

Afon y Foel micro-hydro station. Schematic Diagram v2.

This is an off-grid system to provide electricity to the cottage Hafod y Rhedwydd. The Declared Net Capacity (DNC) is 9 kW.

Regardless of the choice of alternator, the electrical output before system losses cannot exceed 10.2 kW gross (or 9 kW net after losses) because this is limited by the water supply (penstock and nozzle size). Changeover switch 1 connects one or other of the two alternators to the cable feeding the cottage.

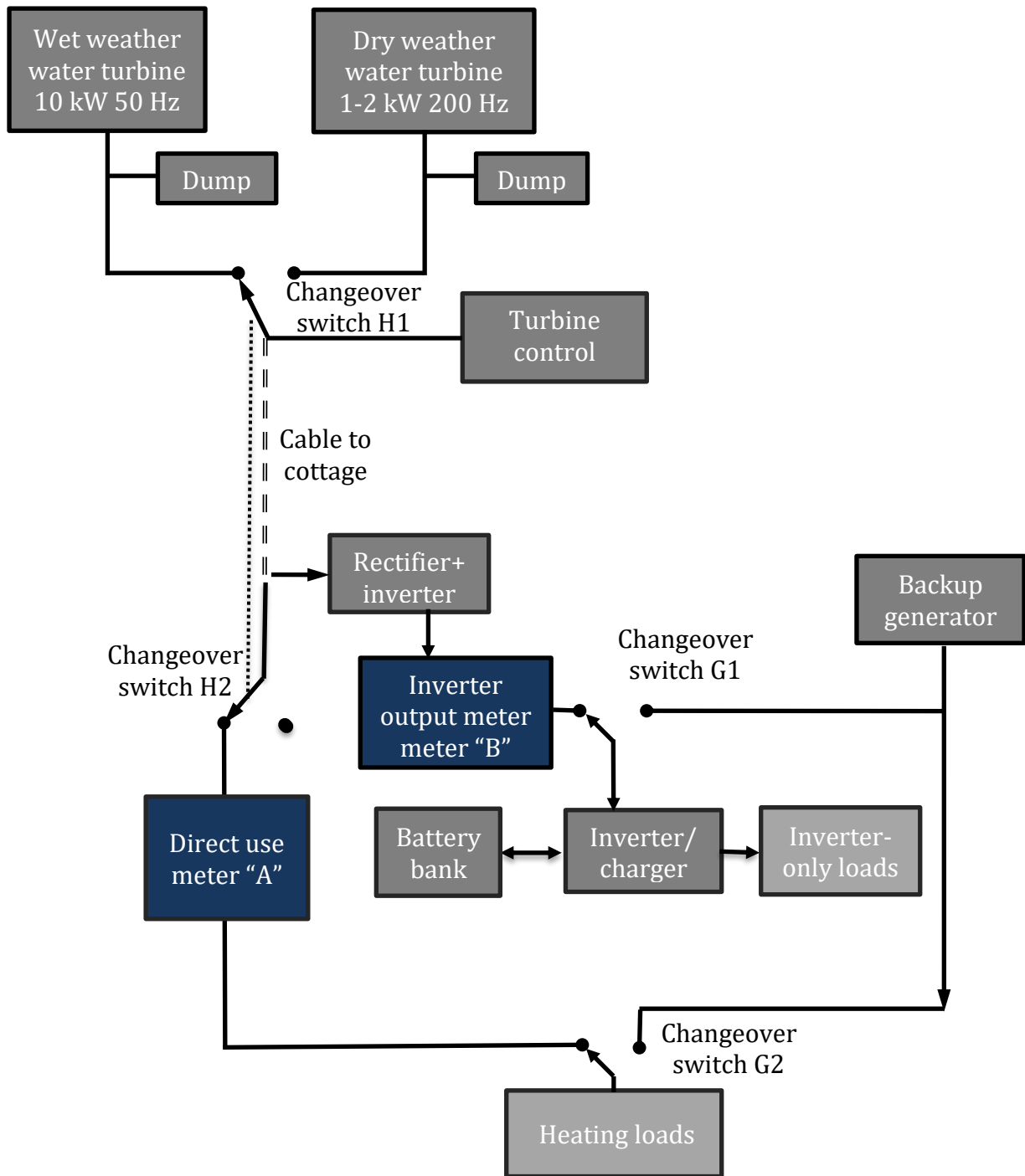
- The wet weather alternator is expected to be a 2-pole permanent magnet alternator by RFL (the [RF2-12.5](#) rated at 10 kW). The next model down in terms of size is the [RF2-7.5](#) which is only rated at 6 kW (50Hz 3-phase version) hence rather too small for this application.
- The dry weather alternator will be either a [MOOG GES013v2](#) or an [ESD X-Stream Engine](#).
- Changeover switch H1 connects one alternator at a time to the 500m cable between turbine hut and cottage
- Changeover switch H2 disconnects the direct (heating) loads and meter A when using the high-frequency dry weather alternator.
- The inverter/charger is expected to be either a Victron MultiPlus or SMA Sunny Island. The hydro inverter is likely to be a Victron Uno.

Meter “A” is a 3-phase [Eastron SDM630-Modbus v2](#) (serial number 01046687) which meters electricity passed directly from the main alternator to the oil-filled radiators i.e. not via the inverter.

Meter “B” (KHLMS meter serial number 81102206, a clone of the [Raleigh Instruments D35](#)) measures the output from the hydro inverter.

In very dry weather the backup generator will run occasionally (perhaps 1-2 hours per day for 4 weeks each summer). Changeover switches G1 and G2 ensure that the backup generator is isolated from the meters at all times.

The meters will be located in the outhouse at Hafod y Rhedwydd and are MID-certified. The dump loads on the schematic prevent over-speed if there is a sudden drop in demand – the power to them (and the control system) is not metered because it is not used in the cottage.



Schematic diagram using a 50 Hz wet weather alternator to drive heavy loads directly. The changeover switch connects one or other of the two alternators to the cable feeding the cottage - they can never both be connected.