GPA GRID TRANSFORMATION SOLUTIONS TOWARD A HIGHLY RESILIENT, RELIABLE, AFFORDABLE AND HIGH RENEWABLE ENERGY PRODUCTION GRID



Charge/Discharge-Anytime Battery Energy Storage Systems (BESS) - Provides spinning reserve and frequency regulation. Greatly improves grid response to FIDVR, duck curve ramp ups, and excess solar PV production events. Provides other grid services.



Flexible Efficient Generation - Better follows the changes in demand and available generation online especially when large intermittent sources of power are on the grid. Reduces power rates.



Energy Shifting Battery Energy Storage Systems (ES BESS) - Decreases Excess Solar PV Production Events by storing 100% of energy for nighttime use; Replaces expensive production from peaking generation.



Demand Response (DR) - Adjusts customer demand up or down however needed by the grid.



Synchronous Condensers (SC) - Provides Short-Circuit MVA to power system to keep the grid stable, prevents grid-tied inverter cessation, improves fault response and voltage, and allows GPA grid to operate with 100% renewable energy.



Smart Grid (SG) - Advanced technology for getting the right information to the right people or systems at the right time to make the right strategic and operational decisions.



Energy Efficiency - Energy efficiency has a much higher rate of return than just simply installing solar PV. Putting energy efficiency first lowers energy costs for everyone.



Time-of-Use (TOU) Rates - Provides incentives for customers to change their electricity-use behavior to match the needs of the grid.



Daytime Charging Electric Vehicles (EV) -Prevents curtailment of synchronous generation and solar PV during excessive solar PV production events when solar PV production is high and daytime loads are low. Slows growth of system peak deferring expensive investments for new capacity.



Microgrids - Using synchronous generators and Solar PV + energy-shifting battery energy storage systems with grid forming capability to provide power after natural disasters such as typhoons especially in southern Guam.



Grid Controller - Optimizes all resources to provide the most benefit at the least cost. Improves system stability and system economics.



Solar Irradiance Sensor Network - Provide real-time estimates of solar PV power production. Forecast solar PV power production. Track cloud cover.



System Protection - Improve System Protection to operate in an environment with less synchronous generation and more inverter based resources.



Improving Generator Reliability - Improving GPA generator availability results in serving more load using less generation. It also significantly lowers energy costs.



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