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India SMART UTILITY Week 2024

Supporting Ministries



Session : LONG DURATION ENERGY STORAGE SYSTEMS (LDES)

Presented By

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Conventional thermal power plants provide more than just electricity to the system



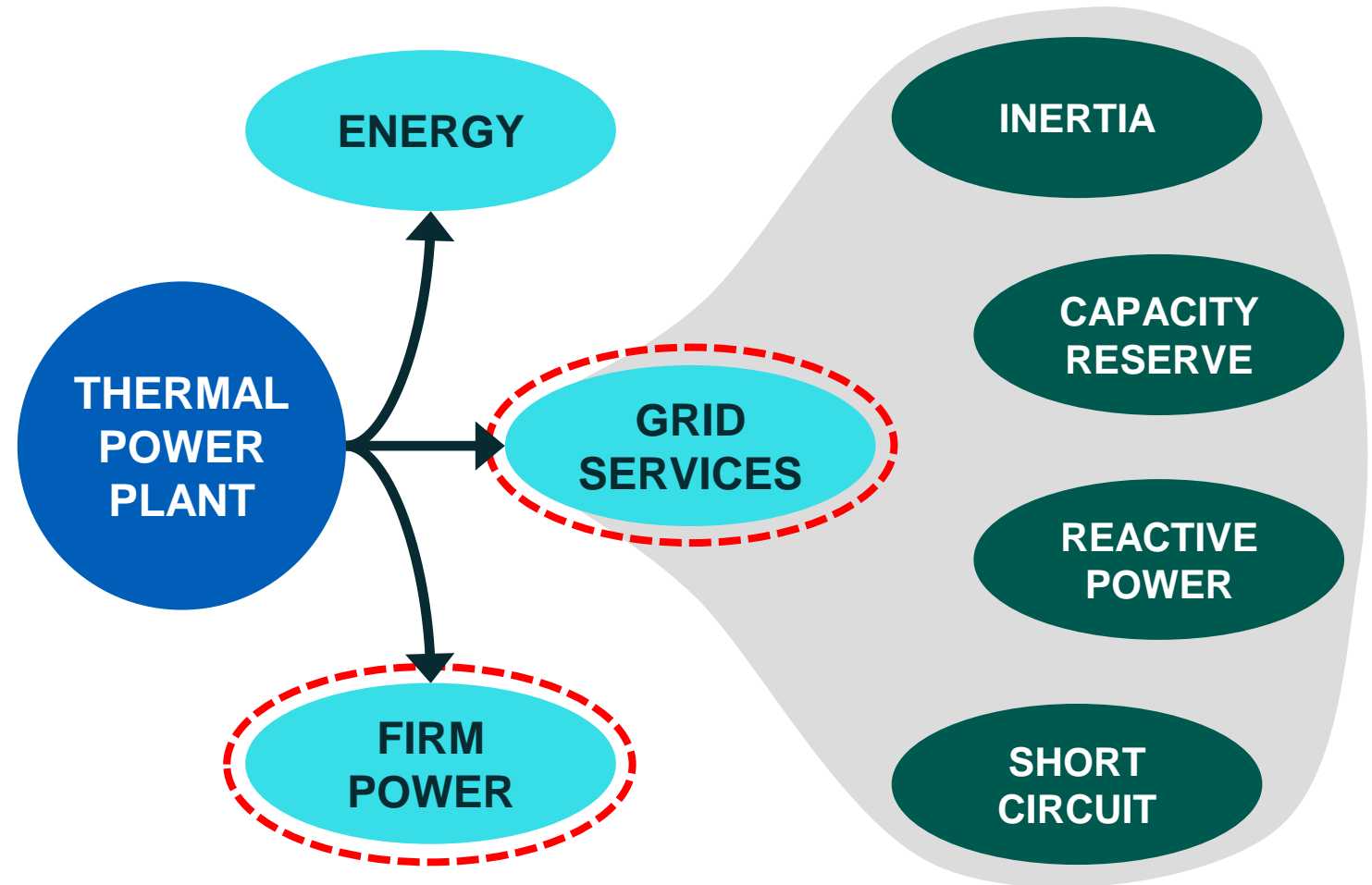
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Dispatchability of thermal generation ensures energy supply when required and keep the grid stable

More than **30 events** involving generation **loss of above 1000 MW** from renewable power plants has been observed in the grid between January 2022 to May 2023

Source: Grid Controller of India Limited, Report on Events Involving Transmission Grid Connected Wind & Solar Power Plants, 2023



Long Duration Energy Storage (LDES) can ensure dispatchability of Renewable Energy



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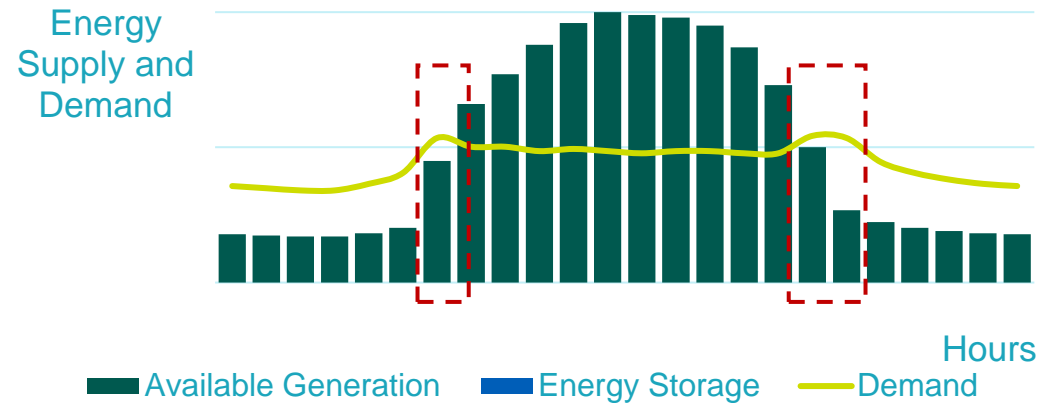
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By bulk shifting Solar and / Wind Energy from generation to demand period

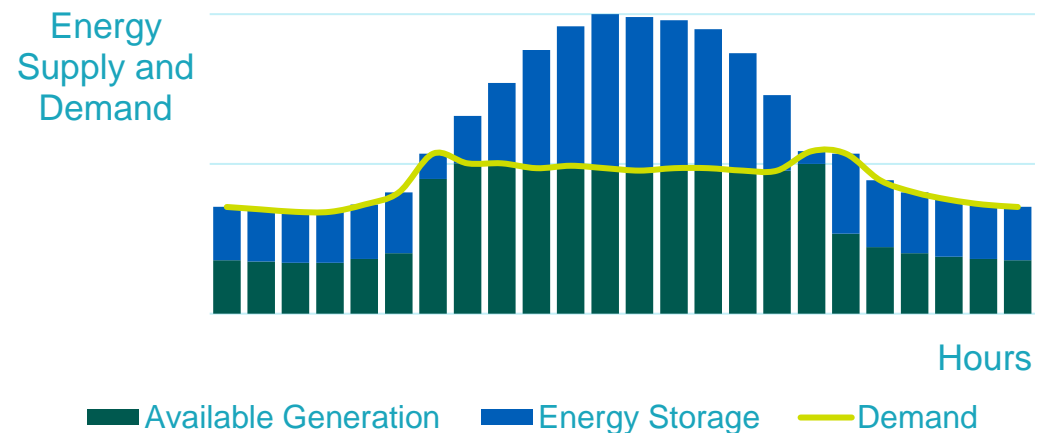
One of the challenges to decarbonize the power grid with wind and solar is the intermittency

Peak demand

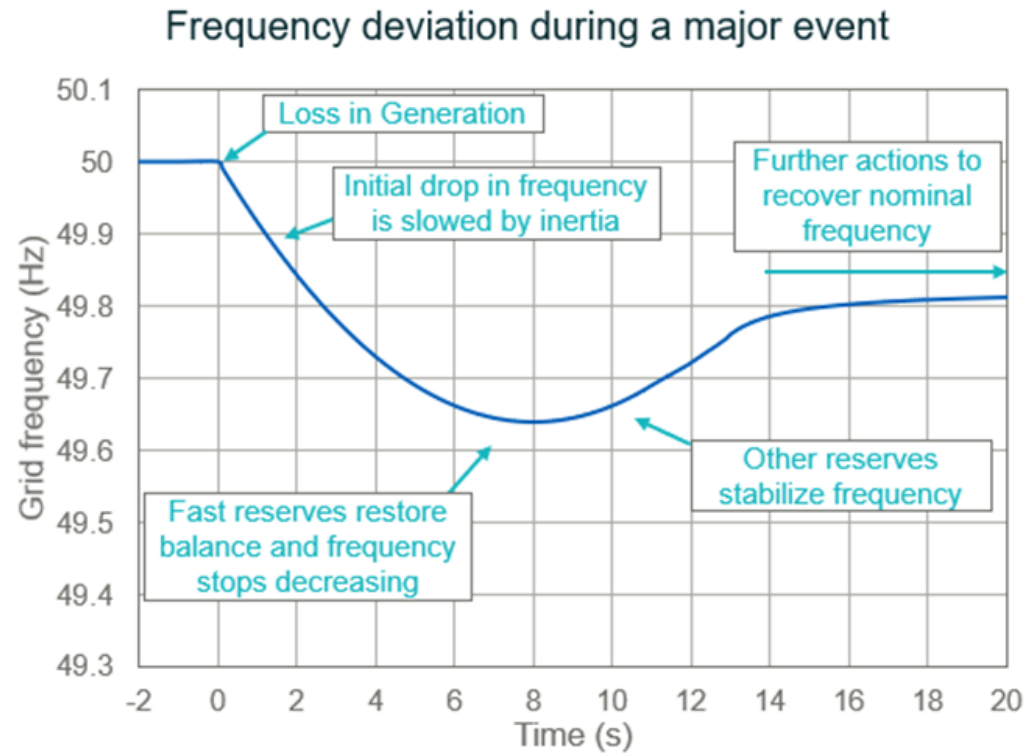
Long duration storage can solve this issue for daily or even weekly balancing of supply and demand



With LDES, a transmission utility can evacuate stored energy over a longer duration and defer capex



System inertia allows the grid to react to external events



Fault external to RE plant 15th May 2023

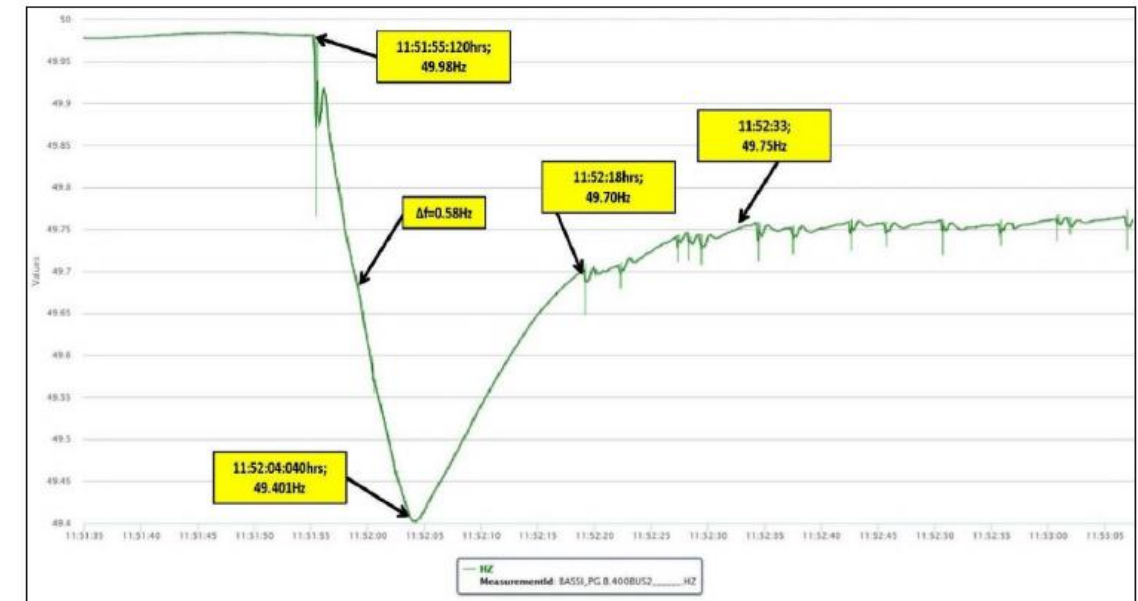


Figure 3- 23: Bassi PMU frequency during the event

Frequency drop of 0.58 Hz (from 49.98 Hz to 49.40) and triggering of under frequency load shedding in some pockets (~4016 MW load shedding reported across all India). (ref Figure 3- 23)

7120 MW generation loss occurred

Source: Grid Controller of India Limited, Report on Events Involving Transmission Grid Connected Wind & Solar Power Plants, 2023

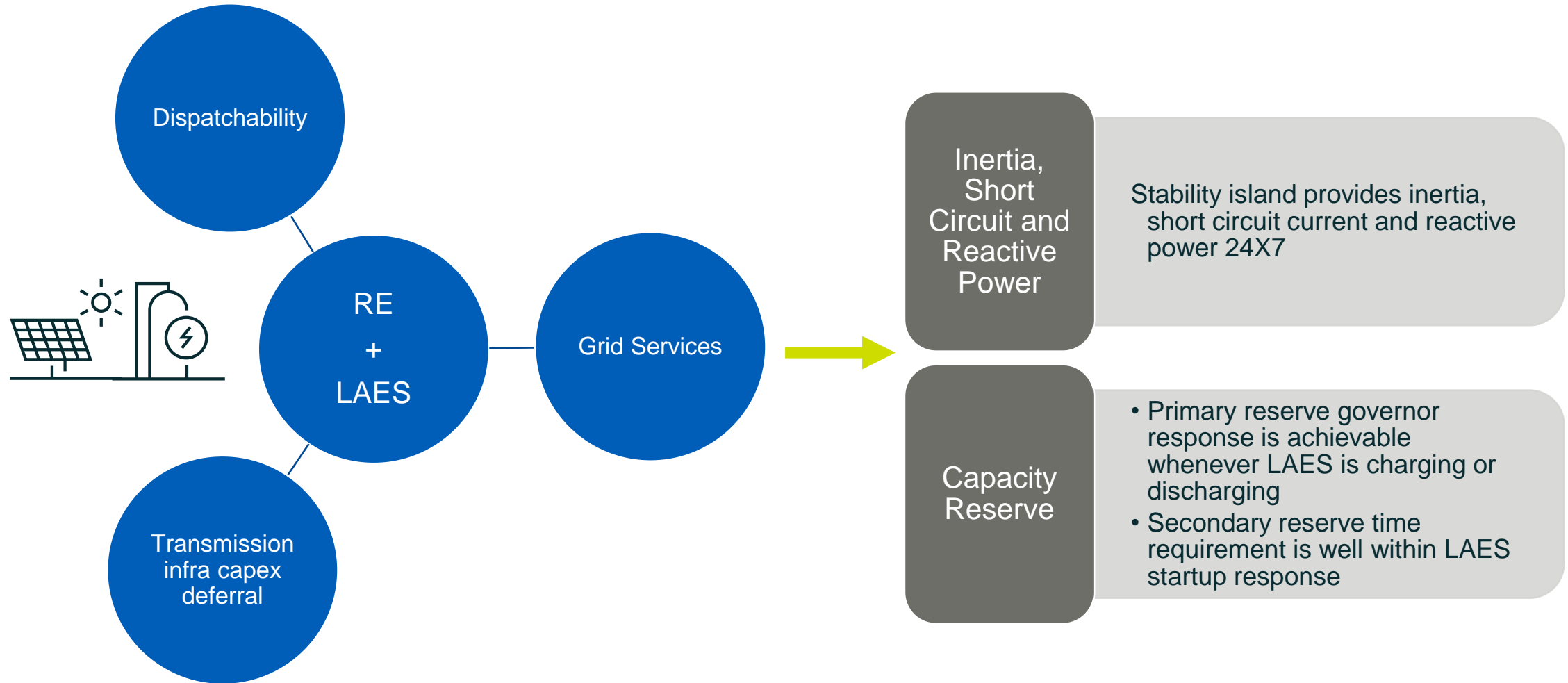
LAES can mimic thermal power plant characteristics along with RE



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Ensuring a stable, flexible and secure power system that can support energy transition



What is Liquid Air Energy Storage (LAES)



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https://www.youtube.com/watch?v=Gc_Sa40Fzbg&list=TLGGWMs-9o597YwNTAzMjAyNA



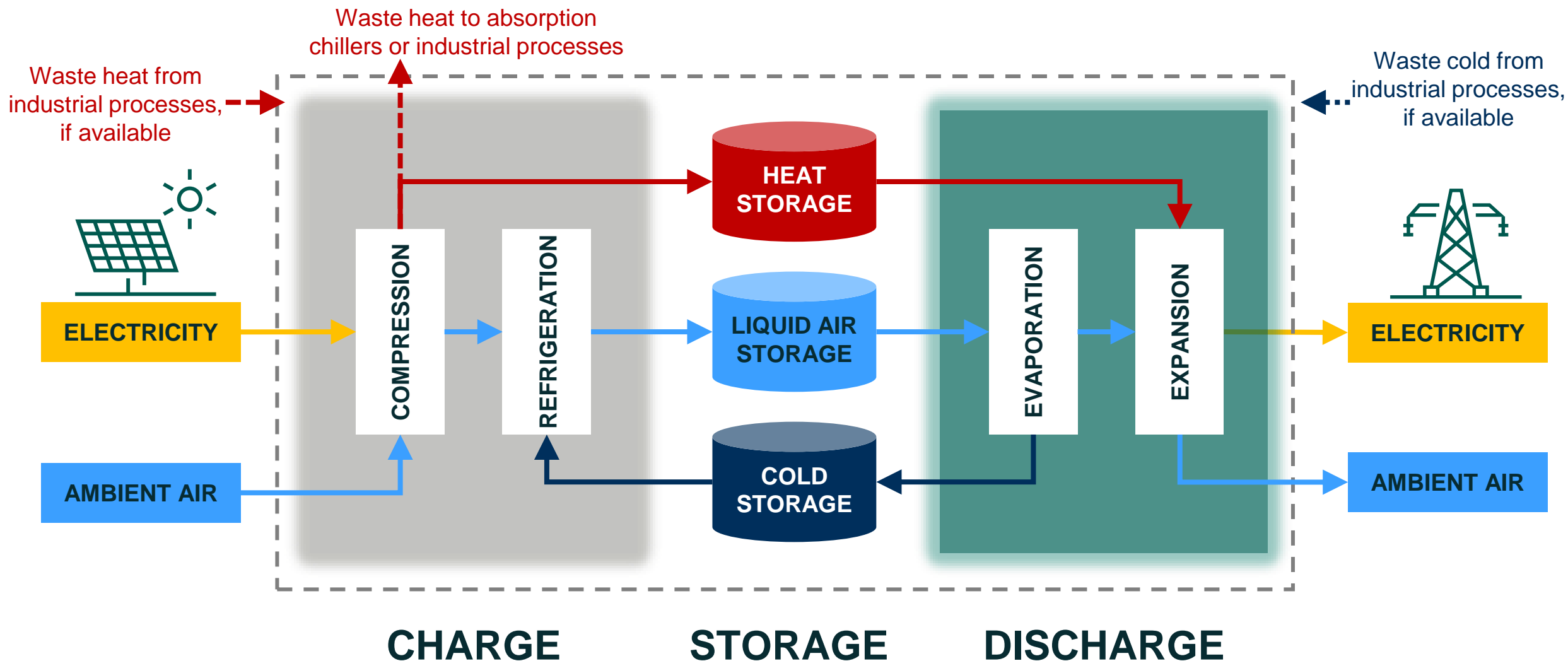
Liquid Air Energy Storage (LAES) Schematic



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https://www.youtube.com/watch?v=Gc_Sa40Fzbg&list=TLGGWMS-9o597YwNTAzMjAyNA



Solid performer

- 30+ years life
- Negligible degradation
- No supply chain risk
- Location agnostic and low incremental footprint
- No minimum uptime or downtime

Flexible solutions and value stacking

- Decoupled charge, discharge and storage
- Eliminate Grid congestion
- Transmission infra deferral
- Integrates with industrial thermal processes



Grid security

- Supports renewable energy integration by injecting rotational inertia in the grid
- Capacity reserve, standby reserve, spinning reserve
- Baseload renewable generation

Enabling sustainable societies

- Complies with circular economy
- Storage of clean air, unlimited harnessable potential
- No dependancy or impact on environment
- Zero emissions to air and water
- Job opportunities through operation, maintenance and local manufacturing

THANK YOU

*For discussions/suggestions/queries email: **isuw@isuw.in***

visit: www.isuw.in

Links/References (If any)