

WEM Quarterly Market Review

Q3 2024

Introduction

What is this report and where did all the data come from?

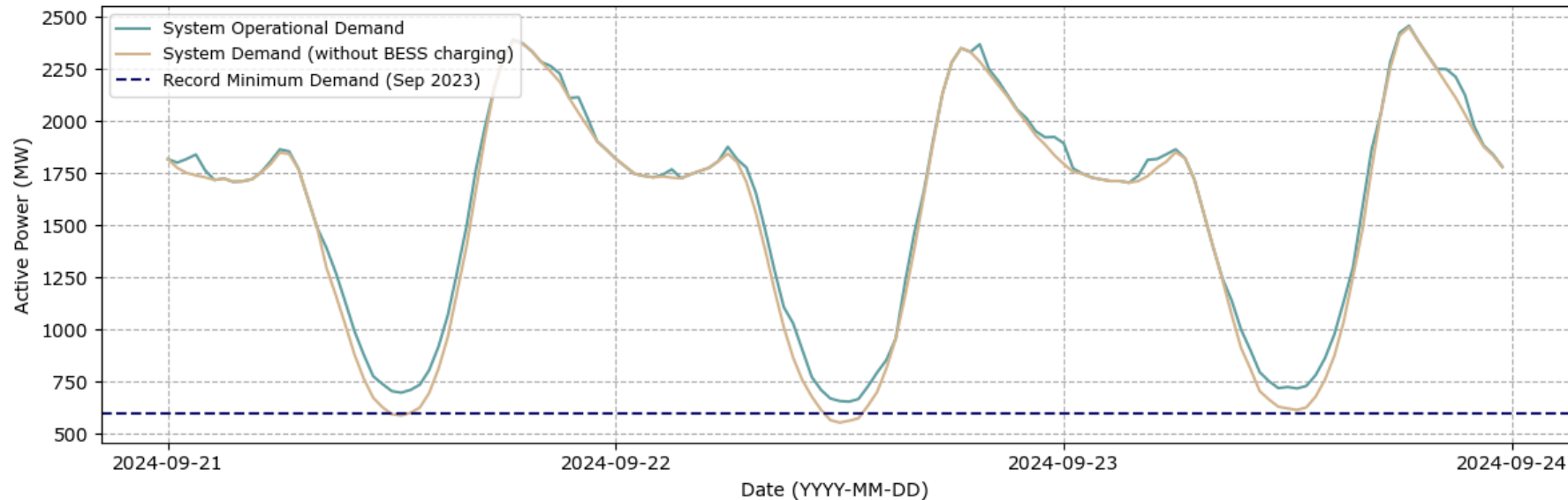
- This report presents an independent review of Wholesale Electricity Market (WEM) outcomes in Q3 2024 from a neutral perspective (*).
- The material in this report is intended to complement the data and insights published by AEMO and other WEM stakeholders.
- Please note that there is no proprietary data used in this report and all the information is derived from the following publicly available data sources:

| Data Source | Link |
|--|---|
| AEMO WA market data | http://data.wa.aemo.com.au/ |
| WEM market fees | https://aemo.com.au/-/media/files/about_aemo/energy_market_budget_and_fees/2023/wa-budget-and-fees-2023-24.pdf?la=en |
| LGC spot prices (Demand Manager) | https://www.demandmanager.com.au/certificate-prices/ |
| Perth daily temperatures (Bureau of Meteorology) | http://www.bom.gov.au/climate/dwo/IDCJDW6111.latest.shtml |

Highlights from Q3 2024

(1) Minimum demand season is back!

- The Spring shoulder season (September to November) has arrived and with it, daytime system minimum demands are already threatening to break records.
- The record minimum demand of 595 MW was set in September 2023. This September, the record would have been broken had it not been for Kwinana BESS at near full charge during the middle of the day.
- On consecutive days from Saturday 21/09 to Sunday 22/09, the minimum demand record would have been broken were it not for BESS charging:

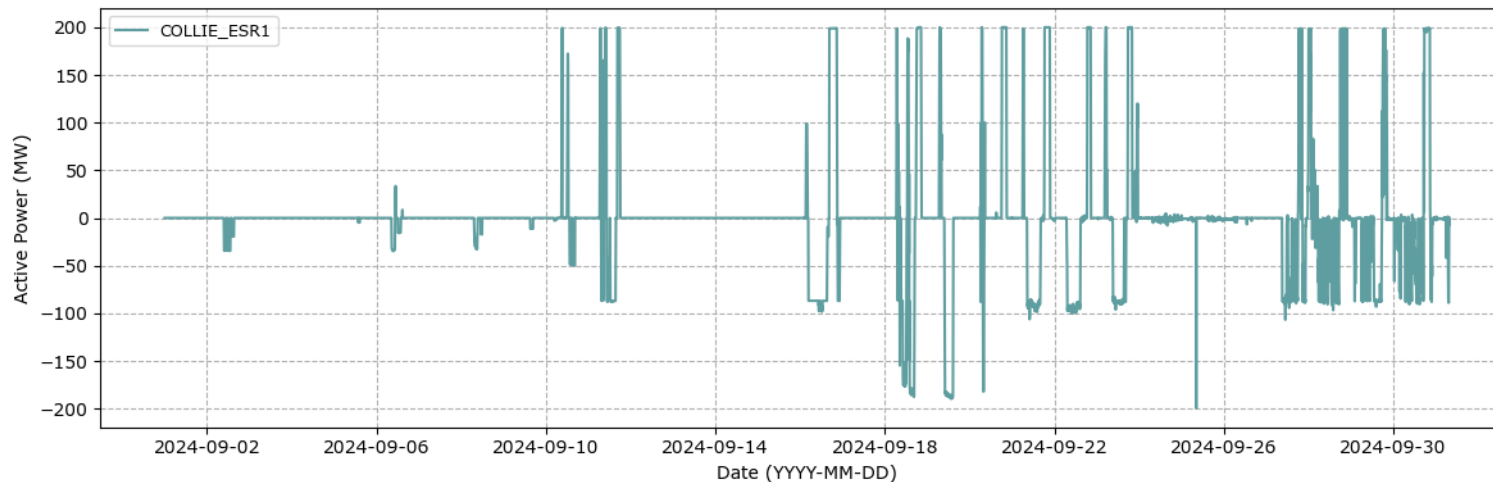
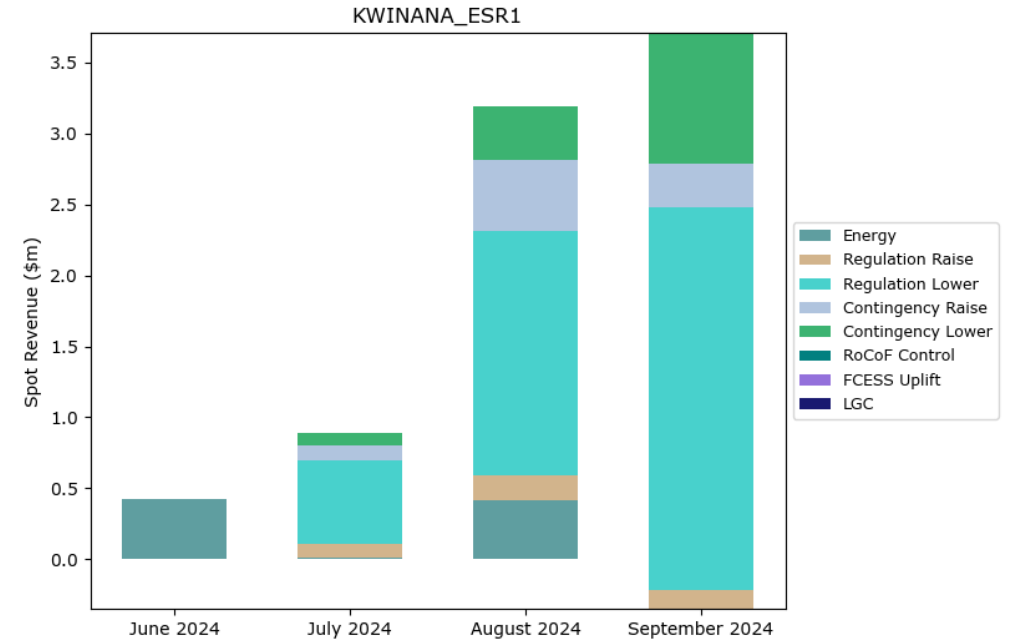


- Now with >1.3 GW of new BESS facilities currently under construction or being commissioned, will we ever see minimum demand records again in future Spring shoulder seasons?

Highlights from Q3 2024

(2) Kwinana BESS 1 is accredited for FCESS and new BESS facilities coming online

- **Kwinana BESS 1** (KWINANA_ESR1) was accredited for Contingency and Regulation FCESS in July 2024 and is now making most of its real-time market revenue from providing FCESS.
- **Kwinana BESS 2** (KWINANA_ESR2) has now been registered in the market, with commissioning expected towards the end of 2024.
- **Collie Battery Stage 1** (COLLIE_ESR1) has started its commissioning tests and can be seen to be charging and discharging its full registered capacity (200 MW) in September.



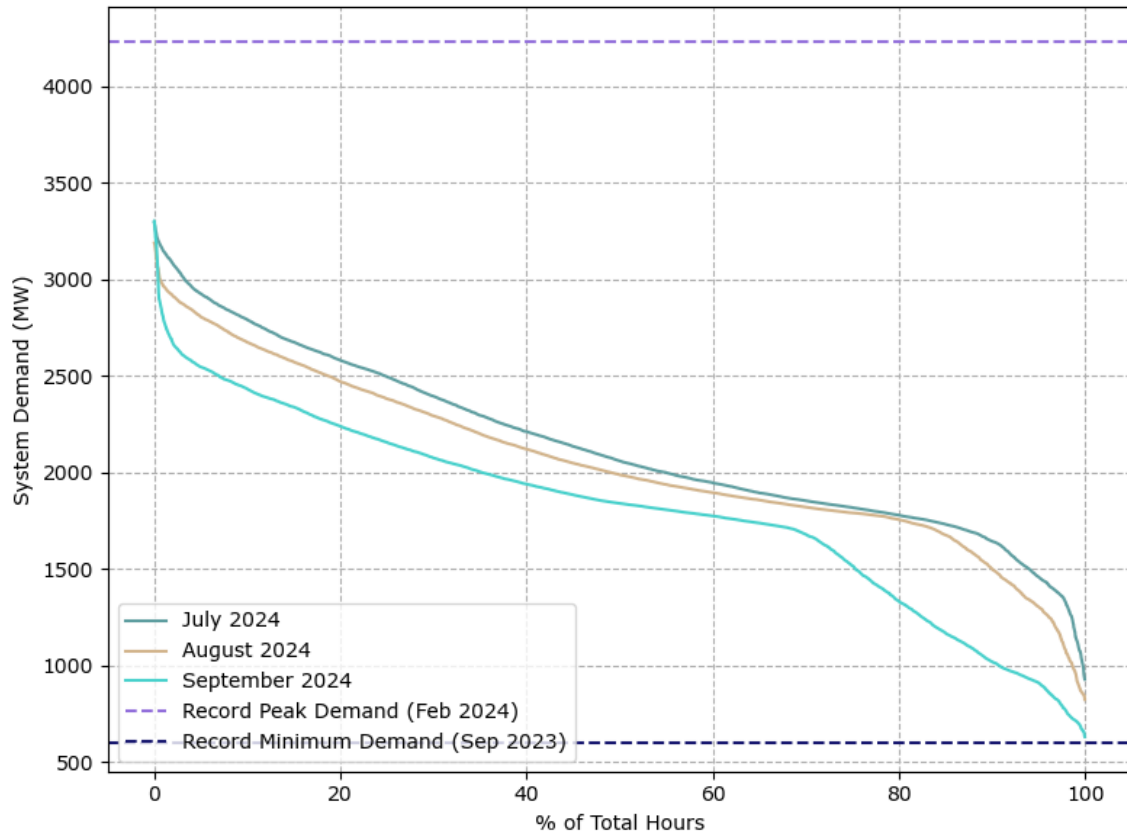
.01 System

Aggregate system level outcomes

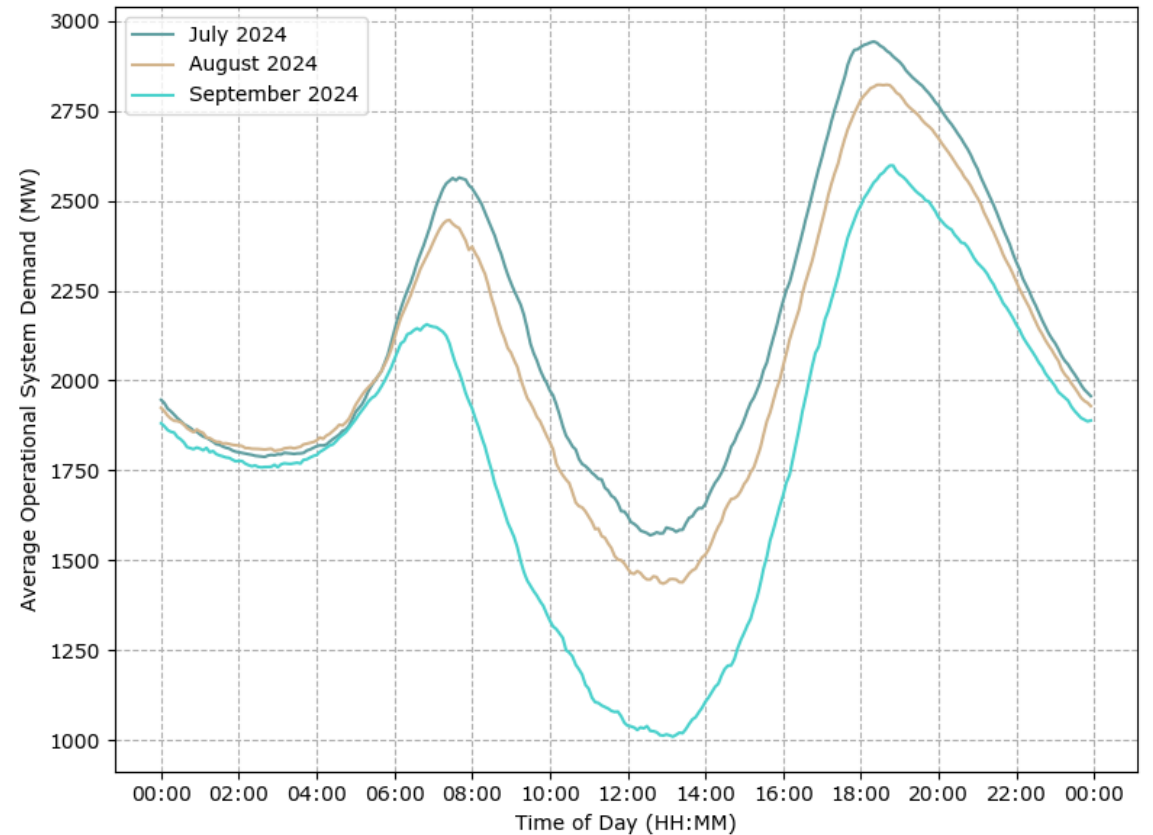
System Operational Demand

System operational demand duration curves and time-of-day averages

Demand Duration Curves



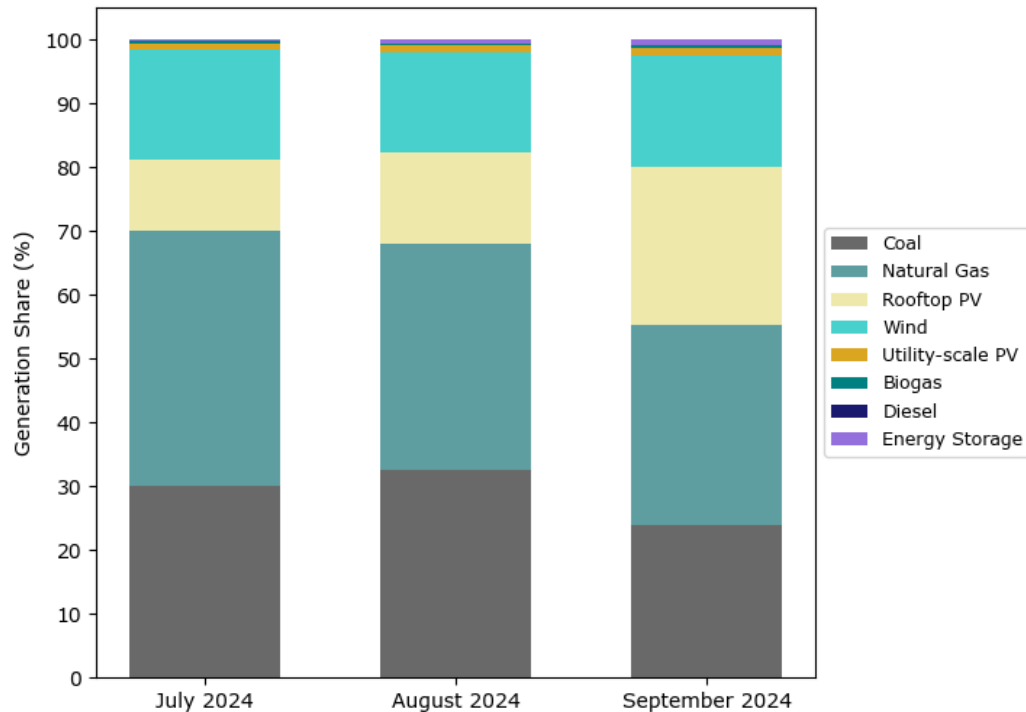
Average Time-of-Day Demand



Generation Mix

Categorised by fuel / technology type

Q3 2024 Generation Mix



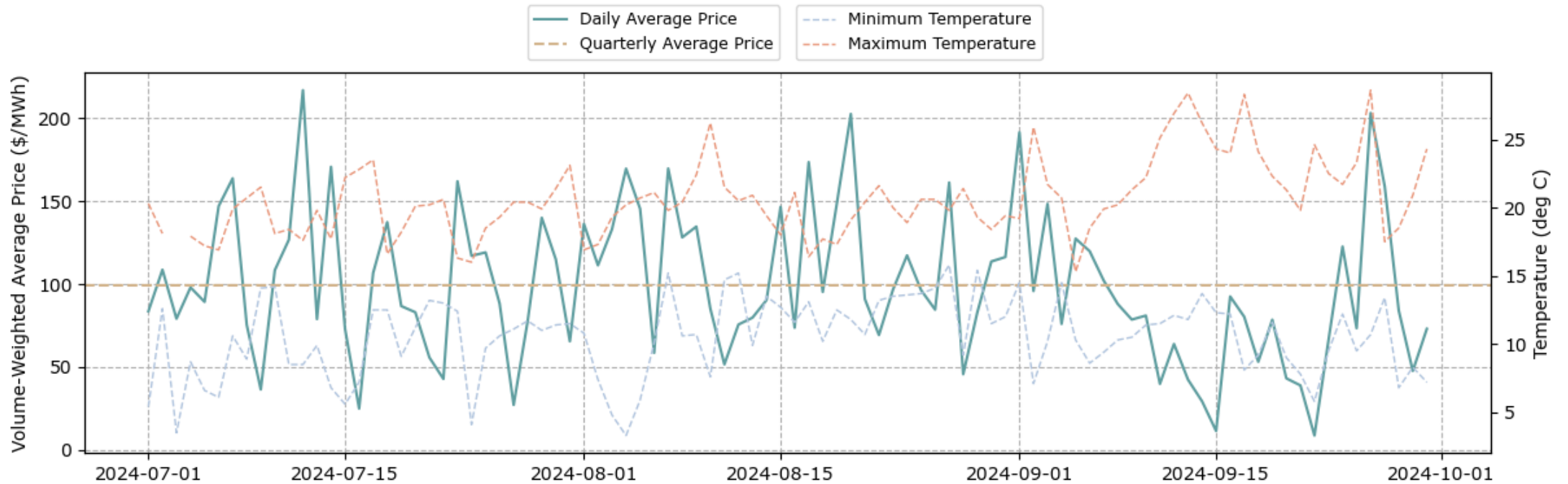
Generation Mix Breakdown

| Category | Jul 2024 | Aug 2024 | Sep 2024 |
|--------------|------------------|------------------|------------------|
| Coal | 539 GWh (30.1%) | 579 GWh (32.5%) | 411 GWh (23.8%) |
| Natural Gas | 715 GWh (40%) | 632 GWh (35.5%) | 541 GWh (31.3%) |
| Rooftop PV | 199 GWh (11.1%) | 258 GWh (14.4%) | 430 GWh (24.9%) |
| Wind | 310 GWh (17.3%) | 278 GWh (15.6%) | 302 GWh (17.5%) |
| Utility PV | 17 GWh (0.9%) | 19 GWh (1.1%) | 20 GWh (1.2%) |
| Biogas | 5 GWh (0.3%) | 5 GWh (0.3%) | 6 GWh (0.3%) |
| Diesel | 2 GWh (0.1%) | 2 GWh (0.1%) | 1 GWh (0.1%) |
| Storage (*) | 3 GWh (0.2%) | 11 GWh (0.6%) | 16 GWh (0.9%) |
| TOTAL | 1,790 GWh | 1,784 GWh | 1,727 GWh |

(*) Energy storage is only counted when discharging.

Energy Prices

Daily volume-weighted energy prices and daily min/max Perth temperatures (*)

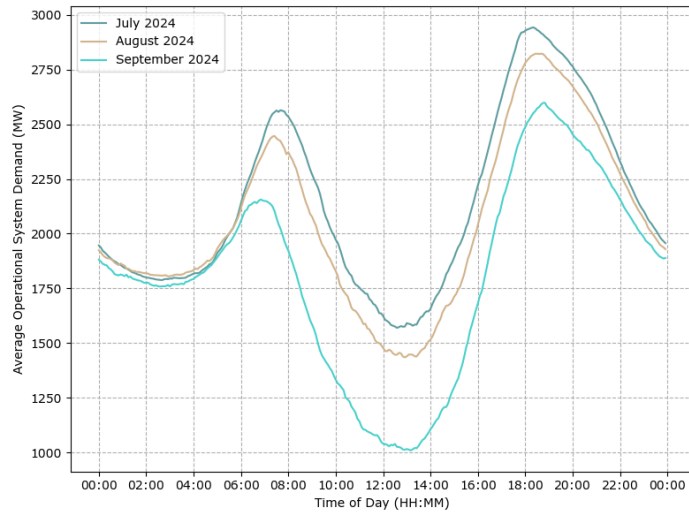
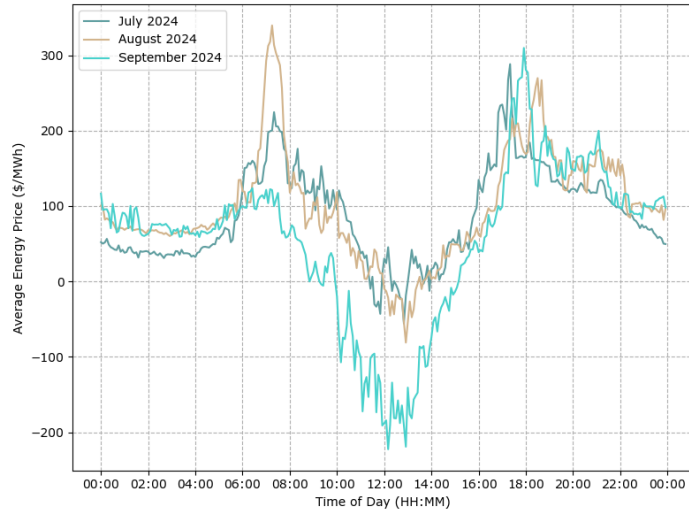


(*) Daily temperatures are based on BOM observations at the [Perth Metro site](#).

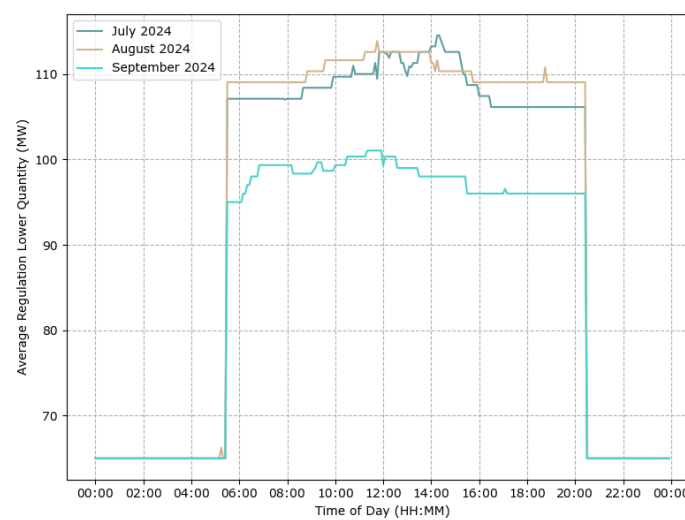
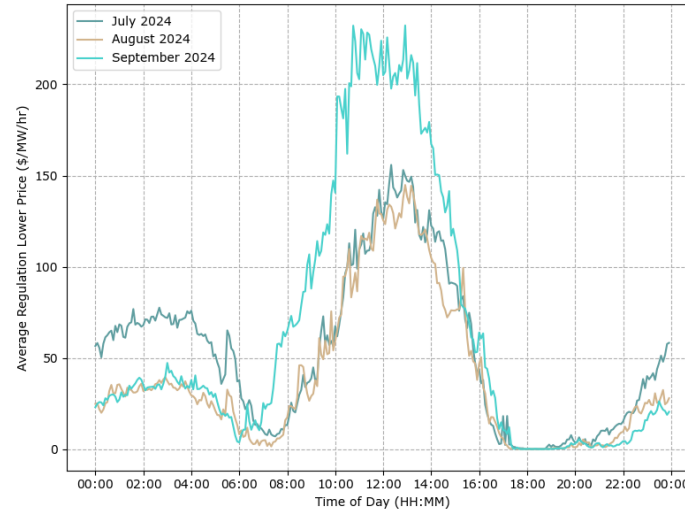
Average time-of-day clearing prices and quantities (1)

Energy, Regulation Lower and Regulation Raise ESS

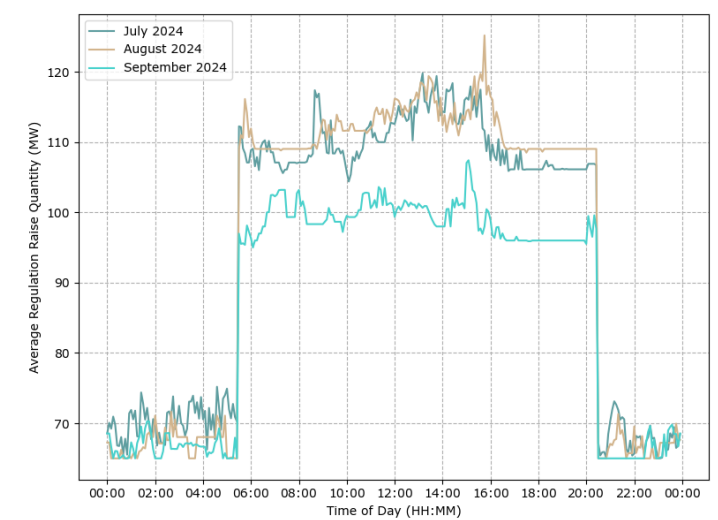
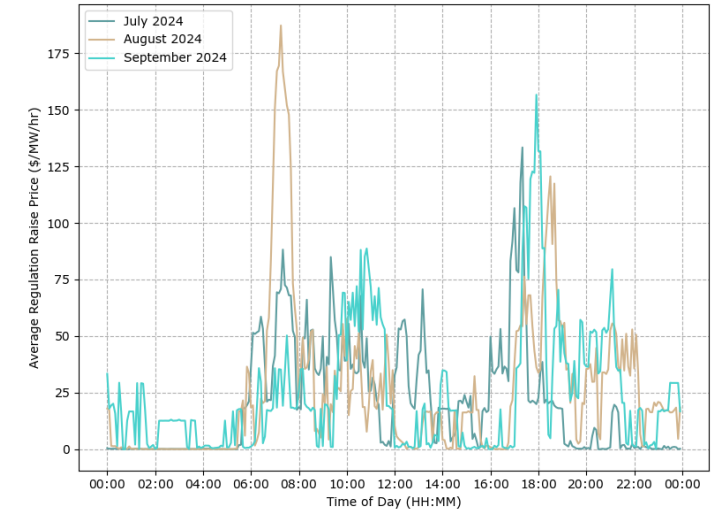
Energy



Regulation Lower (*)



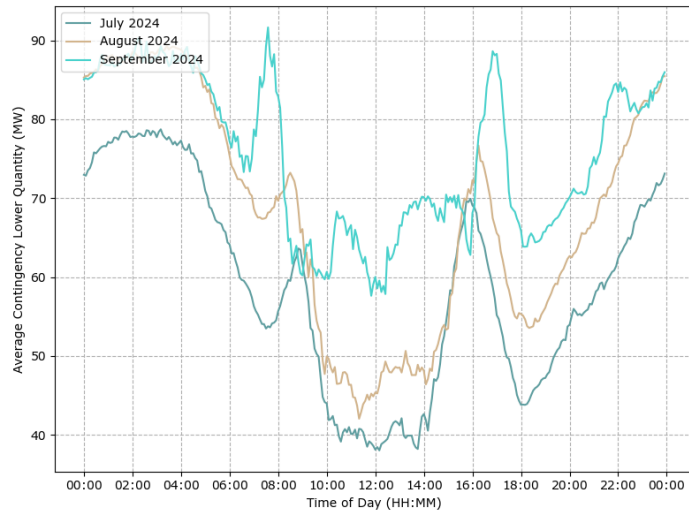
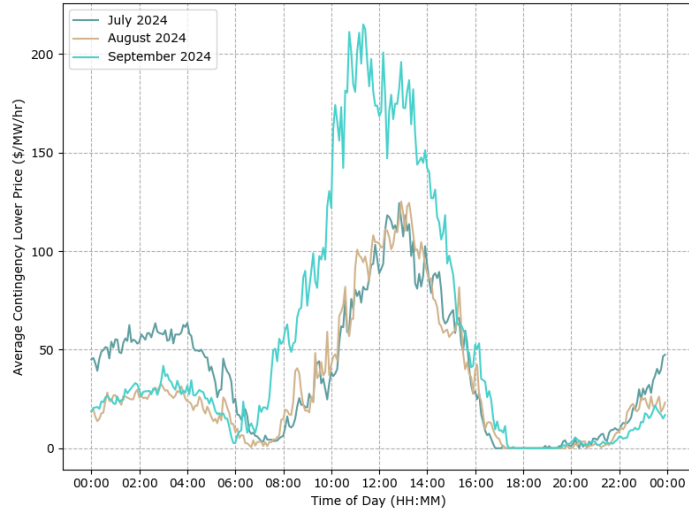
Regulation Raise (*)



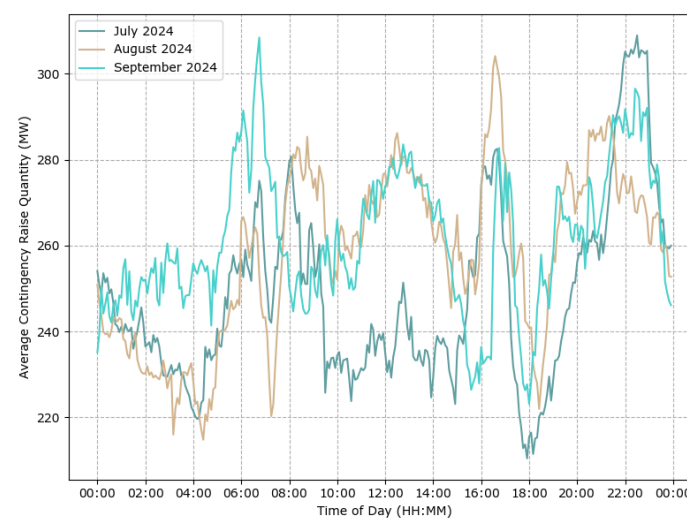
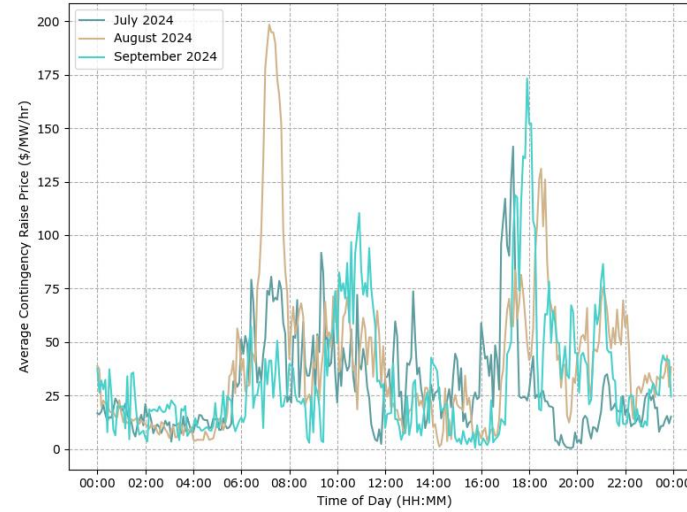
Average time-of-day clearing prices and quantities (2)

Contingency Lower, Contingency Raise and RoCoF Control ESS

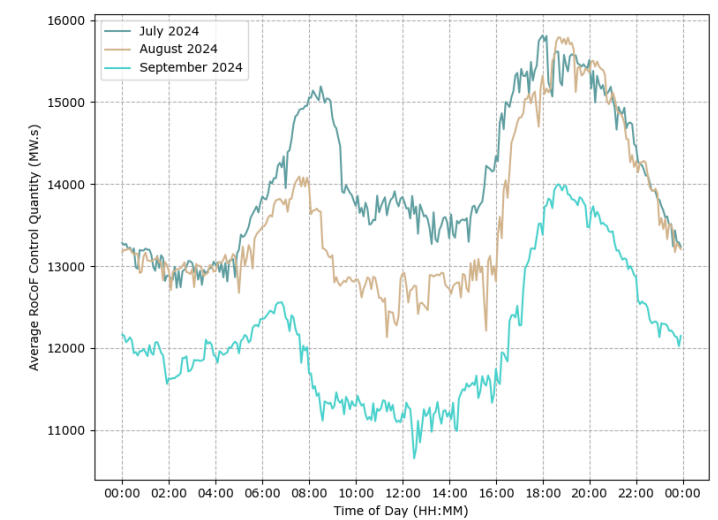
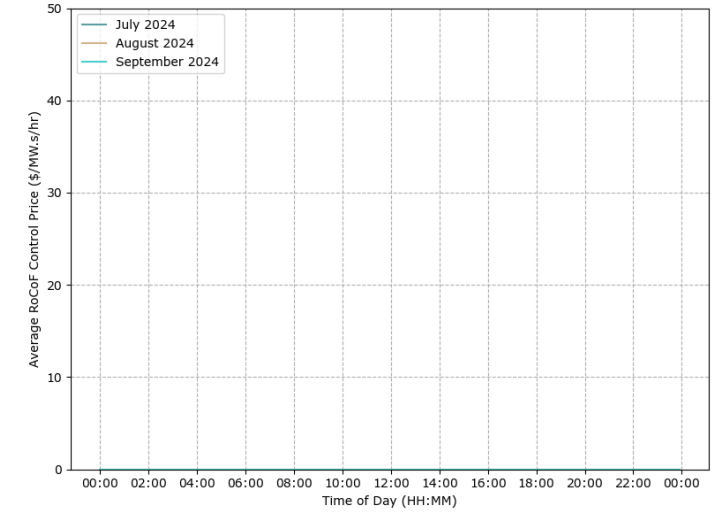
Contingency Lower (*)



Contingency Raise (*)



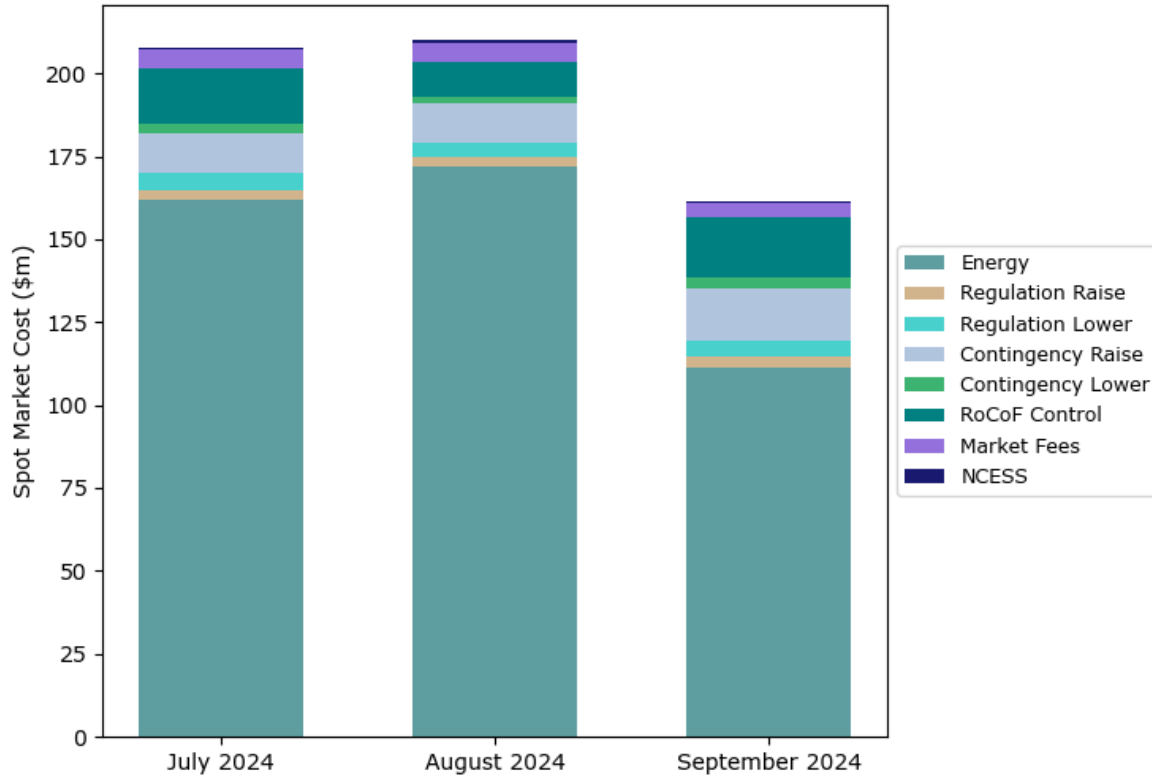
RoCoF Control (*)



WEM Total Spot Market Costs

Total mark-to-market cost of the WEM (excluding Reserve Capacity)

Q3 2024 Market Costs



Market Cost Breakdown (\$m AUD)

| Category | Jul 2024 | Aug 2024 | Sep 2024 |
|-----------------------|------------------|------------------|------------------|
| Energy | \$162.07m | \$172.04m | \$111.29m |
| Regulation Raise (*) | \$2.79m | \$2.96m | \$3.16m |
| Regulation Lower (*) | \$4.97m | \$3.95m | \$4.94m |
| Contingency Raise (*) | \$12.22m | \$12.28m | \$15.98m |
| Contingency Lower (*) | \$2.76m | \$1.88m | \$3.26m |
| RoCoF Control (*) | \$16.56m | \$10.53m | \$17.8m |
| Market Fees | \$5.75m | \$5.49m | \$4.64m |
| NCESS | \$0.73m | \$1.03m | \$0.26m |
| TOTAL | \$207.85m | \$210.16m | \$161.33m |
| \$ / MWh | \$130.82 | \$138.61 | \$125.96 |

(*) Includes estimated FCESS Uplift Payments

.02

Facilities

Selected facility level outcomes

Facility-Level Metrics

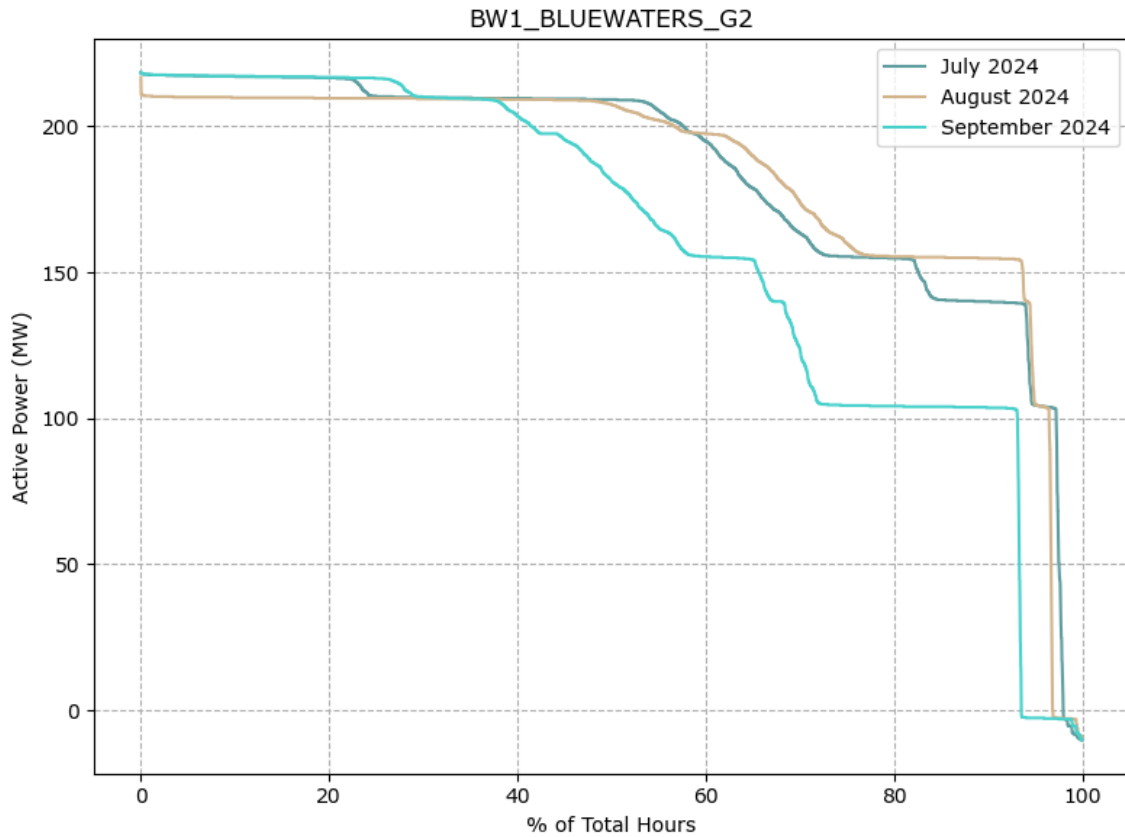
Definitions for the facility-level metrics reported in this section

| Facility Metric | Description |
|--|---|
| Monthly Generation Duration Curve | Curve showing the proportion of time in a month that a facility is operating above a specific output. |
| Average Time of Day Output | Curve showing the mean output from a facility over a month at a 5-min resolution (with no adjustments for a facility being offline). |
| Facility Merchant Spot Revenue | The implied monthly revenue that a facility would have received from all energy and ESS markets if it were a merchant facility. Where a facility receives Large Generation Certificate (LGC), this revenue is estimated based on publicly available LGC spot prices published on Demand Manager . |
| Facility Capacity Factor | Daily average capacity factors based on the daily energy generated and the registered facility size . Note that for energy storage facilities, the net energy throughput is used. |
| Average Energy Capture Price | Daily average volume weighted energy price that the facility receives based on the following calculation: $\text{Average Energy Capture Price} = \frac{\sum \text{Energy Revenue}}{\sum \text{Energy Generated or Consumed} }$ |

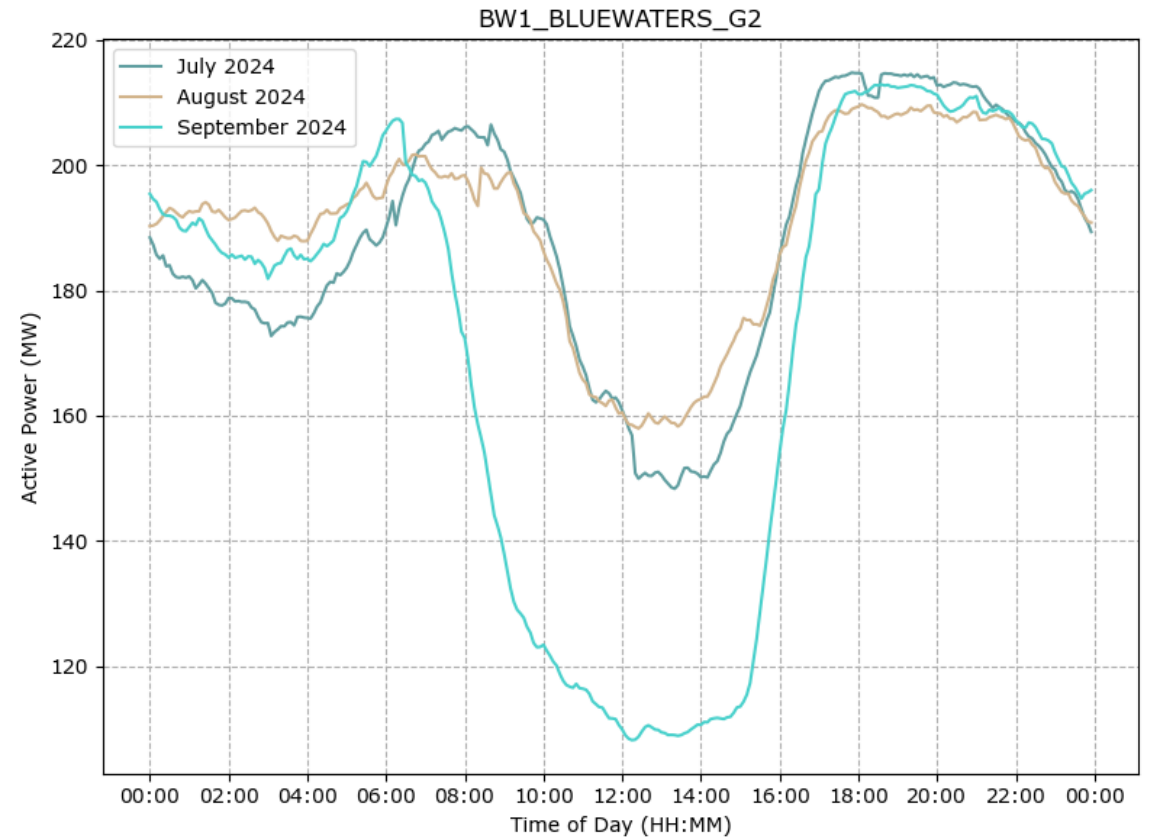
Bluewaters Power Station BW1-G2

Coal-fired Scheduled Facility, 217 MW, Summit Southern Cross Power

Generation Duration Curves



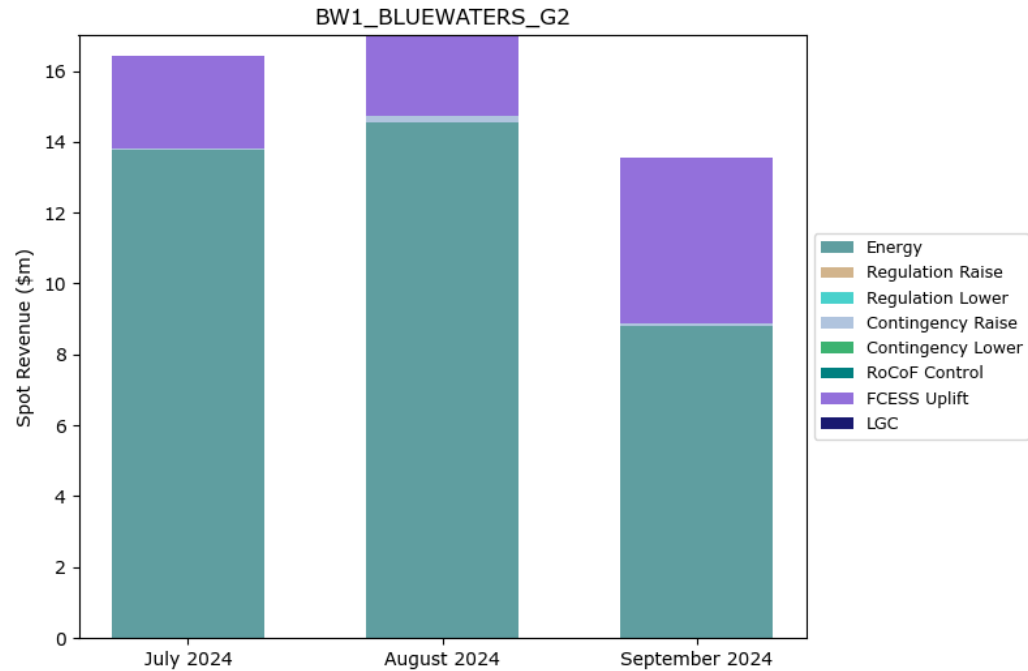
Average Time-of-Day Output



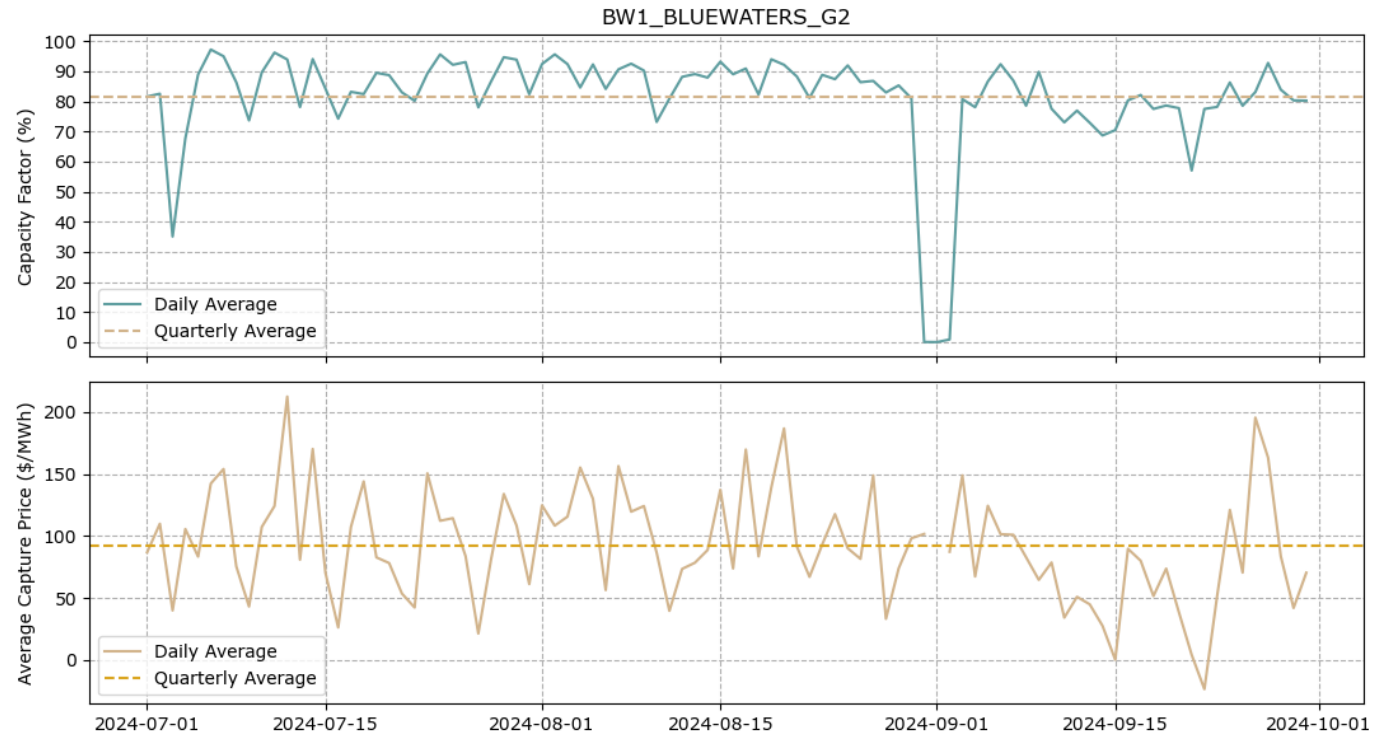
Bluewaters Power Station BW1-G2

Coal-fired Scheduled Facility, 217 MW, Summit Southern Cross Power

Facility Merchant Spot Revenue



Daily Capacity Factor and Average Energy Capture Price

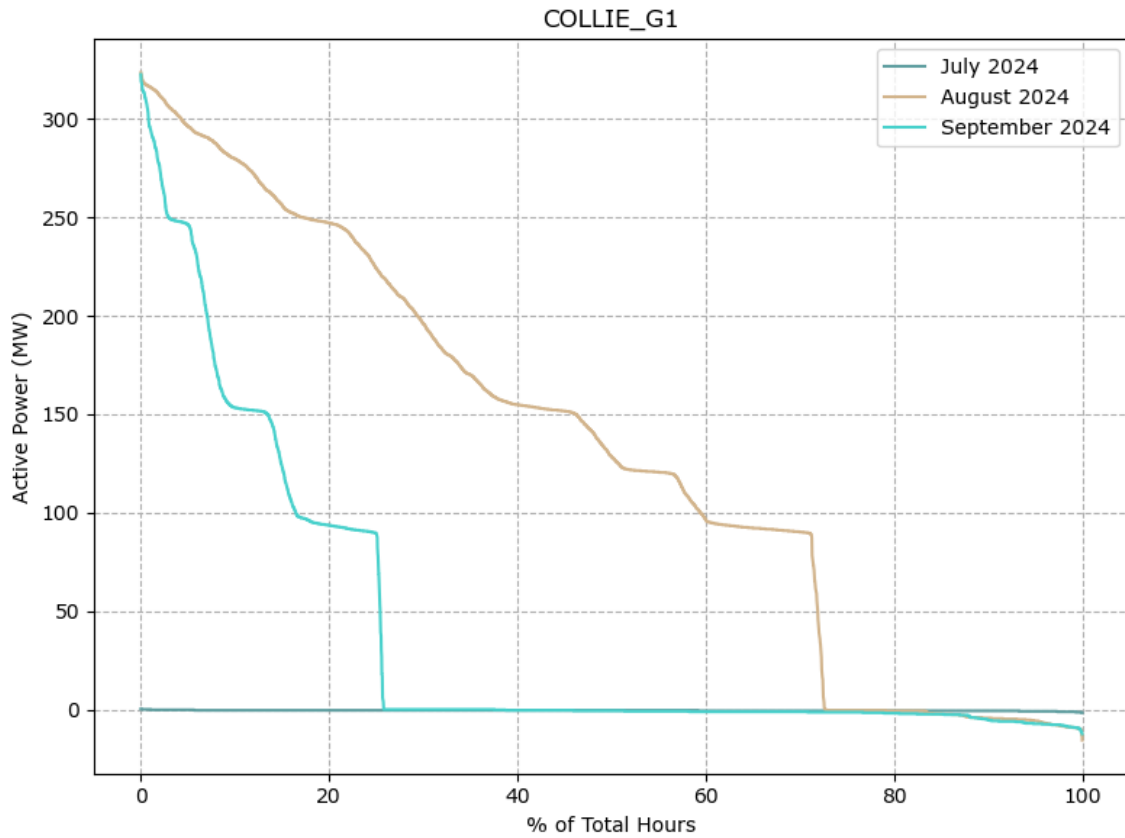


| | Jul 2024 | Aug 2024 | Sep 2024 |
|--------------------------|-----------------|-----------------|-----------------|
| Energy Generated (GWh) | 137.02 | 137.26 | 116.01 |
| Total Spot Revenue (\$m) | 16.42 | 17.01 | 13.53 |
| \$ / MWh | \$119.84 | \$123.95 | \$116.66 |

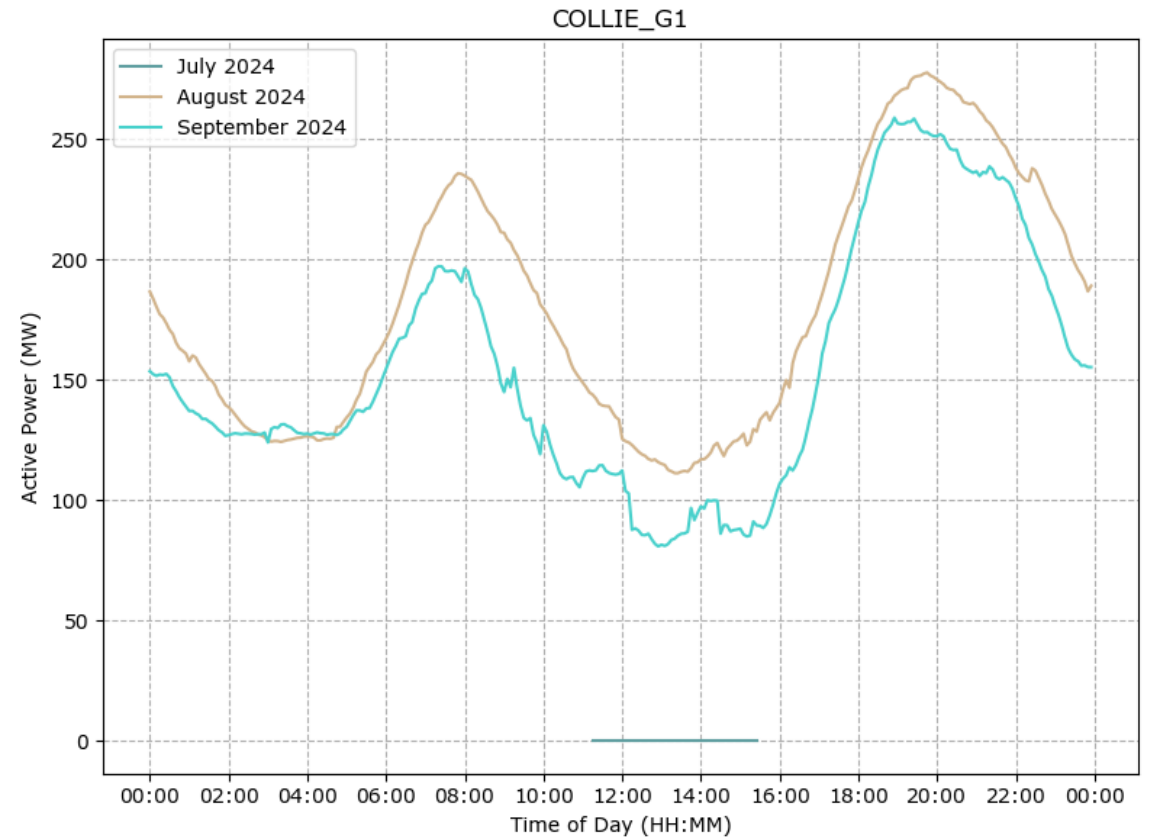
Collie Power Station G1

Coal-fired Scheduled Facility, 318.3 MW, Synergy

Generation Duration Curves



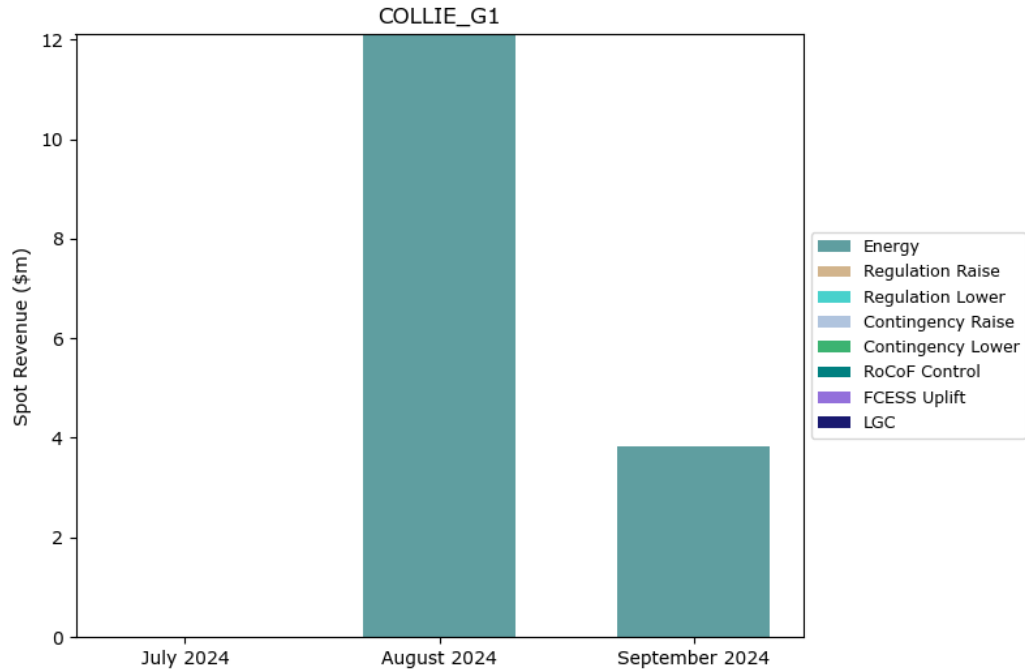
Average Time-of-Day Output



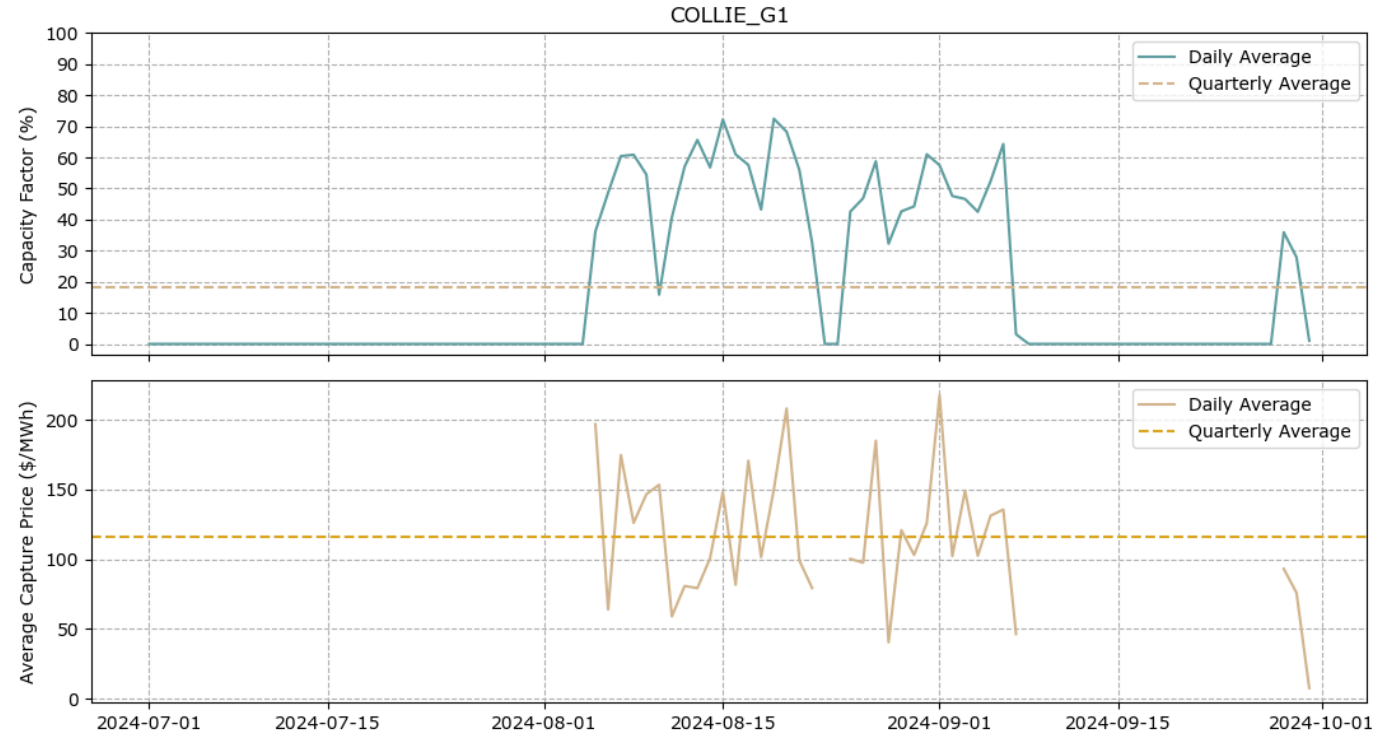
Collie Power Station G1

Coal-fired Scheduled Facility, 318.3 MW, Synergy

Facility Merchant Spot Revenue



Daily Capacity Factor and Average Energy Capture Price

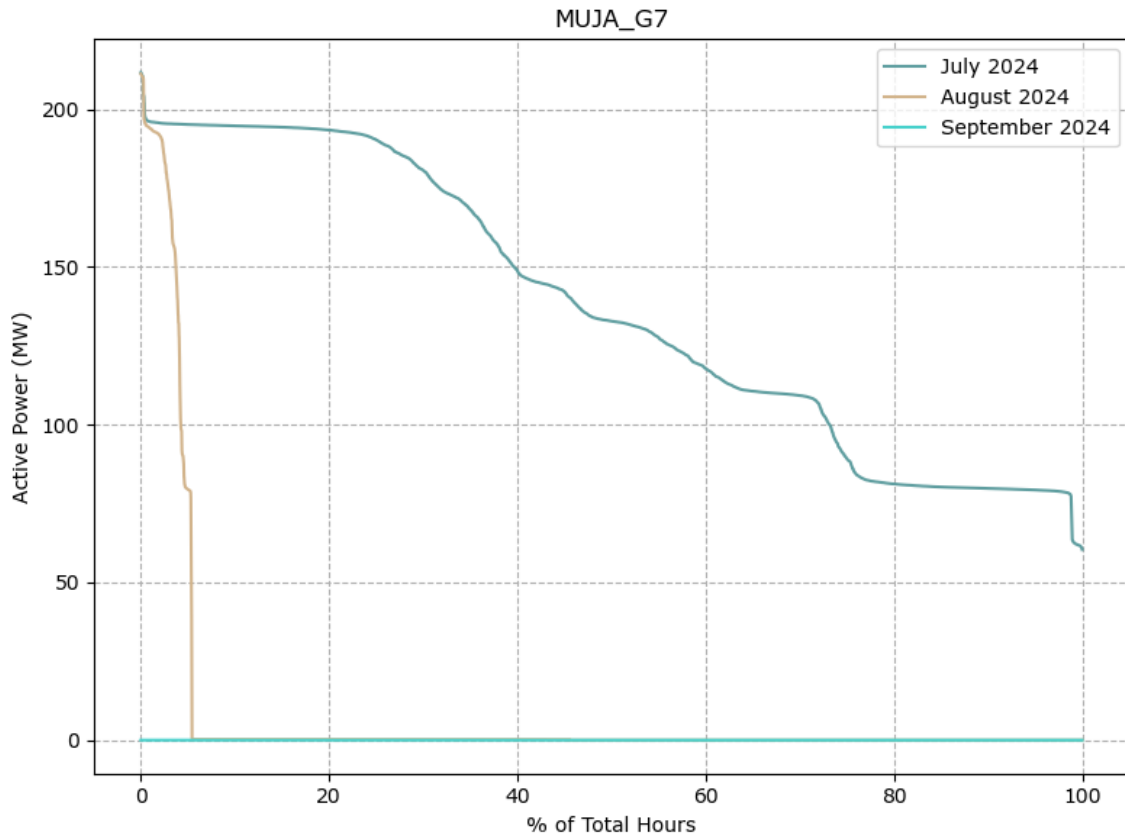


| | Jul 2024 | Aug 2024 | Sep 2024 |
|--------------------------|---------------|-----------------|-----------------|
| Energy Generated (GWh) | 0.00 | 98.46 | 28.96 |
| Total Spot Revenue (\$m) | 0.00 | 12.11 | 3.82 |
| \$ / MWh | \$0.00 | \$123.02 | \$131.80 |

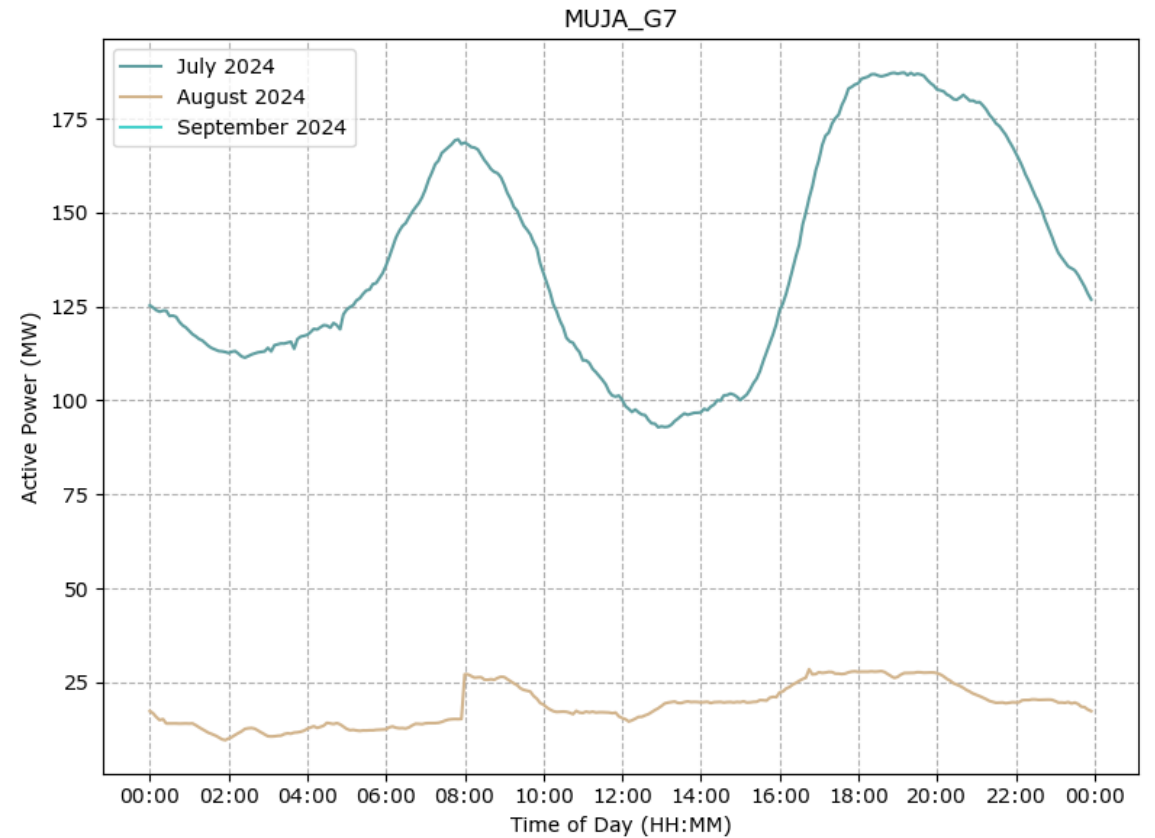
Muja Power Station G7

Coal-fired Scheduled Facility, 212.6 MW, Synergy

Generation Duration Curves



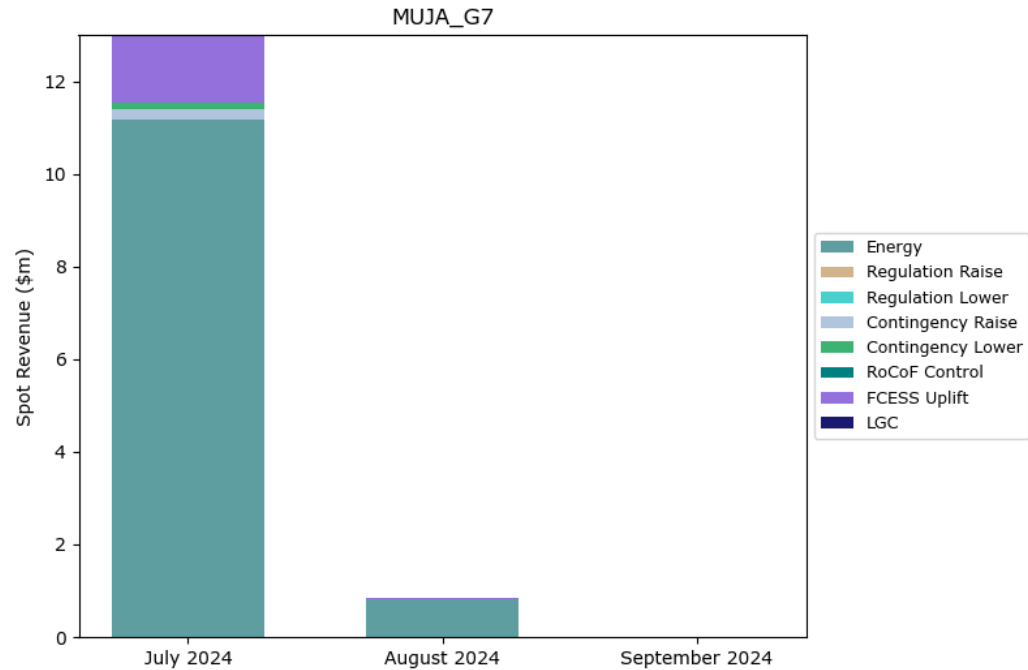
Average Time-of-Day Output



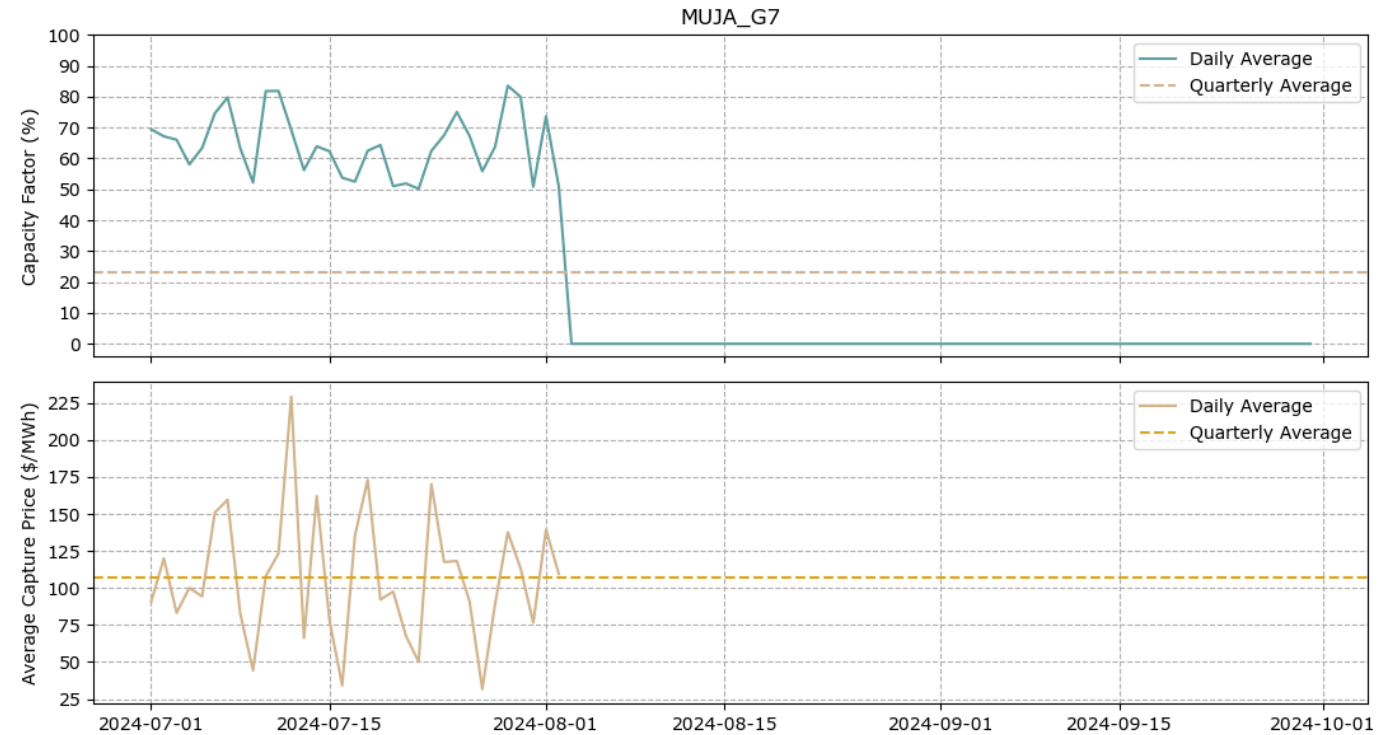
Muja Power Station G7

Coal-fired Scheduled Facility, 212.6 MW, Synergy

Facility Merchant Spot Revenue



Daily Capacity Factor and Average Energy Capture Price

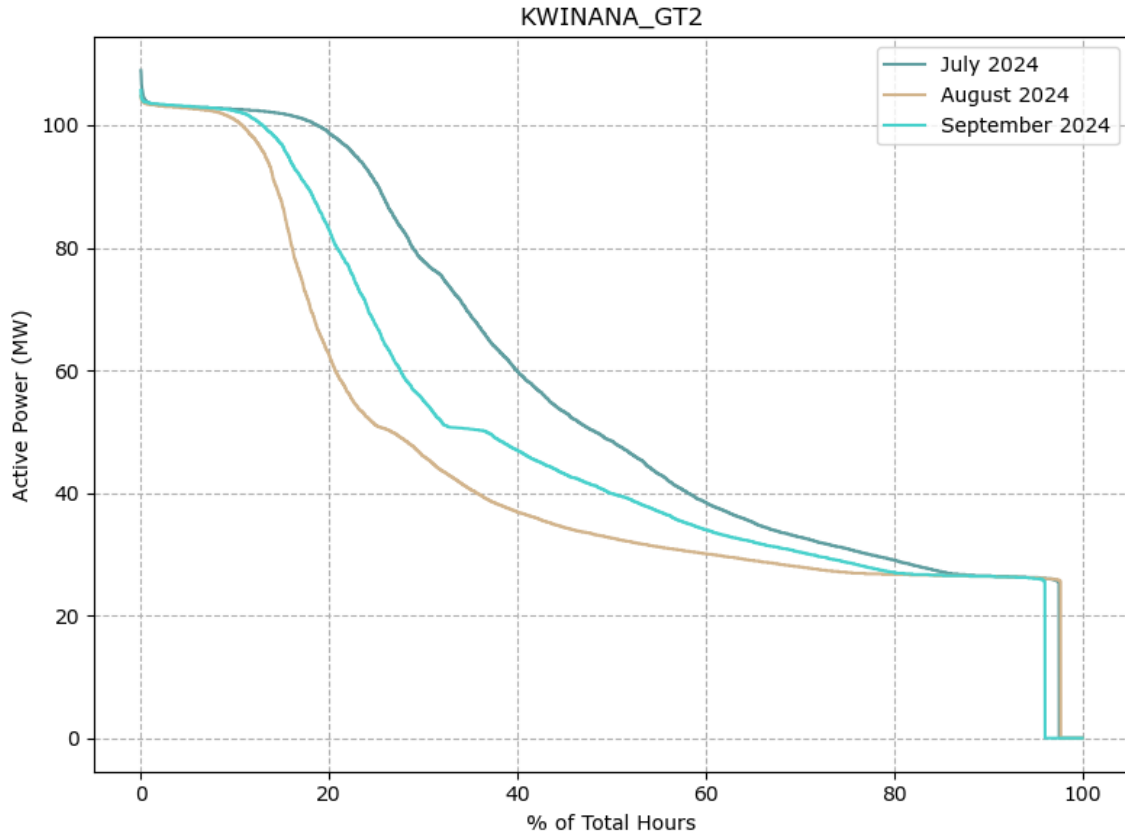


| | Jul 2024 | Aug 2024 | Sep 2024 |
|--------------------------|-----------------|-----------------|---------------|
| Energy Generated (GWh) | 102.15 | 6.36 | 0.00 |
| Total Spot Revenue (\$m) | 13.00 | 0.85 | 0.00 |
| \$ / MWh | \$127.27 | \$133.22 | \$0.00 |

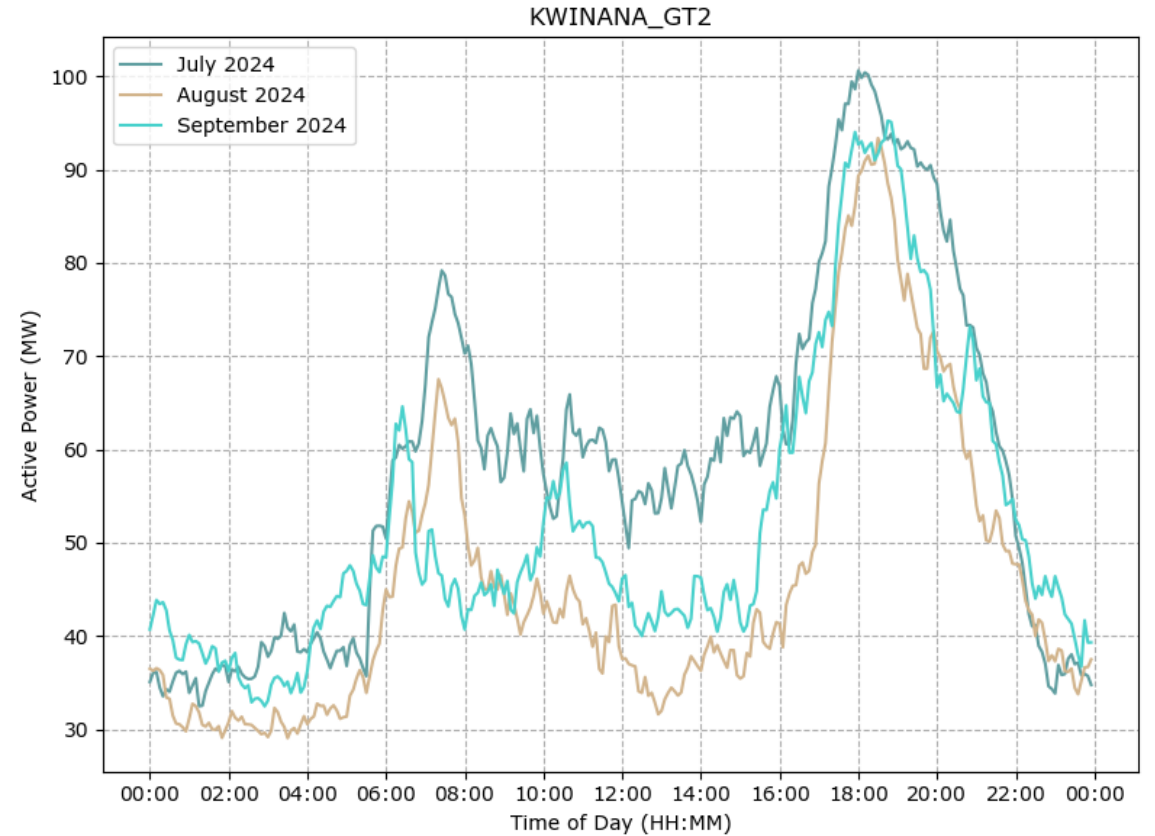
Kwinana Power Station GT2

Gas-fired Scheduled Facility, 103.94 MW, Synergy

Generation Duration Curves



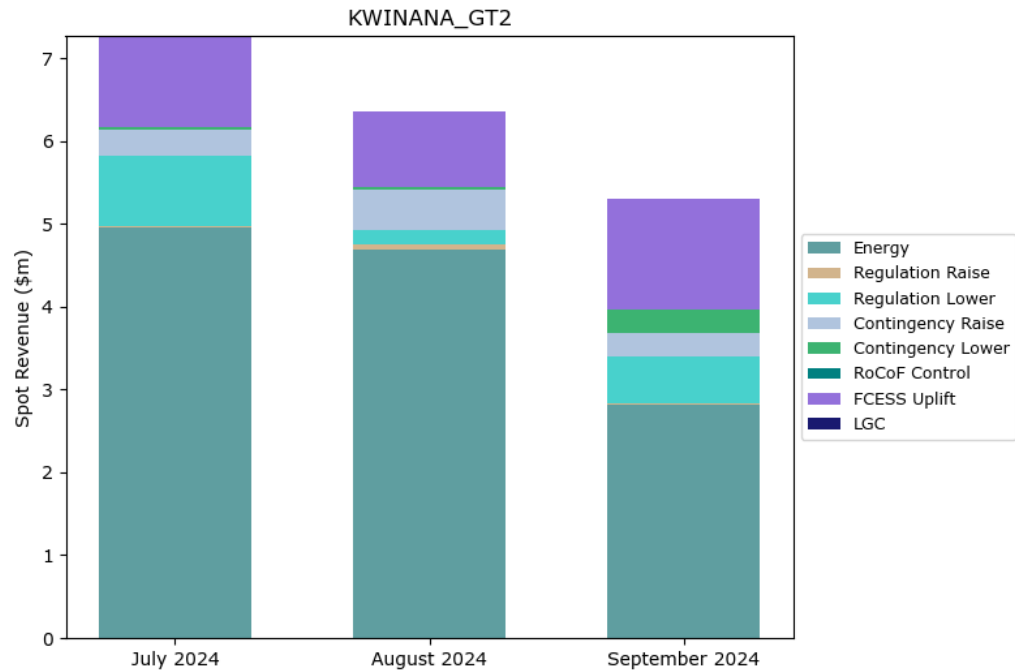
Average Time-of-Day Output



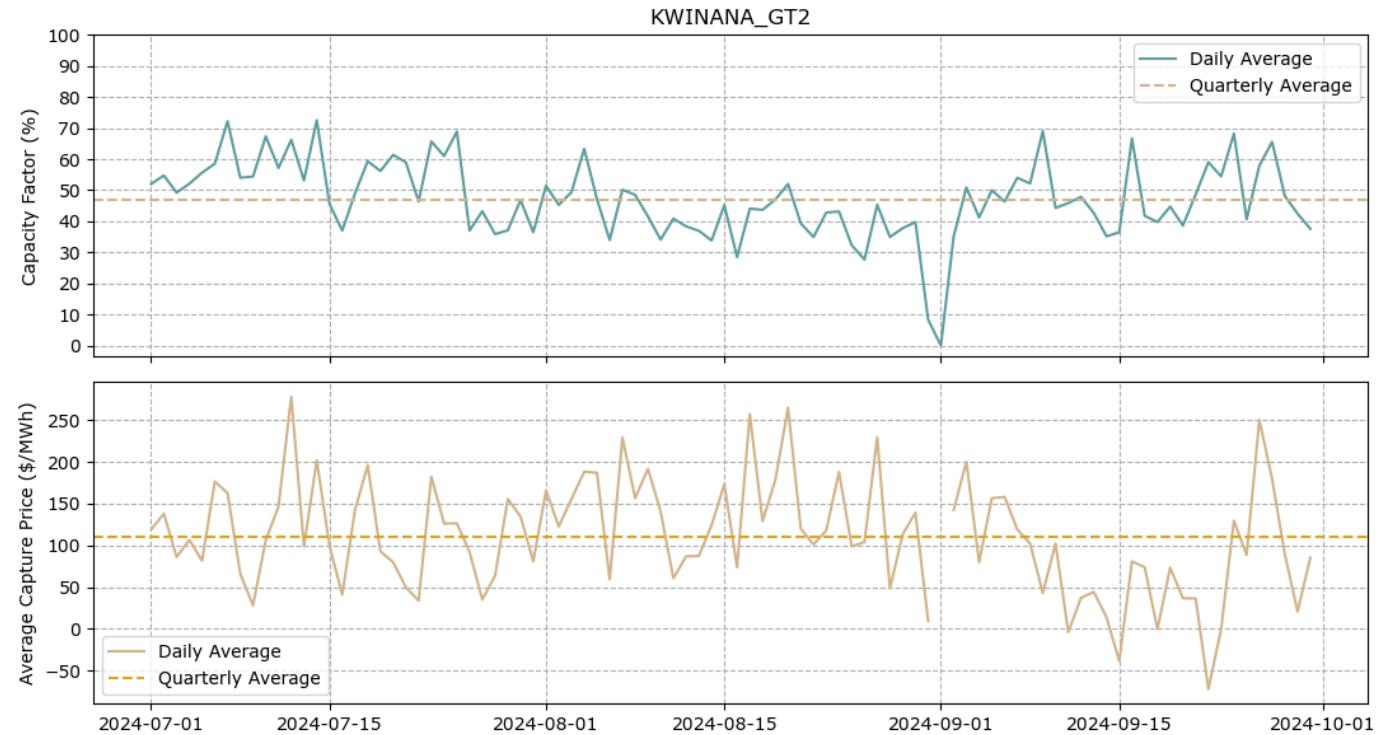
Kwinana Power Station GT2

Gas-fired Scheduled Facility, 103.94 MW, Synergy

Facility Merchant Spot Revenue



Daily Capacity Factor and Average Energy Capture Price

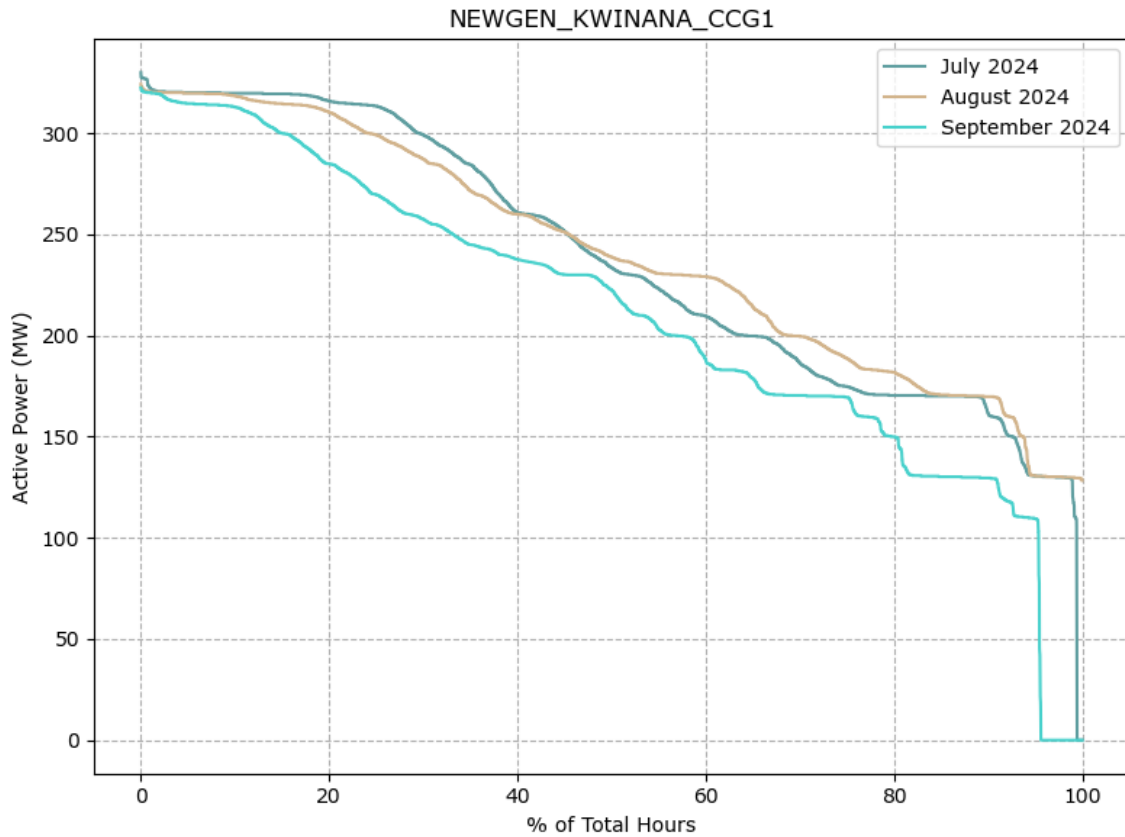


| | Jul 2024 | Aug 2024 | Sep 2024 |
|--------------------------|-----------------|-----------------|-----------------|
| Energy Generated (GWh) | 41.53 | 31.46 | 35.05 |
| Total Spot Revenue (\$m) | 7.28 | 6.36 | 5.30 |
| \$ / MWh | \$175.17 | \$202.11 | \$151.27 |

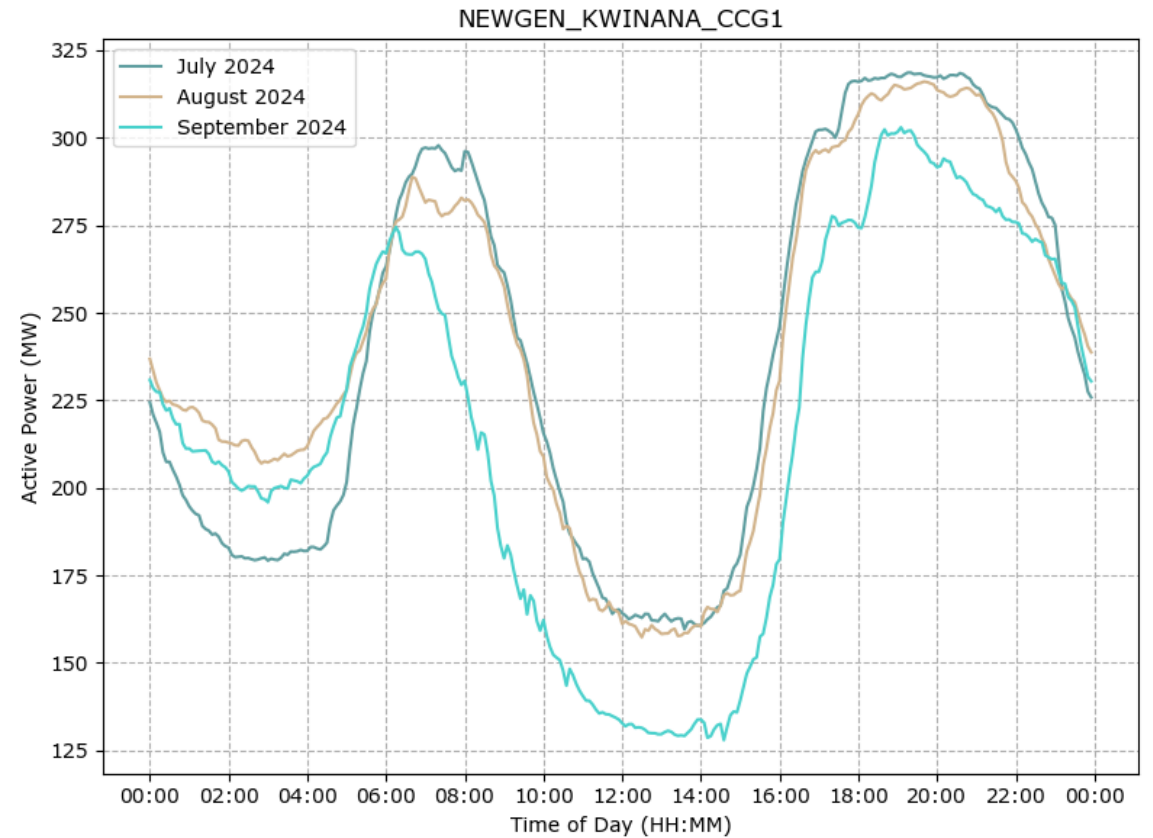
Newgen Kwinana Power Station

Gas-fired Scheduled Facility, 334.8 MW, Summit Southern Cross Power

Generation Duration Curves



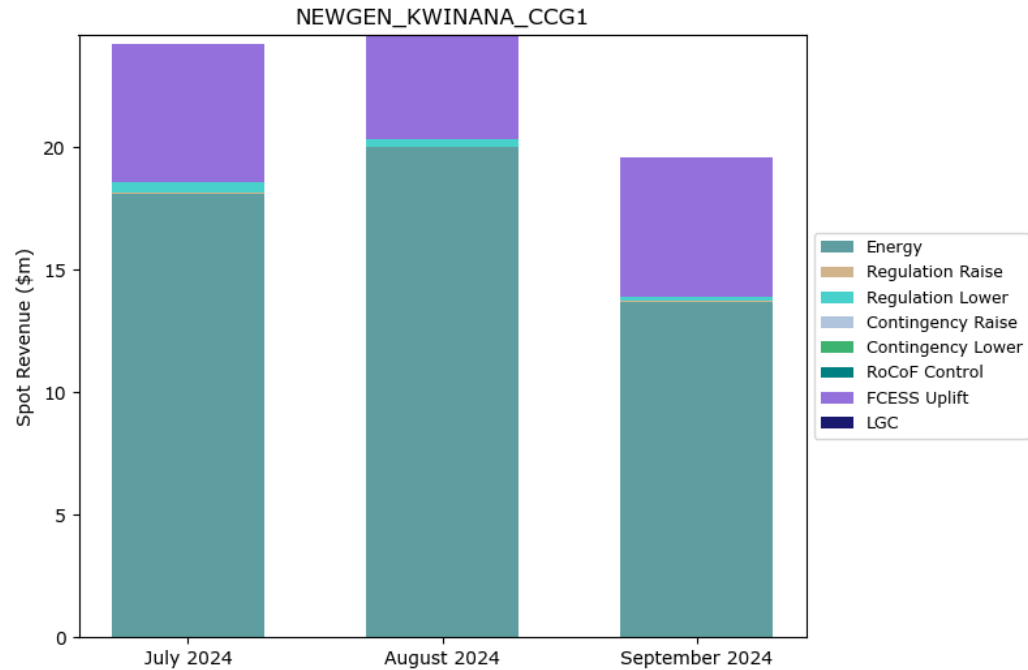
Average Time-of-Day Output



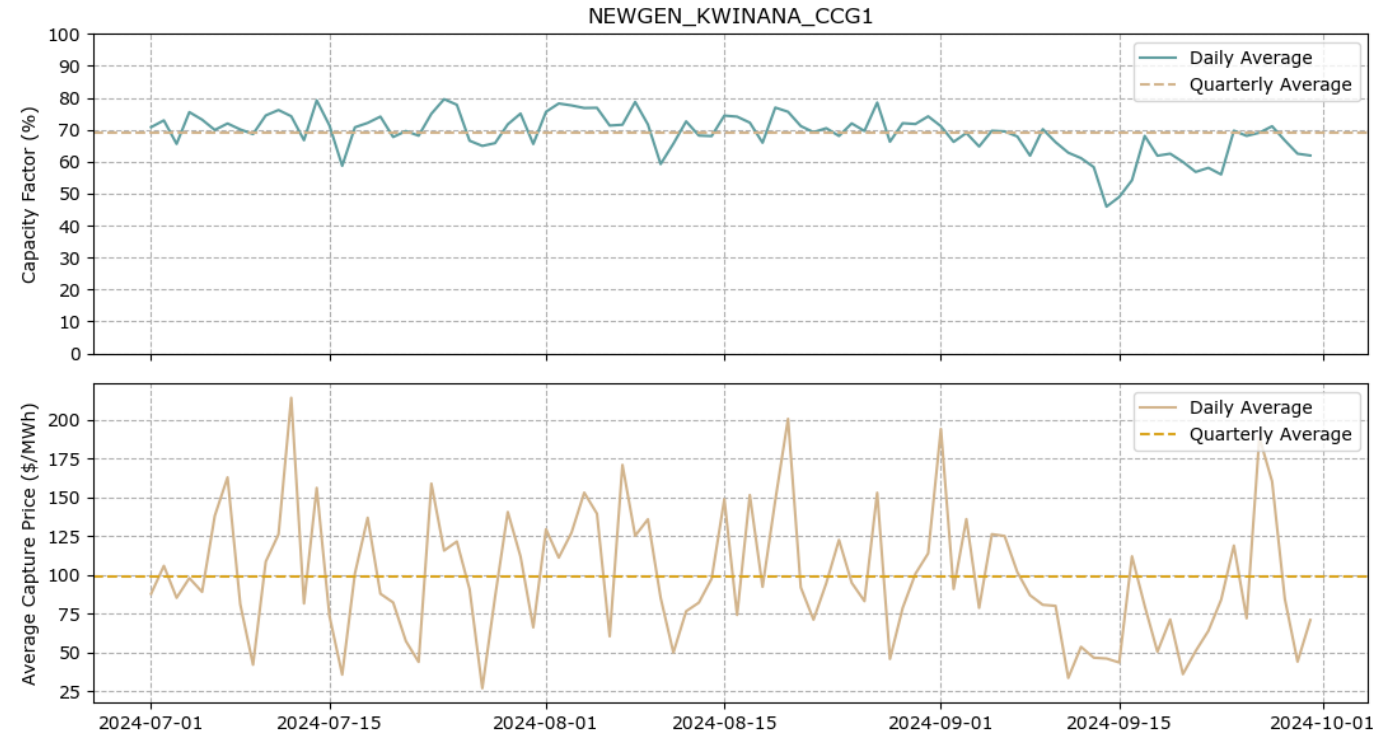
Newgen Kwinana Power Station

Gas-fired Scheduled Facility, 334.8 MW, Summit Southern Cross Power

Facility Merchant Spot Revenue



Daily Capacity Factor and Average Energy Capture Price

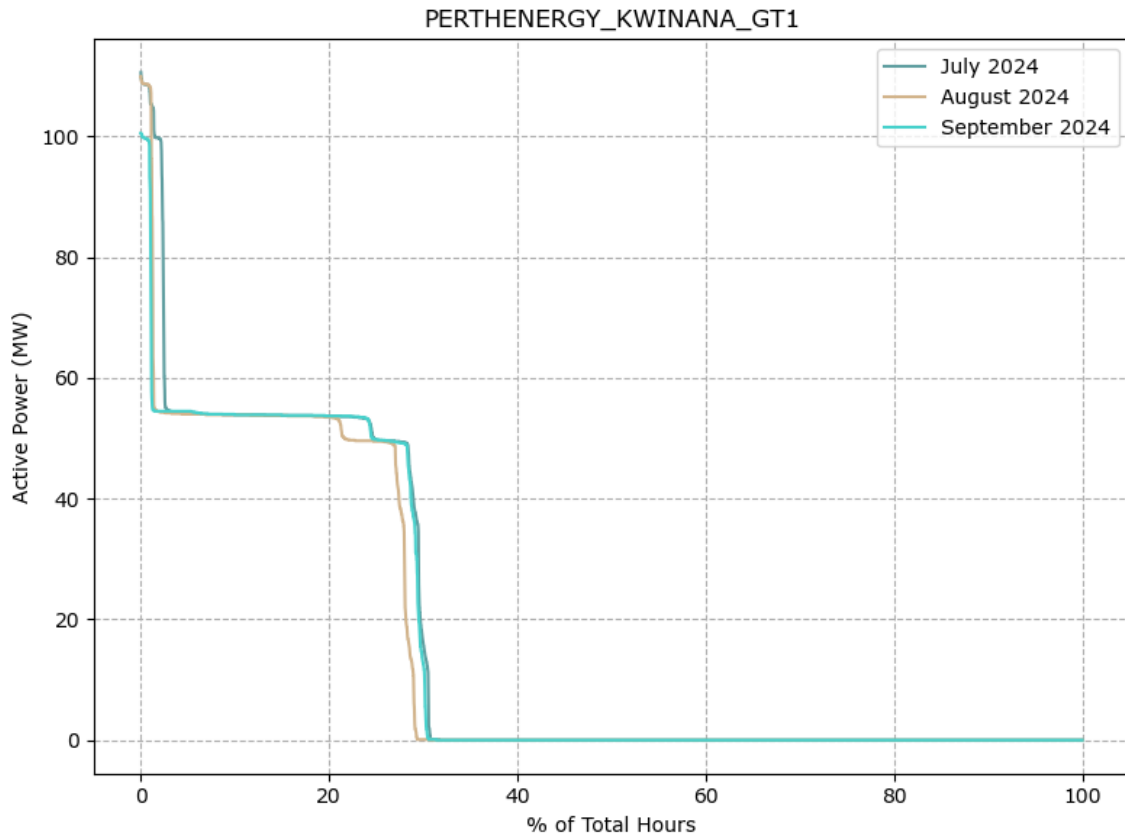


| | Jul 2024 | Aug 2024 | Sep 2024 |
|--------------------------|-----------------|-----------------|-----------------|
| Energy Generated (GWh) | 177.11 | 179.58 | 152.68 |
| Total Spot Revenue (\$m) | 24.21 | 24.60 | 19.59 |
| \$ / MWh | \$136.72 | \$137.01 | \$128.30 |

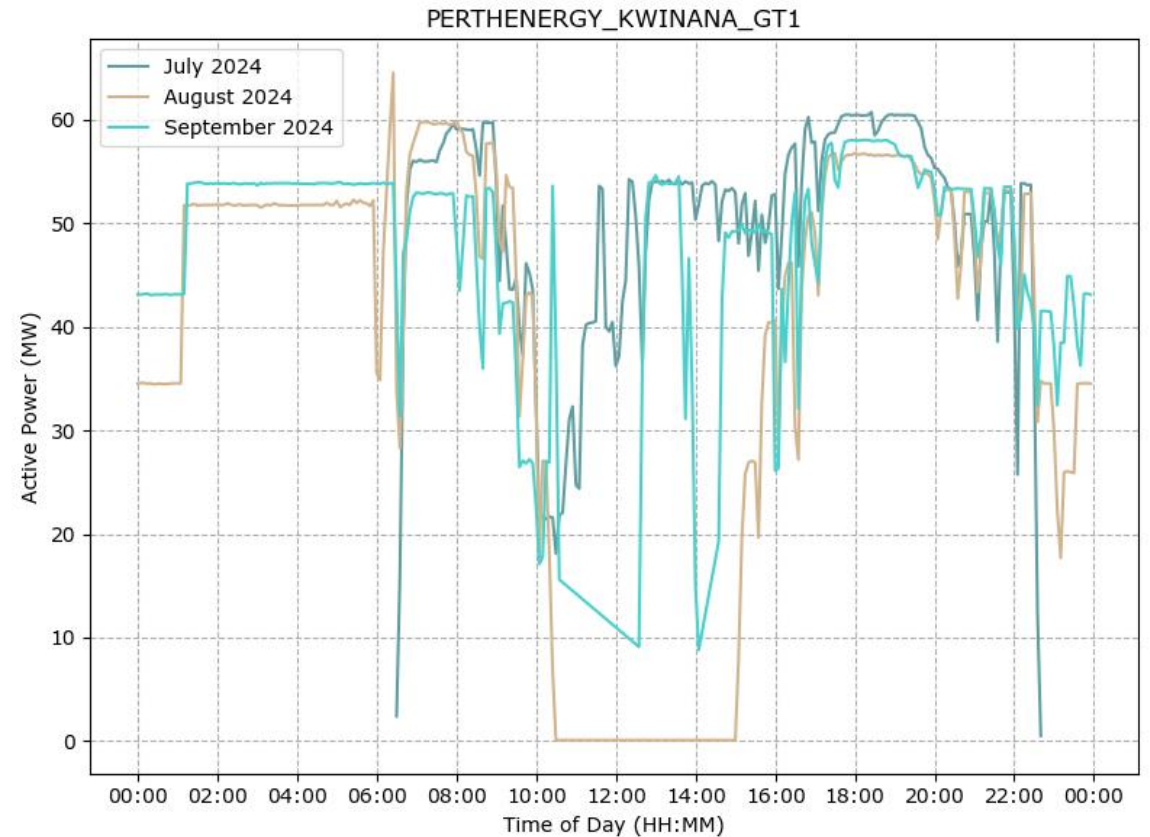
Kwinana Swift Power Station

Gas-fired Scheduled Facility, 109 MW, AGL (Perth Energy)

Generation Duration Curves



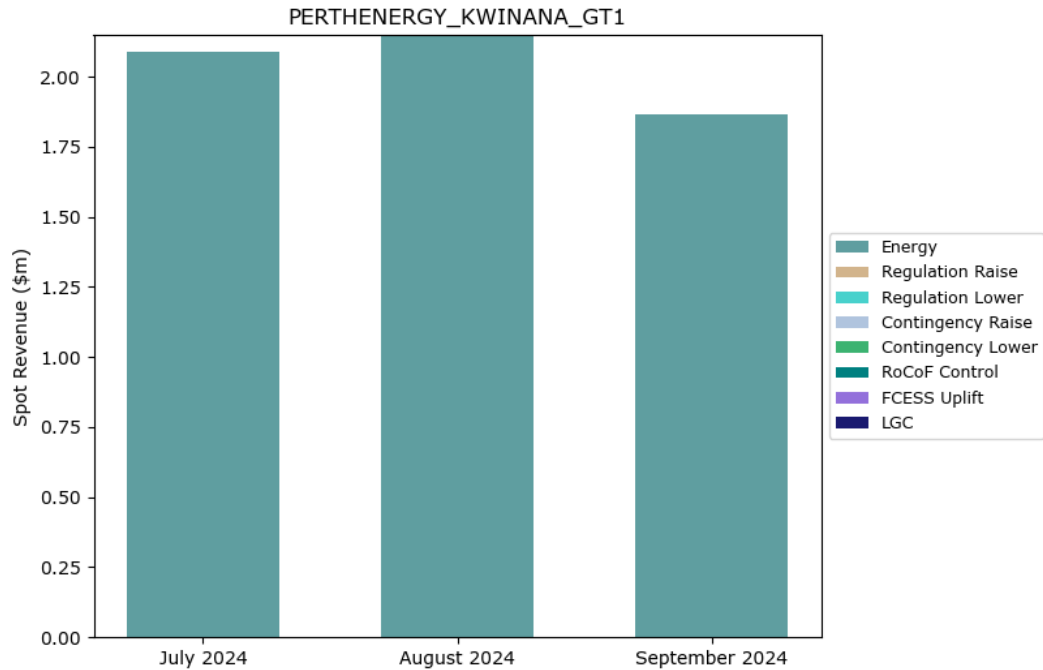
Average Time-of-Day Output



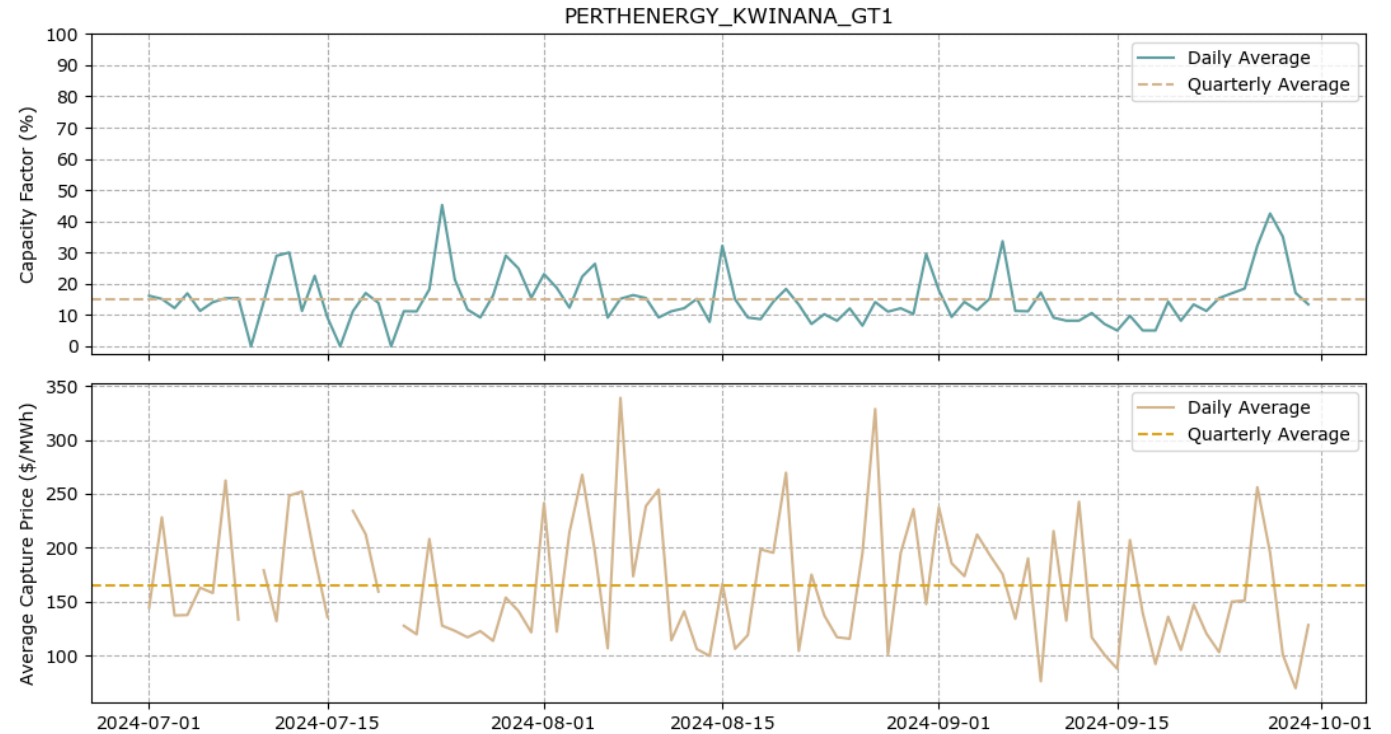
Kwinana Swift Power Station

Gas-fired Scheduled Facility, 109 MW, AGL (Perth Energy)

Facility Merchant Spot Revenue



Daily Capacity Factor and Average Energy Capture Price

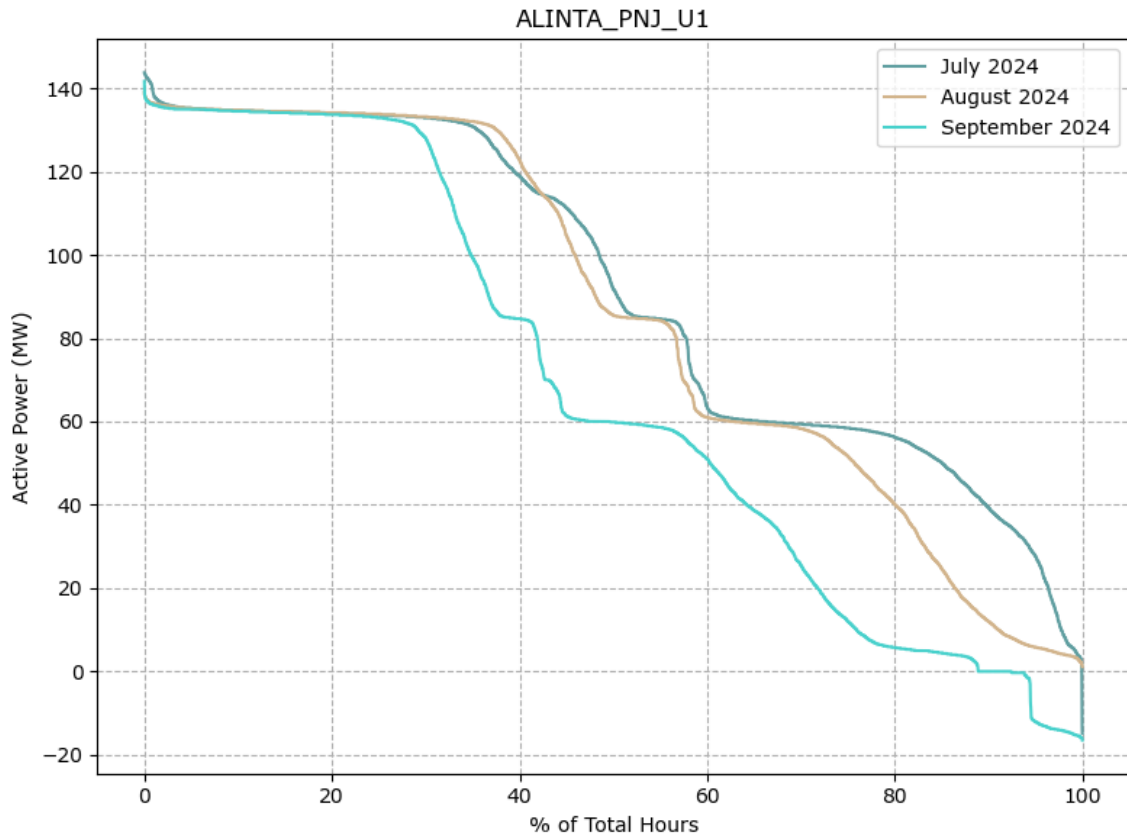


| | Jul 2024 | Aug 2024 | Sep 2024 |
|--------------------------|-----------------|-----------------|-----------------|
| Energy Generated (GWh) | 12.80 | 11.70 | 11.73 |
| Total Spot Revenue (\$m) | 2.09 | 2.15 | 1.87 |
| \$ / MWh | \$163.17 | \$183.65 | \$159.23 |

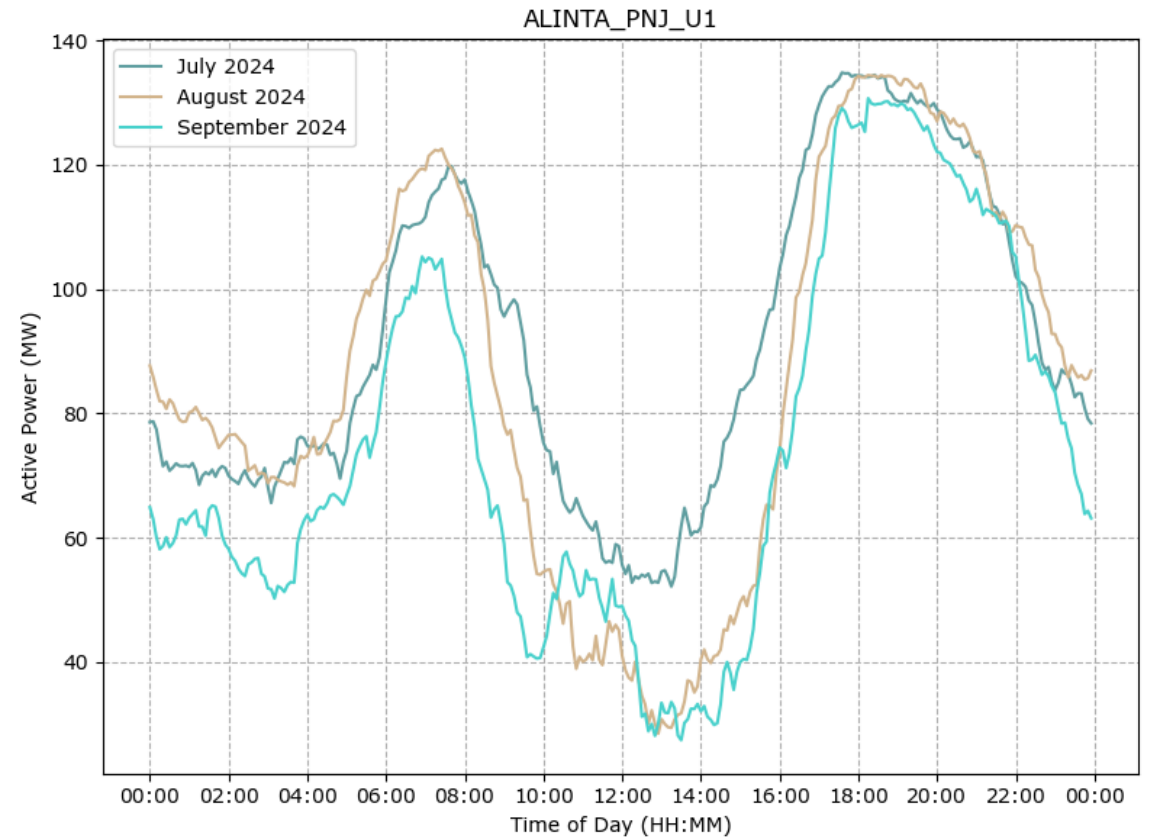
Pinjarra Power Station U1

Gas-fired Scheduled Facility, 143 MW, Alinta Energy

Generation Duration Curves



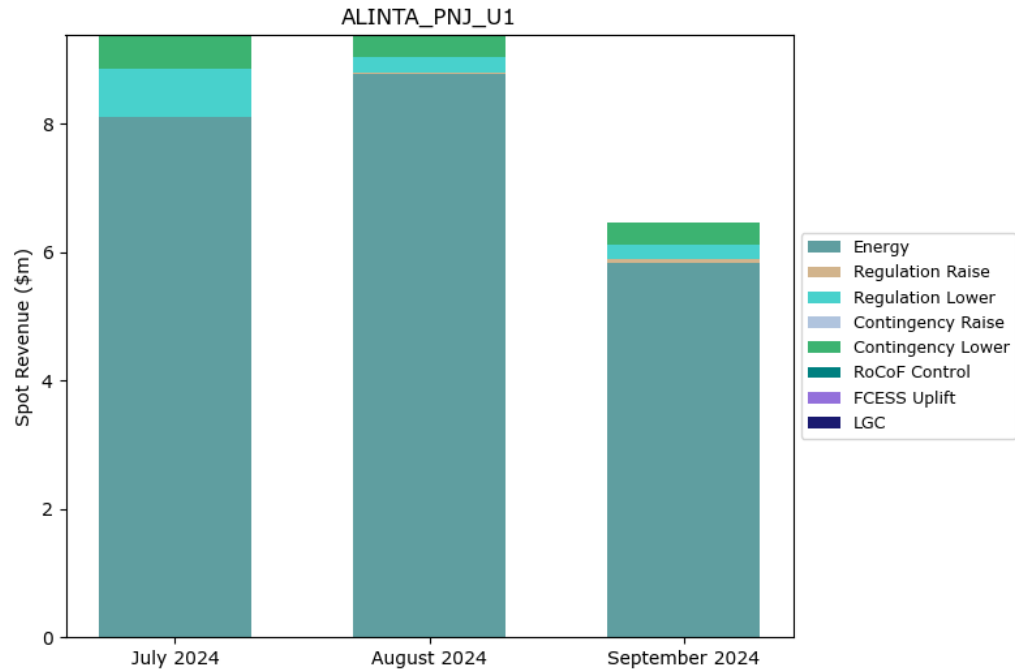
Average Time-of-Day Output



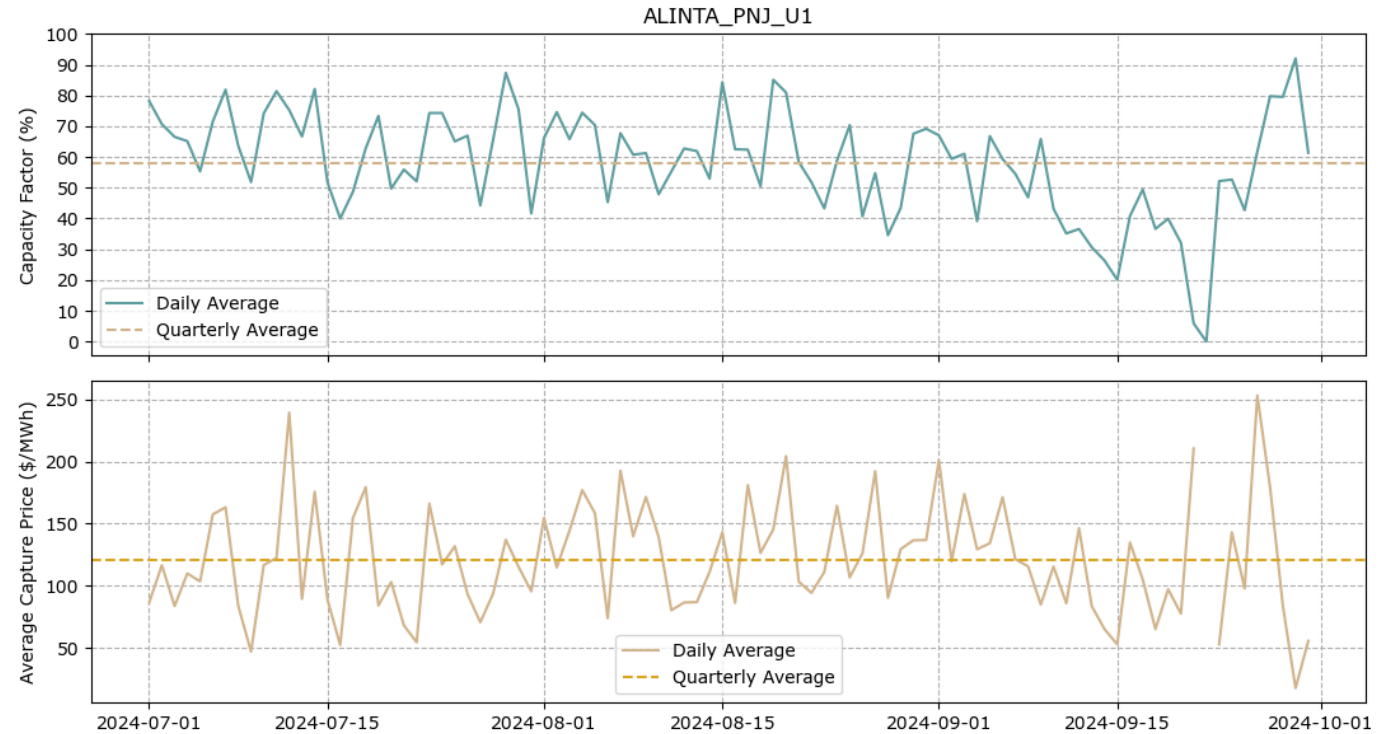
Pinjarra Power Station U1

Gas-fired Scheduled Facility, 143 MW, Alinta Energy

Facility Merchant Spot Revenue



Daily Capacity Factor and Average Energy Capture Price

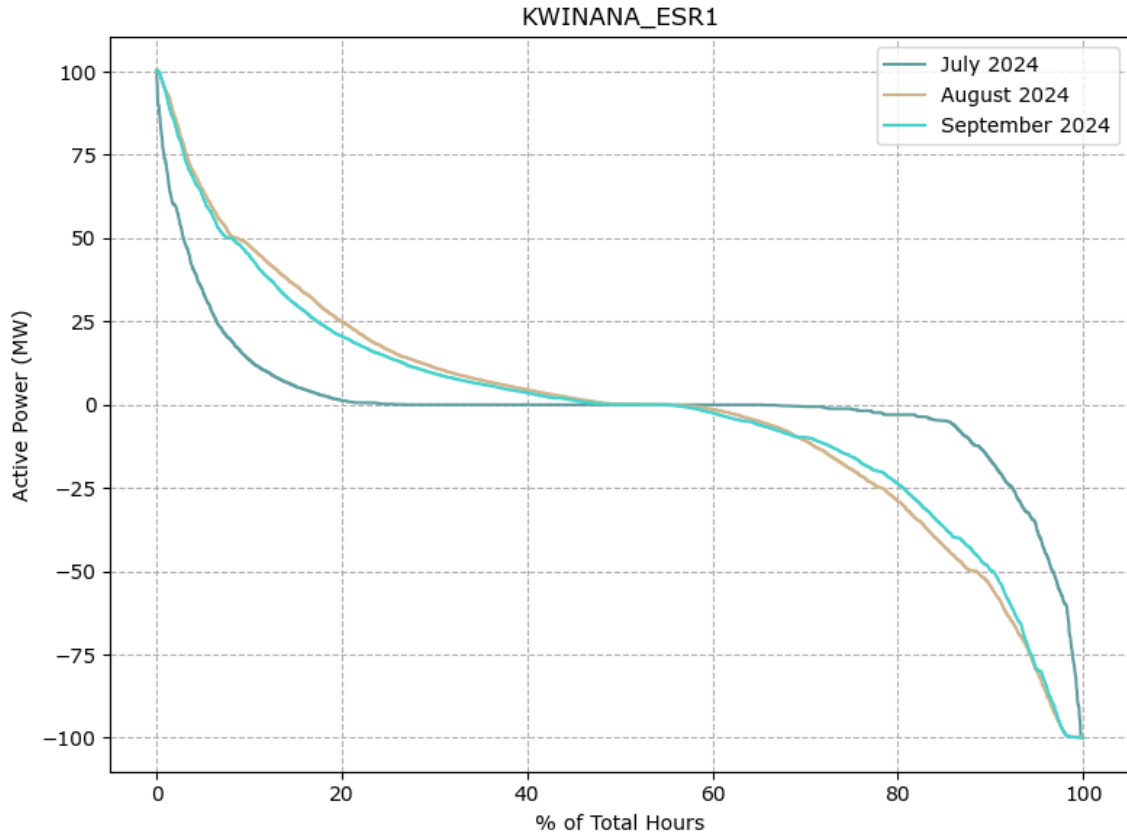


| | Jul 2024 | Aug 2024 | Sep 2024 |
|--------------------------|-----------------|-----------------|-----------------|
| Energy Generated (GWh) | 69.11 | 64.71 | 49.99 |
| Total Spot Revenue (\$m) | 9.37 | 9.39 | 6.46 |
| \$ / MWh | \$135.53 | \$145.12 | \$129.28 |

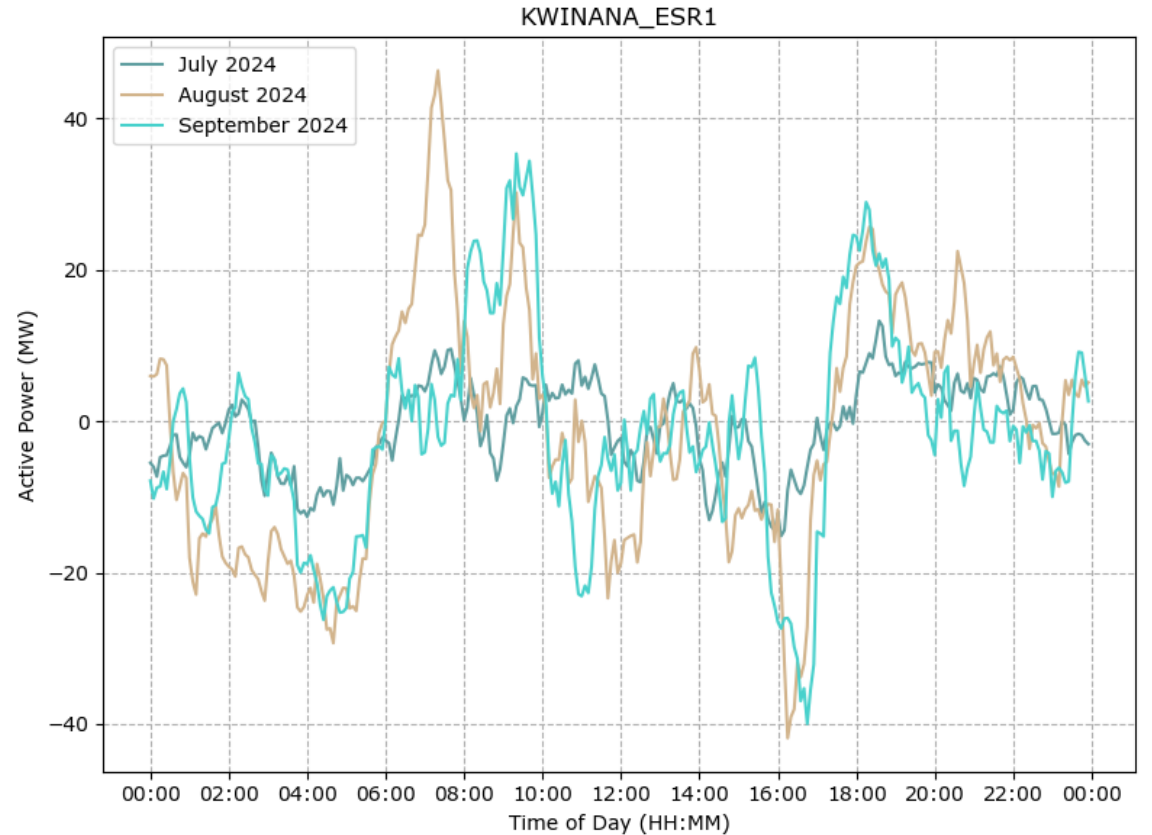
Kwinana BESS 1

Energy Storage Scheduled Facility, 100 MW, Synergy

Generation Duration Curves



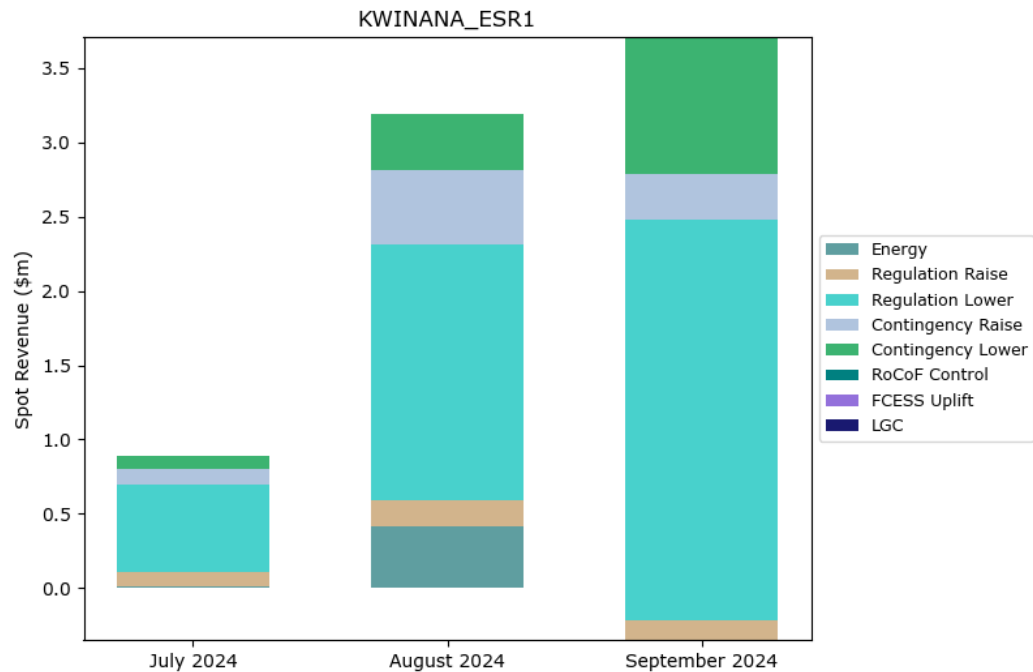
Average Time-of-Day Output



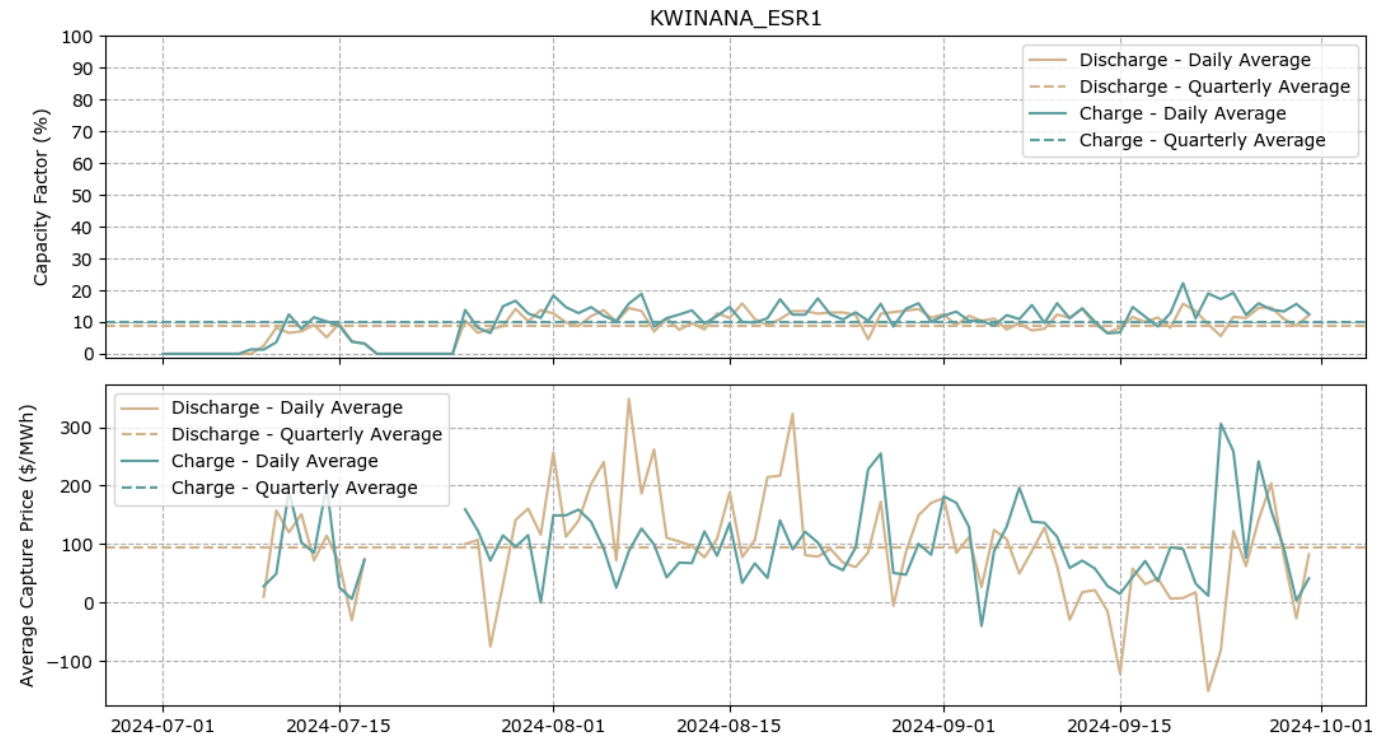
Kwinana BESS 1

Energy Storage Scheduled Facility, 100 MW, Synergy

Facility Merchant Spot Revenue



Daily Capacity Factor and Average Energy Capture Price

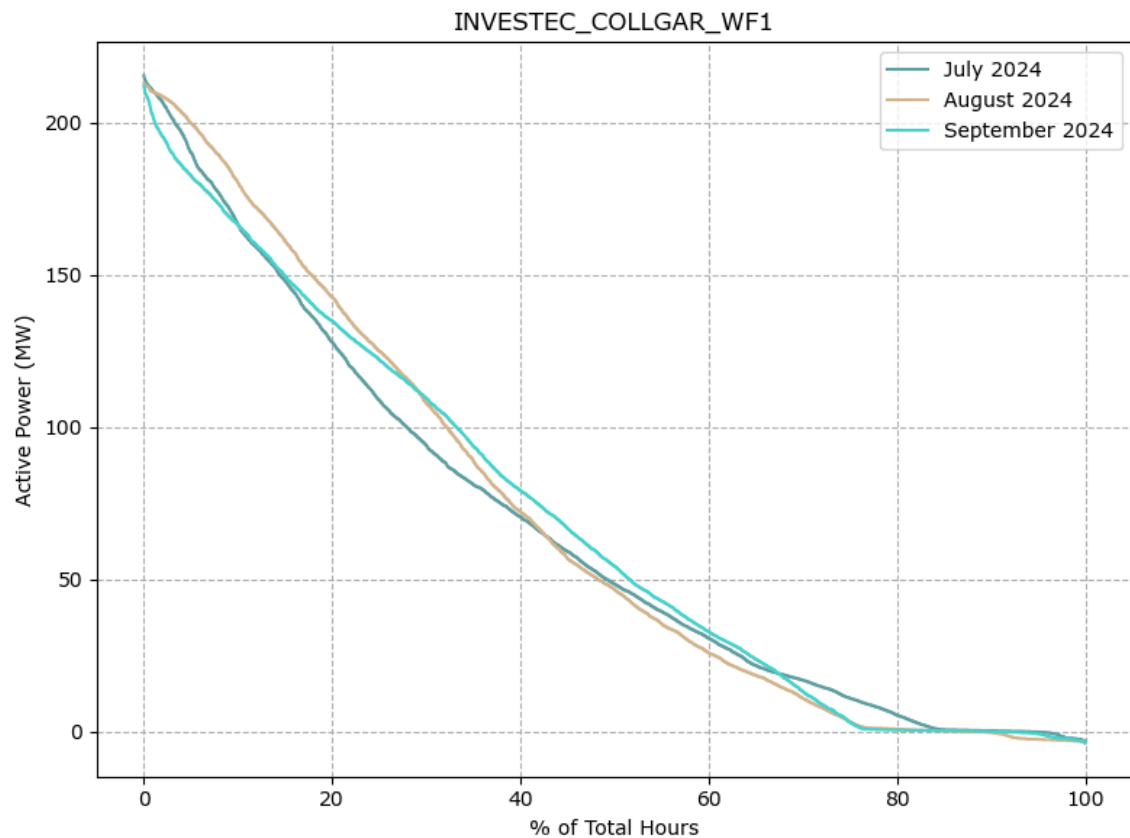


| | Jul 2024 | Aug 2024 | Sep 2024 |
|--------------------------|----------|----------|----------|
| Total Spot Revenue (\$m) | 0.89 | 3.2 | 3.71 |

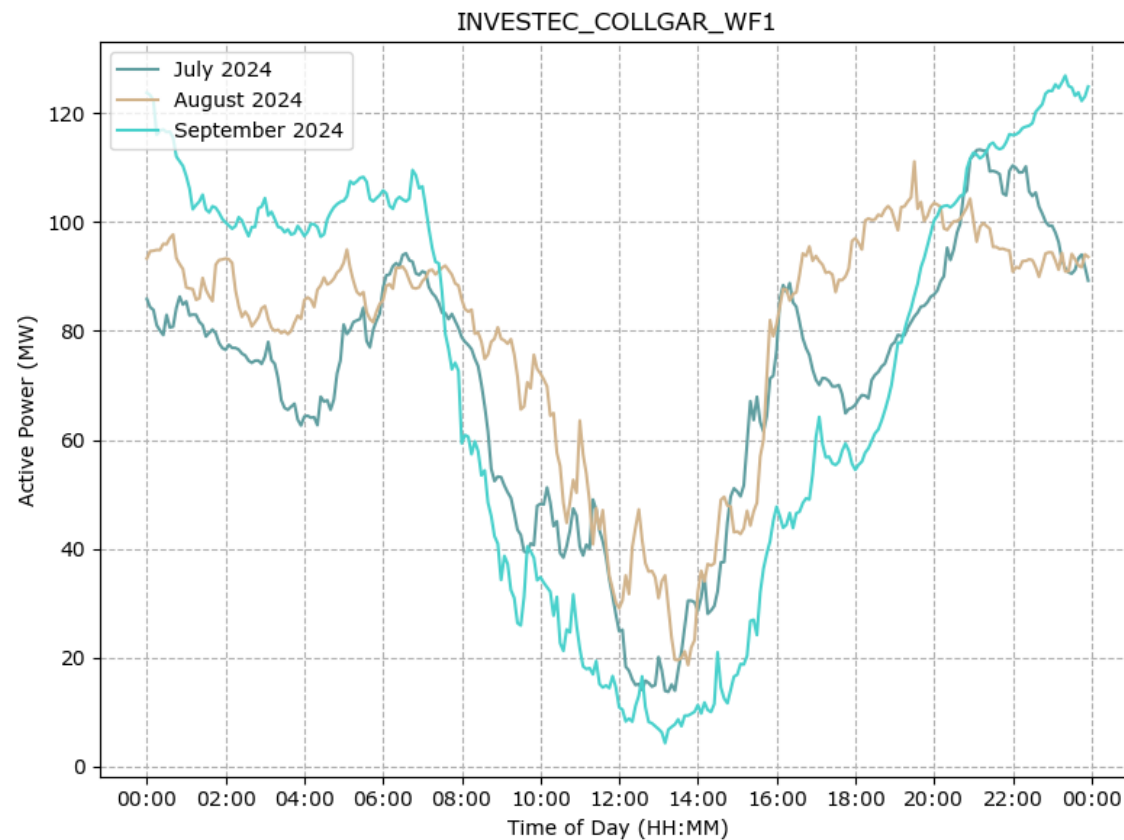
Collgar Wind Farm

Wind Semi-Scheduled Facility, 218.5 MW, Collgar Renewables

Generation Duration Curves



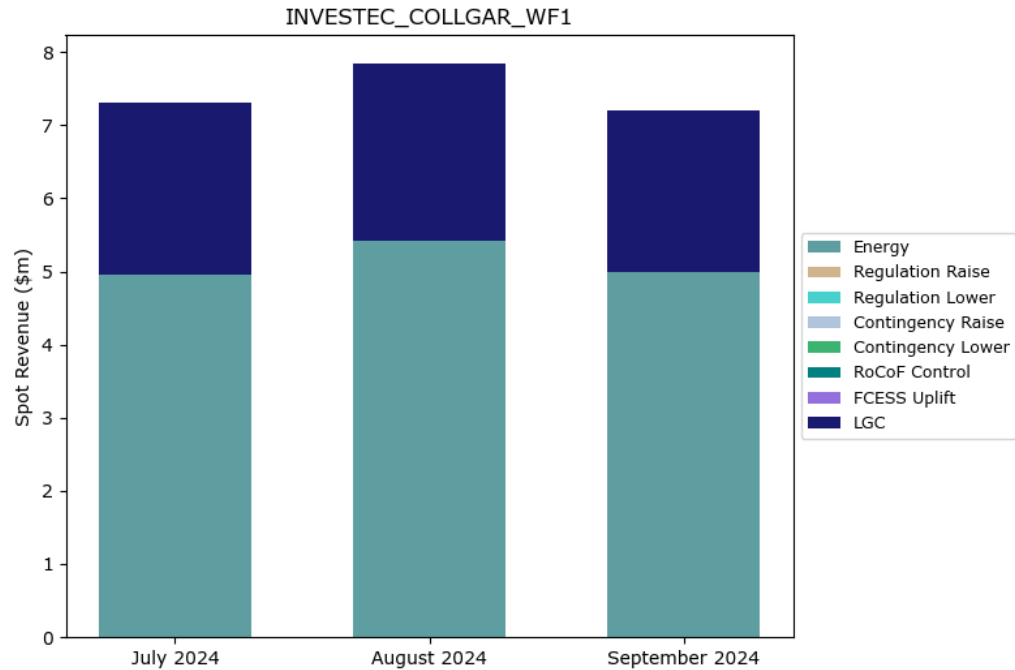
Average Time-of-Day Output



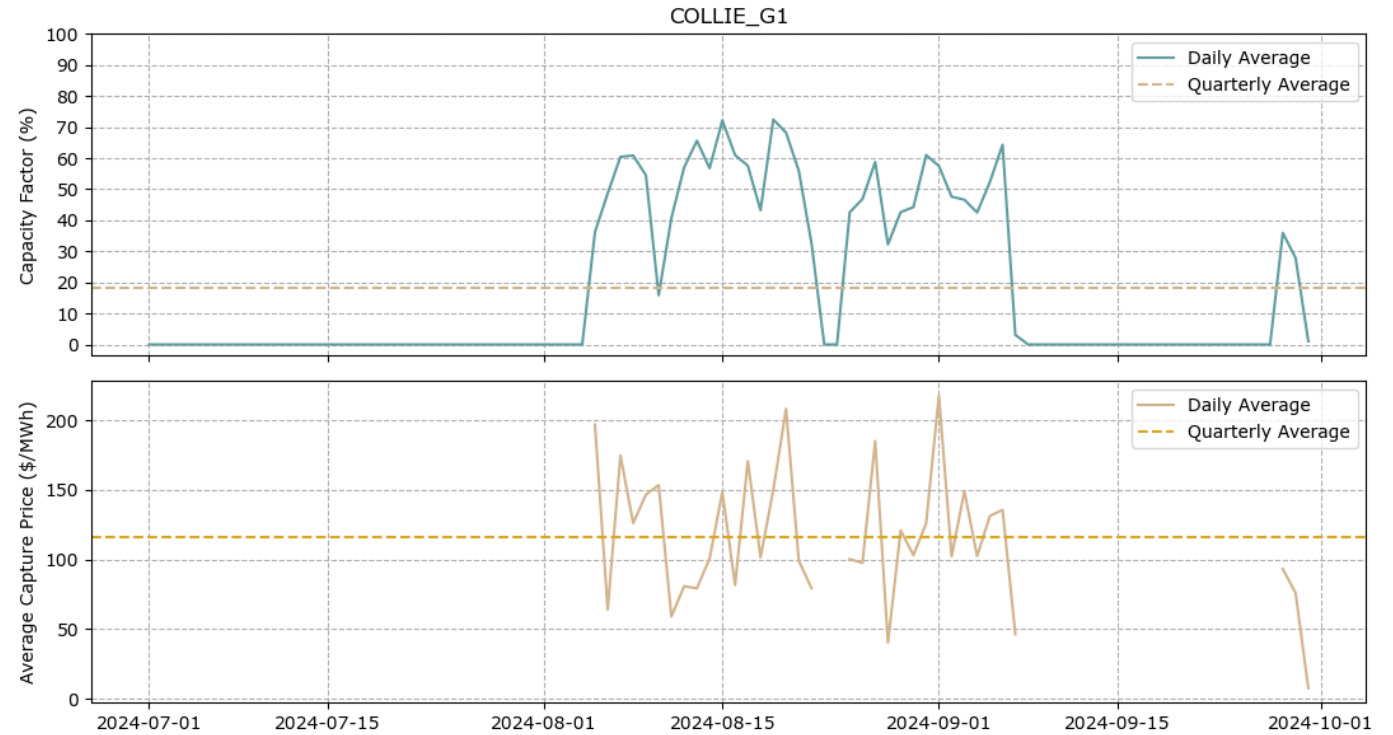
Collgar Wind Farm

Wind Semi-Scheduled Facility, 218.5 MW, Collgar Renewables

Facility Merchant Spot Revenue



Daily Capacity Factor and Average Energy Capture Price

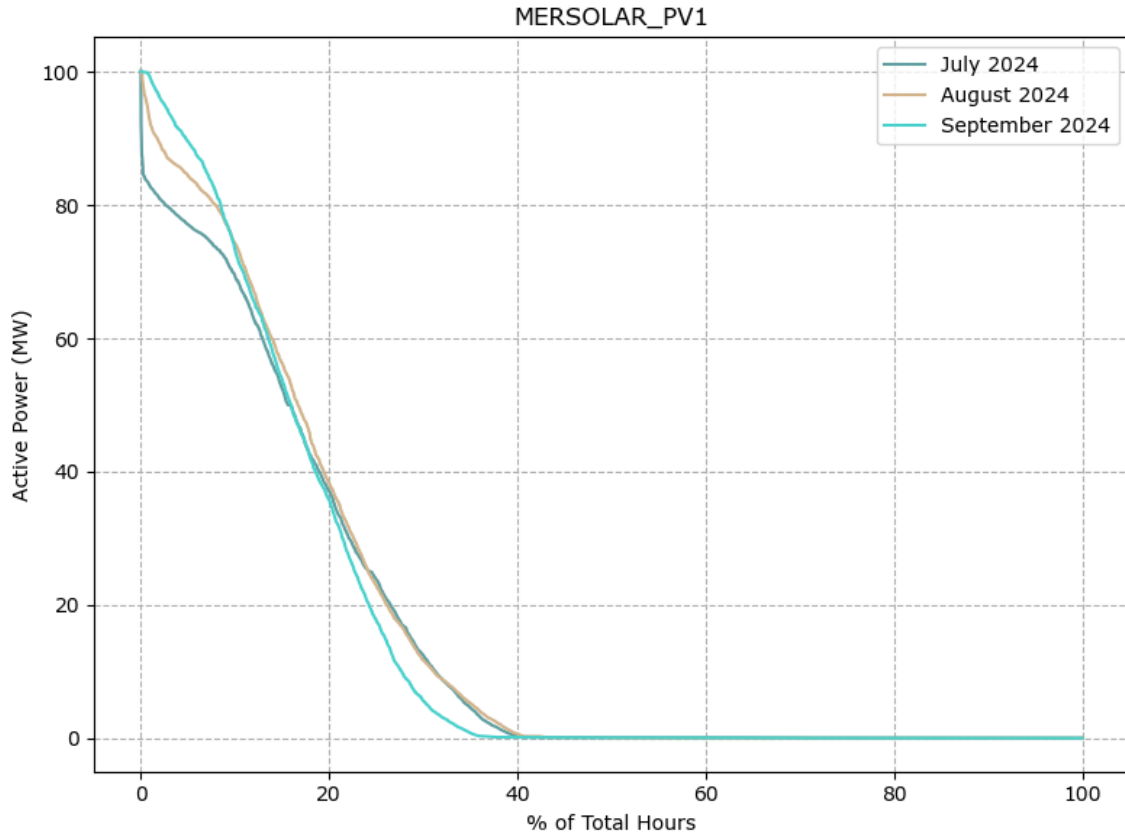


| | Jul 2024 | Aug 2024 | Sep 2024 |
|--------------------------|-----------------|-----------------|-----------------|
| Energy Generated (GWh) | 51.23 | 53.32 | 50.61 |
| Total Spot Revenue (\$m) | 7.31 | 7.84 | 7.20 |
| \$ / MWh | \$142.79 | \$147.10 | \$142.24 |

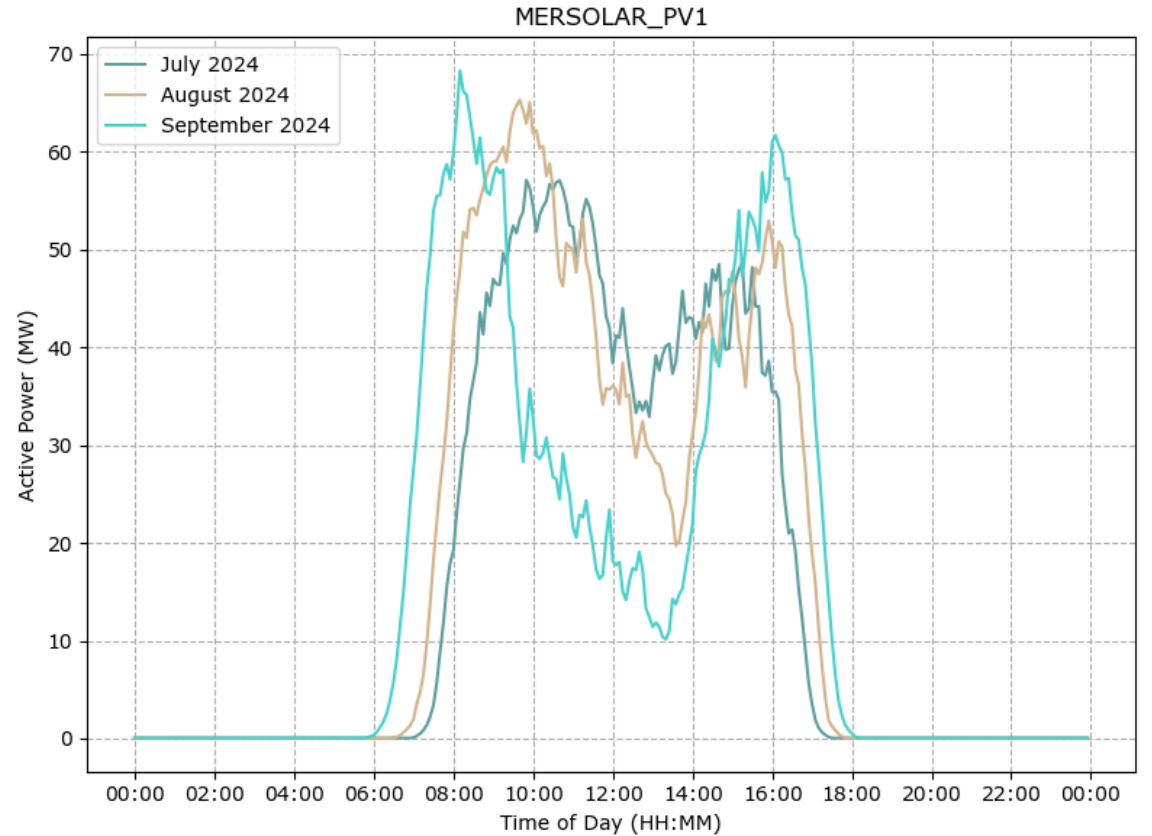
Merredin Solar Farm

Solar PV Semi-Scheduled Facility, 100 MW, SUN Energy

Generation Duration Curves



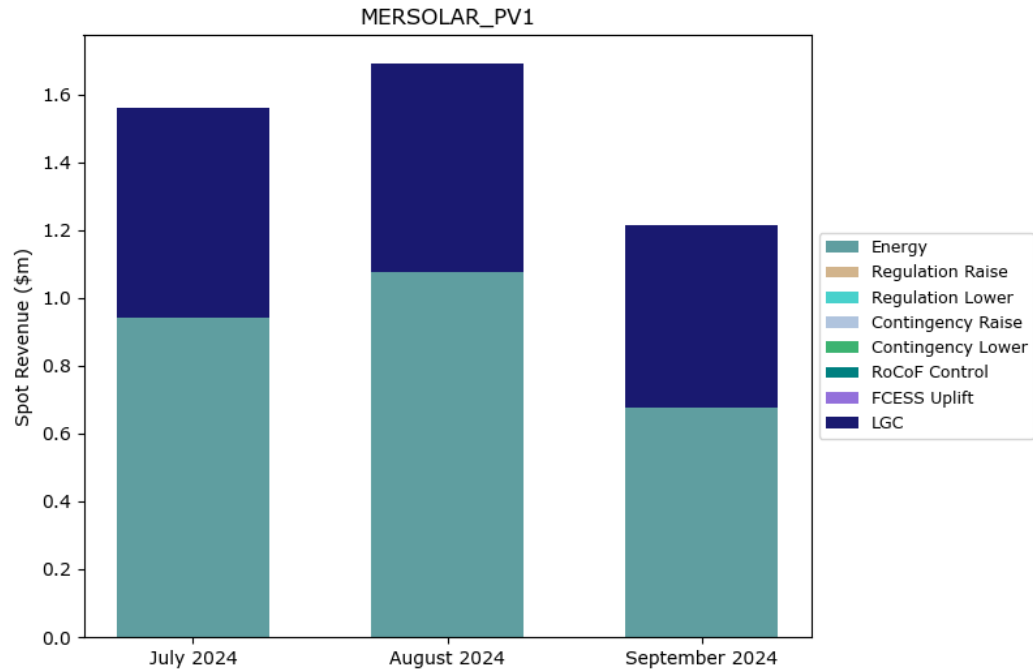
Average Time-of-Day Output



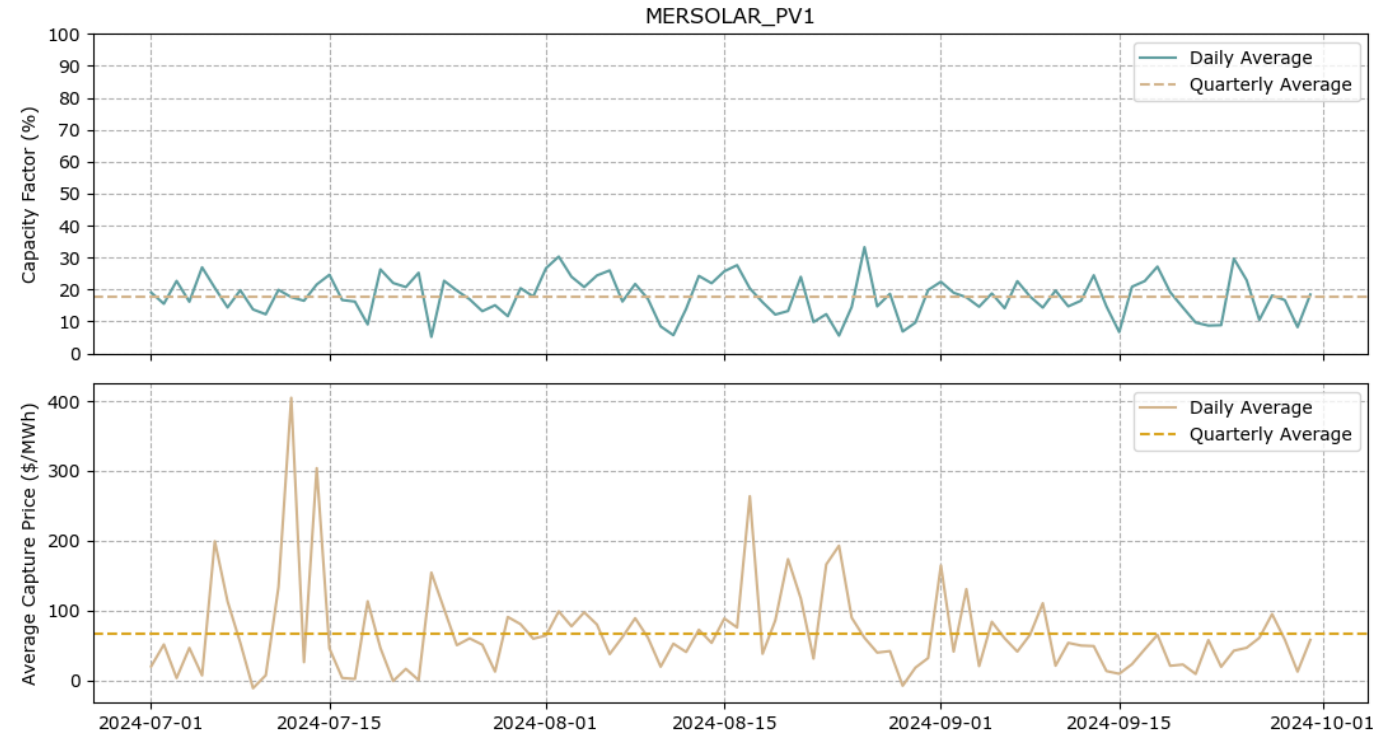
Merredin Solar Farm

Solar PV Semi-Scheduled Facility, 100 MW, SUN Energy

Facility Merchant Spot Revenue



Daily Capacity Factor and Average Energy Capture Price

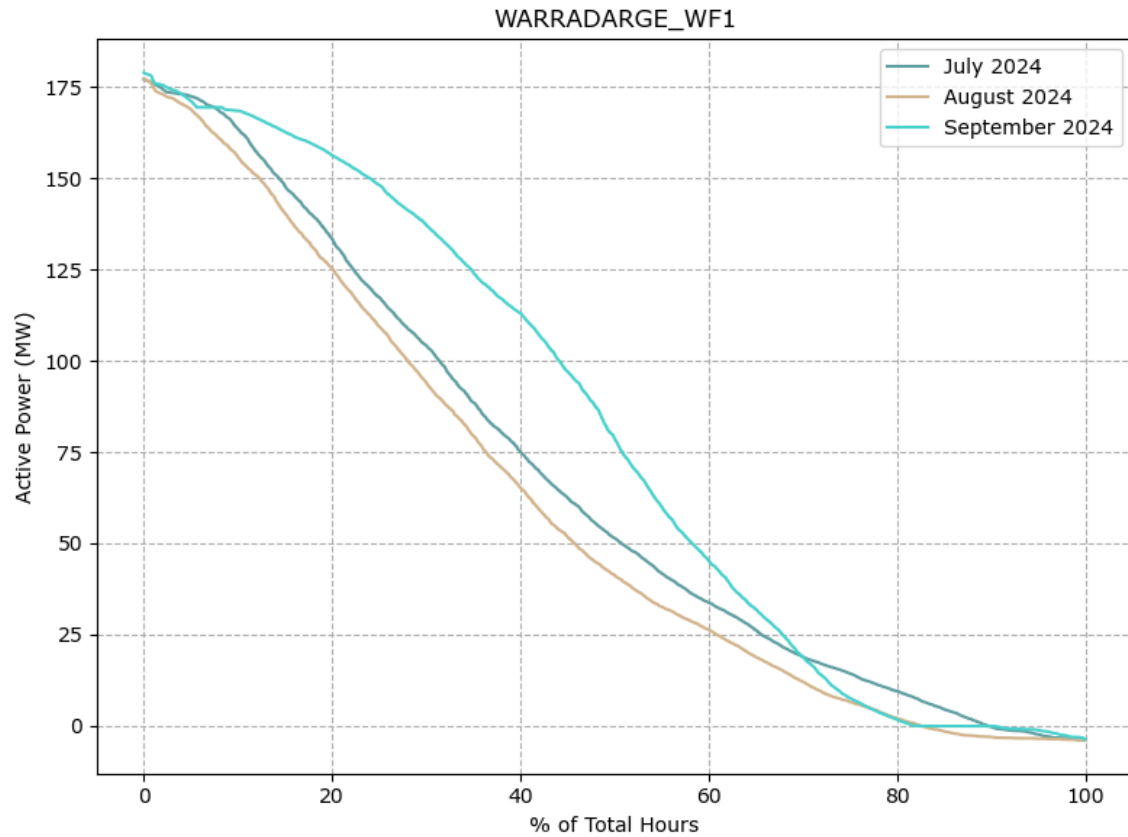


| | Jul 2024 | Aug 2024 | Sep 2024 |
|--------------------------|-----------------|-----------------|----------------|
| Energy Generated (GWh) | 13.45 | 13.58 | 12.33 |
| Total Spot Revenue (\$m) | 1.56 | 1.69 | 1.21 |
| \$ / MWh | \$116.07 | \$124.51 | \$98.33 |

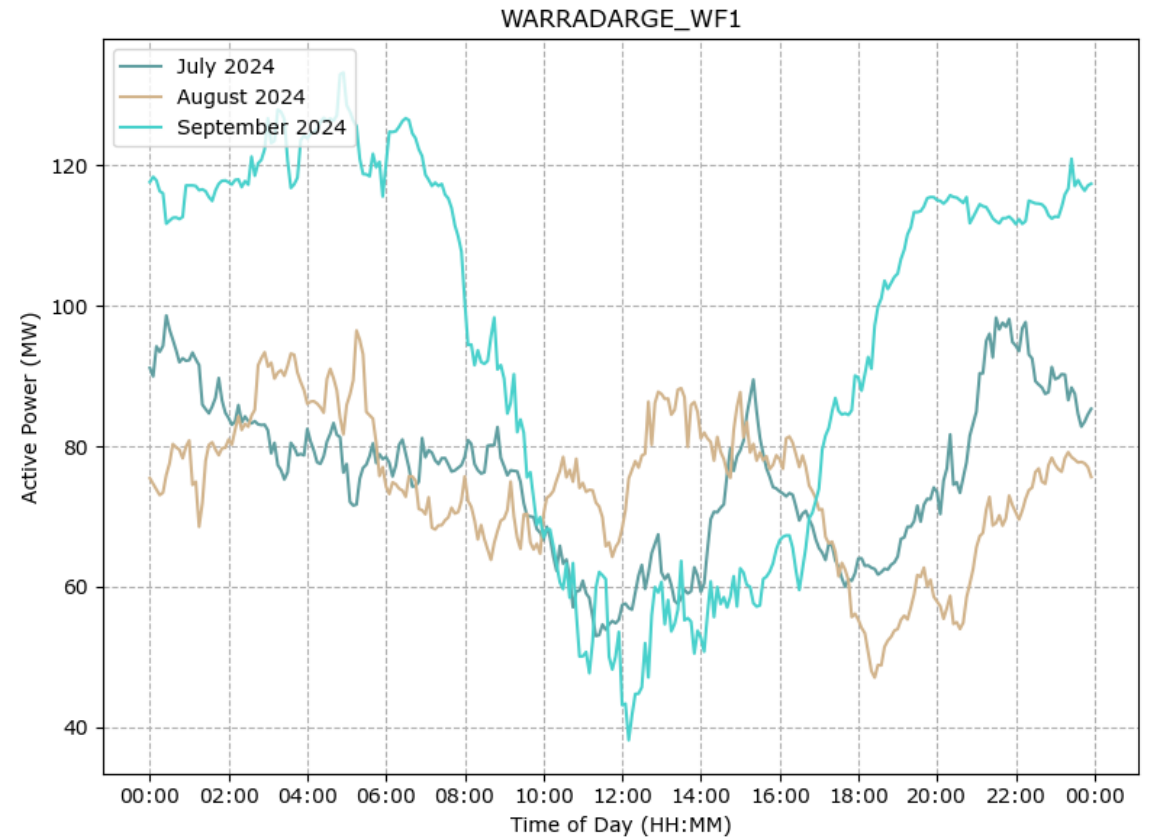
Warradarge Wind Farm

Wind Semi-Scheduled Facility, 180 MW, Bright Energy Investments

Generation Duration Curves



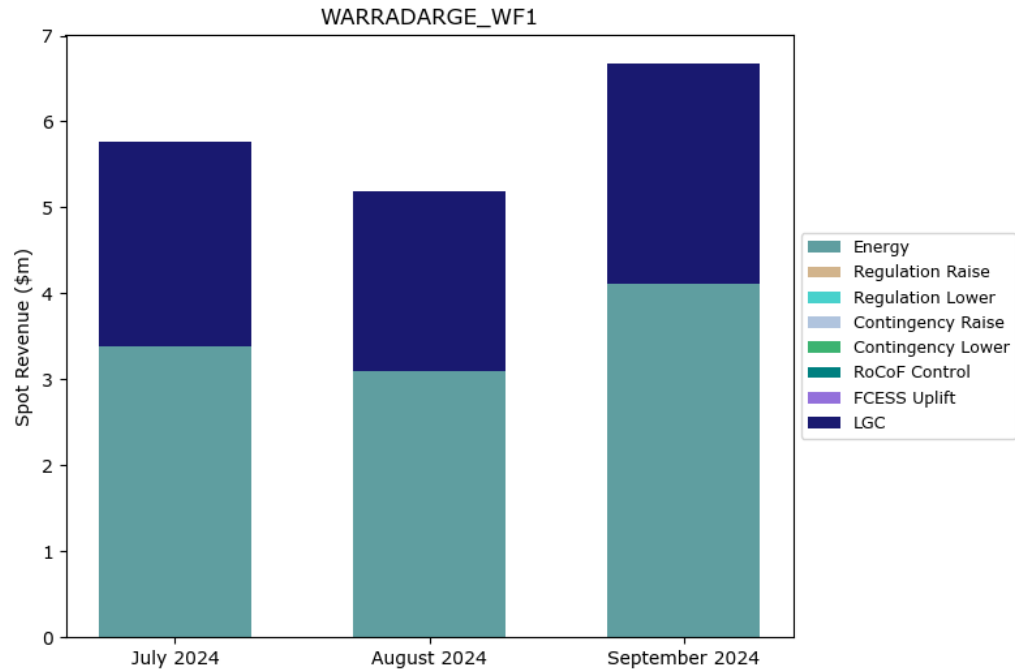
Average Time-of-Day Output



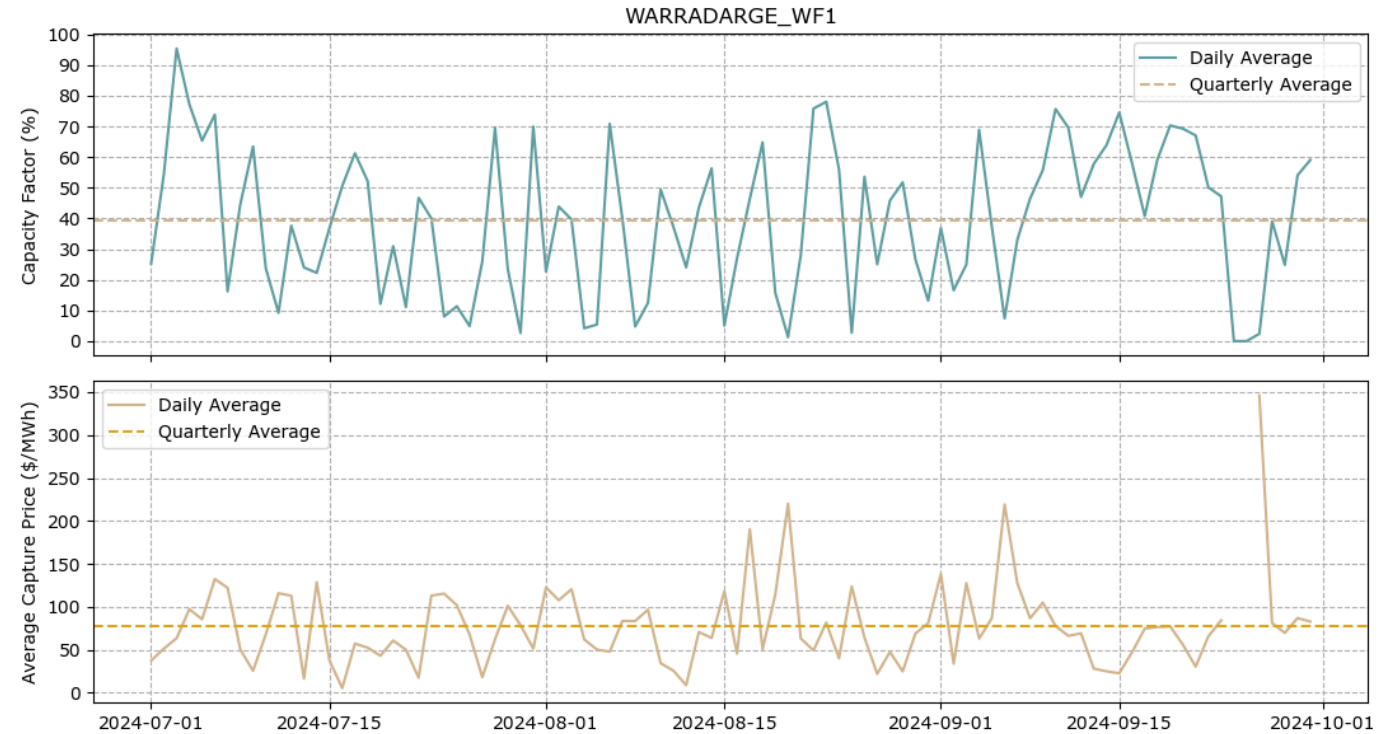
Warradarge Wind Farm

Wind Semi-Scheduled Facility, 180 MW, Bright Energy Investments

Facility Merchant Spot Revenue



Daily Capacity Factor and Average Energy Capture Price

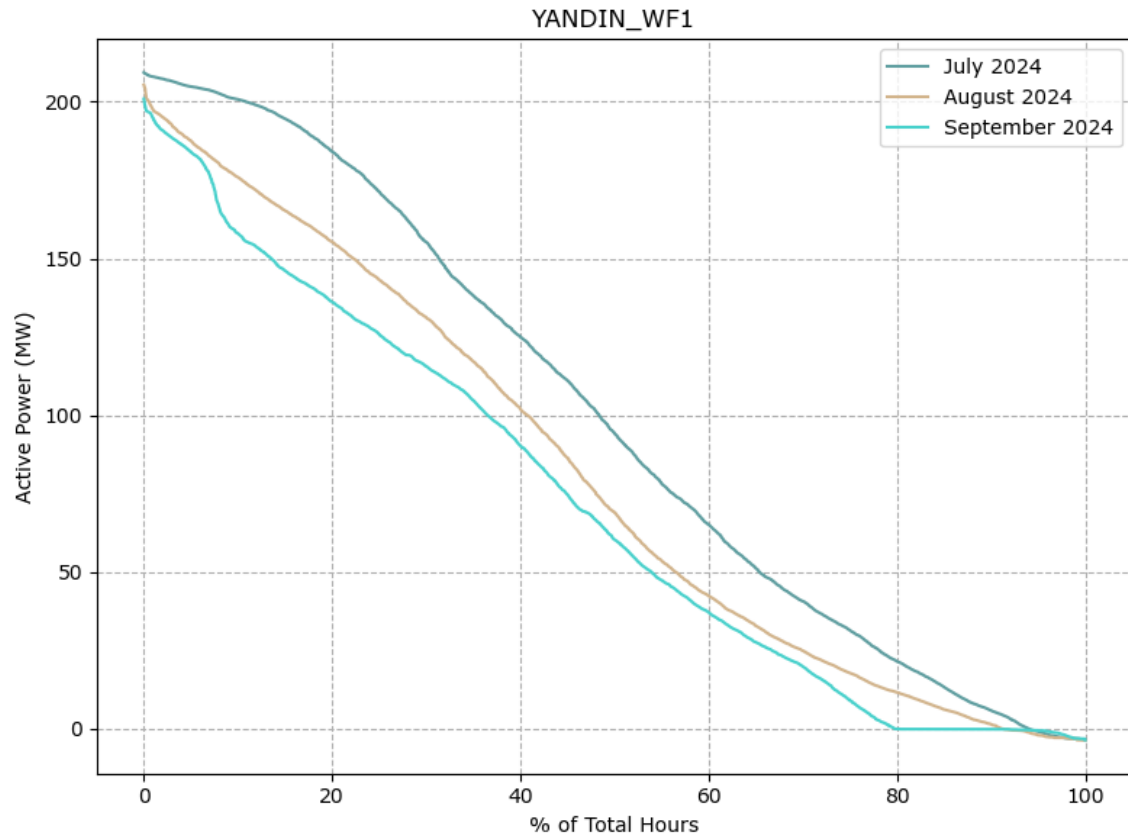


| | Jul 2024 | Aug 2024 | Sep 2024 |
|--------------------------|-----------------|-----------------|-----------------|
| Energy Generated (GWh) | 51.41 | 46.26 | 58.61 |
| Total Spot Revenue (\$m) | 5.76 | 5.19 | 6.67 |
| \$ / MWh | \$112.07 | \$112.23 | \$113.86 |

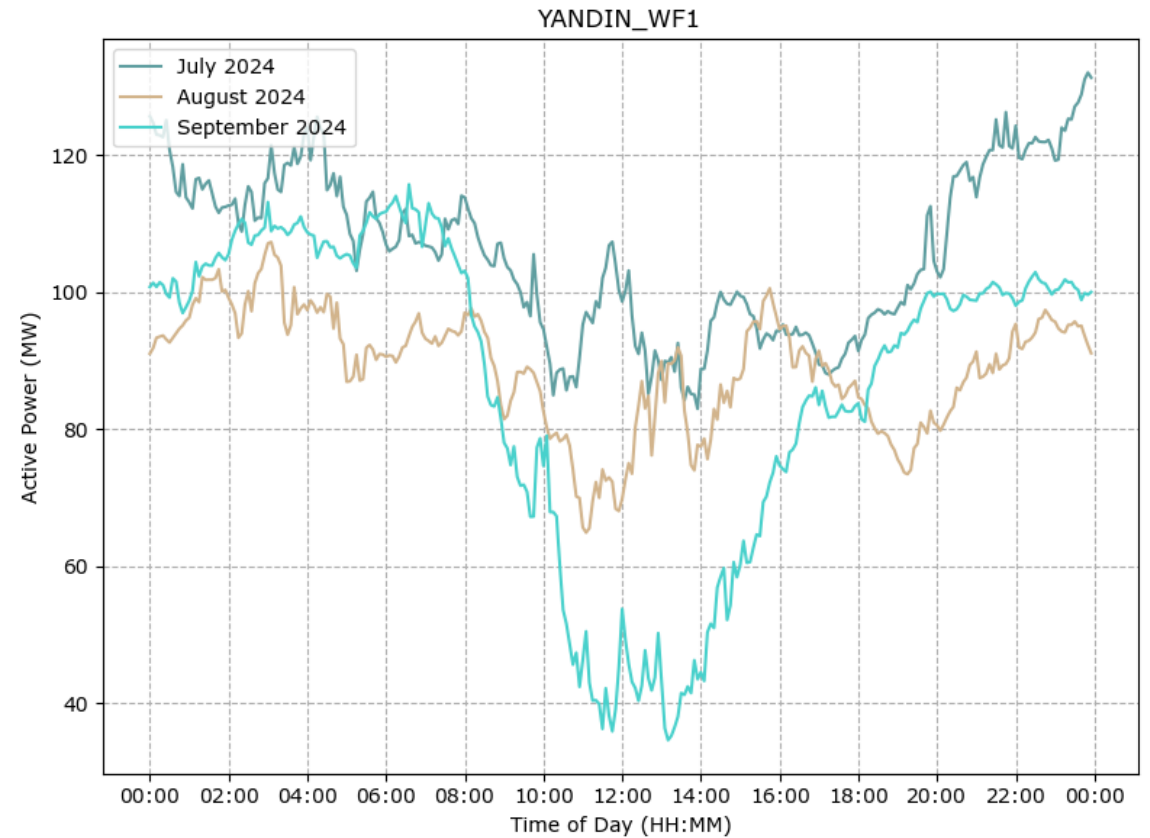
Yandin Wind Farm

Wind Semi-Scheduled Facility, 214.2 MW, Alinta Energy

Generation Duration Curves



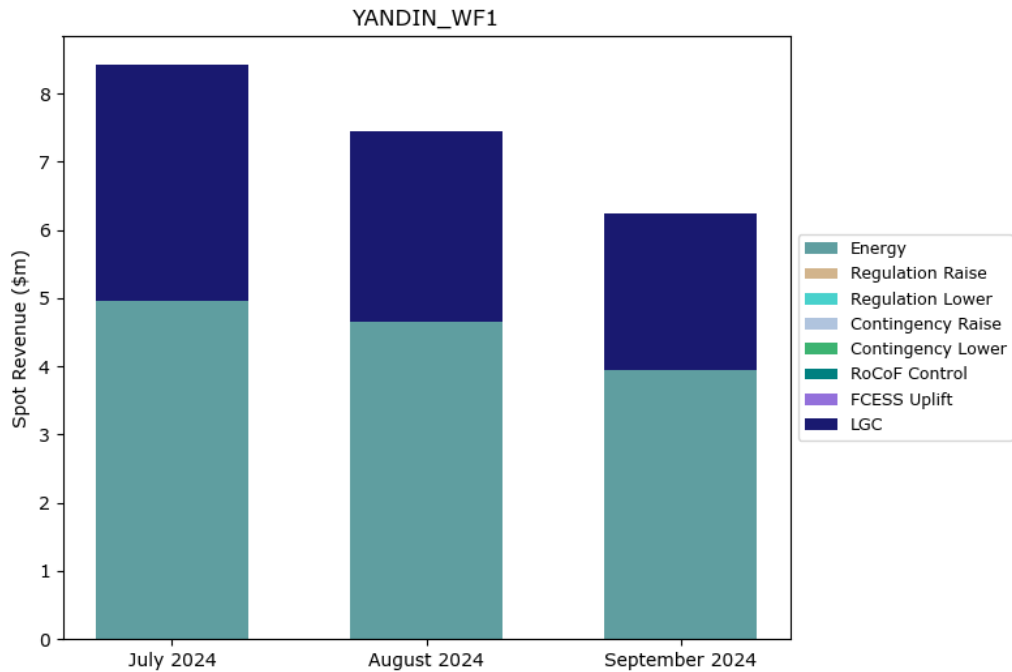
Average Time-of-Day Output



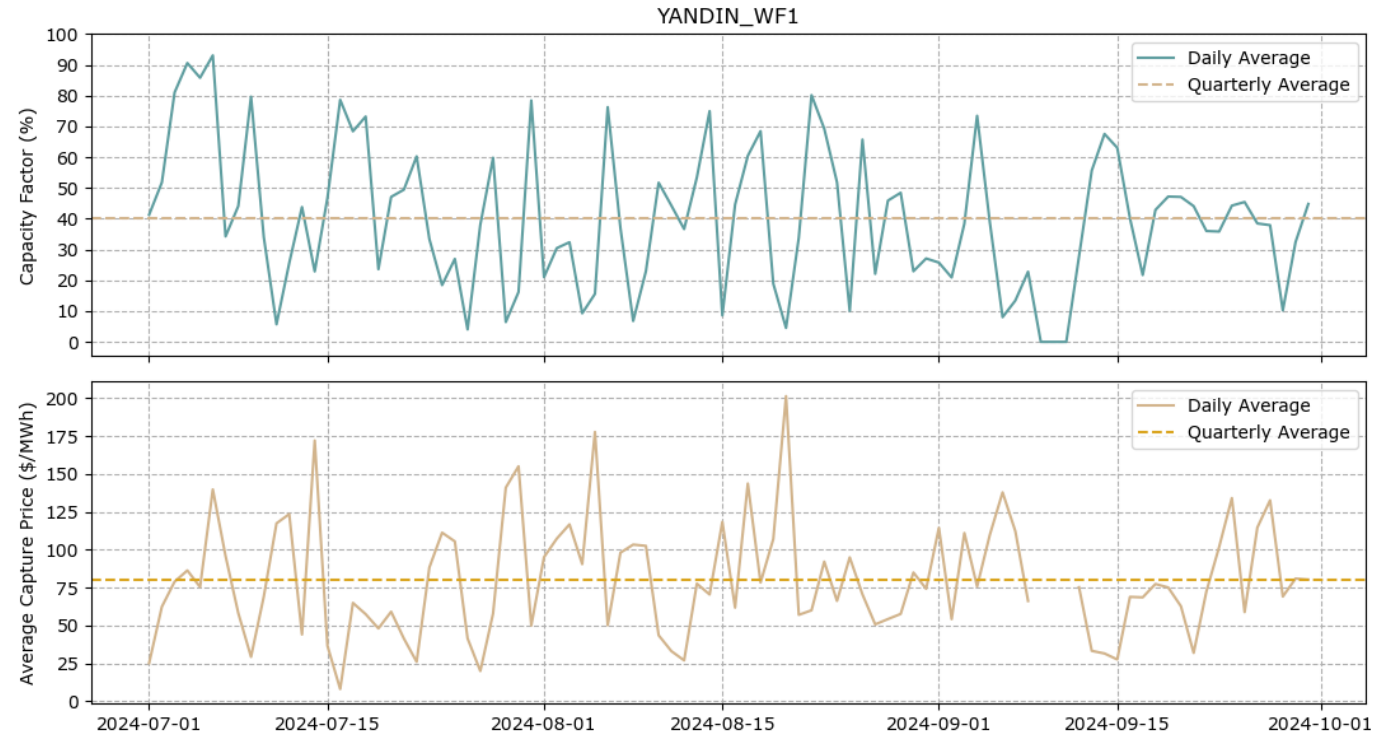
Yandin Wind Farm

Wind Semi-Scheduled Facility, 214.2 MW, Alinta Energy

Facility Merchant Spot Revenue



Daily Capacity Factor and Average Energy Capture Price



| | Jul 2024 | Aug 2024 | Sep 2024 |
|--------------------------|-----------------|-----------------|-----------------|
| Energy Generated (GWh) | 75.19 | 61.45 | 52.64 |
| Total Spot Revenue (\$m) | 8.42 | 7.44 | 6.23 |
| \$ / MWh | \$112.00 | \$121.13 | \$118.37 |



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