

ComAp 

Advanced Microgrid Controls Reducing Fuel Consumption and Emissions

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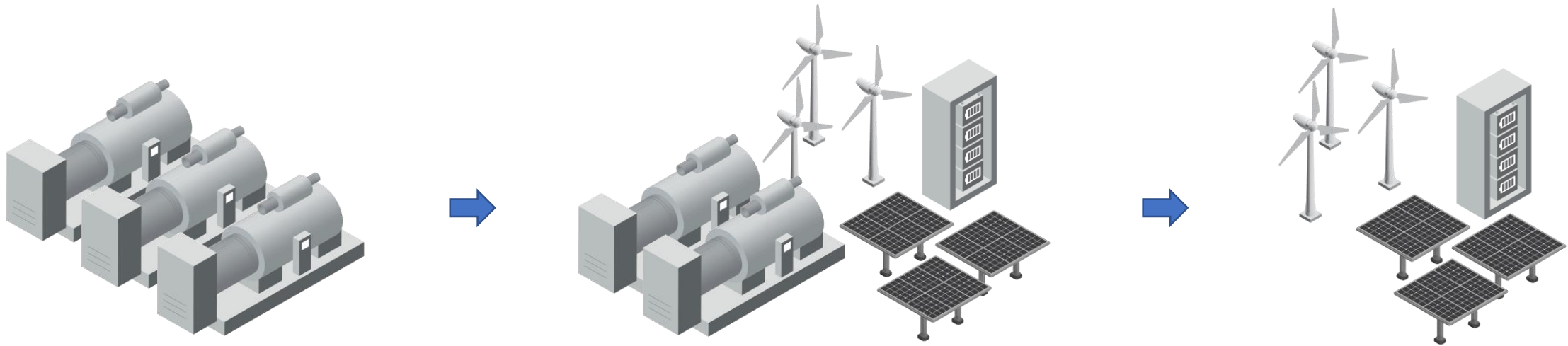
About us



Hybrid Microgrids - End User Landscape



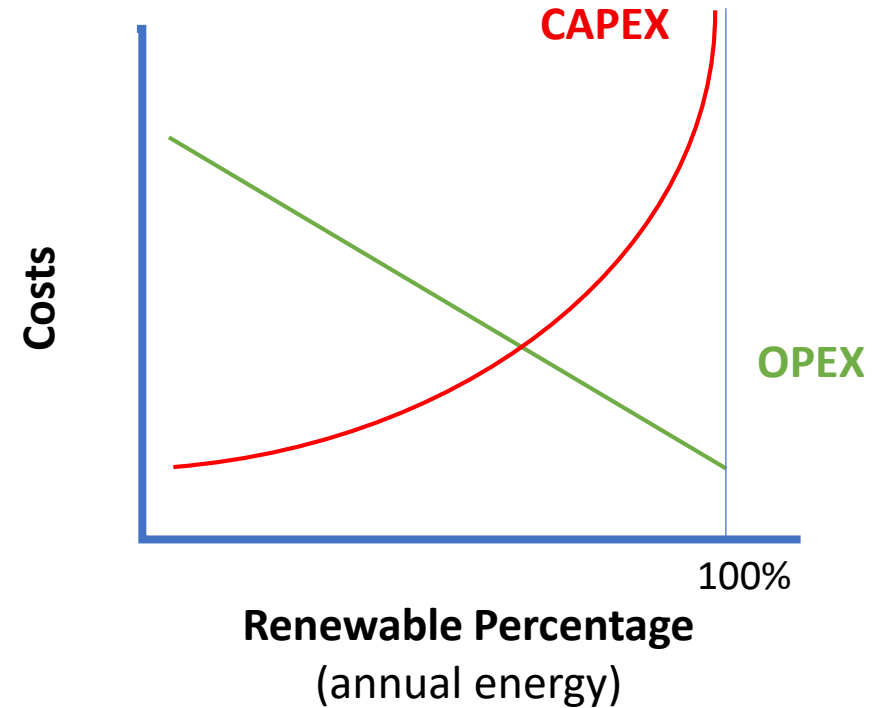
Carbon Energy Transition – What is Possible?



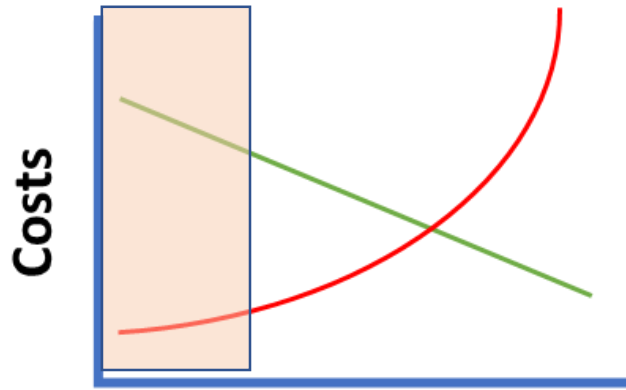
Hybrid Renewable Energy

Renewables Trap – If a Little is Good, More Must be Better!

- › CAPEX vs. OPEX
- › Diminishing returns
- › Dark Calm – Dunkelflaute
- › Beat it into submission with storage?
- › Storage does not add energy – it only consumes it!

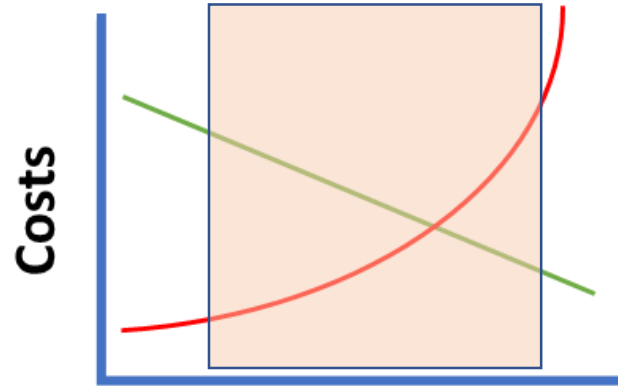


Hybrid Microgrid Controls



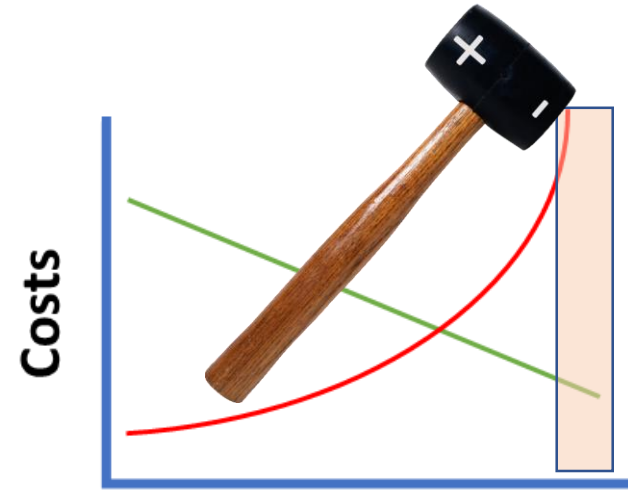
Renewable Percentage

**Hybrid Controls:
Do Nothing!**



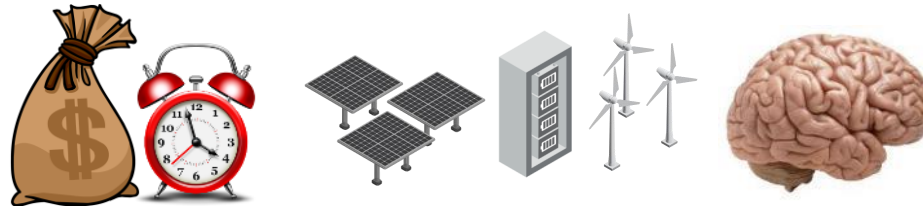
Renewable Percentage

**Hybrid Controls:
Everything!**



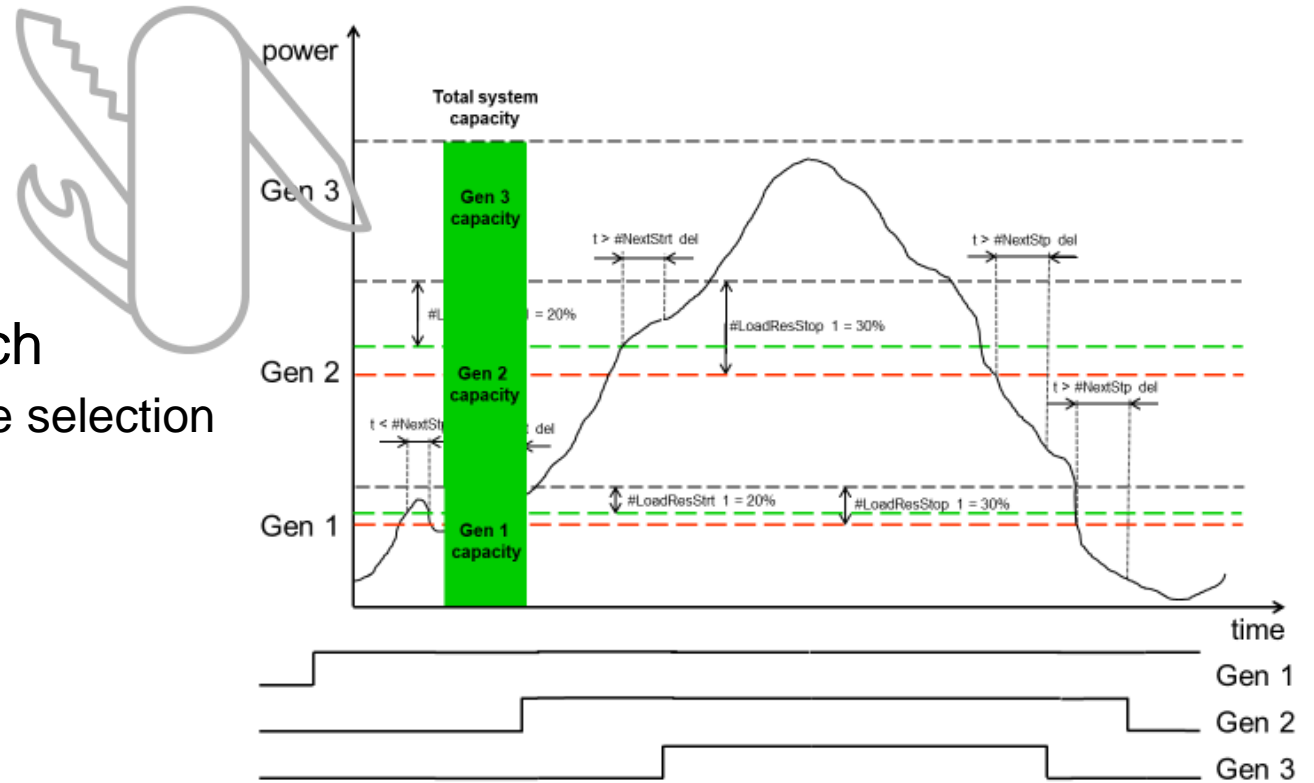
Renewable Percentage

**Hybrid Controls:
Do Very Little!**

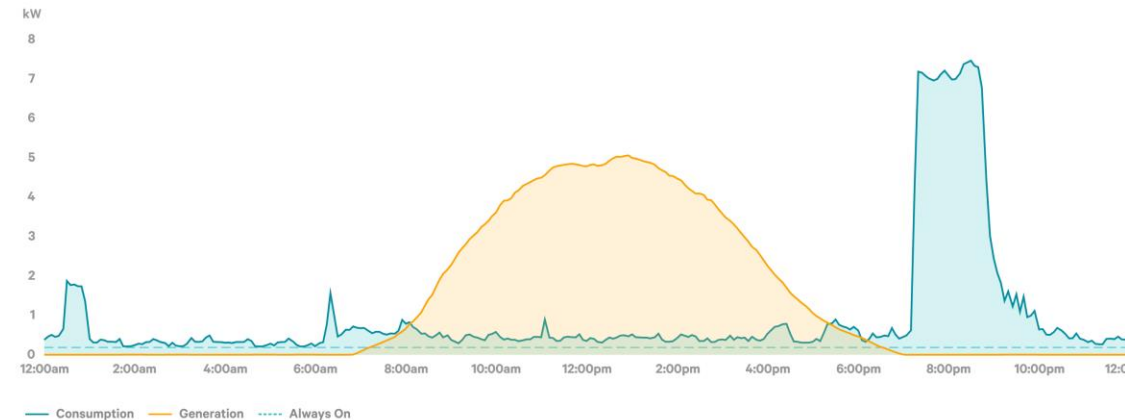


Hybrid Microgrid Controls Tools

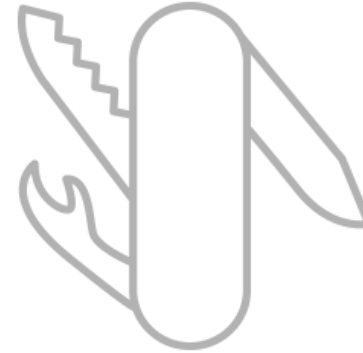
- › Power Management – engine dispatch
 - ›› Efficient points on the fuel curves, engine selection
 - ›› Minimum genset loading
 - ›› Dynamic spinning reserves
 - ›› Diesels off (Silent Mode)
- › Energy Storage Dispatch
 - ›› SOC management
 - ›› Storm prep mode
- › Load Shaping – Matching load to generation
 - ›› Electric Vehicles
 - ›› Hot water heaters, pool pumps, reverse osmosis pumps



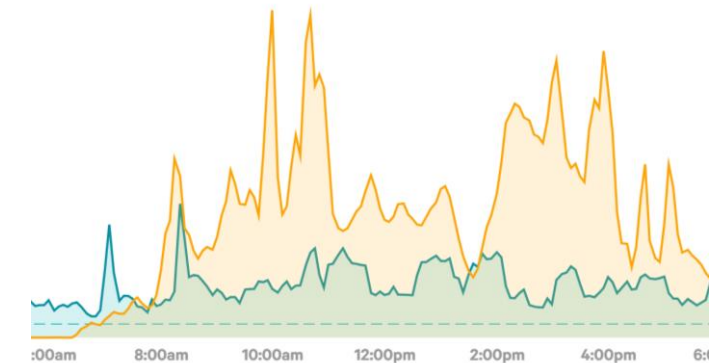
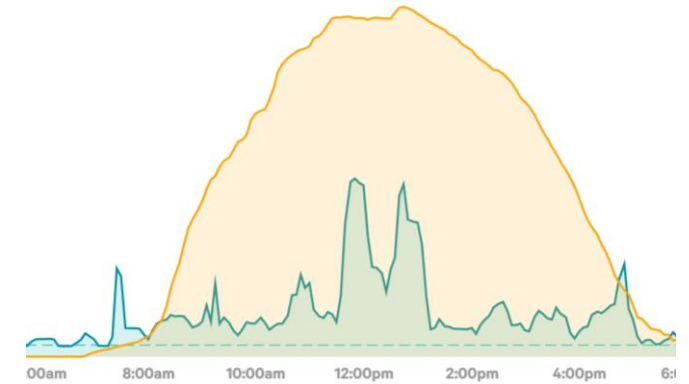
Power Over Time



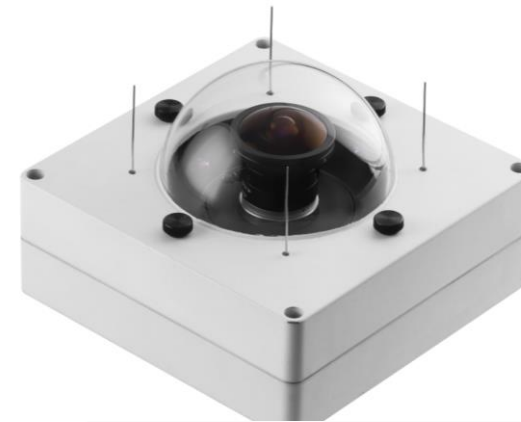
Hybrid Microgrid Controls Tools



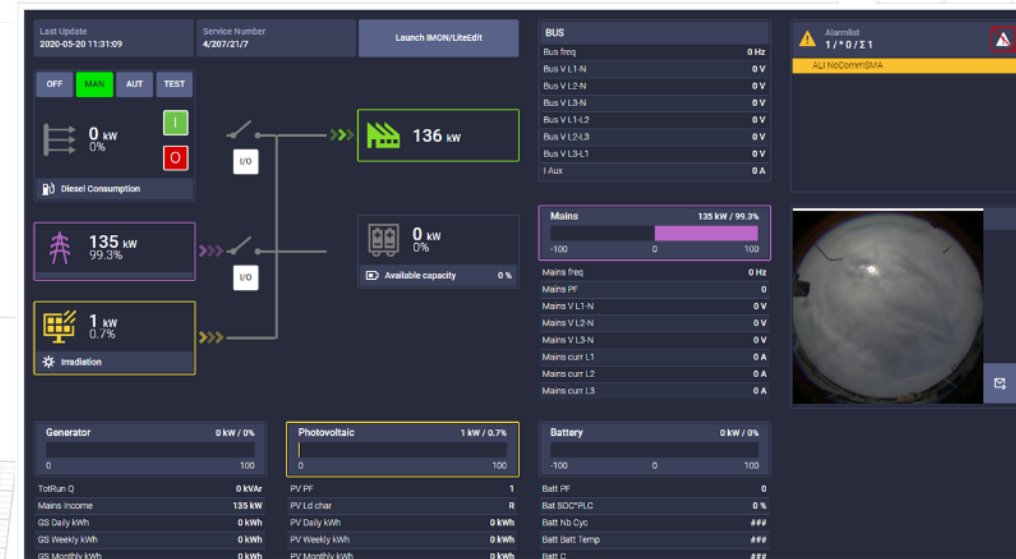
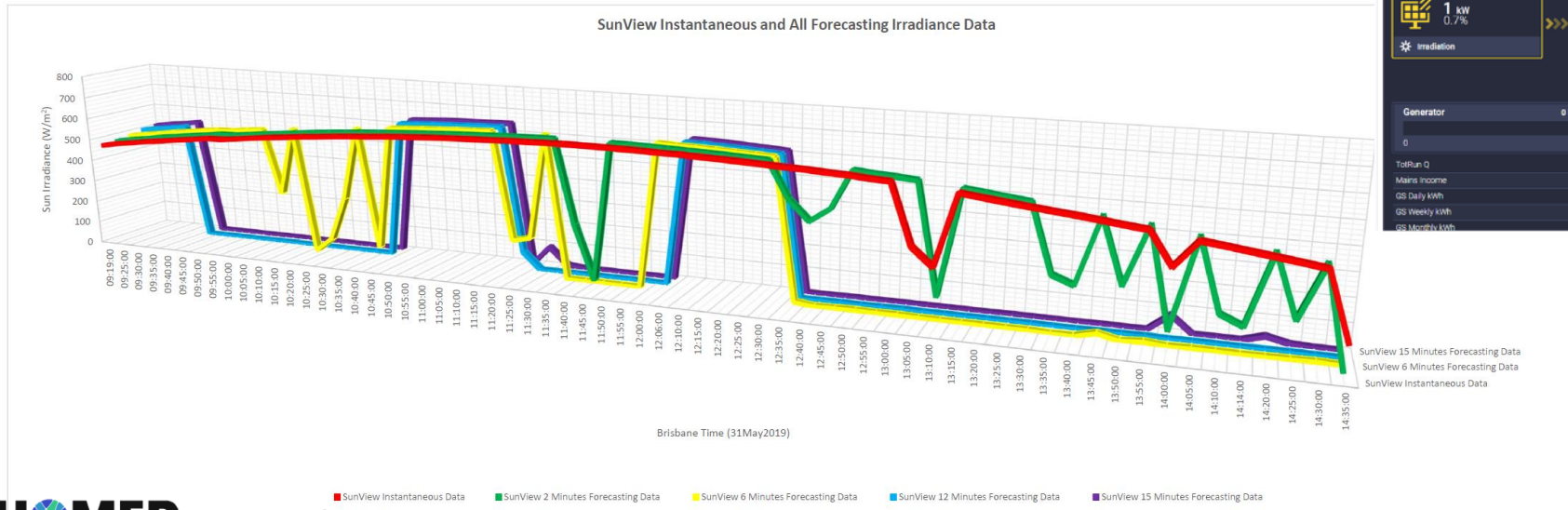
- › Dynamic Spinning Reserves -
 - › Add margin for renewable volatility
 - › Predict volatility
 - › Cloud Forecast System
 - › Specify aggressive of fuel-economy actions
- › Expand spinning reserve resources
 - › Load shedding – non-critical loads
 - › Exceeding ratings for short periods



Cloud Forecasting System - CFS



- Camera and software combine to forecast potential disruptions to PV output
- Multiple time steps – short term is most useful for our controls
- Not practical for smaller systems at this time



Hybrid Microgrid Case Studies



**Save Fuel and
Maximize Power
System Reliability**

**That's smart
control**

Thank you for your attention

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