



# Barr River hydro scheme

## Monthly report – July 2022

### 1 Summary

Although July was not unusually wet, the plant far exceeded the predicted energy generation. The plant operated reliably with one grid-related trip being the only notable period of downtime, fortunately when river levels were very low. The plant continues to operate with chamber 2 for control, this is leading to chamber 1 being emptied on occasions and air being drawn into the pipe. This is not ideal but is not a significant concern.

### 2 Monthly generation & revenue

Parameter	Value
Actual generation (FIT meter), kWh	329,058
Average generation in month, kWh	165,261
Forecast generation in month (P50), kWh	195,146
Actual relative to forecast	168.6%
Rainfall relative to 1991-2020 average by month	74%
Calculated generation <sup>1</sup> kWh	330,341
Actual relative to calculated generation, kWh	-1,283
Actual relative to calculated generation, %	-0.4%
Approximate revenue in month <sup>2</sup>	£39,605*

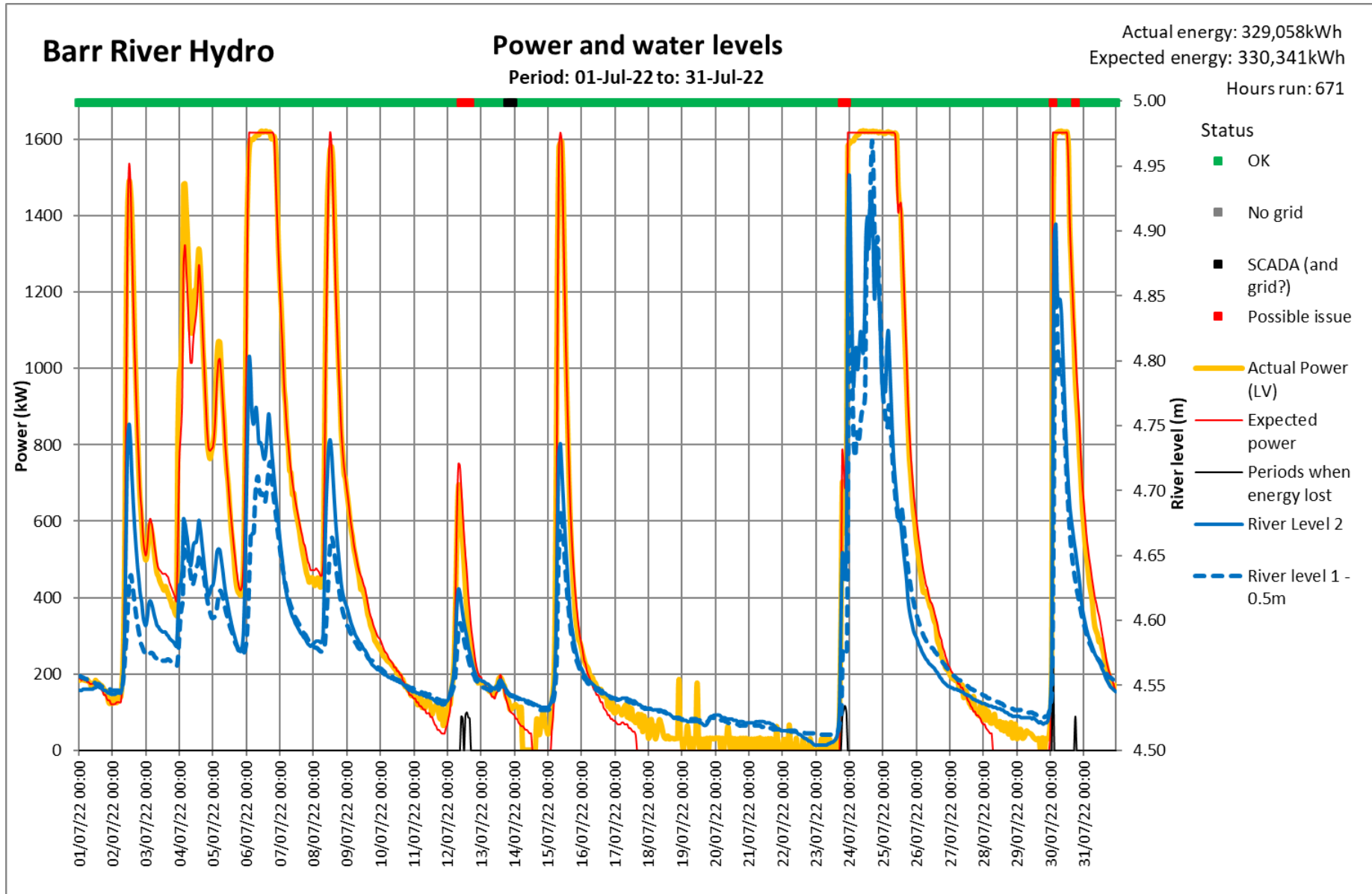
<sup>1</sup> Calculated generation is based on river level data and seeks to establish the expected generation with no performance issues. The expected power and energy calculations are being calibrated and will be refined over the coming months as more data is gathered.

<sup>2</sup> Export revenue based on generated output and estimated export rate.

Export meter	Value
Export, kWh	275,402 *
Variance to generation, kWh	-53,656 *
Variance to generation, %	-16.3%*

\* The export readings are missing data – to be taken up with Engie by Morvolts

### 3 System reporting



### 3.1 Scheme anomalies to calculated generation

Date/time	Details	Action required
12/07/2022	Power less than predicted by algorithm due to less water available at intake 1 than at intake 2. No actual loss.	None
13/07/2022	Occasional missing records in SCADA log files.	None
14/07/2022	Grid outage, grid returned. Generator breaker tripped.	JH flagged to AR & NT. AR attended on 14/7 to reset
23/07/2022	River 2 rose much faster than river 1, therefore power was less than predicted by algorithm. No actual loss.	None
30/07/2022	River 2 rose faster than river 1, therefore power was less than predicted by algorithm. No actual loss.	None
31/07/2022	River 2 higher than river 1, therefore power less than predicted by algorithm. No actual loss.	None

### 3.2 Other system events

Date/time	Details	Action required
05/07/2022	Unable to connect with TeamViewer. Potential issue with TeamViewer on Barr PC.	Machine rebooted by Nick on 6/7. Problem resolved.
07/07/2022	High reactive power trip, automatically recovered	None
06/07/2022 08/07/2022 15/07/2022 24/07/2022	In some conditions, the use of chamber 2 as control means that chamber 1 sometimes empties and air is drawn into the pipe. This increases the head loss and therefore reduces power for a given flow.	JH to check as part of annual review.

### 3.3 Head loss

Target head loss at full power	Current head loss at full power	Status
14.5m	13.82m	Stable. Within target.

### 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	43	85	Generator winding 1	72	145
Generator NDE bearing 1	47	85	Generator winding 2	69	145
Generator NDE bearing 2	51	85	Generator winding 3	73	145
Turbine room	27	30	Power cabinet (RG1)	34	42

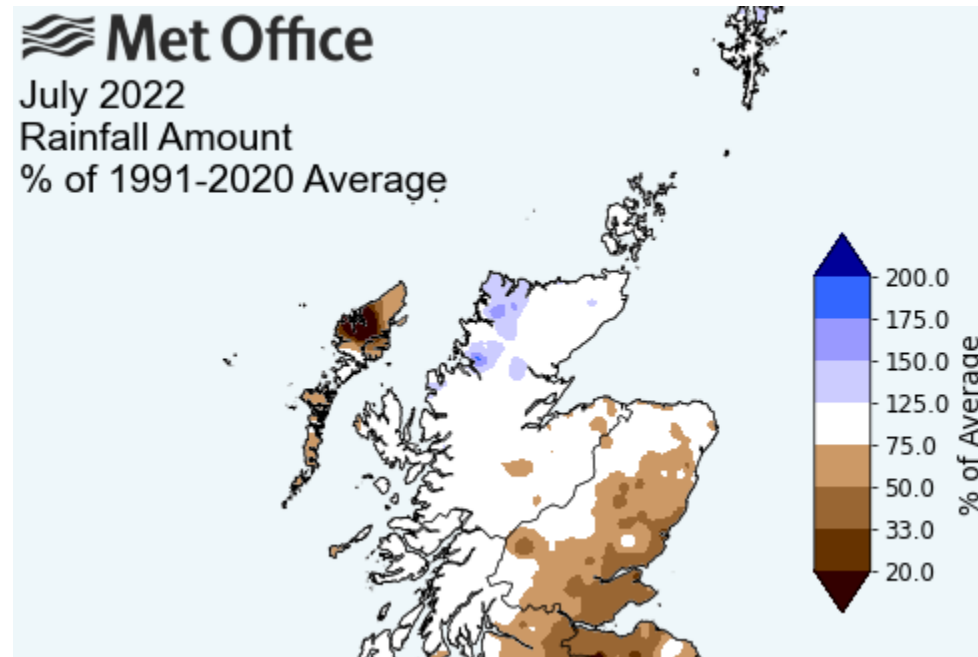
### 3.5 Vibration

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	0.42	3.0	Generator NDE	1.17	3.0

#### 4 Recommended and ongoing actions

Action	Responsibility	Status
Fuses to be labelled clearly in X91 (signal cable junction box in powerhouse)	MorVolts	Complete
More fuses to be ordered	MorVolts	Complete, some fuses in X91.
Monitor for export readings in excess of generation readings.	GHC	Ongoing
Install power quality monitoring equipment at grid connection to address grid trips affecting the generator breaker and requiring a site visit.	GHC	GHC continuing to liaise with SSE. SSE are checking their data on the occasions that trips occurred. GHC to chase.
Service to be arranged	GHC/CINK	Expected to be 01-02/09/2022. JH to confirm with CINK.
Caretaker training (Douglas Taylor)	GHC/MorVolts	We understand a new caretaker has been appointed and await instruction from MorVolts in relation to training/meeting.
Order replacement level sensors	MorVolts	Link to replacement sensors sent to AR.
Paint repairs required to manifold pipe	DAM	JH raised to Stuart, Stuart was to check on site. JH to chase Stuart.
Annual inspection	GHC	JH attended on 12/08/2022.
Investigate meter reading errors and discrepancies in export billing	GHC	JH to follow up with Engie.

## 5 Rainfall



Rainfall this month (rain gauge), mm	132
Western Scotland rainfall in month with respect to 1991-2020 long term average	74%

## 6 Scheme annual performance summary

2022	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	YTD
Actual generation kWh	555,764	647,905	240,688	247,605	424,386	286,501	329,058						2,731,907
Average generation since commissioning	555,764	647,905	240,688	247,605	424,386	286,501	165,261	91,714	356,893	652,190	676,213	512,649	2,568,110
Forecast generation (P50)	695,941	554,678	611,047	369,360	226,766	188,561	195,146	280,601	387,431	582,631	618,214	620,057	2,841,499
Actual relative to forecast	79.9%	116.8%	39.4%	67.0%	187.1%	151.9%	168.6%						96.1%
Rainfall relative to 1991-2020 average	58.0%	163%	51%	77%	126%	104%	74%						93%
Calculated generation kWh	494,286	664,527	241,159	253,540	432,296	294,437	330,341						2,787,286
Variance to calculated generation kWh	61,478	-16,622	-471	-5,935	-7,910	-7,936	-1,283	-	-	-	-	-	-55,379
Variance to calculated generation %	+12.4%	-2.5%	-0.2%	-2.3%	-1.8%	-2.7%	-0.4%						-2.0%
Approximate revenue	£72,273	£84,255	£31,299	£29,616	£51,079	£34,483	£39,605						£342,611
Capacity factor (monthly)	46.1%	59.5%	20.0%	21.2%	35.2%	24.6%	27.3%						33.4%
Industry wide RoR capacity factor	52.2%	63.2%	26.7%	19.4%	35.0%	18.0%	16.0%						40.4%

