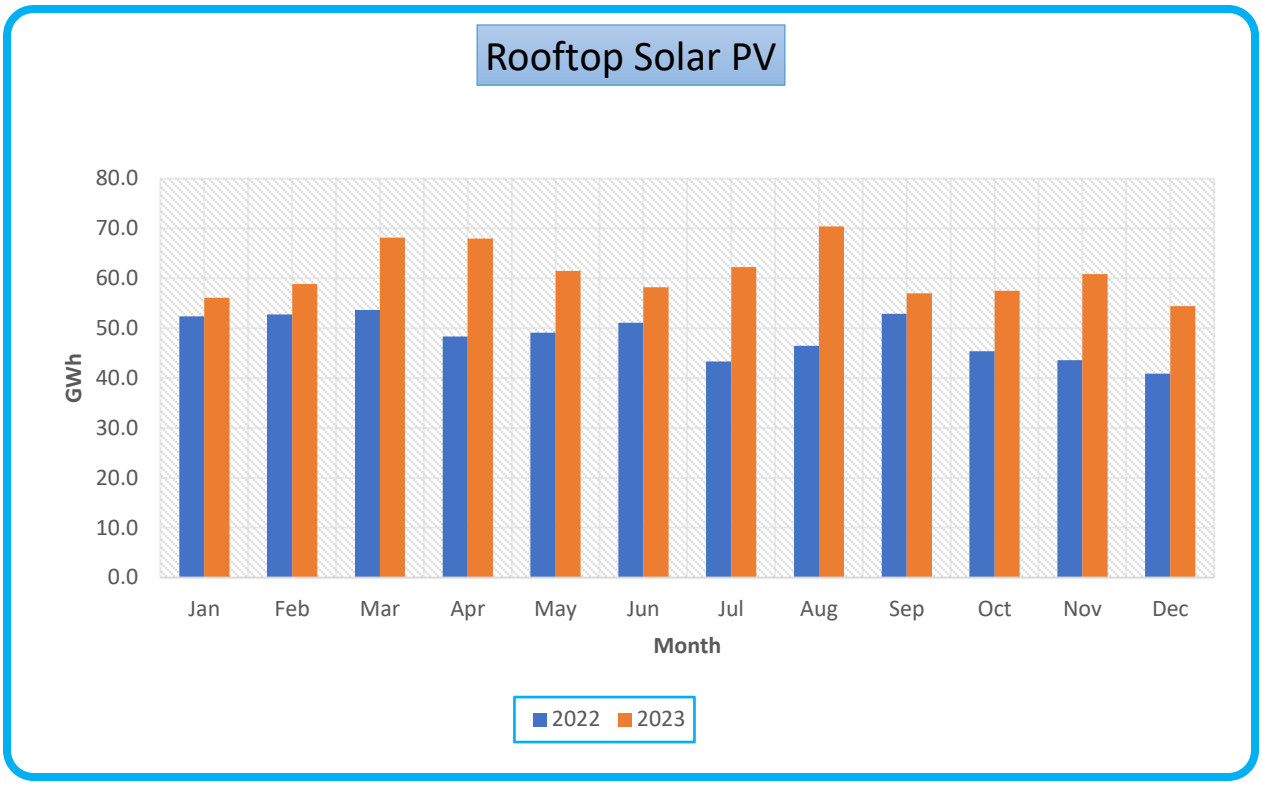
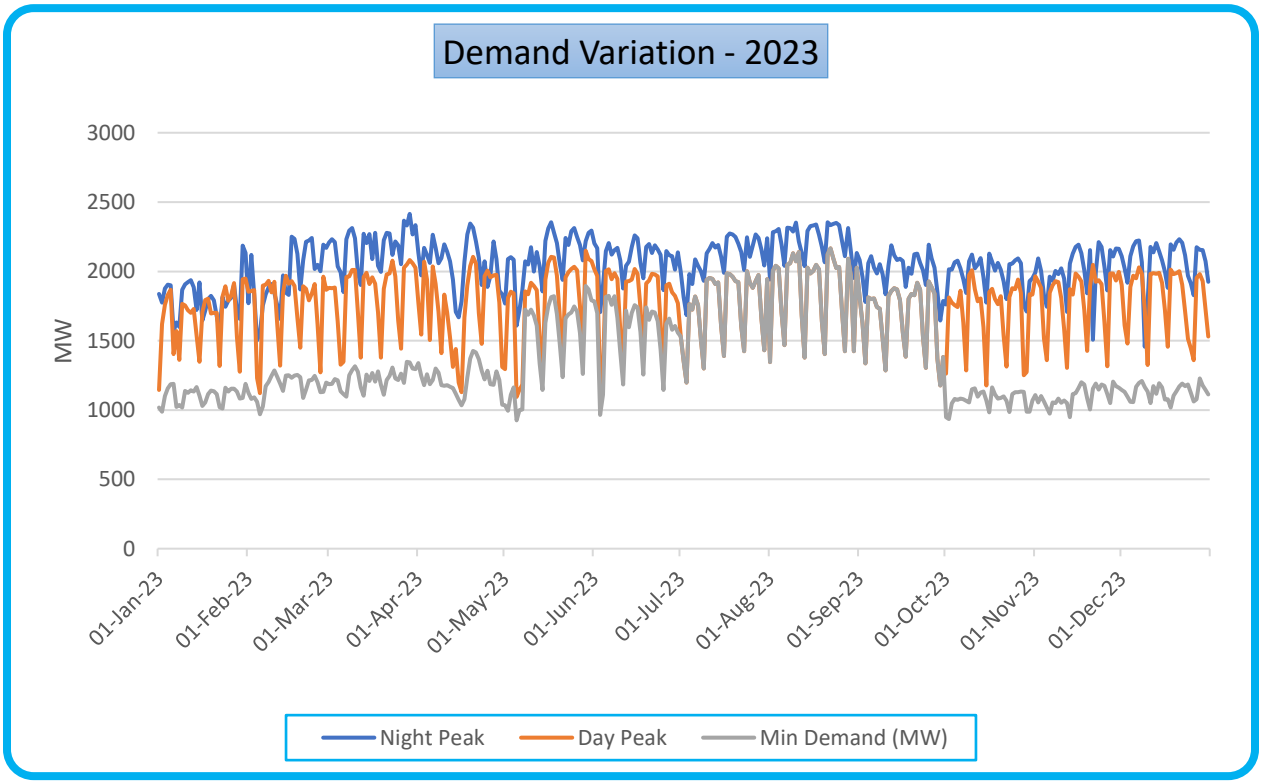
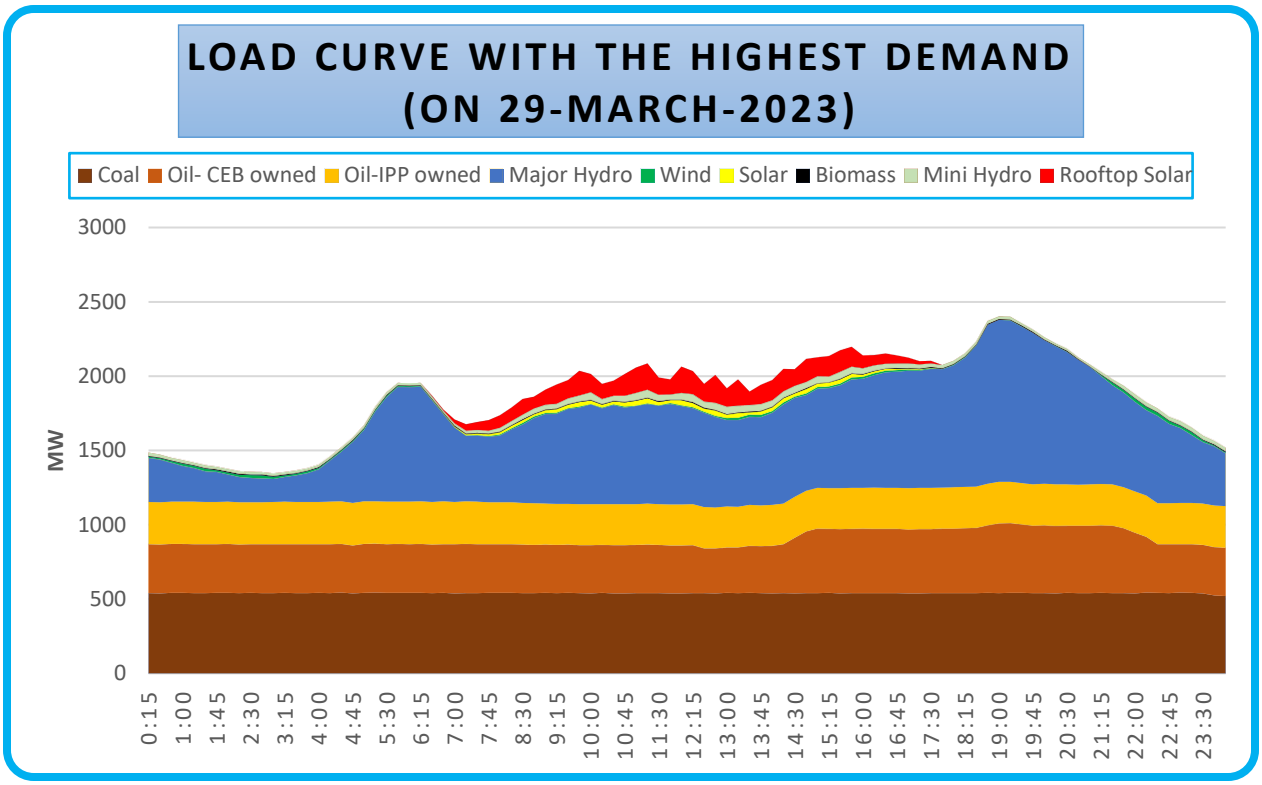
Oct
Nov
Dec
MONTH
2022
2023



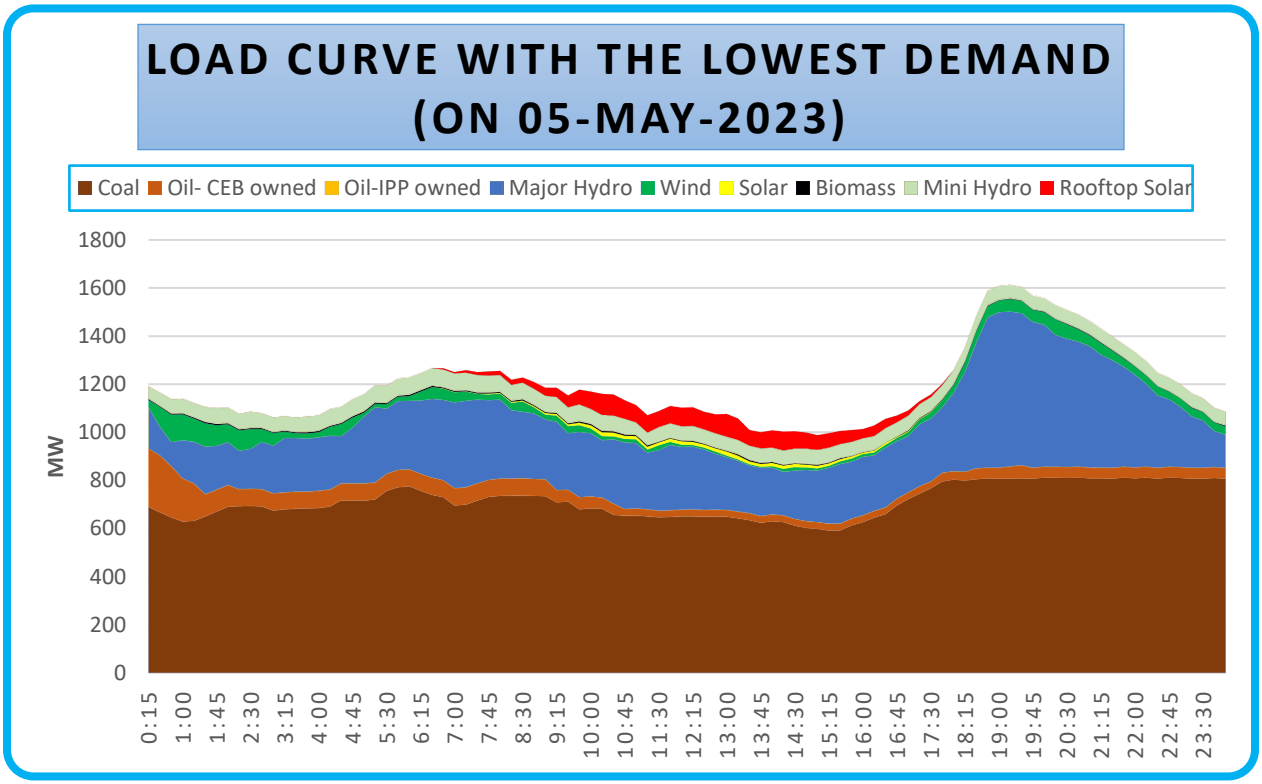
Source: CEB monthly Review Report

Daily Demand Variation

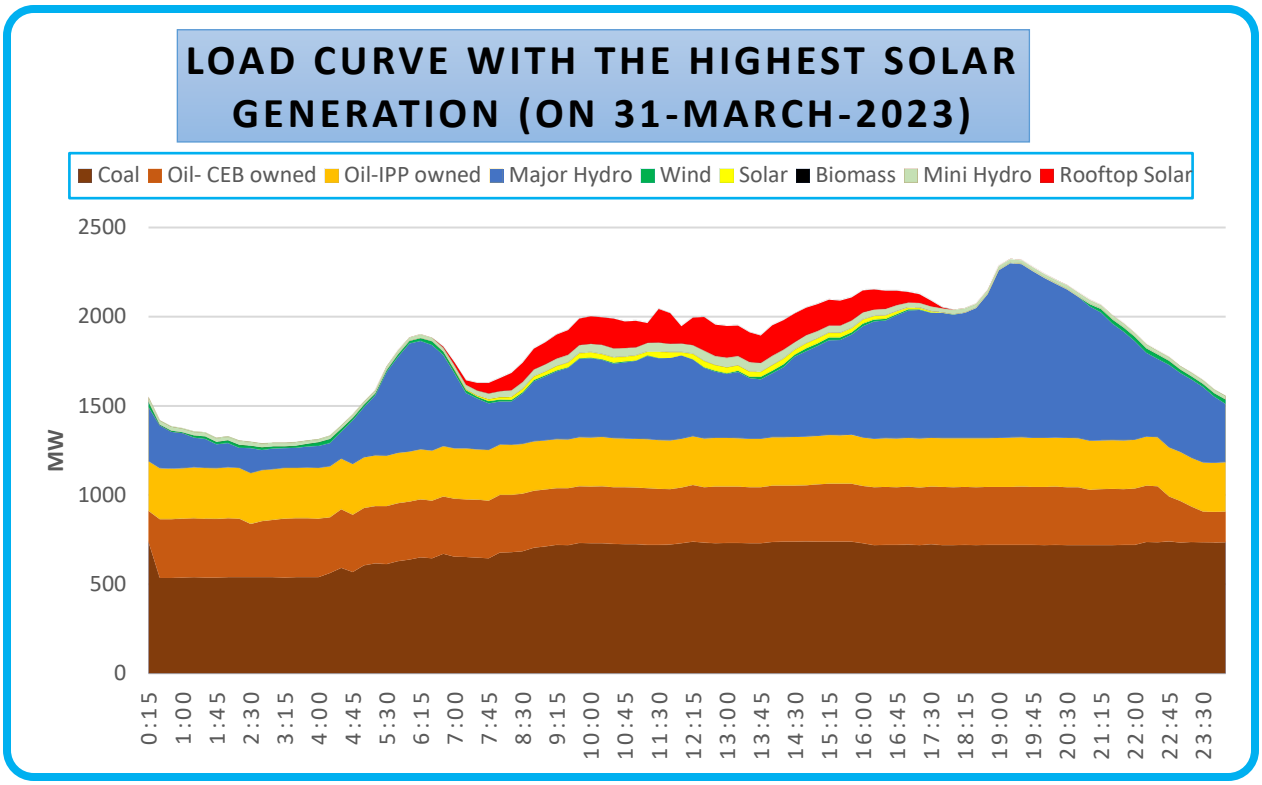




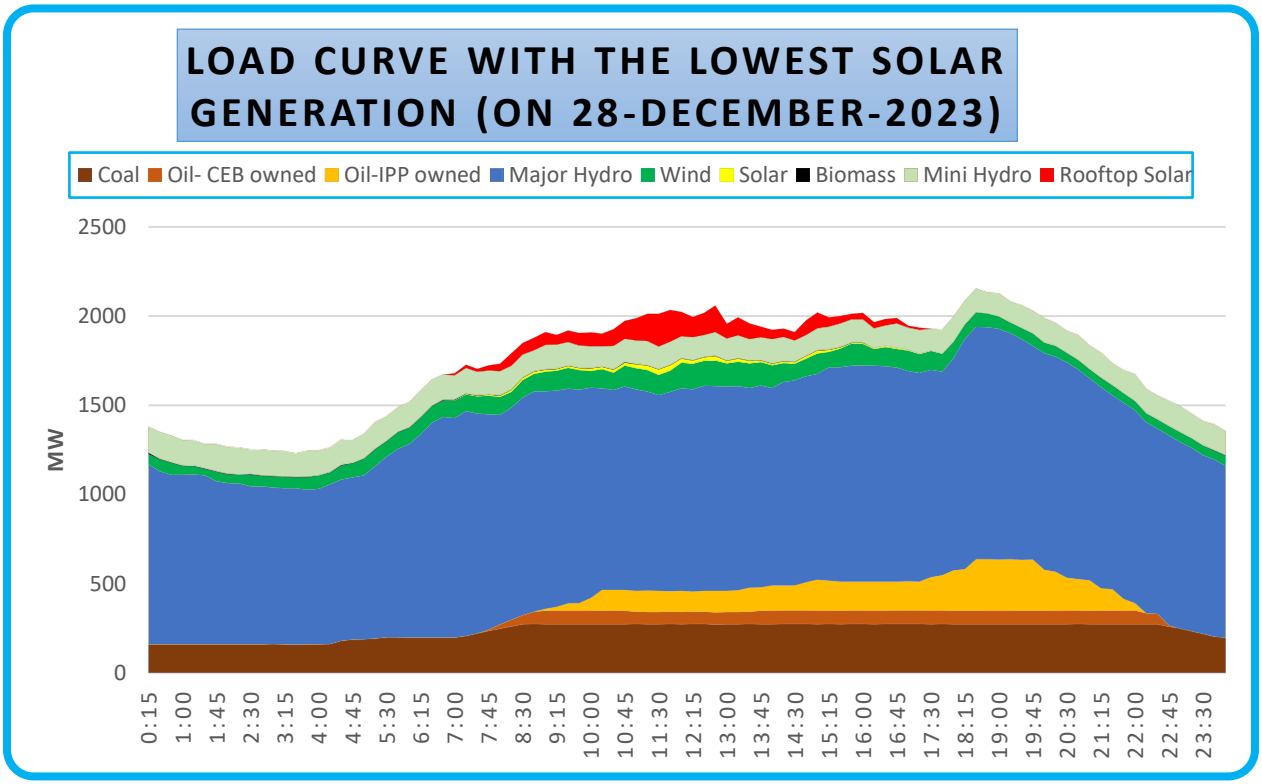
Note: Contribution from Rooftop Solar PV, IPP Solar (1MW), and Non-telemetered Mini Hydro is estimated based on the relevant actual generation and modelled in the generation profile



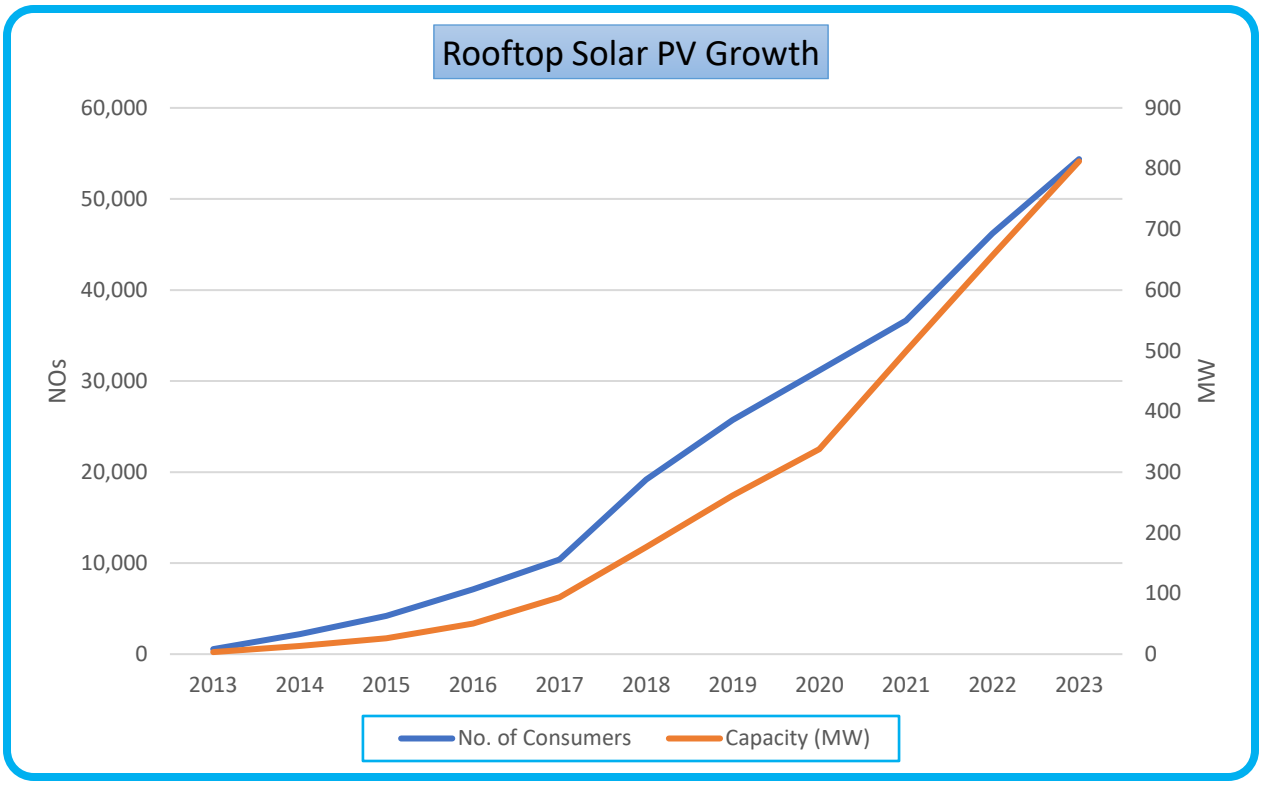
Note: Rooftop Solar PV, IPP Solar (1MW), and Non-telemetered Mini Hydro daily generation for Load Curves are calculated relative to actual monthly generations.



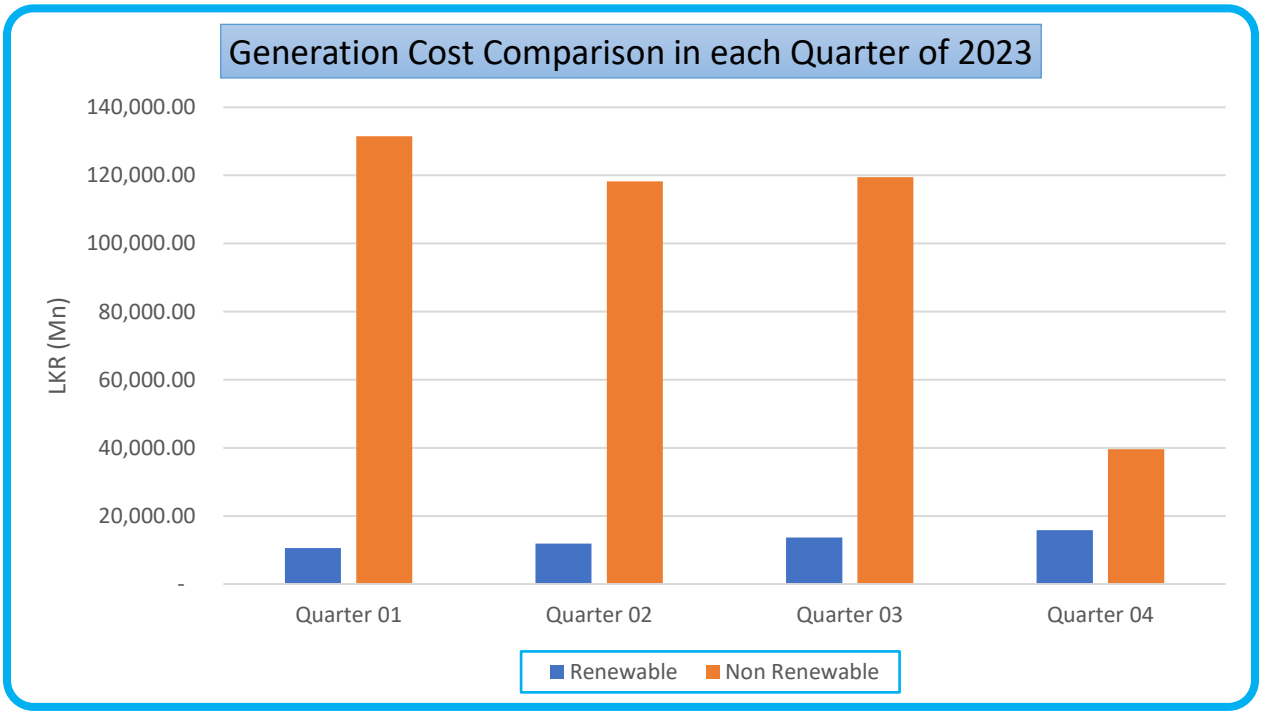
Note: Rooftop Solar PV, IPP Solar (1MW), and Non-telemetered Mini Hydro daily generation for Load Curves are calculated relative to actual monthly generations.

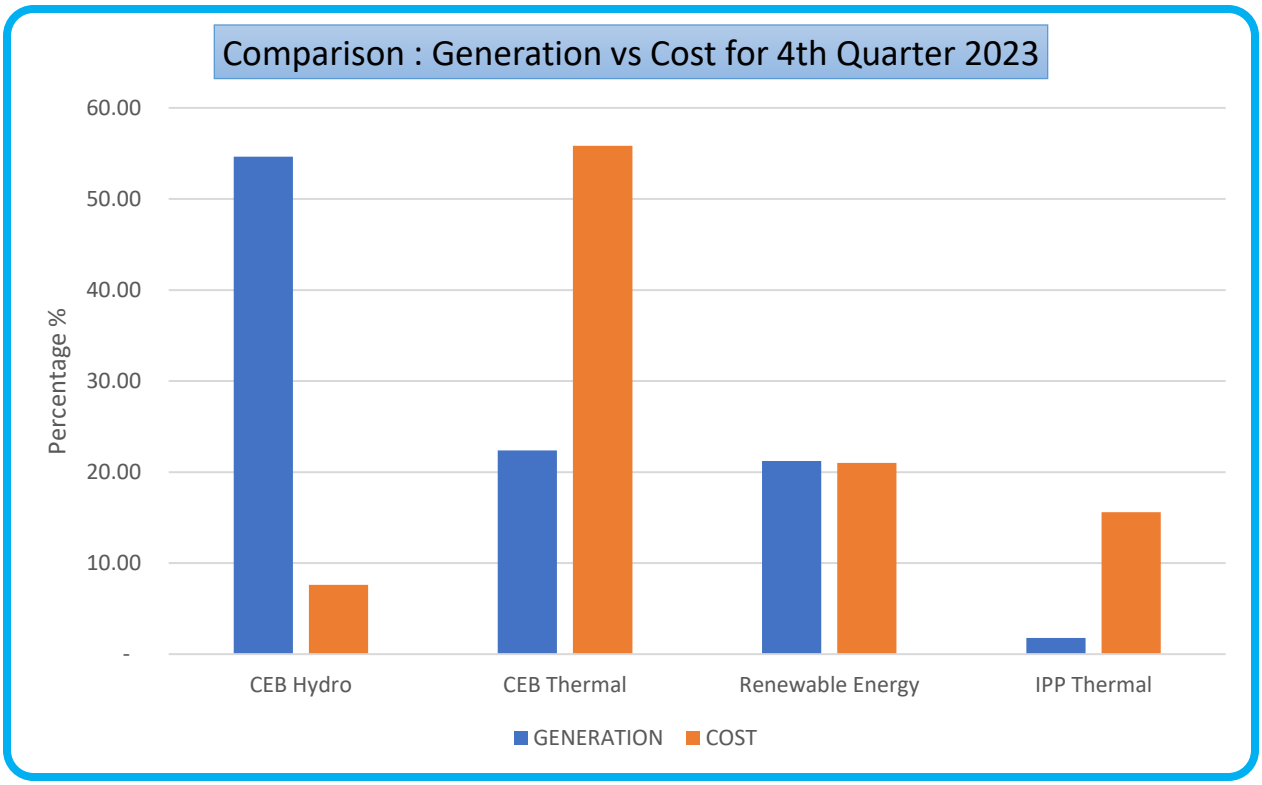


Note: Rooftop Solar PV, IPP Solar (1MW), and Non-telemetered Mini Hydro daily generation for Load Curves are calculated relative to actual monthly generations.



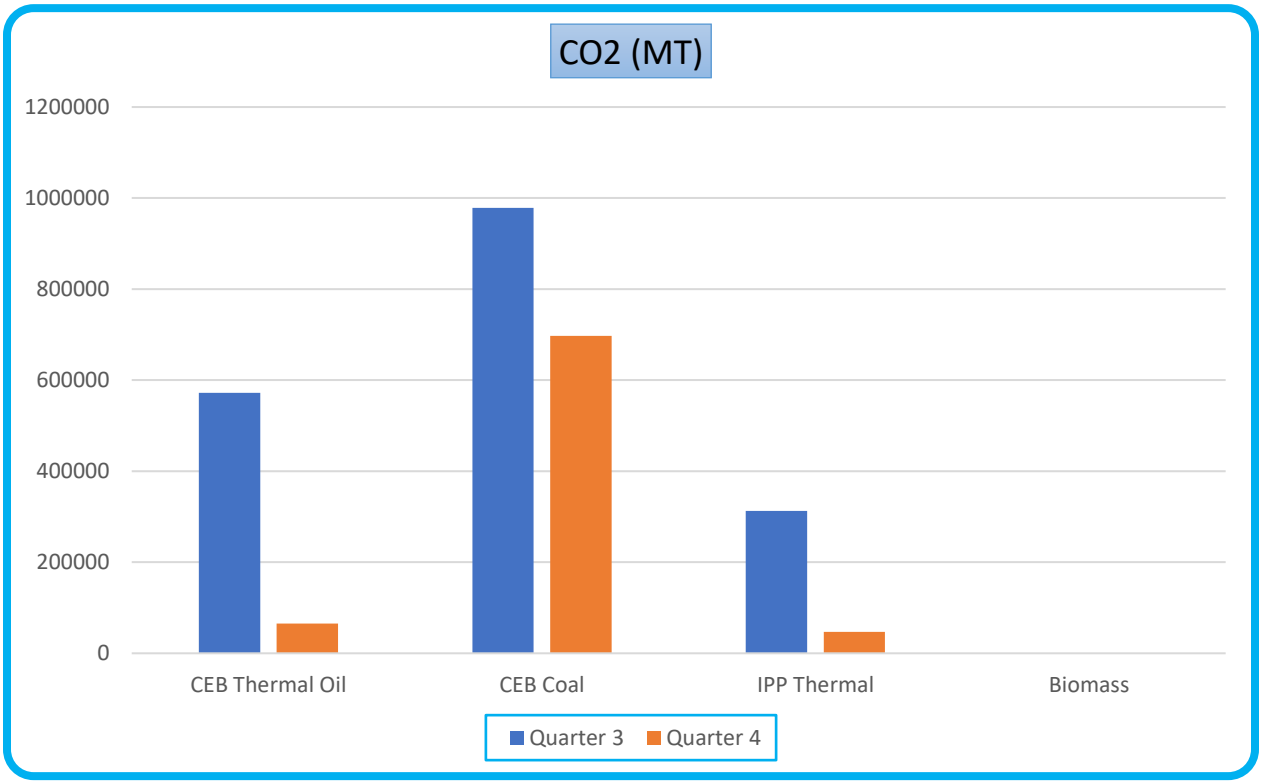
Generation Cost

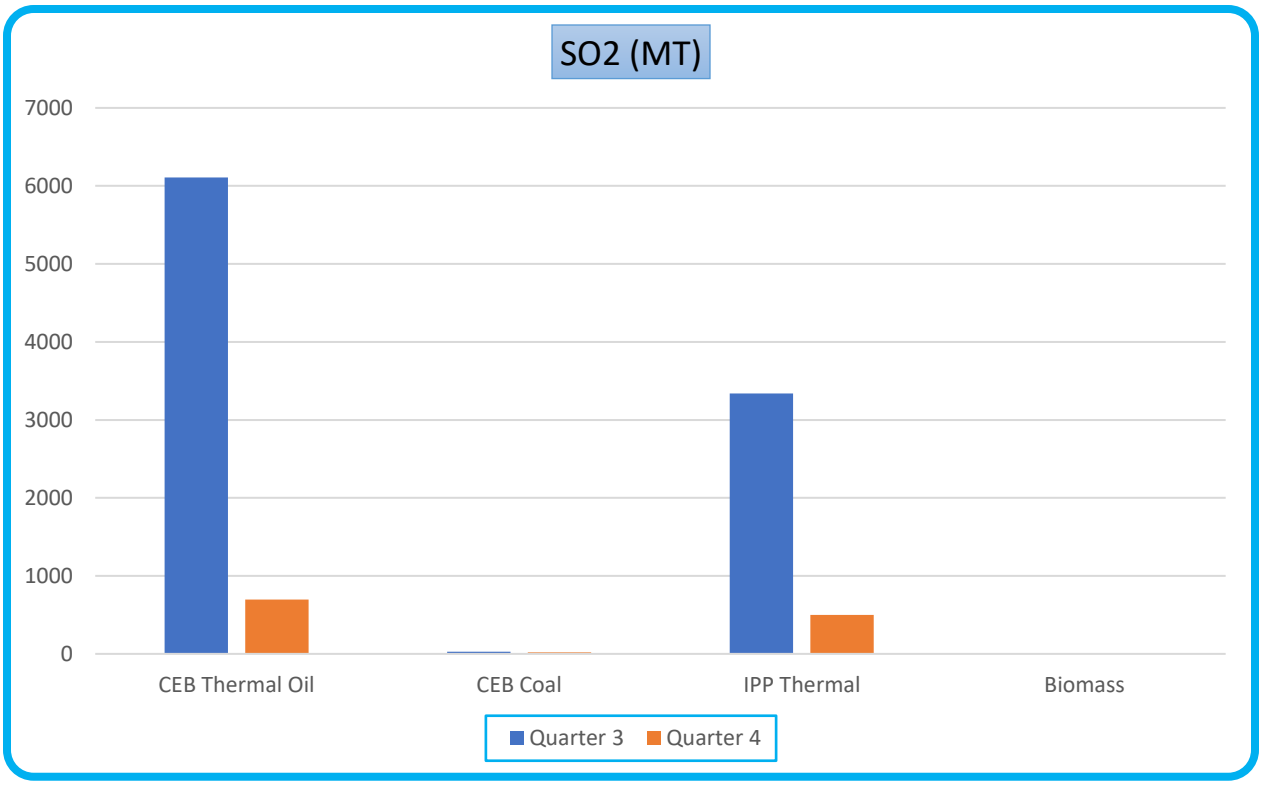


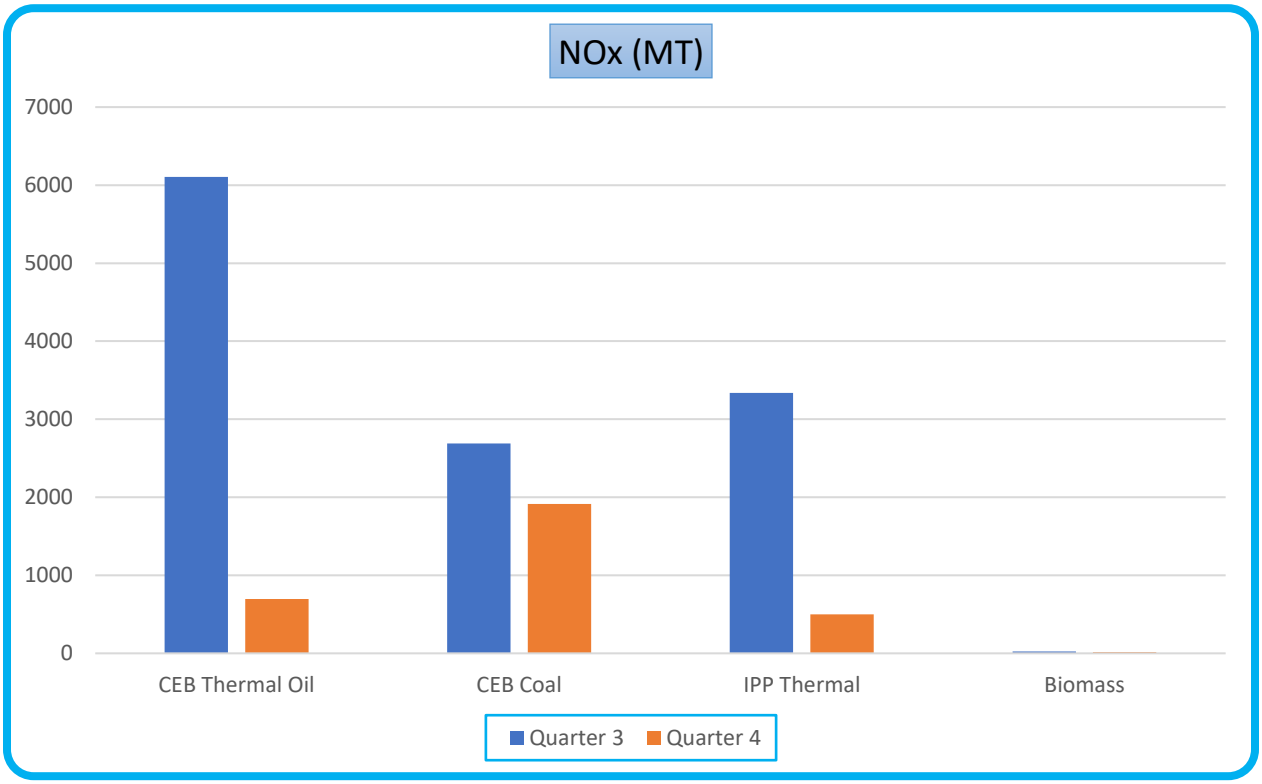


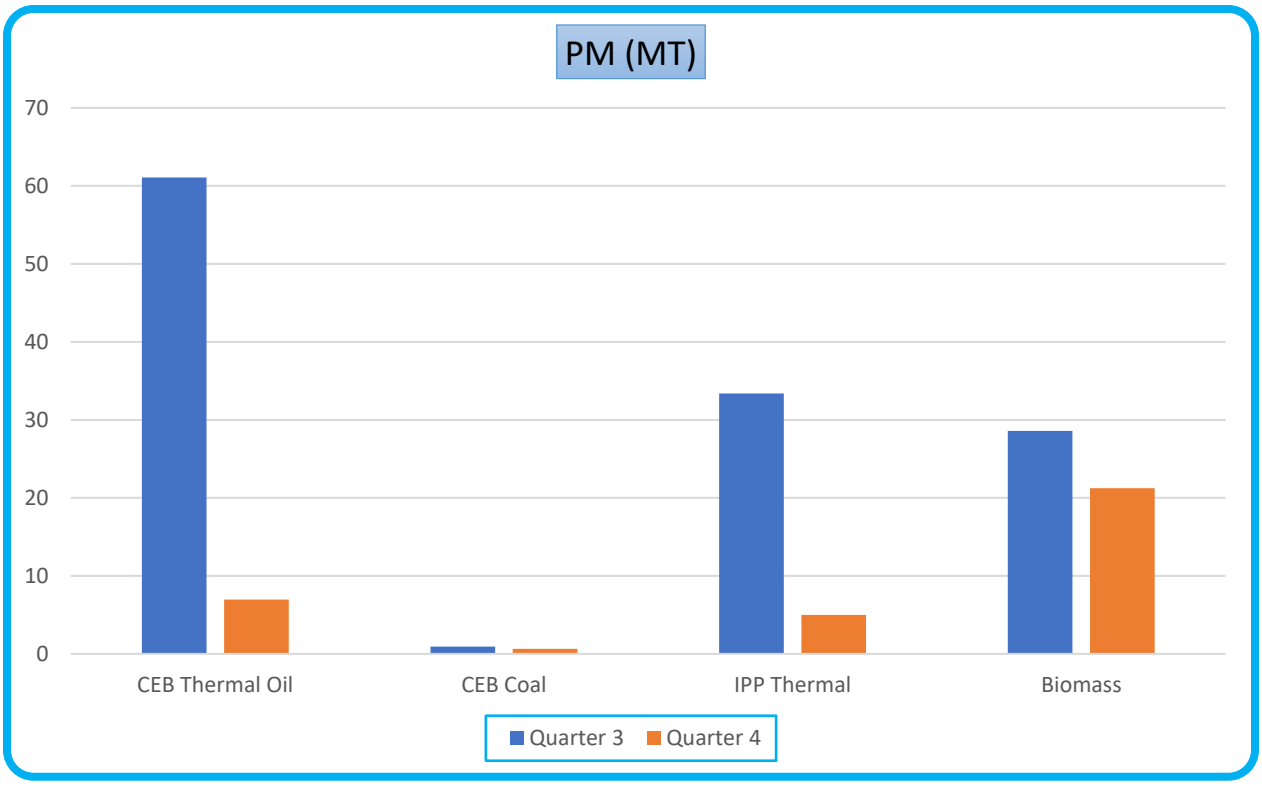
Source: CEB monthly Review Report

Generation Source wise Emission Q3 vs Q4 2023




SO2 (MT)
7000
6000
5000
4000
3000
2000
1000
0
CEB Thermal Oil
CEB Coal
IPP Thermal
Biomass
Quarter 3
Quarter 4


NOx (MT)
7000
6000
5000
4000
3000
2000
1000
0
CEB Thermal Oil
CEB Coal
IPP Thermal
Biomass
Quarter 3
Quarter 4



Source: Estimated base on actual generation

PUCSL Approvals issued for Renewable Generation

RFP Approvals 2023

Technology	Capacity	Proposed Commissioning Year
Wind	350 MW	2026
Solar PV	150 MW	2026

Approvals for Energy Purchasing to TL-2023

Technology	Cumulative Capacity (MW)	No. of Projects
Wind	20	4
Solar PV	196	23

Generation License issued in 2023

Generation License details can be found via the following

Link:**https://www.pucsl.gov.lk/electricity/licensee/list-of-licensees/**

Renewable Generation Power Plants in Sri Lanka

Locations of the Renewable Power plants can be found via the following link.

https://www.pucsl.gov.lk/electricity/quality/environment-and-renewable-energy/

Electricity Dispatch Data Dashboard

Electricity Dispatch Data can be found via the following link.

https://gendata.pucsl.gov.lk/home