



Barr River hydro scheme

Monthly report – April 2023

1 Summary

A poor month due to low rainfall. Head loss significantly above target reinforcing the need to pig the penstock. Morvolts to confirm that this work has been commissioned. Missing export data issues are being chased up with EDF.

2 Monthly generation & revenue

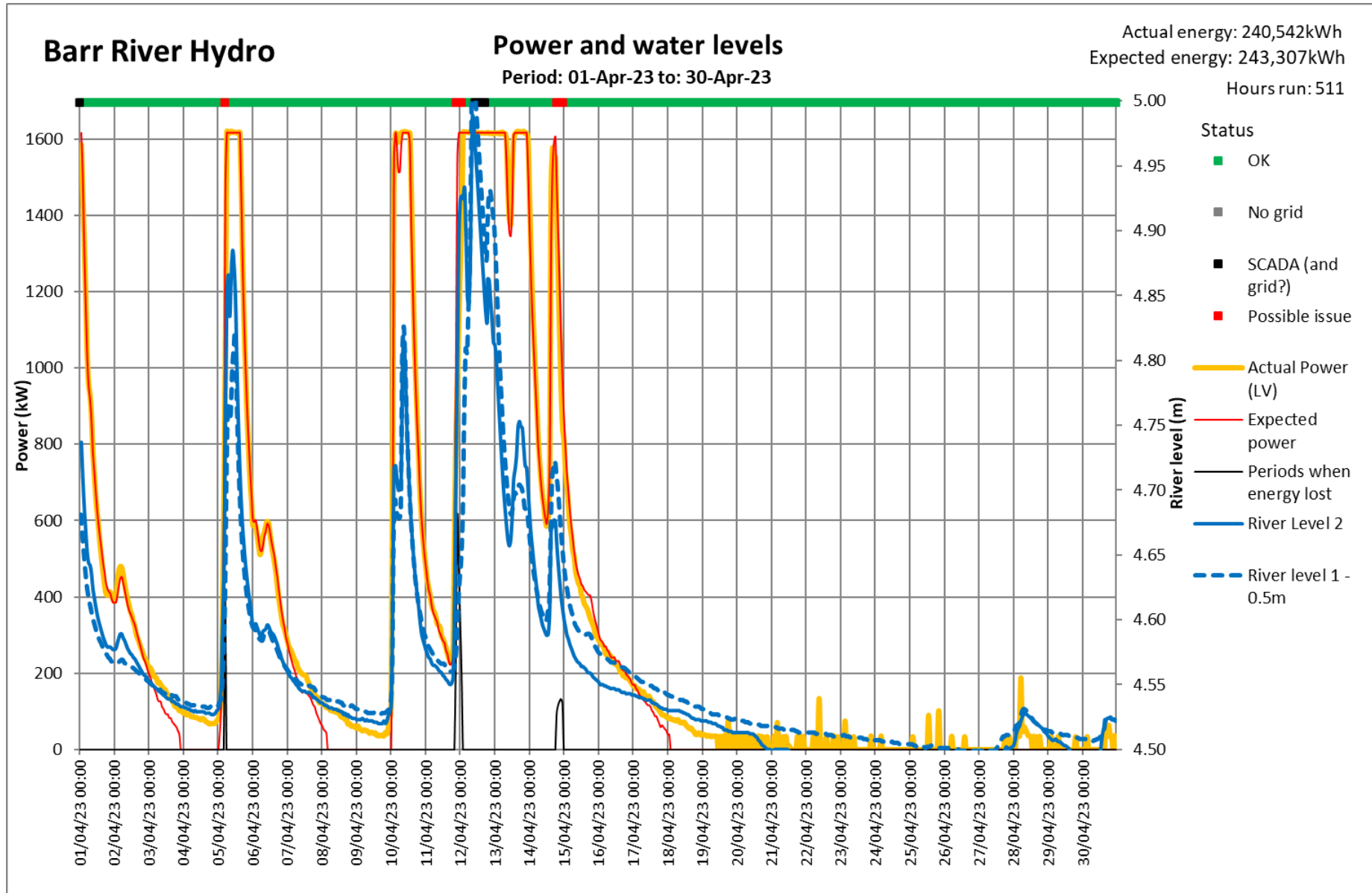
Parameter	Value
Actual generation (FIT meter), kWh	240,542
Average generation in month, kWh	247,605
Forecast generation in month (P50), kWh	369,360
Actual relative to forecast	65.1%
Rainfall relative to 1991-2020 average by month	83%
Calculated generation ¹ kWh	243,307
Actual relative to calculated generation, kWh	-2,765
Actual relative to calculated generation, %	-1.1%
Approximate revenue in month ²	£18,747

¹Calculated generation is based on river level data and seeks to establish the expected generation with no performance issues. The expected power and energy calculations are being calibrated and will be refined over the coming months as more data is gathered.

²Export revenue based on reported export and estimated GDUoS charges.

Export meter	Value
Export, kWh	239,877
Variance to generation, kWh	-665
Variance to generation, %	-0.3%

3 System reporting



3.1 Scheme anomalies to calculated generation

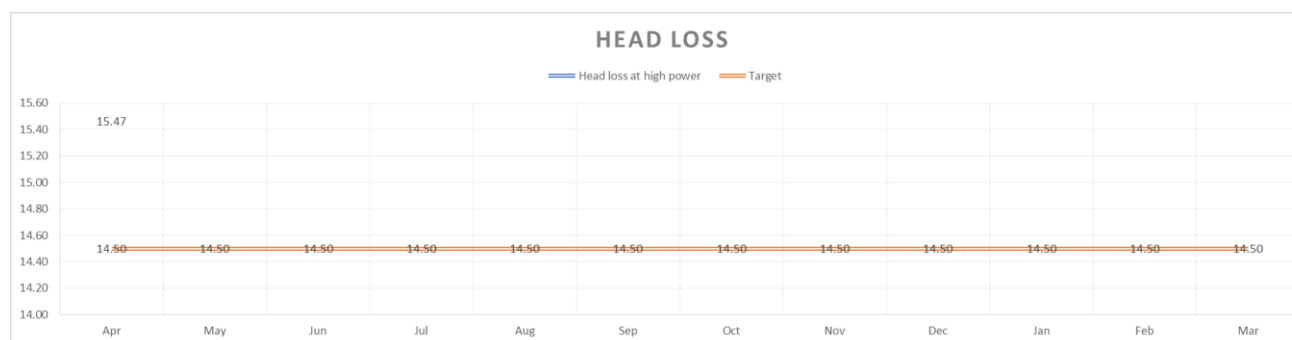
Date/time	Details	Action required
5/4/2023	River 2 rose fast, then river 3, river 1 last, chamber 2 spilling as a result.	For note only
10/4/2023	River 3 rose very fast, then river 2, finally river 1. Chamber 2 spilling as a result.	For note only
14/4/2023 16:45	Full opening and a strange dip in power. However, no water (and therefore no generation) was lost here. This could be an anomaly in the analysis software.	Continue monitoring.

3.2 Other system events

Date/time	Details	Action required
2/4 09:00 to 18:00	Gap in SCADA data	None.

3.3 Head loss

Target head loss at full power	Current head loss at full power	Status
14.5m	15.47m	Further increase but limited data points. Significantly over target. Pigging recommended. Quotation received from Stuart Stankey. Morvolts to advise as to whether this has been commissioned.



3.4 Temperatures

Parameter	Temperature at or near full power, °C	Alert level, °C	Parameter	Temperature at or near full power, °C	Alert level, °C
Generator DE bearing	33	85	Generator winding 1	61	145
Generator NDE bearing 1	40	85	Generator winding 2	58	145
Generator NDE bearing 2	44	85	Generator winding 3	62	145
Turbine room	17	30	Power cabinet (RG1)	28	42

3.5 Vibration

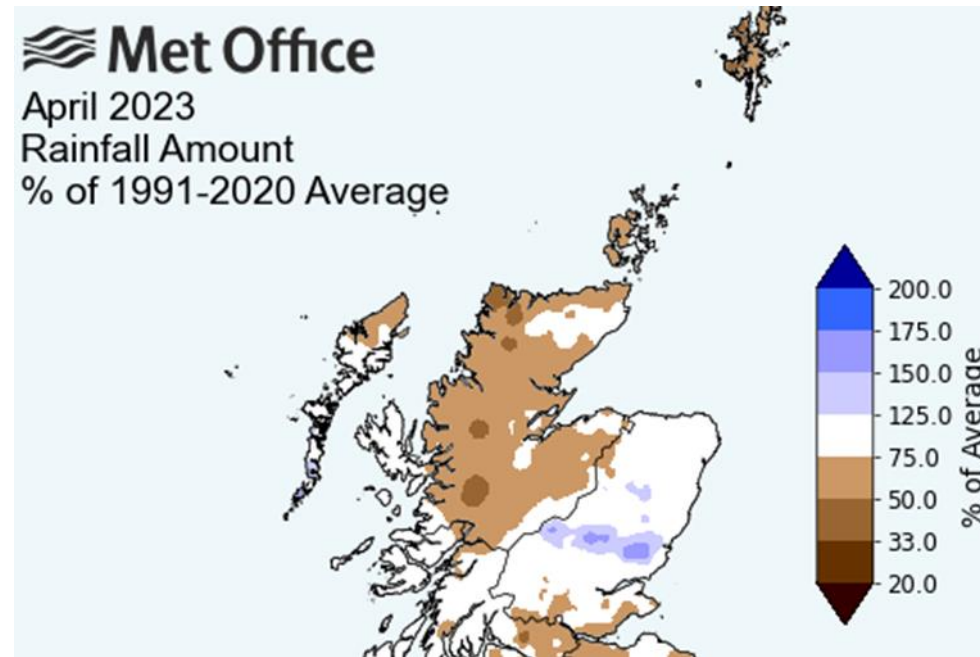
Parameter	Vibration at or near full power, mm/s	Alert level, mm/s	Parameter	Vibration at or near full power, mm/s	Alert level, mm/s
Generator DE	0.43	3.0	Generator NDE	1.08	3.0

3.6 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	SSEN have confirmed that the logging period has concluded. SSEN to collect data logger. GHC have been chasing SSEN as to the results of this logging.
Services to be arranged	MorVolts	LOLER checks complete. MorVolts to send inspection report.
Fire extinguisher testing	MorVolts	To be arranged (awaiting MDCD fire extinguisher service contract for existing CO2 extinguisher only)
Order replacement level sensors	MorVolts	Three ordered and expected on site w/c 6/3/2023. MorVolts to confirm receipt
Chase SSE for details of planned outage in 2024	GHC	RH will keep up the pressure on SSEN to try to reduce this outage.

Housekeeping in turbine house	MorVolts	Spares to be arranged on shelves/in cupboard. Underway.
Spares stock to be reviewed	GHC	CINK asked to review spares list and advise if any other spares recommended – CINK chased, no response yet 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	CINK have provided a response to GHC’s queries on the maintenance schedule, but not provided a complete schedule. GHC to propose a schedule for review by Cink.
Arrangements to be established with Colin Thwaites for HV switching/isolation	Morvolts	CV awaited from Colin for GHC records. Colin has visited site. MorVolts to confirm that Colin has been appointed as AP.
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 by GHC 20/4/23.
Missing data from March export statement	GHC	Should be automatically updated but raised with EDF and SCADA supplied.

4 Rainfall



Rainfall this month (rain gauge), mm	151
Western Scotland rainfall in month with respect to 1991-2020 long term average	83%

5 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												240,542
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	247,605
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	369,360
Actual relative to forecast	65.1%												65.1%
Rainfall relative to 1991-2020 average	83%												83%
Calculated generation kWh	243,307												243,307
Variance to calculated generation kWh	-2,765	-	-	-	-	-	-	-	-	-	-	-	-2,765
Variance to calculated generation %	-1.1%												-1.1%
Approximate revenue	£18,747												£18,747
Capacity factor (monthly)	20.6%												20.6%
Industry wide RoR capacity factor													#DIV/0!
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
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	4,770,561
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	5,330,433
Actual relative to forecast	67.0%	187.1%	151.9%	168.6%	91.8%	61.6%	118.9%	114.8%	36.1%	91.0%	80.7%	58.3%	90.9%
Rainfall relative to 1991-2020 average	77%	126%	104%	74%	65%	93%	134%	112%	89%	104%	56%	118%	96%
Calculated generation kWh	253,540	432,296	294,437	330,341	257,587	239,724	700,013	748,966	295,507	639,670	459,640	358,262	5,009,984
Variance to calculated generation kWh	-5,935	-7,910	-7,936	-1,283	-82	-1,146	-7,226	-39,093	-71,798	-6,323	-12,191	-1,910	-162,834
Variance to calculated generation %	-2.3%	-1.8%	-2.7%	-0.4%	-0.0%	-0.5%	-1.0%	-5.2%	-24.3%	-1.0%	-2.7%	-0.5%	-3.3%
Approximate revenue ¹	£28,994	£50,244	£33,677	£38,789	£30,177	£27,894	£108,061	£111,476	£34,832	£44,660	£31,298	£52,804	£669,447
Capacity factor (monthly)	20.5%	39.0%	23.8%	28.2%	21.4%	20.5%	57.5%	60.9%	18.6%	52.5%	41.1%	29.6%	34.2%
Industry wide RoR capacity factor	19.4%	34.6%	18.3%	15.5%	15.5%	11.9%	55.8%	59.0%	32.6%	58.8%	50.2%	30.9%	33.5%

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

