Agile Octopus Scheduling with PV and Usage Prediction
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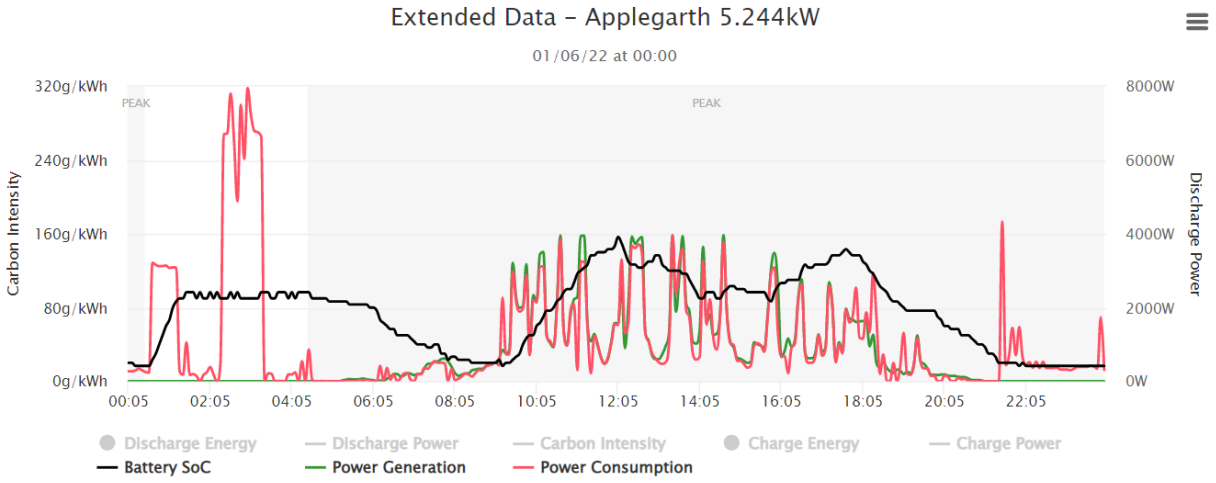
Summary

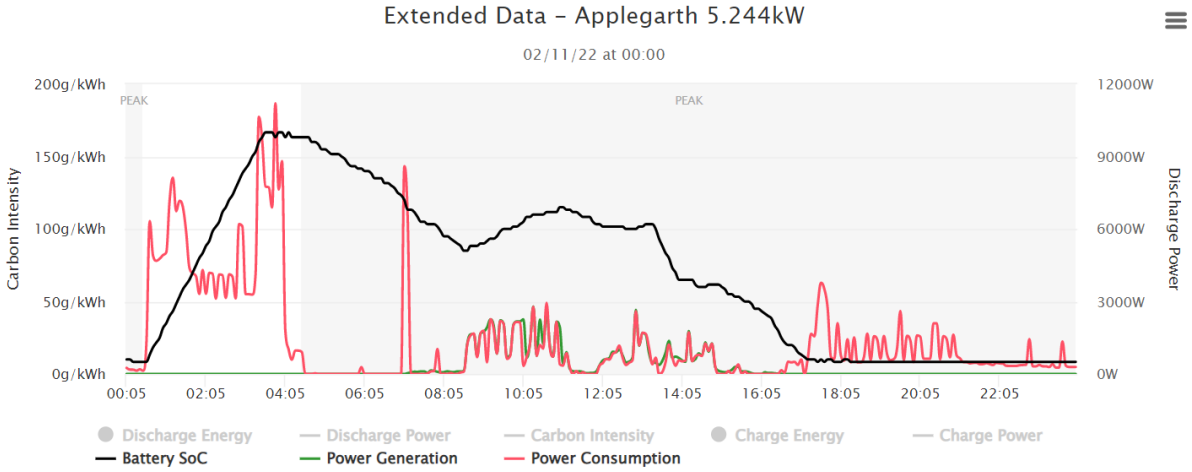
Unlike conventional “off-peak” tariffs which have set low-cost times each day, the daily pricing pattern variations of Agile octopus warrant a more flexible approach to energy storage and battery charging. Considering also the additional uncertainty of local PV generation and consumption patterns further compounds the challenge. This note proposes an effective charging strategy which overcomes these issues.

Progress so far

Off Peak SoC Target Setting

PV prediction software, such as Solcast, is readily available for personal use and can be combined with a representative consumption profile to establish a daily energy shortfall from PV and thus the amount of import required. Calculating target SoC purely on a daily basis is unreliable due to the need for shorter-term considerations. For example, a 50% PV generation forecast on a certain day can be due to a sunny morning and cloudy afternoon, vice versa or sunshine and showers throughout the day. Likewise, significant variations exist in consumption patterns. Typical examples are shown below.





To counter these issues and provide a reliable SoC forecast, it is necessary is to step through the day, calculating battery SoC, based on forecast generation and consumption for each 30-minute period. This typically results in a profile with a mid-morning minimum, followed by a peak in the afternoon. The profile

can then be adjusted with an offset of battery pre-charge to ensure the battery has sufficient charge to get past the minimum whilst reducing the amount of generated energy exported later in the day.

Agile “Rack and Stack”

Using the Agile Octopus rate sheet for the following day, it is straightforward to rank each 30-minute period and select a number of the cheapest charging periods each day, subject to predetermined price limits. To ensure the battery discharges only when there is a sufficient price difference, a “hold” mode is needed to avoid discharge during marginal periods and maximise use during the most expensive periods.

Whilst “rack and stack” may be effective during the winter months, it is of limited utility when there is significant PV generation. For example, the lowest-cost period at a time with high PV and little wind generation may be selected for mid-afternoon, but this fails to address energy needs during the morning peak and on-site PV may already be at a surplus during the afternoon. Under these circumstances, it could be better to import overnight at a higher rate to provide for the morning peak.

A Combined Approach for Agile Octopus with PV

To optimise Agile Octopus usage and overcome the disadvantages of the rack and stack approach, a modified approach is outlined in the following table.

Off Peak SoC	**Agile Rack & Stack**	**Modified Approach**
Download next day PV generation forecast (e.g Solcast)		Download next day PV generation forecast (e.g Solcast)
Download daily consumption profile		Download daily consumption profile
Step through day using battery model to identify first minimum and daily maximum	Download Agile pricing forecast, establish rankings	Download Agile pricing forecast, establish rankings
Determine offset charge		Identify any plunge price periods and add to schedule
	Select cheapest (and hold) periods and determine charging schedule	Step through day using battery model to identify charge profile 1. Work backwards from first minimum, to identify cost of each period needed to pull minimum above x% 2. Work forwards from first minimum to determine cost of import. 3. Balance cost of early charge with later import to determine morning charging slots. 4. Re-run profile with morning import plan. 5. Work forwards from day’s maximum, identifying any subsequent low-cost charging periods and add to schedule to start next day at 50% SoC
Write target overnight SoC target	Write instructions to inverter throughout the day	Write instructions to inverter throughout the day. Re run predictions with following day’s forecast at 4pm or if significant variance from schedule