



creating sustainable change through education, engineering and leadership

Future Grid Solutions

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Training • Consulting • Engineering • Publications



Company Profile



global
sustainable energy
solutions

Established in 1998, GSES® provides renewable energy engineering, training and consultancy services world-wide.



TRAINING

- Official Australian Registered Training Organisation (RTO)
- Face to face practical and online training
- Grid Connect PV (GCPV), Stand-Alone, GC with Batteries, Solar Fundamentals, etc.



CONSULTING

- Grid Connected PV, Stand-Alone PV and hybrid system design
- Feasibility studies
- DNSP liaison for Grid Connected systems
- Independent/Owner Engineer
- Tender Development/Evaluation



PUBLICATIONS

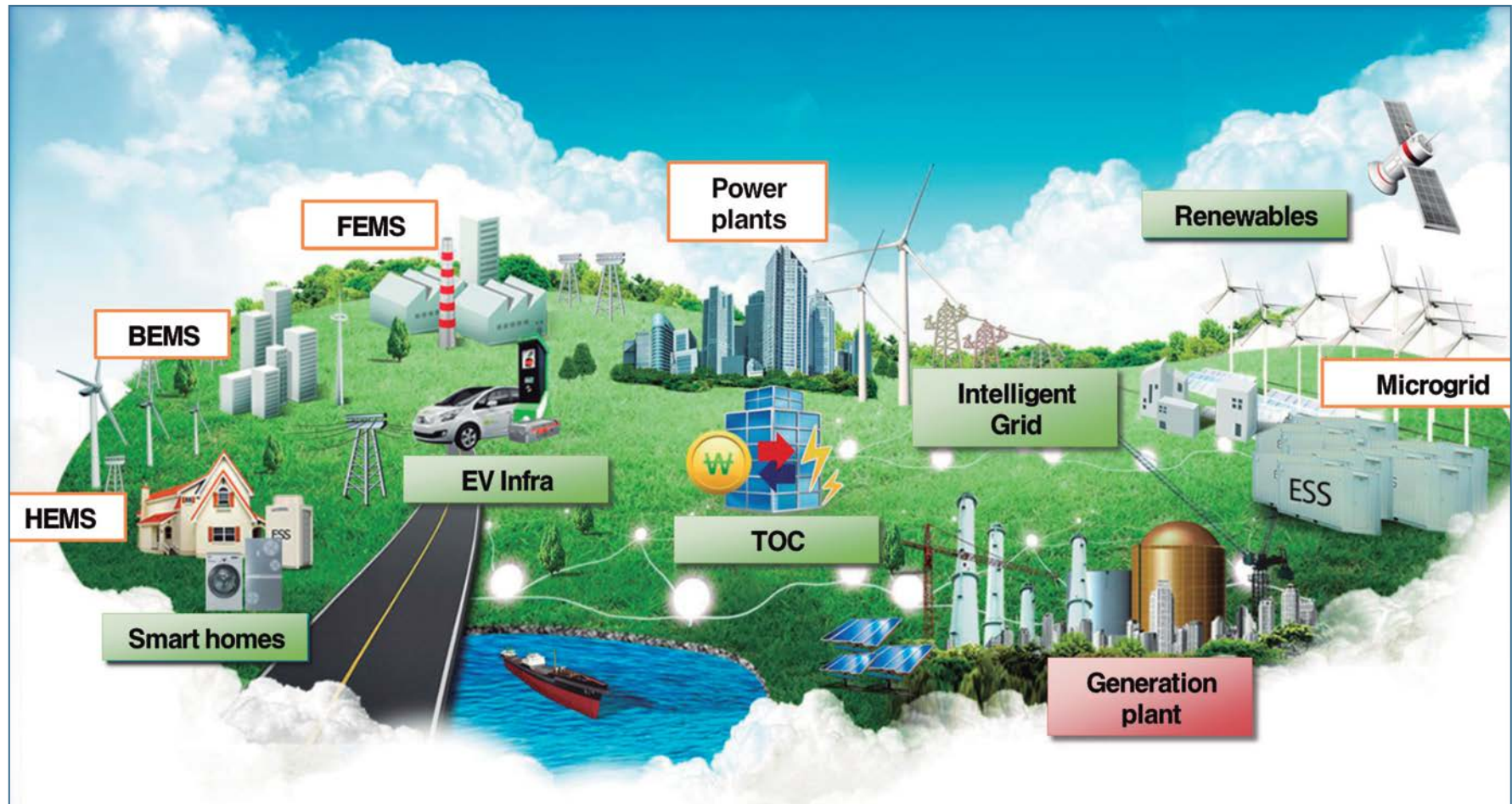
- Grid Connected PV Systems Design and Installation
- Stand Alone Power Systems Design and Installation
- News releases, Technical Articles and much more.



Global Markets



The Future Electricity Grid



Micro Grid vs Mini Grid

Mini Grid

- “Mini Grids provide centralised electricity generation at the local level using a village distribution network” – ARE
- An electricity grid which operates independent of a country, city or regions main electricity grid.

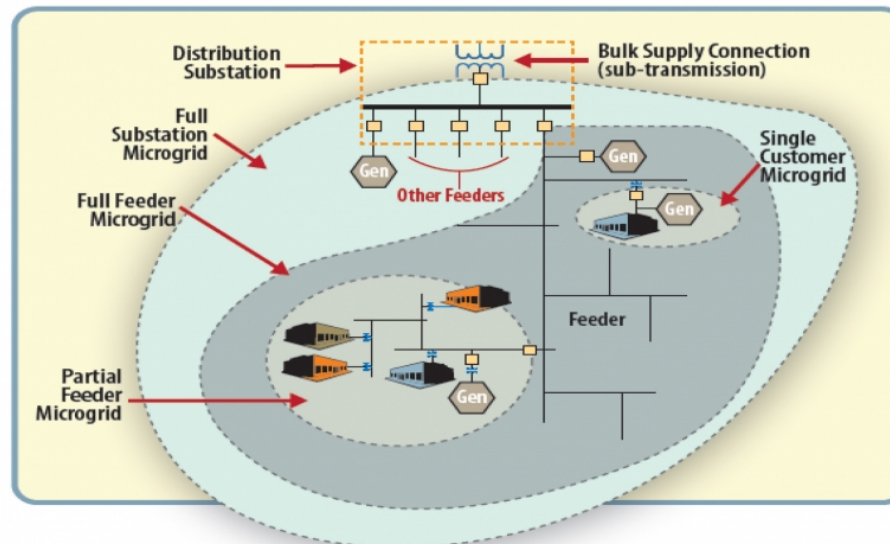


Source: SMA

Micro Grid vs Mini Grid

Micro Grid

- “Micro Grids are localised grids that can disconnect from the traditional grid to operate autonomously” – USDOE



Source: US Department of Energy

- Provide grid stability to the centralised grid and can operate as an islanded grid



Micro Grid Example



Source: Siemens

A consortium which includes academia, private industry and the network operator is working to convert the town of Wildpoldsried into a Topological Power Plant (TPP). The town already produces five times more energy than it consumes using solar PV, wind and biomass. The IRENE project, and subsequent IREN2 project will use sophisticated modelling, energy storage and advanced power control equipment to create a micro grid capable of grid re-synchronisation, black start sequence, voltage and power quality control, bi-directional current flow and much more.

IRENE

Wildpoldsried, Germany



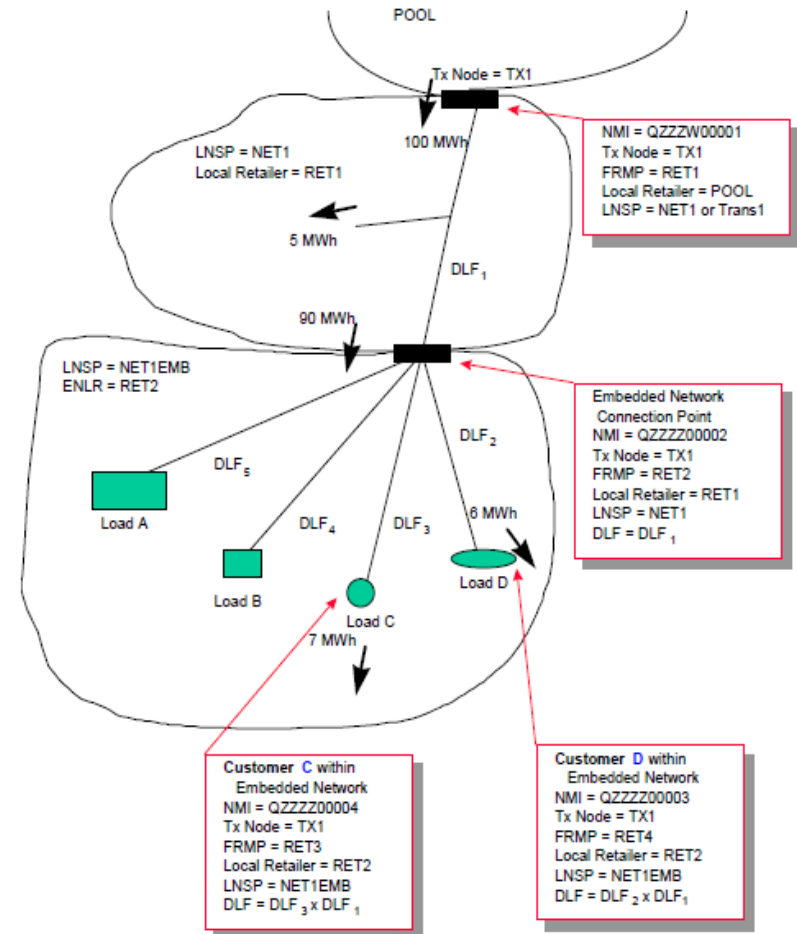
Source: Siemens



Embedded Networks

Embedded Networks, as allow retirement villages, shopping centres, housing estates, educational centres, apartment buildings, industrial complexes, etc. to have exemption as a network service provider and an energy reseller.

The Energy Network Operator (ENO) own the local electricity distribution system and resell energy to the end users.

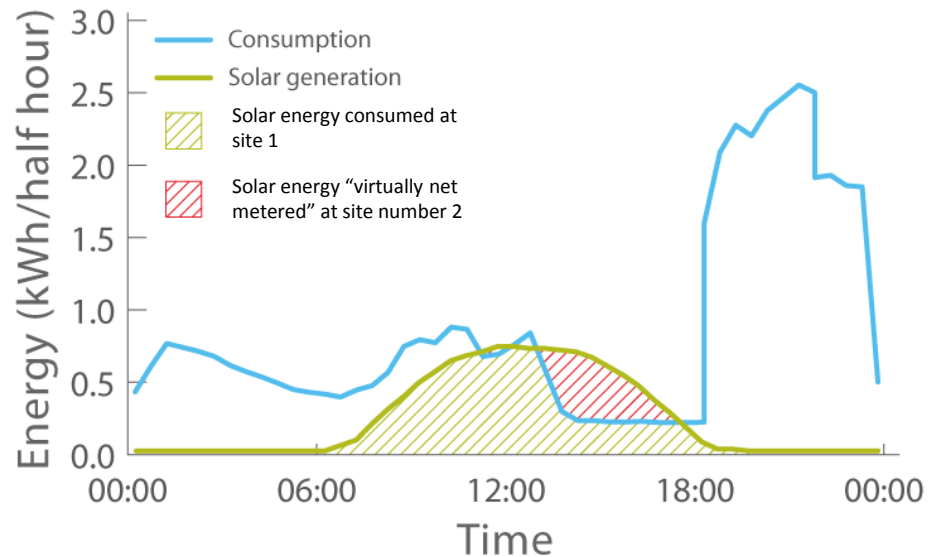


Source: AEMO



Virtual Net Metering

Virtual Net Metering (VNM) is when an electricity customer with on-site generation is allowed to assign their 'exported' electricity generation to another site or sites. To date only co-generation and tri-generation sites in Sydney and Melbourne have been allowed to utilise this market function



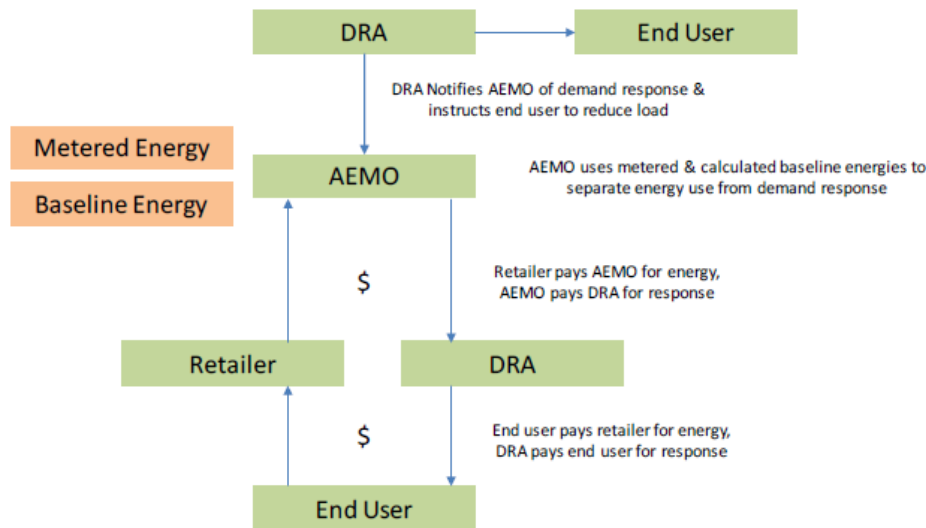
Byron Shire Council however, has just been supported in a virtual net metering arrangement utilising commercial scale solar PV (from a sporting arena to a sewage treatment plant). This opens the door for many other sites to do the same thing. DNSP's and retailers will have to be ready for this change.



DRM and ASU

Demand Response Mechanism (DRM) – “Pays an end user for reducing demand via the wholesale electricity market. Under the mechanism, end users are able to be rewarded for demand response that would be provided through a Demand Response Aggregator (DRA).”

Ancillary Services Unbundling (ASU) – “Allows a third party to register and sell Frequency Control Ancillary Service (FCAS) using aggregated loads/generation independently of the retailer.”



Source: AEMO



Source: Reposit Power



Community Owned Assets



Growing Community Energy (GCE) Grants have been awarded to 19 groups which include community owned solar, biomass and wind as well as finance and education groups targeting the growth of community renewable energy



Groups such as embark which is a non-profit consultancy working to encourage the growth of community owned renewable energy generation.



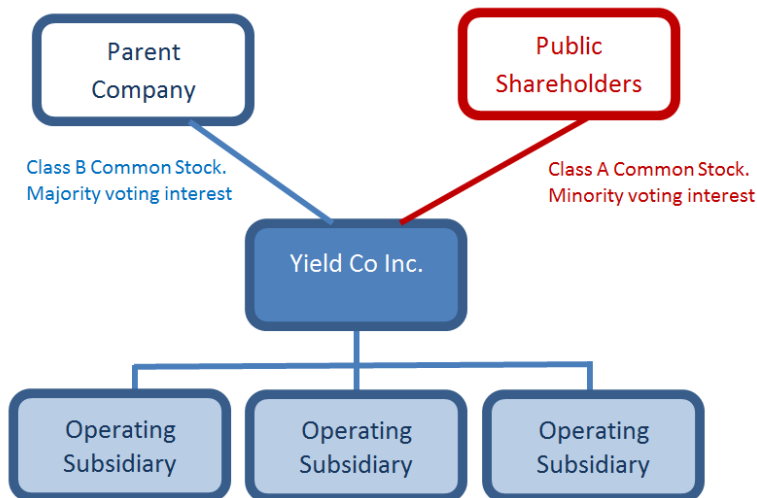
Example: Hepburn Community Wind Park in Leonards Hill, Victoria



Crowd Funded Solar and Yield Co's



Crowd Funding groups, like Mosaic in the US, allow the public to invest in renewable energy products and links finance to approved borrowers wanting to build a renewable energy generation system.



YieldCo's (such as SunEdison - TerraForm Power) are already a popular vehicle for creating renewable energy products. The YieldCo links the financing to projects and manages the returns, usually using a power purchase agreement structure



Some Technology



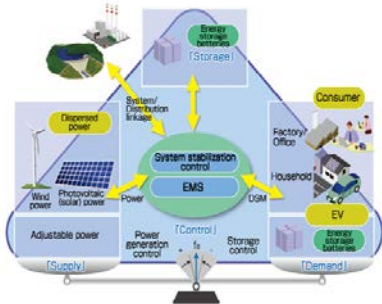
Source: Tesla

New Energy Storage technology such as the Telsa Powerwall will unlock the full potential of renewable energy. Renewables such as solar will no longer be an intermittent generator but instead become a cheap, consistent and reliable source of energy

Smart distribution systems, such as the voltage regulating transformer FITformer by Siemens, will become increasingly important especially when connecting micro-grids. Other forms of power quality regulation will also become increasingly important.



Source: Siemens



Source: Hitachi

In general, IT and the networking of electrical assets will become increasingly important. A robust monitoring and control system is necessary for node management, market accessibility, fault finding, operations and maintenance, etc.



Questions

Questions?

