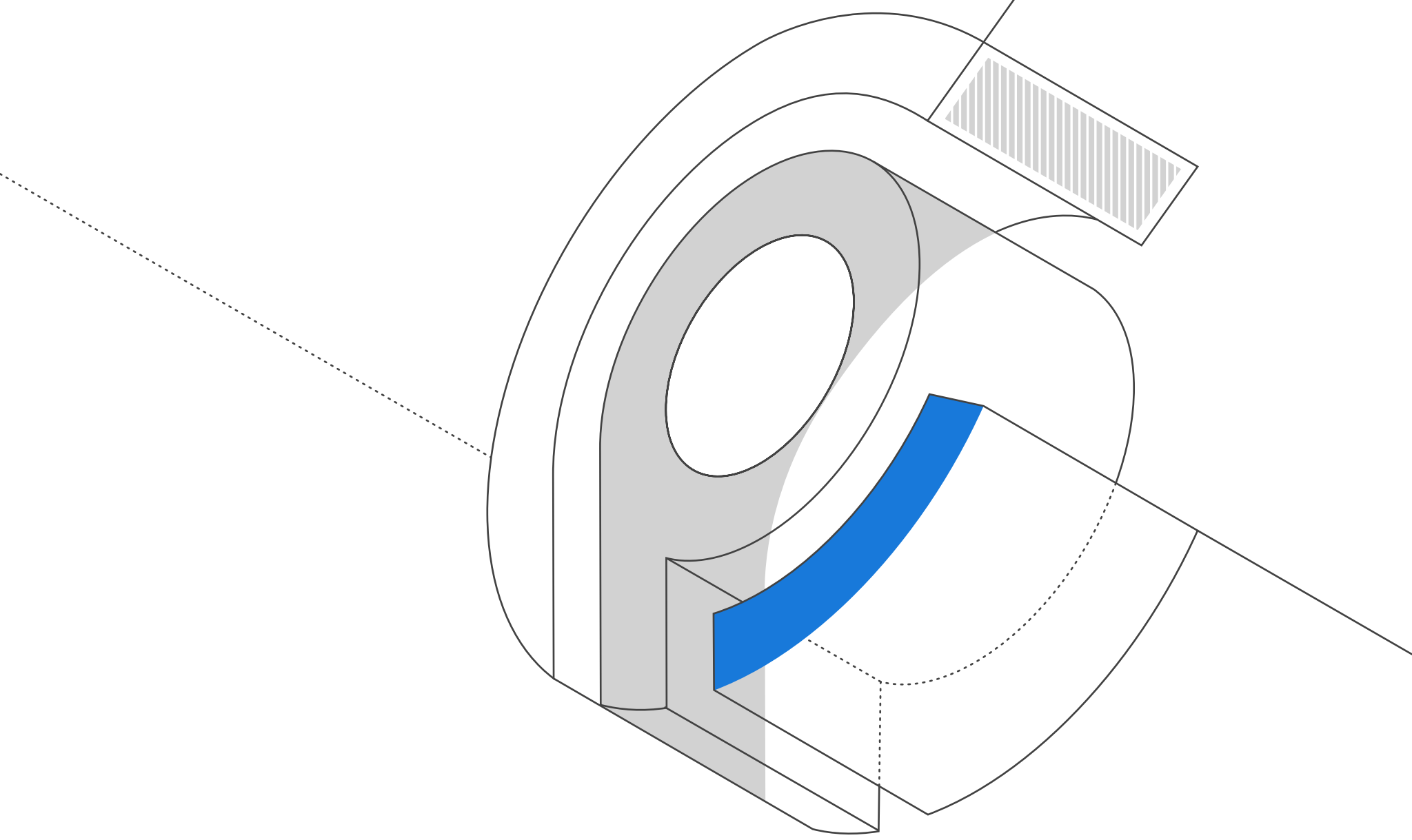
CONFLOW
POWER GROUP



# Technology Assessment Protocol Guideline

## PROJECT PARTNERS

- **ConFlow Power Group (CPG)** is a UK-based power tech aggregator using enhanced battery, enhanced solar and enhanced generators to create off-grid autonomous power, making alternative energy a stronger use case than the incumbent.
- **Southern California Edison (SCE)**, one of the nation's largest electric utility holding companies, delivering electricity to 15 million people across Southern, Central and Coastal California has over 800,000 streetlights in its portfolio and a mandate to reduce reliance on fossil fuel.
- **Caltrans** is the largest department of transport in the USA with 11 districts and over 1000 intersections and 50,000 miles of highways under its direct control.
- **California State University**, Dominguez Hills (CSUDH), As the largest public four-year university system in the world, the CSU is a complex public agency delivering quality degree programs to 485,550 students across 23 campuses. California State University, Dominguez Hills is a highly diverse, metropolitan university primarily serving the South Bay area of Los Angeles County. Established in 1960, CSU Dominguez Hills is one of the 23 campuses that comprise the California State University system.
- **Energy Zero Solutions**, a group of energy experts, focusing on delivering energy reduction and clean energy solutions by identifying solutions to best serve the client's operating model. A leading partner in implementing sustainability programs through clean energy replacements and targeting energy solutions to meet clients' requirements and savings goals.

## INTRODUCTION

This project is designed to address the importance of safety and impacts of streetlighting at isolated rural intersections in addition to maintaining operation of critical lighting and traffic signalling equipment in the event of power outages caused by natural disasters.

In addition, with existing grid based streetlighting, a voltage drop in excess of 5% may cause the luminaries at the end of a circuit run to either not operate or provide reduced lumen output. The same applies for traffic signal electrical infrastructure.

To mitigate this risk, an aggregated approach is employed with the use of distributed energy resources. DERs are small-scale electricity supply or demand resources that are interconnected to the electric grid. They are power generation resources and are usually located close to load centres and can be used individually or in aggregate to provide value to the grid.

Both **SCE** and **Caltrans** need a cutting-edge partner to integrate new technologies state-wide, to help stop power outages and maintain safe streets whilst striking a balance between emission reduction and energy security. Ensuring California is ahead of the field for reliance on alternative power is a high priority for all partners involved.

## STATE OVERVIEW

With the recent rolling brown and blackouts of 2022, forest fires, and further unprecedented heatwaves predicted in California, it is vital that as many technologies as is possible run to the aid of the traditional electricity grid.

Blackouts are often thought of as a rural problem. Not anymore. The state has been repeatedly forced to shut down solar and wind power since at least 2016 because alternative energy sources were said to be damaging the grid and causing blackouts. Fast forward to 2023, this is no longer the case.

According to the North American Electric Reliability Corporation (NERC), the leading cause of electric transmission outages in California is faulty equipment or human error.

## ASSESSMENT OBJECTIVES

To evaluate the ConFlow Power Group technology stack capabilities to perform as a traffic signal application as well to assess the potential to produce excess power as a smart streetlight unit in a microgrid asset deployment scenario.

Validation of each technology performance as a standalone solution each comes with its own individual challenges when integrated as part of aggregated system. To manage, control and deploy such technology emphasises the importance of the testing procedure outlined.

Structured in a way to allow for a complete analysis of each test aspect resulting in a successful outcome at all stages of assessment. Additional power resources may be added during the project as and when technology becomes available.

## SCHEDULED TIMEFRAME

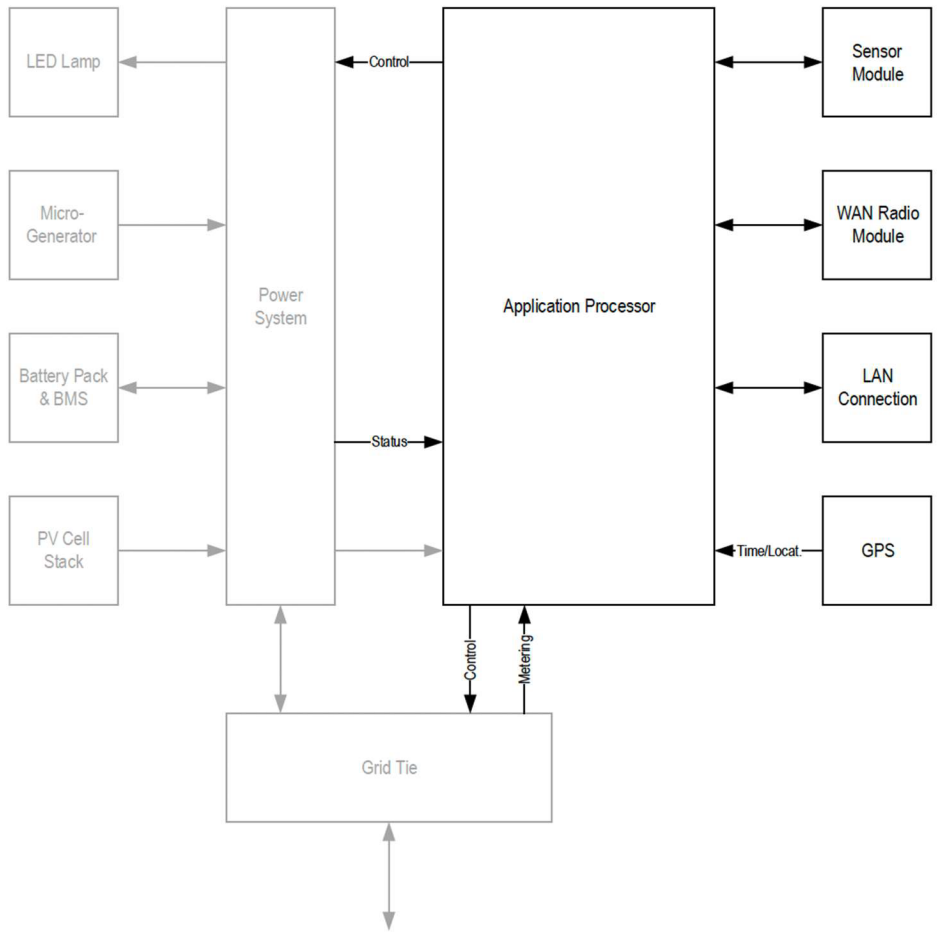
The assessment will proceed for collection of data for a minimum of XX weeks (months) for each mode.

## SUCCESS CRITERIA

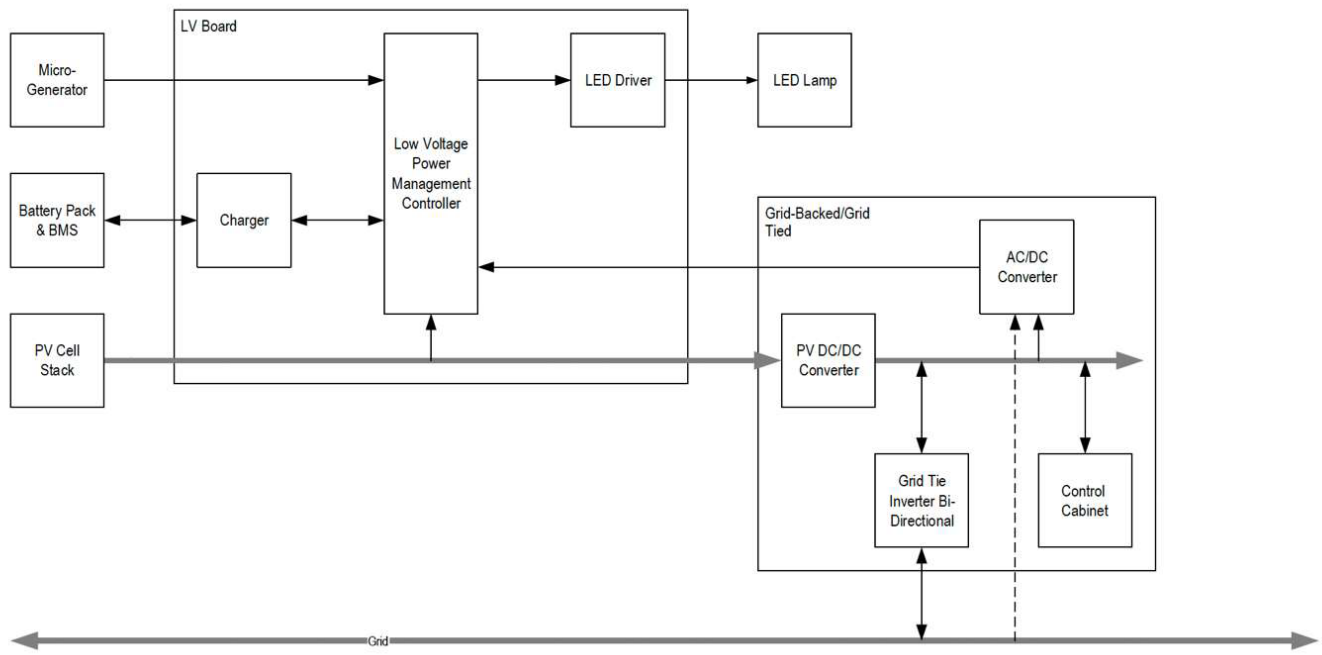
Key Steps and variables to be measured in each operational mode are as follows:

- **Solar power and battery** - The system will initially operate as a solar and battery system producing and storing sufficient power to operate as a streetlight entirely off-grid.
- **Battery independent** - The system will continue to operate without the solar input for a period relevant to installation location and ambient conditions.
- **Microgenerator and battery** - Sufficient recharge of battery provided by the microgenerator continuously operating.
- **Microgenerator independent** - Direct power supply from microgenerator at the desired load to operate for 24 hours.
- **Grid connected** - In the event of all alternative power resources failure, the system will be switched to operate traditionally via the grid.
- **Aggregated system** - Use smart controls to manage all power resources to determine optimum operating schedule.

## POWER OVERVIEW




## POWER SYSTEM ARCHITECTURE



## ANALYSIS, REPORTING & MAINTENANCE

The transition of energy systems toward a higher share of renewable energy creates complex challenges in designing, implementing, controlling, and maintaining the systems. Environmental assessments of system structures and the decisions made during design, implementation and operation are usually based on complex data, models and decision procedures and therefore involve innovative applications of information and communication technologies (ICT).

Proprietary software by CPG (as shown below) will be used in generate reports at key intervals and simulate scenario analysis in preparation for real-world applications.