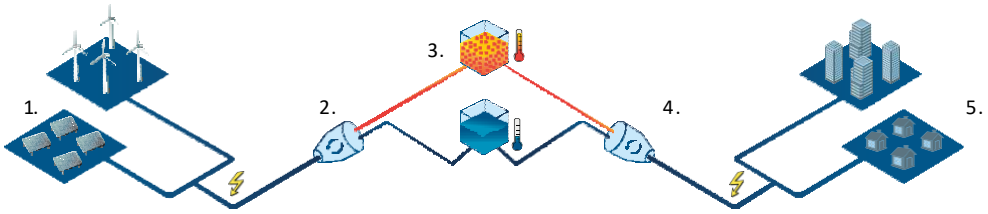
MALTA

THE FUTURE OF ENERGY STORAGE

# Malta M100 System

## Technical Specifications

Malta's Pumped Heat Energy Storage (PHES) technology is based on a high-temperature heat-pump electricity storage system for large-scale long-duration energy storage (LDES). This technology is well-suited to the changing energy landscape, with the potential for discharge duration capabilities of hours to days and an expected plant lifespan of 30+ years without performance degradation. Malta's plant operates in a very similar way to existing gas turbine technologies, meaning partners and customers are familiar with the technology, grid integration, construction, O&M, and supply chains. The plant requires well-understood and readily available raw materials and commodity products, including solar salt and antifreeze, rather than any rare earth materials or critical minerals in limited supply.




1. Collects
Renewable energy is gathered from wind or solar farms on the grid as electrical energy and sent to Malta's energy storage plant.

2. Converts
The electricity drives a heat pump, which converts electrical energy into thermal energy by creating a temperature difference.

3. Stores
The heat is then stored in molten salt, while the cold is stored in chilled liquid.

4. Reconverts
The temperature difference is converted back to electrical energy by a heat engine.

5. Distributes
Electricity is sent back to the grid when it is needed.

**The Malta PHES system also offers benefits over other storage technologies:**

- It is site-agnostic, without the topographic or geologic restrictions faced by technologies including pumped hydro or compressed air energy storage.
- It can be charged with electricity from any source and provides a wide range of traditional grid attributes – including rotating machinery provides inertia, circulating current, and primary frequency response – that are valued by grid operators, and offers optional modularity with independently tunable charge and discharge cycles.

**The Malta PHES offers the following services:**

- Spinning Reserve
- Ancillary Service
- Heat Application
- Load Following Reserve
- Duration & Duration to Meet ISO/RTO Capacity Supply Obligations
  4-24+ hrs
- Charge to Discharge Ratio <1:1
- Volt/Var Support
- AGC/Load Following
- Ability to Charge & Discharge at Separate Interconnection Points/Voltages

**Key Technical Specification for the Malta M100-10 Plant:**

| Parameter | Definition | Value |
|---|---|---|
| Rated Discharge Power | The rated steady state active power at which the plant can continuously deliver under ISO conditions. | 100 MW |
| Rated Charge Power* | The rated steady state active power at which the plant can continuously absorb under ISO conditions. | 154-190 MW |
| Minimum Discharge Power | The minimum power level the plant can discharge under ISO condition | 25% rated power |
| Minimum Charge Power | The minimum power level the plant can charge under ISO condition | 25% rated power |
| Available Discharge Energy | The usable energy that can be provided by the plant when discharging at rated power in ISO condition. | 1000 MWh |
| System Power Factor Range | Specify leading and lagging power factor range. | 0.85 - 1.00 |
| Recommended Maximum State of Charge | The maximum percentage state of charge the manufacturers recommends to maximize life of the asset when subjected to daily or more frequent cycling. | 100% |
| Recommended Minimum State of Charge | The minimum percentage state of charge the manufacturers recommends to maximize life of the asset when subjected to daily or more frequent cycling. | 0% |
| Charge Duration at Rated Charge Power | The minimum amount of time required for the plant to be charged at rated charge power. | 10 hours |
| Discharge Duration at Rated Discharge Power | The maximum amount of time over which the plant can be discharged at its rated discharge power. | 10 hours |
| Charge Ramp Rate – Hot | The maximum rate that the plant can change its input power in ISO condition. | 25%/min |
| Discharge Ramp Rate – Hot | The maximum rate that the plant can change its output power in ISO condition. | 25%/min |
| Start-up Time for "Hot Start"- Discharging | Time between when the external signal (command) is received at the plant boundary and the plant discharge power output (electrical or thermal) reaches 100% of its rated discharge power when the plant is in ready-to-start mode. | 10 minutes |
| Start-up Time for "Hot Start"- Charging | Time between when the external signal (command) is received at the plant boundary and the plant charge power input (electrical) reaches 100% of its rated charging power when the plant is in ready-to-start mode. | 10 minutes |
| Overall System Efficiency AC to AC (RTEAC)* | Total roundtrip efficiency of the plant defined as the ratio of the delivered discharge energy to the delivered charge energy at the output terminals (parasitic included). | 53%-65% |
| Cycle Life Ratings | The number of cycles that the energy storage plant can perform until EOL, independent of calendar life degradation. | No limits |
| System Availability | Anticipated scheduled maintenance is 3% and unscheduled maintenance is 2% of time annually based 8,760 hours per year. | 95% |

* Ranges for RTE and charge power are expected between 1st and Nth plant

DISCLAIMER: Final values to be agreed upon between Malta and the customer

**About Malta:**

Malta is developing utility-scale long-duration energy storage solutions. Its Pumped Heat Energy Storage (PHES) plant is based on well-established technologies in power generation adapted in a new, innovative way for energy storage. The system can store 10+ hours of electricity from any source and dispatch on demand, with independent charge and discharge cycles for flexible applications. Backed by Breakthrough Energy Ventures, Google, and leading players in the energy industry, Malta is based in Cambridge, Massachusetts.