Microgrid electricity generation
Diesel Gen-Sets

Non-renewable energy generation
Diesel generators

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- Diesel-based microgrids are widely used around the world due to their low capital cost.
- Mini grids are mostly small diesel and hydro powered systems in developing countries.
- Rural electrification relies on diesel generators, but it is unsustainable due to price volatility, fossil fuel availability, and their environmental impact.
- Diesel microgrids have high operating cost related to their fuel consumption and it could be higher if the generators have a poor performance.

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Advantages of diesel generators

Diesel generators have been the traditional solution for off-grid applications for a number of reasons:

- Relatively low capital cost to purchase
- widely available
- Can be Portable and movable
- easy to install and maintain
- robust
- provide a quick, cheap solution to provide electricity in rural areas
- Fuel flexible and can be adapted to run as dual fuel systems

Diesel fuel cost can be variable from county to country, and is often expensive/unavailable or inaccessible. Generators are often noisy, cause pollution and have low overall efficiency.

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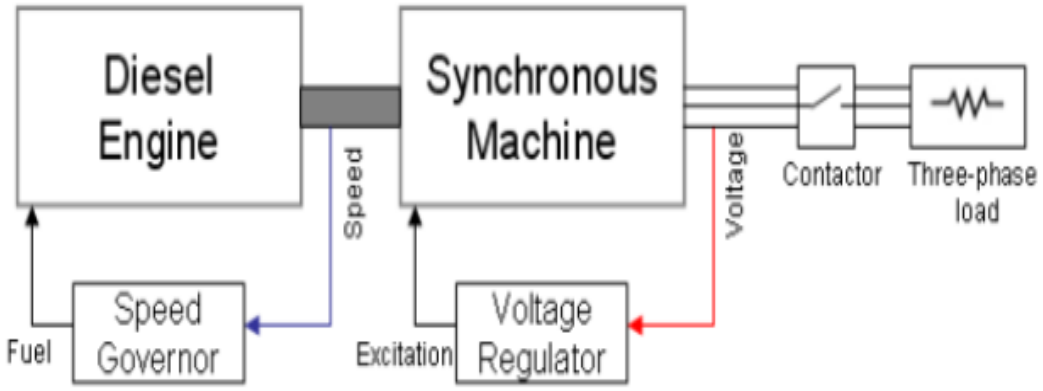
Block diagram of typical configuration of a diesel generator



A gen-set, also known as diesel generator or generator set, is a device that produces electrical power. Gen-sets consist of a diesel engine attached to an electrical generator, generally a synchronous alternator. The engine is controlled by an engine governor and the alternator is controlled by an automatic voltage regulator (AVR)

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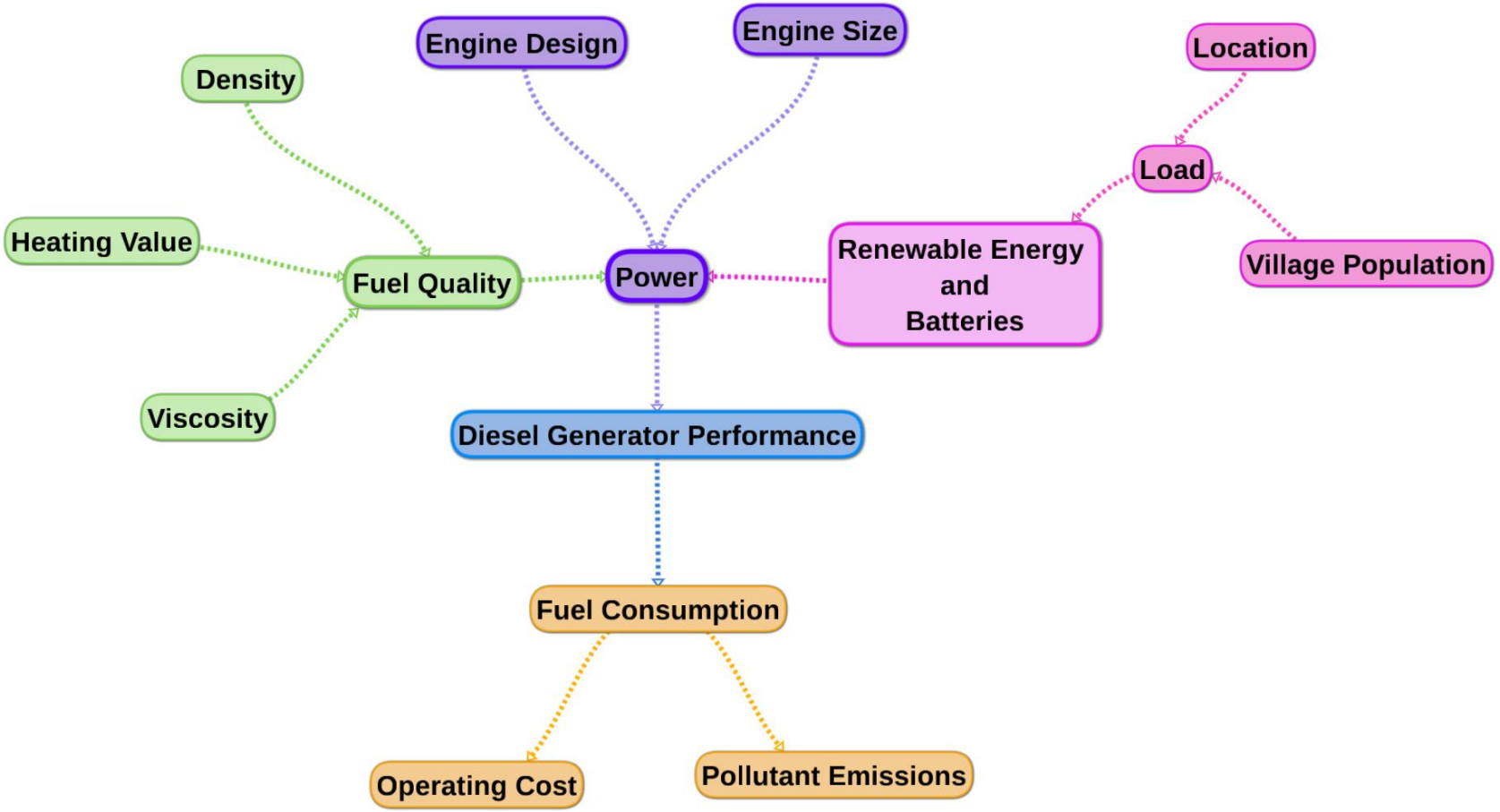

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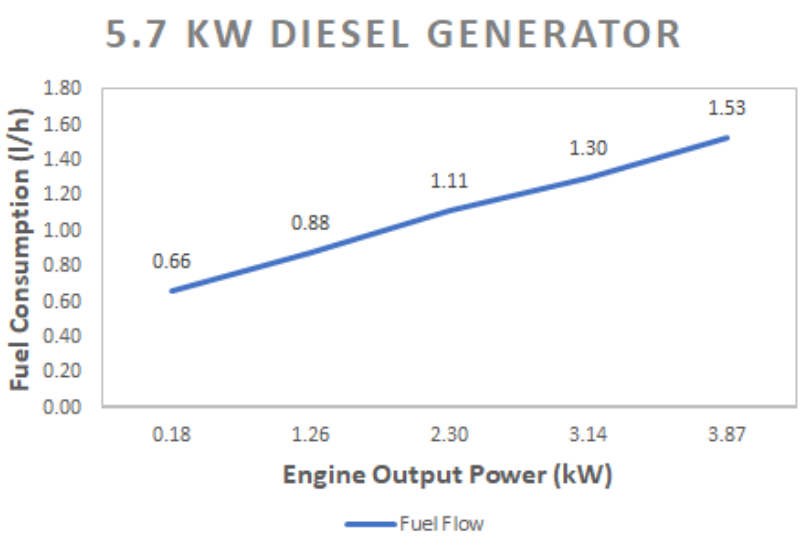

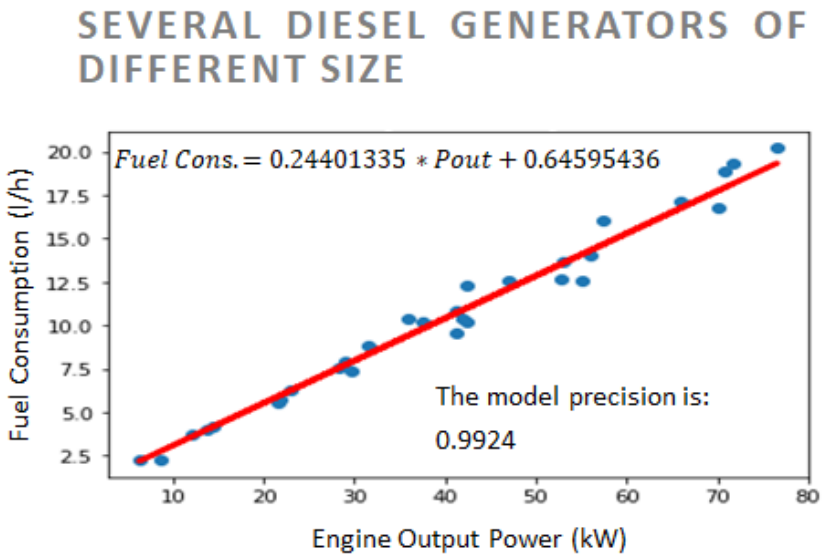

Bigger engine = higher fuel consumption

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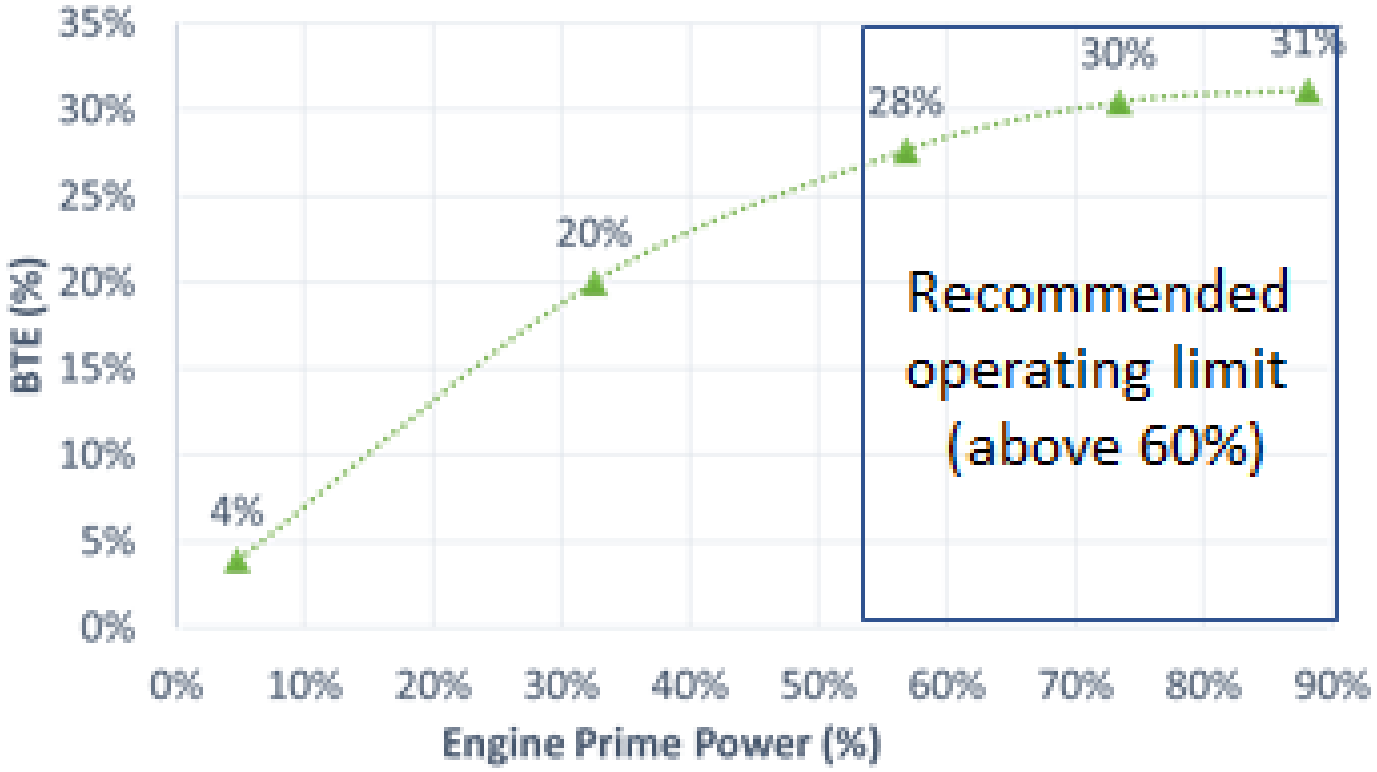

Diesel Generator Efficiency Curve

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Demand and PV power

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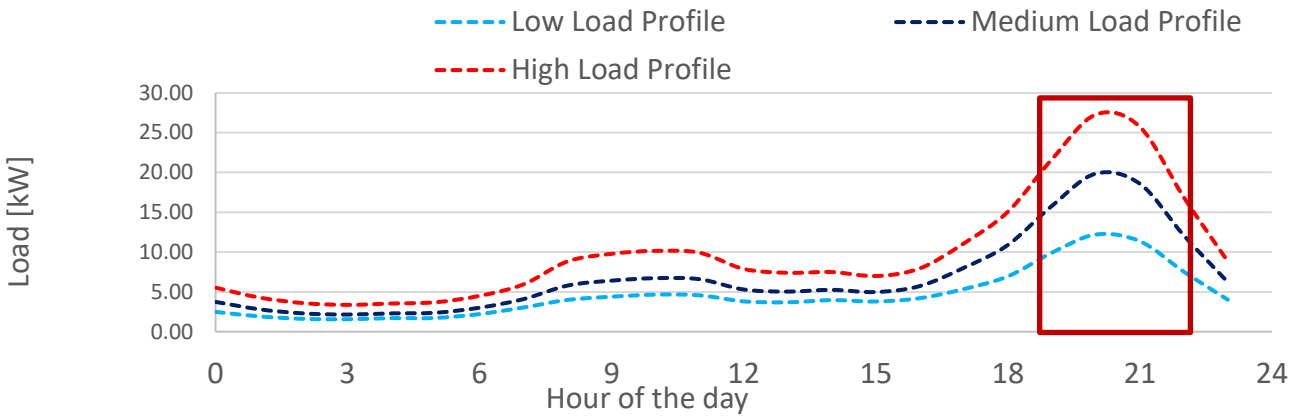

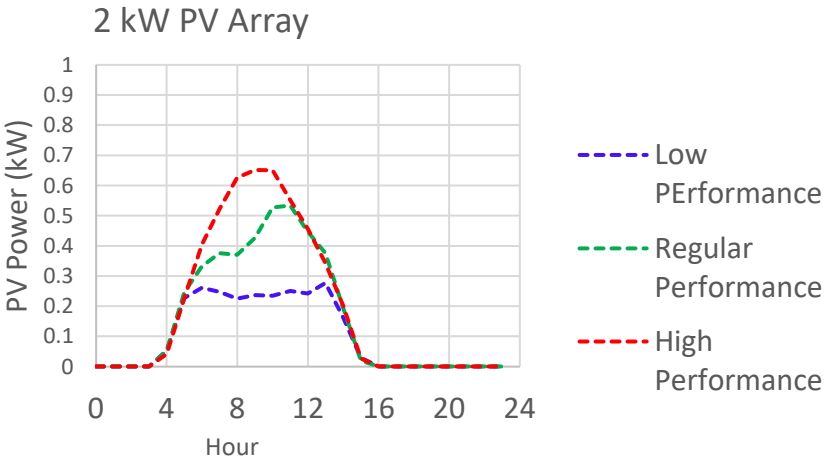

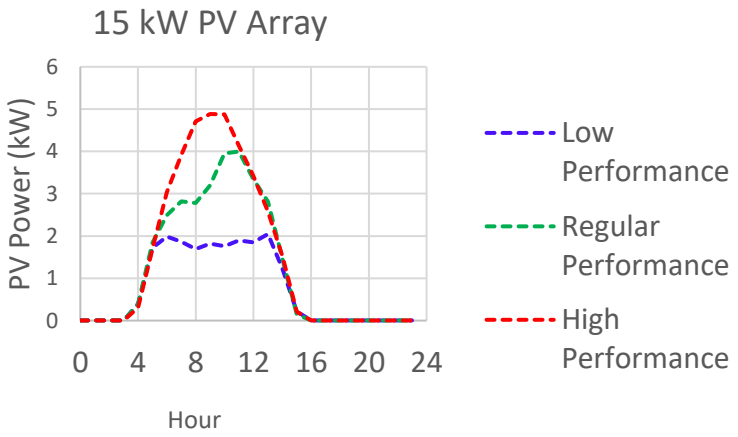

$$Demand - PV\ Power = Power\ required\ form\ genset$$