Over 100 MWh of Energy Storage Systems installed and in operations in the past 2 years
THE COMPLETE MICROGRID

- SOLAR PV
- WIND
- BATTERY STORAGE
- UTILITY GRID
- DIESEL GEN SETS
- CUSTOMER LOAD
Graciosa Project Experience
Graciosa Project Profile

- Battery Storage System
- Solar PV
- Diesel Gen Sets
- Wind Park on Sierra Bianca Ridge

New installation of Solar PV, Wind Turbines and Lithium-ion Battery Storage integrated with existing Diesel gen sets and utility transmission grid

- 7.4 MW / 3.2 MWh Storage
- 4.5 MW Wind Turbines
- 1.0 MW Solar PV System
- 6.0 MW Diesel Gen Sets
Graciosa Hybrid Power Station

7.4 MW / 3.2 MWh Storage
4.5 MW Wind Turbines
1.0 MW Solar PV System
6.0 MW Diesel Gen Sets

Battery Storage System
Solar PV
Diesel Gen Sets
Graciosa Hybrid Power Station – Key Conclusions

• Island locations can have Excellent Renewable Resources which should be tapped for Sustainability

• Business Model is Clear – Savings from High Cost Diesel generation provides sufficient economics to support investment

• Wind / Solar Generation can be Complimentary and effective in greatly increasing Renewable Penetration

• Grid-Forming vs. Grid-Following systems require the right design, the right equipment and the right controls to maintain Grid Stability

• RESULT – 70% RENEWABLE PENETRATION ACHIEVED
Storage Applications in Microgrid Environment

– Dispatchable Renewable Energy

BASE LOAD
POWER from fluctuating renewable energy resources
Storage Applications in Microgrid Environment
– Dispatchable Renewable Energy

Solar PV Generation

BASE LOAD
POWER from fluctuating renewable energy resources
Storage Applications in Microgrid Environment
– Dispatchable Renewable Energy

BASE LOAD
POWER from fluctuating renewable energy resources
Storage Applications in Microgrid Environment

– Dispatchable Renewable Energy

BASE LOAD POWER from fluctuating renewable energy resources

Battery Charge & Discharge

BASE LOAD Power from Battery to Grid

Solar Power available to Grid kW
Load
Solar + Storage Power to Grid kW
Battery SOC %
Storage Applications in Microgrid Environment – Dispatchable Renewable Energy

BATTERY STORAGE absorbs constant fluctuations in renewable generation.
Storage Applications in Microgrid Environment

– Grid Management, Resiliency & Efficiency

DIESEL GENERATION

SOLAR+STORAGE
Solar+Storage can provide peak power and manage grid fluctuation.
Grid Management, Resiliency & Efficiency

Storage Applications in Microgrid Environment

Storage Systems can provide Grid / Load Management 24 X 7
Storage Applications in Microgrid Environment
– Grid Management, Resiliency & Efficiency

Storage Systems react quicker and more accurately to Load Fluctuation than Diesel Gens in Spinning Reserve
Storage Applications in Microgrid Environment
– Grid Management, Resiliency & Efficiency

Key Benefit – More Predictable and Efficient utilization of Diesel Gen Sets
THANK YOU