



Barr River hydro scheme

Monthly report – November 2021

1 Summary

A decent amount of rain meant that the November target was exceeded, despite the grid being constrained for the first half of the month. The performance of the scheme continues to be improved due to optimisation of the target water levels, SCADA improvements by CINK and improved responses to issues requiring site attendance. The grid constraint resulted in approximately 30MWh of lost generation, or roughly £4k revenue.

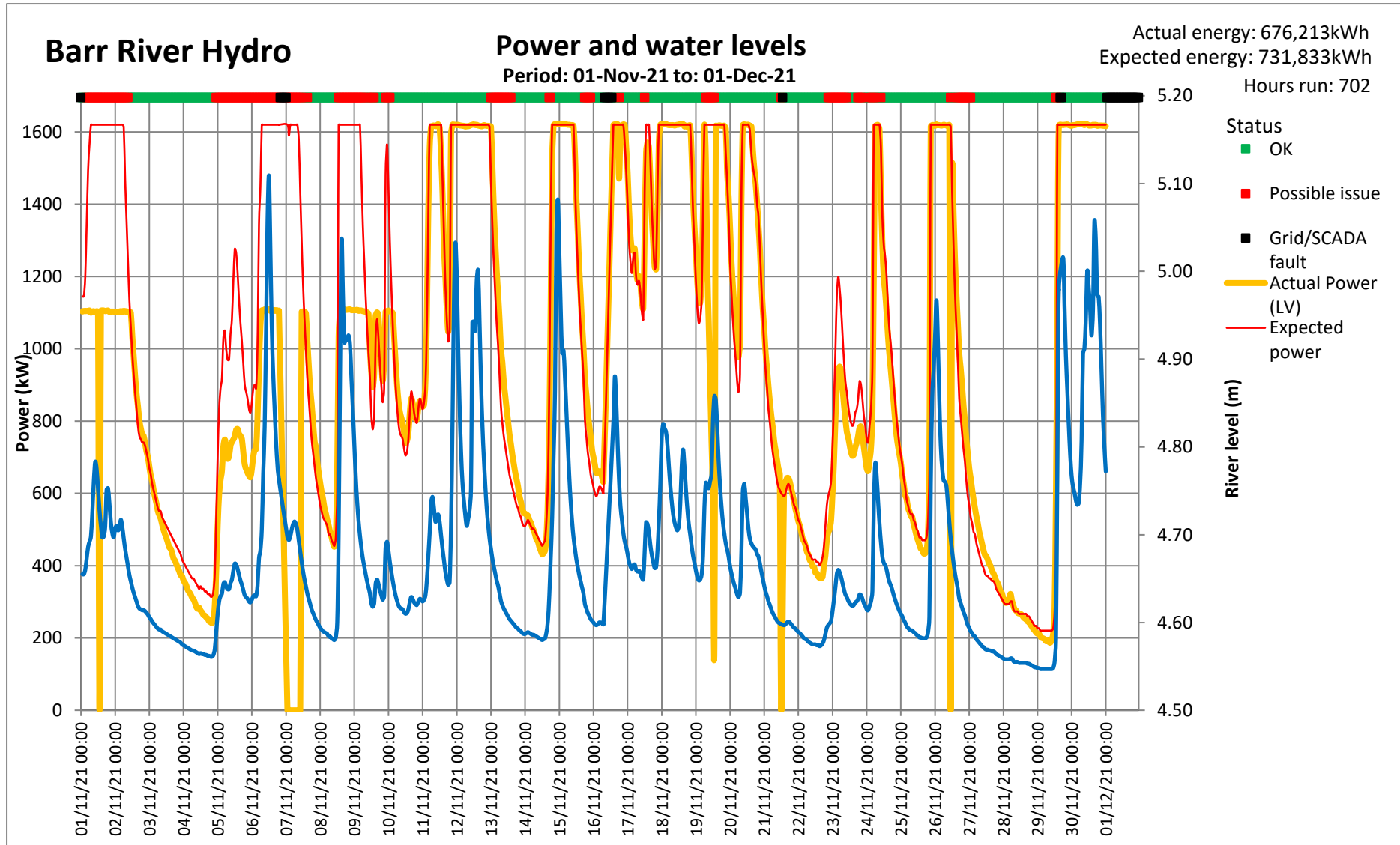
2 Monthly generation & revenue

Parameter	Value
Actual generation (FIT meter), kWh	676,213
Average generation in month, kWh	676,213
Forecast generation in month (P50), kWh	634,000
Actual relative to forecast	106.7%
Rainfall relative to 1981-2010 average by month	67.0%
Calculated generation ¹ kWh	731,833
Actual relative to calculated generation, kWh	- 55,620
Actual relative to calculated generation, %	-7.6%
Approximate revenue in month	£ 87,936

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.

Export meter	Value
Export, kWh	348,429
Variance to generation, kWh	-327,784
Variance to generation, %	-48.5%

3 System reporting



3.1 Scheme anomalies to calculated generation

Date/time	Details	Action required
1/11/21 – 11/11/21	Constrained to 1100kW by SSE.	None
6/11/21	Grid outage, generator breaker tripped.	Reset by Nick.
5/11/21, 9/11/21	Power less than expected, due to more water available at intake 2 than intake 1.	Check chamber 2 sensor calibration to confirm spill level.
6/11/21	Grid outage, generator breaker tripped.	Reset by Angus.
13/11/21 14/11/21 15/11/21	Power higher than expected.	Review power versus river level relationship after chamber 2 sensor calibration/spill level check.
16/11/21	SCADA crashed	SCADA restarted by Nick.
16/11/21	High reactive energy, generator disconnected and automatically restarted.	None
17/11/21	Power less than expected, due to more water available at intake 2 than intake 1.	Check chamber 2 sensor calibration to confirm spill level.
19/11/21	CINK completing commissioning tests.	None
21/11/21	Scheme shutdown tested by Nick and Angus.	None
23/11/21, 24/11/21	Power higher than expected.	Review power versus river level relationship after chamber 2 sensor calibration/spill level check.
26/11/21	Scheme shutdown during opening ceremony. Power higher than expected.	Review power versus river level relationship after chamber 2 sensor calibration/spill level check.
29/11/21	Power less than expected, due to more water available at intake 2 than intake 1. CINK SCADA software upgrade.	Check chamber 2 sensor calibration to confirm spill level.

3.2 Other system events

Date/time	Details	Action required
1/11/21	Intake 1 chamber sensor offset adjusted.	None
3/11/21 – 4/11/21	SSE Contracting on site.	None
9/11/21	Chamber target level reduced to reduce spilling at intake 2.	Continue to review.
2/12/21	Export meter data gaps queried.	Engie to request data re-read.
3/12/21	Chamber target level reduced to reduce spilling at intake 2.	Continue to review.

3.3 Head loss

Target head loss at full power	Current head loss at full power	Status
14.5m	12.75m	Better than specified (as expected for a new pipeline).

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	36	85	Generator winding 1	65	145
Generator NDE bearing 1	39	85	Generator winding 2	62	145
Generator NDE bearing 2	42	85	Generator winding 3	66	145
Turbine room	21	30	Power cabinet (RG1)	31	42

3.5 Vibration

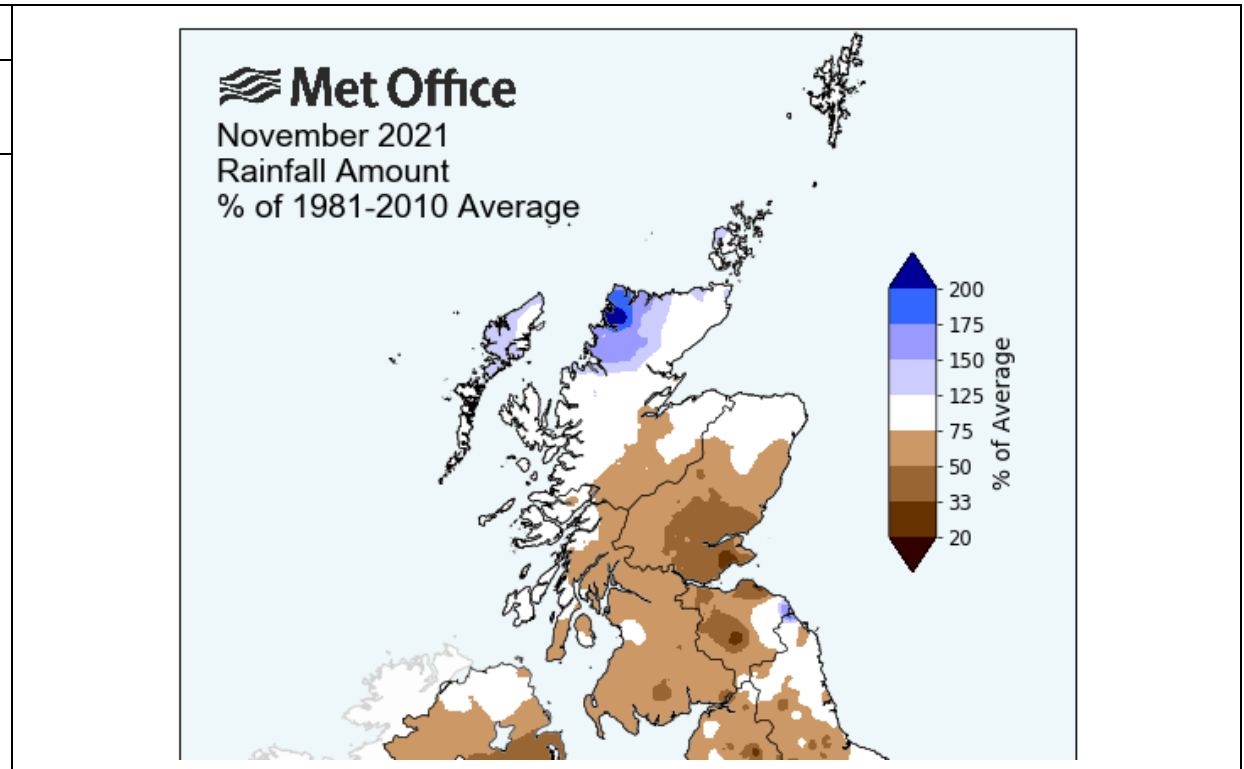
Parameter	Vibration at or near full power, mm/s	Alert level, mm/s	Parameter	Vibration at or near full power, mm/s	Alert level, mm/s
Generator DE	0.39	3.0	Generator NDE	1.22	3.0

4 Recommended and ongoing actions

Action	Responsibility	Status
Commissioning/testing to be completed when sufficient water available	CINK	Complete
Check sufficient stock of spare 50mA fuses for level sensors	MorVolts	Ongoing
Investigate possible causes of fuse failures on intake 2	SSE Contracting	Complete. SSE Contracting modified earthing/bonding of signal cable.
Fit additional smoke alarms	SSE Contracting	Complete
Fuses to be labelled clearly in X91 (signal cable junction box in powerhouse)	MorVolts	Ongoing
Check chamber 2 level sensor calibration to confirm spill level	GHC	Target level under review to reduce spill risk. Gauge board/spill level calibration to be checked when as built data available.
Chase missing export meter data for November	MorVolts	Ongoing

5 Rainfall

Rainfall this month (rain gauge), mm	256
Western Scotland rainfall in month with respect to 1981-2010 long term average	67%



6 Scheme annual performance summary

2021	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year to date
Actual generation kWh							1,463	91,714	356,893	652,190	676,213		1,778,473
Average generation since commissioning							1,463	91,714	356,893	652,190	676,213		1,778,473
Forecast generation (P50)	783,000	655,000	592,000	318,000	186,000	176,000	174,000	237,000	358,000	584,000	634,000	659,000	1,987,000
Variance to forecast							0.8%	38.7%	99.7%	111.7%	106.7%		89.5%
Rainfall relative to 1981-2010 average by month							37.0%	69.0%	79.0%	135.0%	67.0%		77.4%
Calculated generation kWh								91,458	361,406	783,563	731,833		1,968,260
Variance to calculated generation kWh	-	-	-	-	-	0	0	256	-4,513	-131,373	-55,620	-	-191,250
Variance to calculated generation %						+0.0%	+0.0%	+0.3%	-1.2%	-16.8%	-7.6%		-9.7%
Approximate revenue	£-	£-	£-	£-	£-	£-	£186	£12,546	£71,936	£84,812	£87,936	£-	£257,415
Capacity factor (monthly)							0.1%	7.6%	30.6%	54.1%	58.0%		30.1%
Industry wide RoR capacity factor	30.8%	39.3%	45.0%	14.6%	20.0%	6.5%	5.6%	15.2%	14.0%	52.0%			21.3%

