D5 Final Test Scenario 2023

1 Introduction

Storm Recovery Inc. have developed a small-scale portable field hospital and recovery unit that they can deploy in emergencies, dubbed "StormMed" that can be rapidly dispatched to areas of the world suffering from recent storms causing power outage and restricted access to emergency healthcare.

Each StormMed has its own small solar farm, a wind turbine and a battery bank for energy storage. It also has a small substation that provides access to local distribution networks. Bear in mind that this connection is not guaranteed as it is influenced by the state of the local electricity network which may be implementing wide-scale load shedding with no warning.

The facility has three primary electrical loads that are purely resistive in nature:

1. Load 1: Outdoor lighting and search equipment for the rescue operation (**1.2A**)
2. Load 2: Life support system for critical care (**2A**)
3. Load 3: Indoor lighting and heating for the operating theatre (**0.8A**)

Note: The maximum mains capacity is **2A**. Battery charging and discharging current are **1A** per hour only with infinite capacity.

The wind turbine can produce a maximum of **3A** and the solar farm a maximum of **1A**.

2 Emergency Scenario

Due to a recent typhoon in New Zealand, the power has been knocked out at various points across the country and is only intermittently coming back online. The local rescue and health services are overwhelmed so 11 StormMed Teams will be deployed at incident hot spots to help rescue people and localise emergency medical services.

Your smart meter is required to manage both the demand and sources of generation such that over a **24 minute test (24 hours of test scenario)**, the local survival rate is maximised.

Modelling has shown that the existence of a fully installed and operational StormMed facility can theoretically boost survival rates to 250 per thousand population per day, where the following holds (where *t* is hours for the test scenario or minutes for the model):

- Loss of the outdoor lighting and search equipment (load1) alone when it is in demand
  - This reduces the survival rate to *250-(4*t)*
- Loss of the life support system (load2) alone when it is in demand
  - This reduces the survival rate to *250-(3*t)*
- Loss of BOTH the search equipment/lighting AND the life support system whilst they are in demand
  - This reduces the survival rate to *250-(10*t)*
- Loss of power to the operating theatre lighting and heating (Load 3)
  - This reduces the survival rate to *250-(1*t)*

Please note that to avoid overwhelming other areas, the outdoor lighting and search equipment (load 1) will only be used from 08:00 – 22:00 during the day of the trial.

3 Details of the Final Test Process

The trial will start at 00:00 on StormMed time and your smart meter should activate without external prompting. The smart meter performances will be graded with a relative score across the groups in the following categories and distribution of credit:

Category	Measured Quantity	Percentage Credit
Survival rate	Final survival rate	30%
Mains usage minimised	Mains current integral	30%
Renewables usage maximised	Mains and storage current outputs	20%
Busbar voltage stability	Integral of voltage difference from 240Vrms	20%

*Score deduction will be imposed if battery discharge is more than battery charging over the 24 hours.

4 Settings for Labview

Use these settings for the final review; you will be given the final profile tdms files for wind, pv, load1, load2 and load3 on the morning of the review.

Max wind capacity - **3A**	Load 1 Demand - **1.2A**
Max PV capacity - **1A**	Load 2 Demand - **2A**
mains capacity - **2A**	Load 3 Demand - **0.8A**
Battery Discharging Current – **1A**	Battery Charging Current – **1A**