



Technology and Innovation Light Up Rural Sarawak

Innovation and technology have enabled Sarawak to electrify households in rural areas including settlements located in remote pockets that require off-grid solutions.

The technology, adopted by the Sarawak Government through the Ministry of Utilities and its implementor Sarawak Energy, has expedited the quest to achieve full coverage. Sarawak is reaching the final miles of its electrification initiative, with overall domestic coverage presently at 96.9%, of which rural coverage is steadily increasing to 93% today.

These solutions have been tested for suitability in consideration of distance and location of the settlements, geographical and logistic challenges, availability of renewable energy sources and best value optimisation among others.

Grid Connectivity

Rural Electrification Scheme or RES

Conventional approach by extending existing distribution grid lines into the interior and erecting poles along rural roads

In RES where electrification is generally achieved by extending the 33kV or 11kV distribution supply lines to villages nearby cities and towns, and include installing step-down transformers and low-voltage systems to link to individual households.

Distribution supply lines in rural areas are susceptible to disturbances like vegetation and wildlife intrusions and even harsh weather. To overcome this issue, Sarawak Energy is switching to covered conductors where an exterior insulation layer protects the lines against transient elements. Covered conductors also require slimmer easement, and this works to reducing land issues.

This expansion of distribution systems is expected to cost about RM 1 billion and will take 2 to 3 years to complete for the approximately 800 grid-reachable villages.



Rural Power Supply Scheme or RPSS

Complements RES by introducing new transmission lines and substations, enabling existing gridlines to be extended into remote rural areas in parallel with Sarawak's rural infrastructure development.

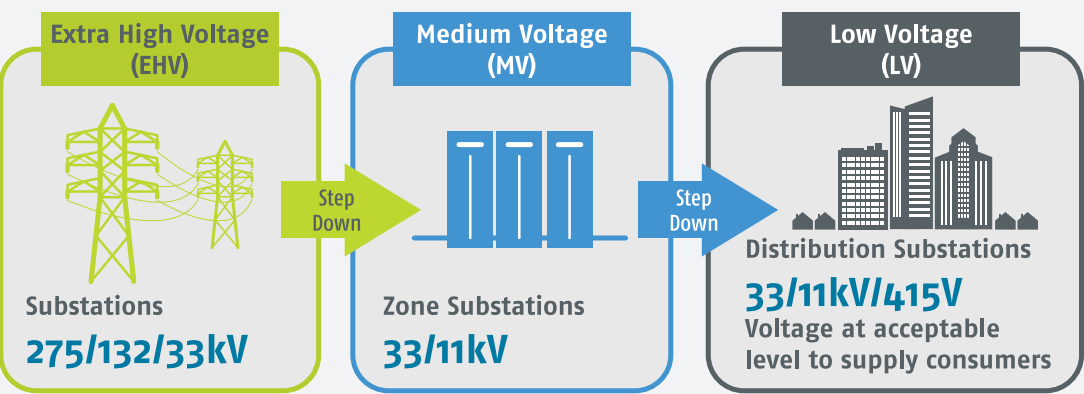
Under RPSS, new reliable power source points are constructed by way of substations to despatch electricity from the generation source to consumers. Instead of having long supply lines, substations are constructed wherever possible especially if there are transmission lines passing through the area.

Substations are integral components of a power system as they transform voltage from high to low or otherwise where necessary. This means a reinforced system capable of speedy restoration should there be tripping and accommodating for expansion of development in the area for the next 20 to 30 years.

RPSS includes the construction of:

- Two EHV substations at Tatau (275kV) and Kanowit (132kV)
- Ten MV (33kV) substations at Batang Ai, Pakan, Julau, Dalat, Ngungun, Sangan, Sebauh, Long Lama, Bakelalan and Belaga
- Eight MV (33kV) main lines using the new covered conductor technology totalling about 500km

This is expected to cost about RM600mln and takes two to three years to complete.



Off-Grid Solution

Hybrid Power Stations

Utility-scale project for sizeable settlements such as Bario, with two generation sources from either solar or micro hydro, backed by diesel to supply an off-grid network. Despite the high cost of energy supply to the provider, this innovative technology enables remote villages and households to enjoy Sarawak's low domestic tariffs.

For solar hybrid, the generation capacity is designed in anticipation that each household would consume 8kWh of electricity daily. The system allows to maintain use of 20% diesel to complement the 80% solar for more reliability should the weather turn and it stays cloudy for a long period.

Currently there are 24 solar hybrid stations in operation supplying 2,075 households in 53 villages.

For instance, the micro hydro hybrid station at Long Banga powers 136 households. While there are plans to expand the micro hydro station to supply more villages, solar is mainly being used for SARES.



Sarawak Alternative Rural Electrification Scheme or SARES

Fast track solution to provide remote households with standalone solar or micro hydro systems in partnership with the community. Cost is borne by government and Sarawak Energy as communities do not pay for electricity once commissioned.

Technical and economic constraints have led to an innovative solution of harnessing solar to power up remote households. The system was made to be safe for the community to manage, operate and maintain. Major technical issues are handled by the SARES team. SARES equipment are utility-grade devices and in compliance with international technical and safety standards.

The system is made up of solar panels, battery inverter, solar inverter, solar charge controller and batteries. The battery system, allocated to power each household with 3kWh of energy every 24 hours, is designed to last for more than five years if its usage is well-managed and controlled.

The battery system is also protected against excessive use and the energy limiter is reset at 6pm every day to ensure that there is ample (new daily) allocation for use in the evenings.

Under well managed and controlled usage conditions, it typically takes 1 to 2 hours for the solar system to fully recharge the batteries each day. If weather conditions continue to be bad or cloudy for consecutive days, the battery storage is still enough to operate for up to 3 days on regular consumption patterns.

SARES aims to provide a basic level of electricity supply to meet the daily needs of a rural household. However, its design incorporates features to temporarily boost the supply capacity for meeting additional requirements from celebration events or community ceremonies.