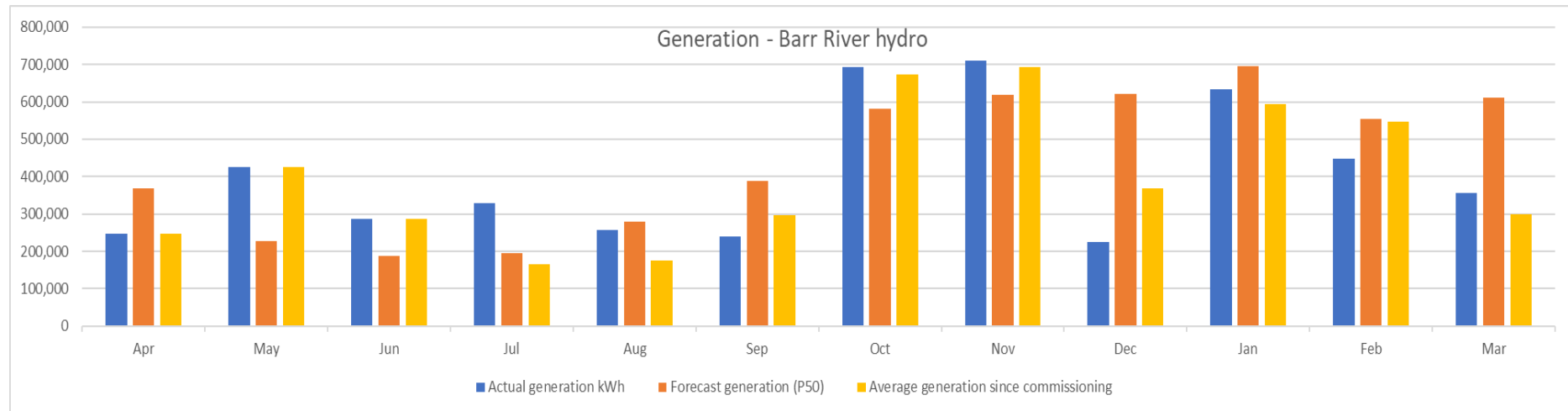




Barr River hydro scheme Annual report – Year to March 2023

1 Summary

FY 2022/3	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total
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 by month	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	£29,070	£50,110	£31,419	£36,167	£30,238	£28,026	£108,048	£111,476	£34,832	£91,372	£65,886	£52,804	£669,447
Capacity factor (monthly)	21.2%	35.2%	24.6%	27.3%	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%



2 Generation versus expectations & industry benchmarks

FY 2022/3	Total
Actual generation kWh	4,847,150
Average generation since commissioning	4,770,561
Forecast generation (P50)	5,330,433
Actual relative to forecast	90.9%
Rainfall relative to 1991-2020 average by month	96%
Calculated generation kWh	5,009,984
Variance to calculated generation kWh	-162,834
Variance to calculated generation %	-3.3%
Capacity factor (monthly)	34.2%
Industry wide RoR capacity factor	33.5%

Actual generation was below forecast during a period of marginally lower rainfall against the long term average but slightly ahead of the average since commissioning. Generation capacity was slightly above the industry norm from a sample of hydro sites across Scotland for the same period (>50 sites), which mirrors previous results.

Regarding the interpretation of the calculated generation figure:

- It is based on a site-specific equation derived from the river level sensor above the intake. It is a best estimate that will show minor variances over time. Its primary use is to highlight potential issues with the system to prompt remedial action.

3 Key events, faults & downtime

Date	Event/issue	Comment
September 2022	Alternative remote login arrangements put in place	Facilities were established and shared with MorVolts to allow direct login to the PLC HMI. This allows the performance of the scheme to be checked even when the SCADA PC has crashed.
November 2022	SCADA software changes	Alva made some changes to the SCADA software which has significantly improved the reliability and has reduced the frequency of crashes.
December 2022	ACB failure	The generator breaker failed, preventing the plant from operating. Despite occurring in the run up to Christmas, the problem was diagnosed within 4 working days of occurrence and resolved within 5 working days of diagnosis. Servicing arrangements have been put in place to reduce the likelihood of future failures and a critical spares stock is now kept on site.
February 2023	Power quality monitoring by SSEN	After a great deal of chasing, SSEN finally fitted a power quality data logger, which recorded 4 weeks' of data, including a grid trip that lead to the ACB tripping. This data has not yet been analysed, we are chasing SSEN for an update. Depending on the outcome, we may push SSEN to modify their protection settings so that we can reduce the frequency of ACB trips.
March 2023	Spear opening issue resolved	One of the spears has been opening more slowly than the others which was leading to a loss in generation when the scheme started up. This issue was finally resolved in March 2023.