

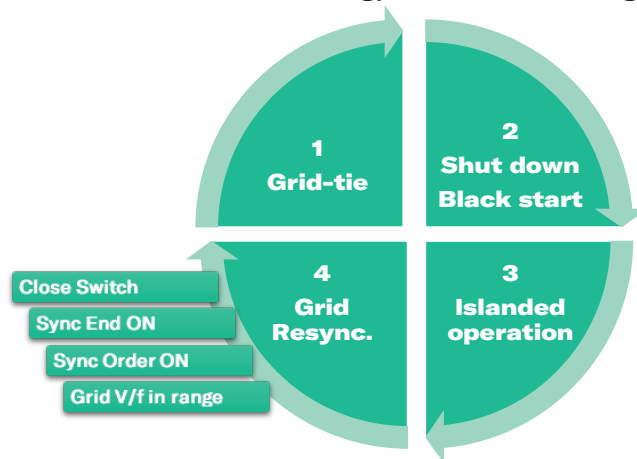
# GRID FORMING ISLANDING OPERATION

## Microgrids

Microgrids can operate connected to a larger electrical grid and thus must therefore comply with the appropriate grid code at the point of interconnection. They can import or export energy to/from the external system based on operational needs and energy availability. Microgrids can operate connected to a larger electrical grid and thus must therefore comply with the appropriate grid code at the point of interconnection. They can import or export energy to/from the external system based on operational needs and energy availability.

However, microgrids may operate in isolation due to a planned operation or an unexpected event. Similar to islanded systems, microgrid operators must ensure power quality and reliability. In some cases, generation units may not be able to meet demand, requiring pre-defined load shedding.

In addition, microgrids will also need to reconnect to the grid again and synchronize with the external grid.



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## Control strategies: Grid Forming –GFM–

eks Energy solutions include the most advanced control strategies for Standard grids and isolated Microgrids applications:

Grid Following	Grid Forming - droop control
<ul style="list-style-type: none"> <li>- Current control</li> <li>- Synchronization through grid voltage</li> <li>- Fault support</li> <li>- Fast frequency response &lt;20ms</li> <li>- +/- sequence controller</li> <li>- &gt;4 GW installed</li> </ul>	<ul style="list-style-type: none"> <li>- Voltage control</li> <li>- Synchronization through active power</li> <li>- Droop control</li> <li>- &gt;20 MW installed (planned 1GW)</li> </ul>
Grid Forming - Virtual Synchronous Machine Control	
<ul style="list-style-type: none"> <li>- Current control using a virtual admittance</li> <li>- Synchronization through active power</li> <li>- In the las step of validation for field deployment</li> <li>- In the last validation stage (planned 1GW)</li> </ul>	

# eks Energy SHAPES THE FUTURE OF GRIDS

## Solutions for increasing renewable in Grids

For Microgrids, Grid-Forming (GFM) control strategies applied to power electronics solutions are a perfect fit. GFM allows active and reactive power control of power converters when connected to the main grid, and voltage and frequency control when isolated.

**GFM control and islanding operation functionalities (e.g. inertia emulation) are possible with power plant controller (PPC) and power stations (PSs) designed by eks Energy.**



### SUCCESS CASE: KEKAHA PV+ESS Power Plant

Kekaha, located in Hawaii, included 21 MWp PV & 87 MWh of ESS integrated with our solution. This PV+BESS power plant is designed to provide emergency backup power in the unlikely event of a KIUC outage or infrastructure failure.

**Our AMPS-DC Coupling Solution, together with PPC,** provided the hardware and controls needed to bring the power plant into compliance with interconnection specifications:

- Provide primary service to KIUC as a dispatchable power plant in accordance with the performance specified in the interconnection agreement with KIUC.
- In the event of a transmission failure and/or utility outage outside of the designated critical loads (24/7 operation up to 2 MW), the Power Plant must enter an islanding mode to provide backup power to the connected critical loads.