

Barr River hydro scheme Monthly report – July 2023

1 Summary

A strong month on the back of unseasonal wet weather. Few operational issues.

2 Monthly generation & revenue

| Parameter | Value |
|---|---------|
| Actual generation (FIT meter), kWh | 374,109 |
| Average generation in month, kWh | 165,261 |
| Forecast generation in month (P50), kWh | 195,146 |
| Actual relative to forecast | 191.7% |
| Rainfall relative to 1991-2020 average by month | 152% |
| Calculated generation ¹ kWh | 377,850 |
| Actual relative to calculated generation, kWh | -3,741 |
| Actual relative to calculated generation, % | -1.0% |
| Approximate revenue in month ² | £52,099 |

¹ Calculated generation is based on river level data and seeks to establish the expected generation with no performance issues. ² Export revenue based on reported export and estimated GDUoS charges.

| Export meter | Value |
|-----------------------------|---------|
| Export, kWh | 369,034 |
| Variance to generation, kWh | -5,075 |
| Variance to generation, % | -1.4% |



3 System reporting





4.1 Scheme anomalies to calculated generation

| Date/time | Details | Action required |
|-----------|---------|-----------------|
| None | | |

4.2 Other system events

| Date/time | Details | Action required |
|-----------|---------|-----------------|
| None | | |

4.3 Head loss

| Target head loss at full power Current head loss at full power | | Status |
|--|--------|--|
| 14.5m | 16.27m | Significantly increased and above target. Pigging by D A MacDonald instructed. |





4.4 Temperatures

| Parameter | Temperature at or near full power, ^o C | Alert level, ⁰C | Parameter | Temperature at or near full power, ⁰C | Alert level, ^o C |
|-------------------------|--|-----------------|---------------------|--|-----------------------------|
| Generator DE bearing | 39 | 85 | Generator winding 1 | 68 | 145 |
| Generator NDE bearing 1 | 45 | 85 | Generator winding 2 | 66 | 145 |
| Generator NDE bearing 2 | 48 | 85 | Generator winding 3 | 69 | 145 |
| Turbine room | 24 | 30 | Power cabinet (RG1) | 31 | 42 |

4.5 Vibration

| Parameter | Vibration at or near full power, mm/s | Alert level, mm/s | Alert level, mm/s Pa | | Vibration at or near full power, mm/s | Alert level, mm/s |
|--------------|--|-------------------|----------------------|---------------|--|-------------------|
| Generator DE | 0.45 | 3.0 | | Generator NDE | 1.17 | 3.0 |



4.6 Recommended and ongoing actions

| Action | Responsibility | Status |
|--|----------------|---|
| Install power quality monitoring equipment at grid connection to address grid trips affecting the generator breaker and requiring a site visit. | GHC | GHC remain in painful discussion with SSEN regarding what can be learned from the data available and obtaining more data. It seems that they can only capture 2 weeks of data at a time. |
| Chase SSE for details of planned outage in 2024 | GHC | RH has had one high level meeting with SSE regarding this. GHC continue to keep up the pressure on SSEN to try to reduce this outage. Communication will now involve other scheme operators. |
| Housekeeping in turbine house | MorVolts | Spares to be arranged on shelves/in cupboard. Underway. |
| Spares stock to be reviewed | Morvolts/GHC | CINK asked to review spares list and advise if any other spares recommended – CINK chased, no response yet. Morvolts to check current spares inventory. Transformer breaker spares requirement to be checked by RB Switchgear on next attendance (note – will require HV isolation and therefore AP attendance). |
| Maintenance schedule and training to be reviewed | GHC | GHC have propose a simplified maintenance schedule. This will be discussed with Morvolts on site at the annual visit on 1 st September. |
| Arrangements to be established with Colin Thwaites for HV switching/isolation | Morvolts | MorVolts to confirm that Colin has been appointed as AP. Padlocks to be changed to Colin's locks. |
| Chase up export payment for late January and early February when scheme was generating but no export recorded. | Morvolts | Raised with EDF and SCADA data provided. Chased again by GHC 21/6/23 and followed up 19/7/23. |
| Missing data from March export statement | GHC | Should be automatically updated but raised with EDF and SCADA supplied. Chased 31/6/2023. |



5 Rainfall



| Rainfall this month (rain gauge), mm | 154 |
|--|------|
| Western Scotland rainfall in month with respect to 1991-2020 long term average | 152% |



6 Scheme annual performance summary

| FY 2023/4 | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Total |
|---|---|---|---|--|--|---|--|---|---|--|--|--|--|
| Actual generation kWh | 240,542 | 57,453 | 111,100 | 374,109 | | | | | | | | | 783,204 |
| Average generation since commissioning | 247,605 | 424,386 | 286,501 | 165,261 | 174,610 | 297,736 | 672,489 | 693,043 | 368,179 | 594,556 | 547,677 | 298,520 | 1,123,753 |
| Forecast generation (P50) | 369,360 | 226,766 | 188,561 | 195,146 | 280,601 | 387,431 | 582,631 | 618,214 | 620,057 | 695,941 | 554,678 | 611,047 | 979,833 |
| Actual relative to forecast | 65.1% | 25.3% | 58.9% | 191.7% | | | | | | | | | 79.9% |
| Rainfall relative to 1991-2020 average | 83% | 45% | 81% | 152% | | | | | | | | | 90% |
| Calculated generation kWh | 243,307 | 59,162 | 112,194 | 377,850 | | | | | | | | | 792,513 |
| Variance to calculated generation kWh | -2,765 | -1,709 | -1,094 | -3,741 | - | - | - | - | - | - | - | - | -9,309 |
| Variance to calculated generation % | -1.1% | -2.9% | -1.0% | -1.0% | | | | | | | | | -1.2% |
| Approximate revenue | £18,747 | £7,087 | £14,675 | £52,099 | | | | | | | | | £107,354 |
| Capacity factor (monthly) | 20.6% | 4.8% | 9.5% | 31.0% | | | | | | | | | 16.5% |
| Industry wide RoR capacity factor | | | | | | | | | | | | | |
| FY 2022/3 | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | YTD |
| | - | - | | | | | | | | | | | |
| Actual generation kWh | 247,605 | 424,386 | 286,501 | 329,058 | 257,505 | 238,578 | 692,787 | 709,873 | 223,709 | 633,347 | 447,449 | 356,352 | 4,847,150 |
| Actual generation kWh Average generation since commissioning | 247,605 247,605 | 424,386 424,386 | 286,501 286,501 | 329,058 165,261 | 257,505 174,610 | 238,578 297,736 | 692,787 672,489 | 709,873 693,043 | 223,709 368,179 | 633,347 594,556 | 447,449 547,677 | 356,352 298,520 | 4,847,150 4,770,561 |
| Actual generation kWh Average generation since commissioning Forecast generation (P50) | 247,605 247,605 369,360 | 424,386 424,386 226,766 | 286,501 286,501 188,561 | 329,058 165,261 195,146 | 257,505 174,610 280,601 | 238,578 297,736 387,431 | 692,787 672,489 582,631 | 709,873 693,043 618,214 | 223,709 368,179 620,057 | 633,347 594,556 695,941 | 447,449 547,677 554,678 | 356,352 298,520 611,047 | 4,847,150 4,770,561 5,330,433 |
| Actual generation kWh Average generation since commissioning Forecast generation (P50) Actual relative to forecast | 247,605 247,605 369,360 67.0% | 424,386 424,386 226,766 187.1% | 286,501 286,501 188,561 151.9% | 329,058 165,261 195,146 168.6% | 257,505 174,610 280,601 91.8% | 238,578 297,736 387,431 61.6% | 692,787 672,489 582,631 118.9% | 709,873 693,043 618,214 114.8% | 223,709 368,179 620,057 36.1% | 633,347 594,556 695,941 91.0% | 447,449 547,677 554,678 80.7% | 356,352 298,520 611,047 58.3% | 4,847,150 4,770,561 5,330,433 90.9% |
| Actual generation kWh Average generation since commissioning Forecast generation (P50) Actual relative to forecast Rainfall relative to 1991-2020 average | 247,605 247,605 369,360 67.0% 77% | 424,386 424,386 226,766 187.1% 126% | 286,501 286,501 188,561 151.9% 104% | 329,058 165,261 195,146 168.6% 74% | 257,505 174,610 280,601 91.8% 65% | 238,578 297,736 387,431 61.6% 93% | 692,787 672,489 582,631 118.9% 134% | 709,873 693,043 618,214 114.8% 112% | 223,709 368,179 620,057 36.1% 89% | 633,347 594,556 695,941 91.0% 104% | 447,449 547,677 554,678 80.7% 56% | 356,352 298,520 611,047 58.3% 118% | 4,847,150 4,770,561 5,330,433 90.9% 96% |
| Actual generation kWh Average generation since commissioning Forecast generation (P50) Actual relative to forecast Rainfall relative to 1991-2020 average Calculated generation kWh | 247,605 247,605 369,360 67.0% 77% 253,540 | 424,386 424,386 226,766 187.1% 126% 432,296 | 286,501 286,501 188,561 151.9% 104% 294,437 | 329,058 165,261 195,146 168.6% 74% 330,341 | 257,505 174,610 280,601 91.8% 65% 257,587 | 238,578 297,736 387,431 61.6% 93% 239,724 | 692,787 672,489 582,631 118.9% 134% 700,013 | 709,873 693,043 618,214 114.8% 112% 748,966 | 223,709 368,179 620,057 36.1% 89% 295,507 | 633,347 594,556 695,941 91.0% 104% 639,670 | 447,449 547,677 554,678 80.7% 56% 459,640 | 356,352 298,520 611,047 58.3% 118% 358,262 | 4,847,150 4,770,561 5,330,433 90.9% 96% 5,009,984 |
| Actual generation kWh Average generation since commissioning Forecast generation (P50) Actual relative to forecast Rainfall relative to 1991-2020 average Calculated generation kWh Variance to calculated generation kWh | 247,605 247,605 369,360 67.0% 77% 253,540 -5,935 | 424,386 424,386 226,766 187.1% 126% 432,296 -7,910 | 286,501 286,501 188,561 151.9% 104% 294,437 -7,936 | 329,058 165,261 195,146 168.6% 74% 330,341 -1,283 | 257,505 174,610 280,601 91.8% 65% 257,587 -82 | 238,578 297,736 387,431 61.6% 93% 239,724 -1,146 | 692,787 672,489 582,631 118.9% 134% 700,013 -7,226 | 709,873 693,043 618,214 114.8% 112% 748,966 -39,093 | 223,709 368,179 620,057 36.1% 89% 295,507 -71,798 | 633,347 594,556 695,941 91.0% 104% 639,670 -6,323 | 447,449 547,677 554,678 80.7% 56% 459,640 -12,191 | 356,352 298,520 611,047 58.3% 118% 358,262 -1,910 | 4,847,150 4,770,561 5,330,433 90.9% 96% 5,009,984 -162,834 |
| Actual generation kWh Average generation since commissioning Forecast generation (P50) Actual relative to forecast Rainfall relative to 1991-2020 average Calculated generation kWh Variance to calculated generation kWh | 247,605 247,605 369,360 67.0% 77% 253,540 -5,935 -2.3% | 424,386 424,386 226,766 187.1% 126% 432,296 -7,910 -1.8% | 286,501 286,501 188,561 151.9% 104% 294,437 -7,936 -2.7% | 329,058 165,261 195,146 168.6% 74% 330,341 -1,283 -0.4% | 257,505 174,610 280,601 91.8% 65% 257,587 -82 -0.0% | 238,578 297,736 387,431 61.6% 93% 239,724 -1,146 -0.5% | 692,787 672,489 582,631 118.9% 134% 700,013 -7,226 -1.0% | 709,873 693,043 618,214 114.8% 112% 748,966 -39,093 -5.2% | 223,709 368,179 620,057 36.1% 89% 295,507 -71,798 -24.3% | 633,347 594,556 695,941 91.0% 104% 639,670 -6,323 -1.0% | 447,449 547,677 554,678 80.7% 56% 459,640 -12,191 -2.7% | 356,352 298,520 611,047 58.3% 118% 358,262 -1,910 -0.5% | 4,847,150 4,770,561 5,330,433 90.9% 96% 5,009,984 -162,834 -3.3% |
| Actual generation kWhAverage generation since commissioningForecast generation (P50)Actual relative to forecastRainfall relative to 1991-2020 averageCalculated generation kWhVariance to calculated generation kWhVariance to calculated generation %Approximate revenue1 | 247,605 247,605 369,360 67.0% 77% 253,540 -5,935 -2.3% £28,994 | 424,386 424,386 226,766 187.1% 126% 432,296 -7,910 -1.8% £50,244 | 286,501 286,501 188,561 151.9% 104% 294,437 -7,936 -2.7% £33,677 | 329,058 165,261 195,146 168.6% 74% 330,341 -1,283 -0.4% £38,789 | 257,505 174,610 280,601 91.8% 65% 257,587 -82 -0.0% £30,177 | 238,578 297,736 387,431 61.6% 93% 239,724 -1,146 -0.5% £27,894 | 692,787 672,489 582,631 118.9% 134% 700,013 -7,226 -1.0% £108,061 | 709,873 693,043 618,214 114.8% 112% 748,966 -39,093 -5.2% £111,476 | 223,709 368,179 620,057 36.1% 89% 295,507 -71,798 -24.3% £34,832 | 633,347 594,556 695,941 91.0% 104% 639,670 -6,323 -1.0% £44,660 | 447,449 547,677 554,678 80.7% 56% 459,640 -12,191 -2.7% £31,298 | 356,352 298,520 611,047 58.3% 118% 358,262 -1,910 -0.5% £52,804 | 4,847,150 4,770,561 5,330,433 90.9% 96% 5,009,984 -162,834 -3.3% £669,447 |
| Actual generation kWhAverage generation since commissioningForecast generation (P50)Actual relative to forecastRainfall relative to 1991-2020 averageCalculated generation kWhVariance to calculated generation kWhVariance to calculated generation %Approximate revenue1Capacity factor (monthly) | 247,605 247,605 369,360 67.0% 77% 253,540 -5,935 -2.3% £28,994 20.5% | 424,386 424,386 226,766 187.1% 126% 432,296 -7,910 -1.8% £50,244 39.0% | 286,501 286,501 188,561 151.9% 104% 294,437 -7,936 -2.7% £33,677 23.8% | 329,058 165,261 195,146 168.6% 74% 330,341 -1,283 -0.4% £38,789 28.2% | 257,505 174,610 280,601 91.8% 65% 257,587 -82 -0.0% £30,177 21.4% | 238,578 297,736 387,431 61.6% 93% 239,724 -1,146 -0.5% £27,894 20.5% | 692,787 672,489 582,631 118.9% 134% 700,013 -7,226 -1.0% £108,061 57.5% | 709,873 693,043 618,214 114.8% 112% 748,966 -39,093 -5.2% £111,476 60.9% | 223,709 368,179 620,057 36.1% 89% 295,507 -71,798 -24.3% £34,832 18.6% | 633,347 594,556 695,941 91.0% 104% 639,670 -6,323 -1.0% £44,660 52.5% | 447,449 547,677 554,678 80.7% 56% 459,640 -12,191 -2.7% £31,298 41.1% | 356,352 298,520 611,047 58.3% 118% 358,262 -1,910 -0.5% £52,804 29.6% | 4,847,150 4,770,561 5,330,433 90.9% 96% 5,009,984 -162,834 -3.3% £669,447 34.2% |

¹Export element of revenue updated to reflect actual export and rate.



