Making Microgrids Easy

Revolutionising Diesel Generation

JULY 2020, V4

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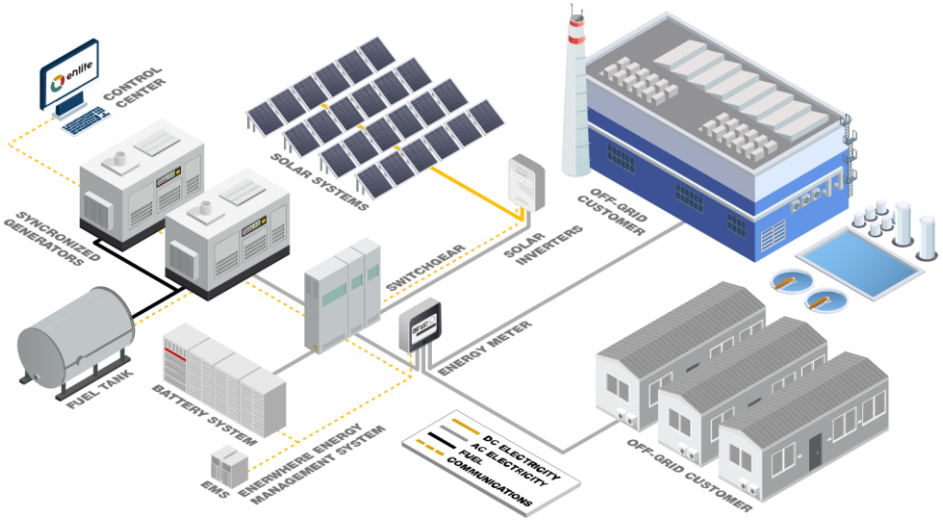
Microgrids Made Easy

A large number of systems currently running on diesel generators can be transitioned to hybrid systems

What is a microgrid?

- A microgrid is **a self-sufficient energy system** that serves a particular area from a building site to commercial & industrial sector to neighbourhood.
- It is a group of interconnected loads and distributed Energy Systems (typically fossil fuel generators but that is starting to change).



Enlite eases the process of hybridizing microgrids

- Existing operators of diesel microgrids often struggle to understand how renewable energy can save them money and don't want to engage expensive consultants to do that analysis. **Inaccurate excel based simulations** related to poor data have ensured **distrust of new technologies** in many of these markets.
- Enlite offers a range of solutions enabling clients to understand their running systems and choose the right energy solution

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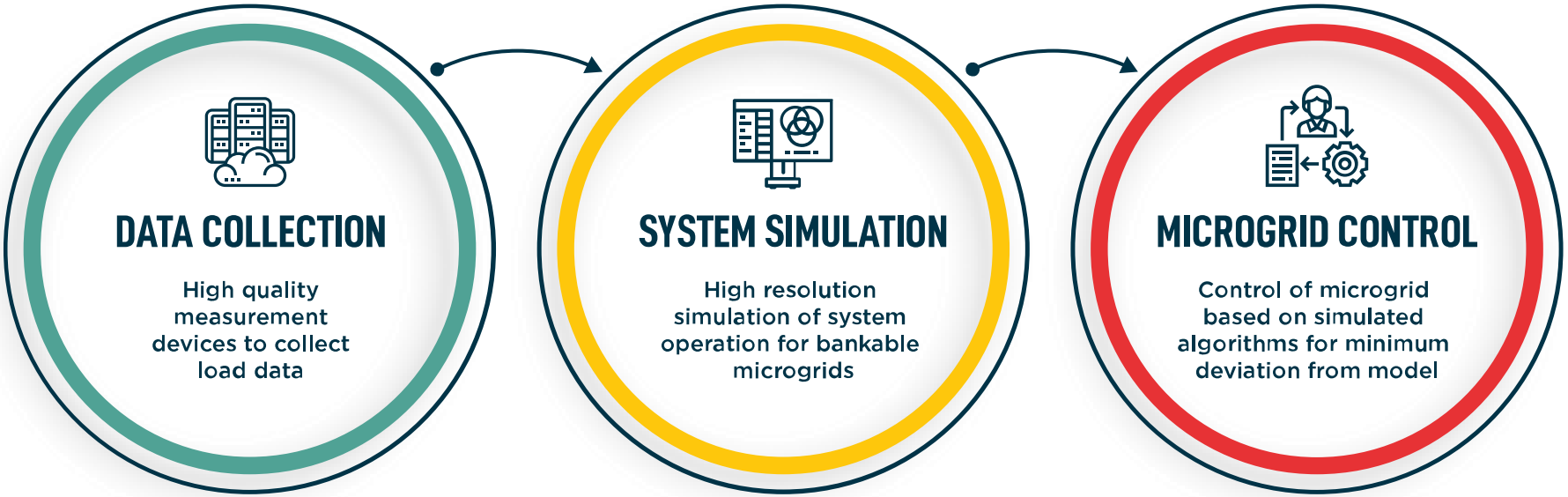
There are three major steps to the process of setting up a microgrid



Data Acquisition

Enlite data loggers are easy to install and enables clients to understand their load patterns

System Design and Modelling

With available data, Enlite's team of engineers will run simulations for different scenarios and suggests optimal configuration of solar and batteries

Control and Operations

Once the client builds the hybrid system, Enlite provides controllers to run the system

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The software supply chain for microgrids is fragmented and there are limitations with many of the products

- Data collected manually
- Technology & Product-specific
- Site/project-specific
- In many cases, only historical data, instead of real-time
- Understanding of the types of load being simulated is required

- Only as good as the input data
- More historical data than real-time
- Limited info on how different systems fit together
- Not User Friendly – require expert engineering support
- No feedback from operational sites

- Microgrid controllers often product-specific (e.g. Tesla, DEIF)
- Most products aimed at grid-connected/large-scale utility space
- No virtual operator marketed for smaller off-grid sites
- Digital twin is not possible
- Feedback to owners on deviation from estimated values is an issue

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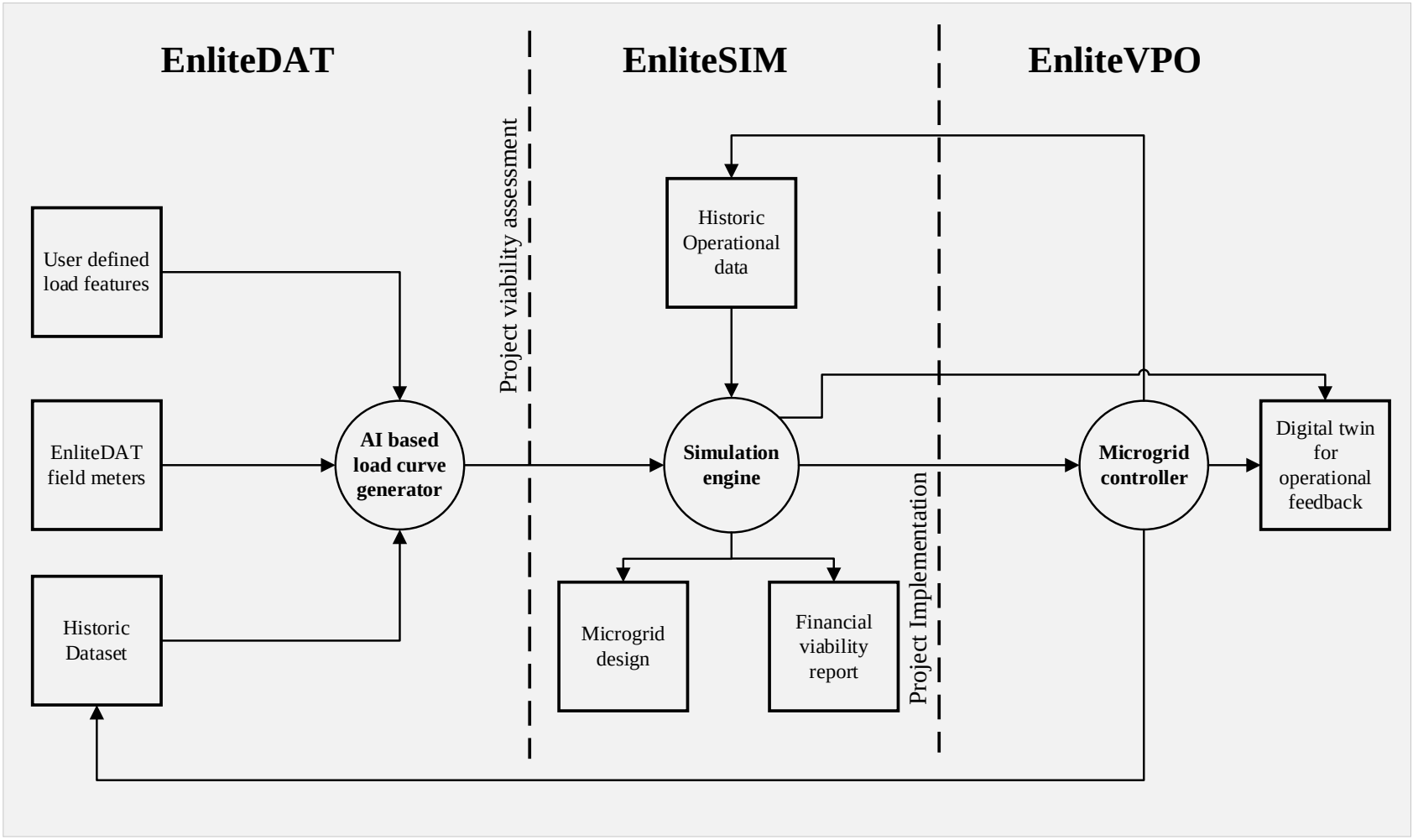
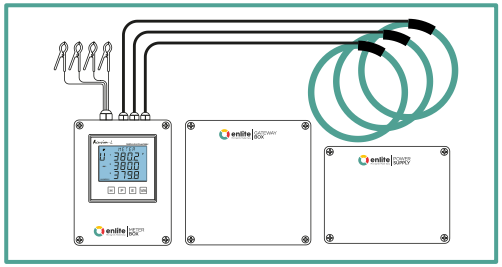
A software ecosystem that brings together three components and provides a single portal for microgrid design and operation



It all starts with better data - Enlite's data collection service is easy to use and gives immediate energy insights

DATA COLLECTION

Client sends Enlite basic information about existing plant or monitoring requirements (Plant info, monitoring points, etc.)



Enlite **sends robust and easy to install metering equipment** to client with clear instructions for installation

Enlite dashboard **displays the load information** along with basic data analytics showing key parameters like fuel efficiency

- The installation is designed to **be easy for any electrician to carry out**
- Client needs to do **minimal setup work** once the meter is installed. Information can be viewed with login information provided by Enlite
- Once connected the monitoring system provides **KPI analytics** which already improve the ability to operate the microgrid (Plant efficiency, load characteristics etc.)

https://clients.enlite.energy/

Better data insights means potential for immediate savings and better technology decisions

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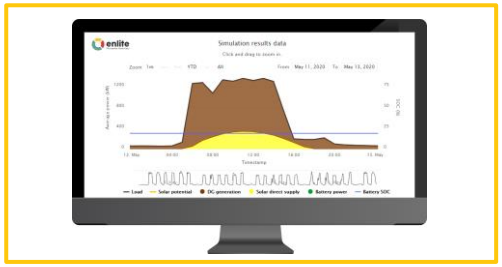
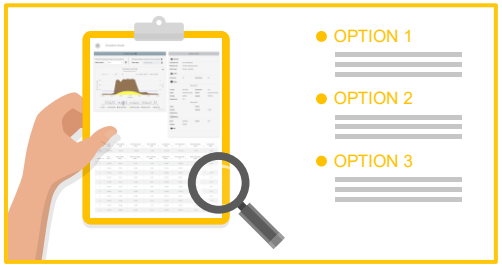
Enlite's design and simulation service provides clients with different options for hybridization and expected returns

SYSTEM SIMULATION

Data from Enlite's meters or the client are taken as an input along with site's physical constraints



Enlite's engineers use our **proprietary design tool to simulate** different system configurations



Client is presented a **range of system design options** with different investment requirements

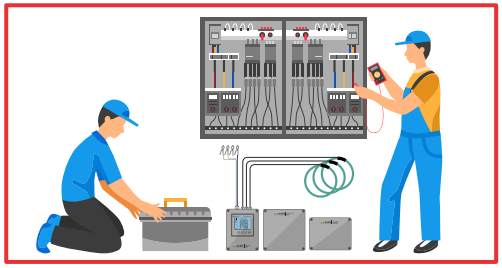
- Enlite's system design software is **built taking into consideration real-world measured solar data, battery operations and real-time diesel generator efficiencies** which vary greatly from data sheets
- Enlite's experienced **engineers who have designed and operated over 60 microgrids** simulate different system scenarios using a proprietary design tool and present the client with different system design options
- Results are presented in a simple-to-read manner for **quick decision making**

Enlite - Login

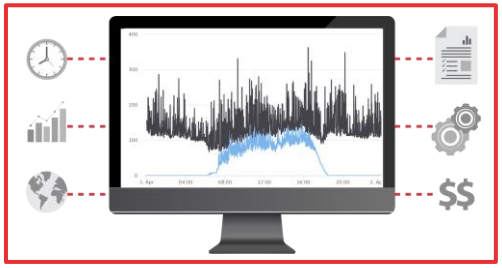
It all starts with better data - Enlite's data collection service is easy to use and gives immediate energy insights

MICROGRID CONTROL

Enlite controller **module is built based on chosen system design** and shipped to client



Client installs and **connects all generation assets and loads** to Enlite controller



Enlite **controller optimizes performance of the plant** maximizing renewable penetration.

- **Enlite's controller is technology agnostic** and can integrate a range of diesel generator controllers, solar inverters and battery providers
- Operational logic is presented to the client before starting operations in **an easy-to-read flowchart.** Specific client requests can be accommodated
- **Enlite's dashboard keeps the client up to date** on the plant operations
- **Operational alerts and alarms to client are part of the Enlite controller,** including alerts for sub-optimal performance of assets
- Features, like demand response and advanced control**, can be added on request**

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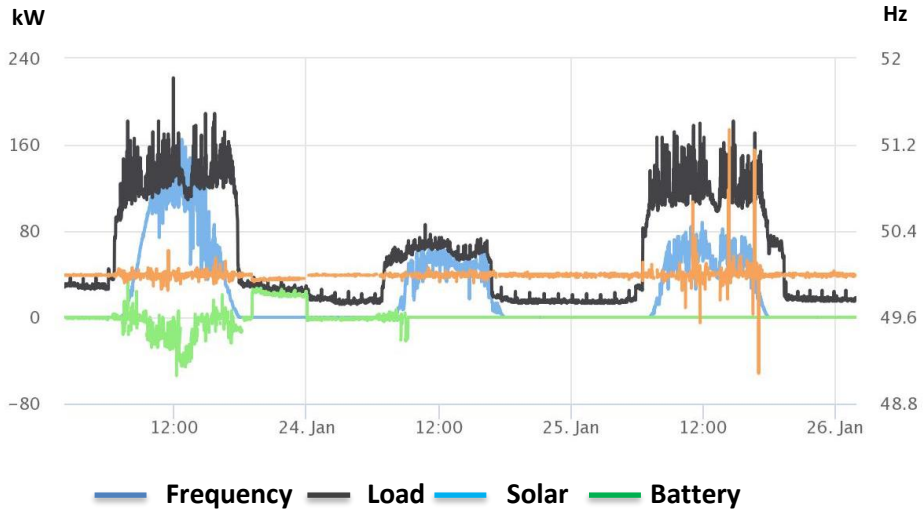
Enlite controllers are currently operating at multiple microgrids globally



- An industrial off-grid facility in Sharjah is operating on an advance microgrid
- The system consists of 1MVA DGs, 300 kWp solar and 100kW/200 kWh storage
- The site has extremely peaky loads; 100 kW jumps in a matter of seconds
- Batteries help to take the excess solar when available and reduce curtailment
- They also help improve the power quality and reduce reliance on DGs
- The battery has allowed us to achieve 82 l/MWh on weekends. Previously, we were forced to curtail most of the solar on weekends
- For weekdays, we have achieved 115 l/MWh. This translates to 44% reduction in diesel consumption
- Consistent solar penetration of higher than 50% in terms of monthly energy

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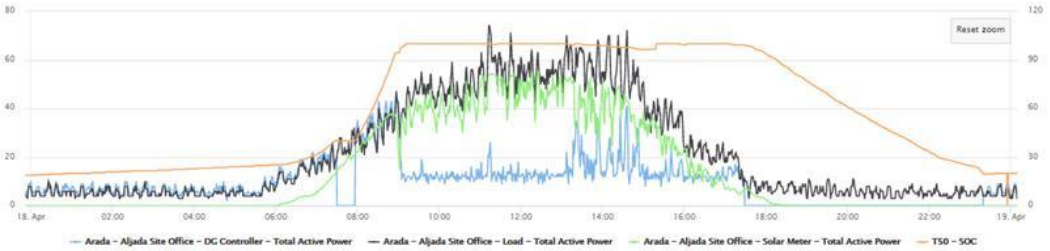
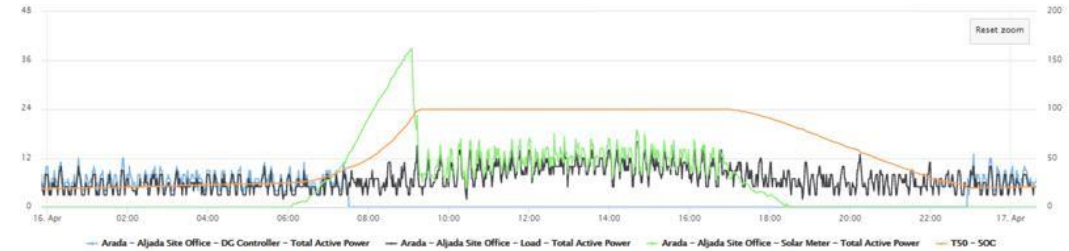
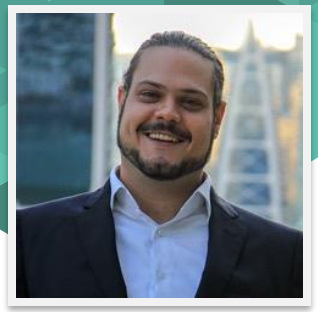




- Enerwhere built a pilot of a 50 kW/50 kWh system locally integrated
- The system is one of the first locally integrated storage units in the region
- The storage system is part of a microgrid that consists of solar and diesel generators supplying a site office
- The primary purpose of the battery is to store excess solar energy and enable switching off the generators at night
- This results in lower diesel consumption as well as lesser running hours on the generators
- Some operational graphs are shown for reference

Enlite' services are now available for clients across the globe

For further information please contact:



Hassan Shamma
Co-founder

hassan@enlite.energy

Imran Syed
Co-founder

imran@enlite.energy

www.enlite.energy

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