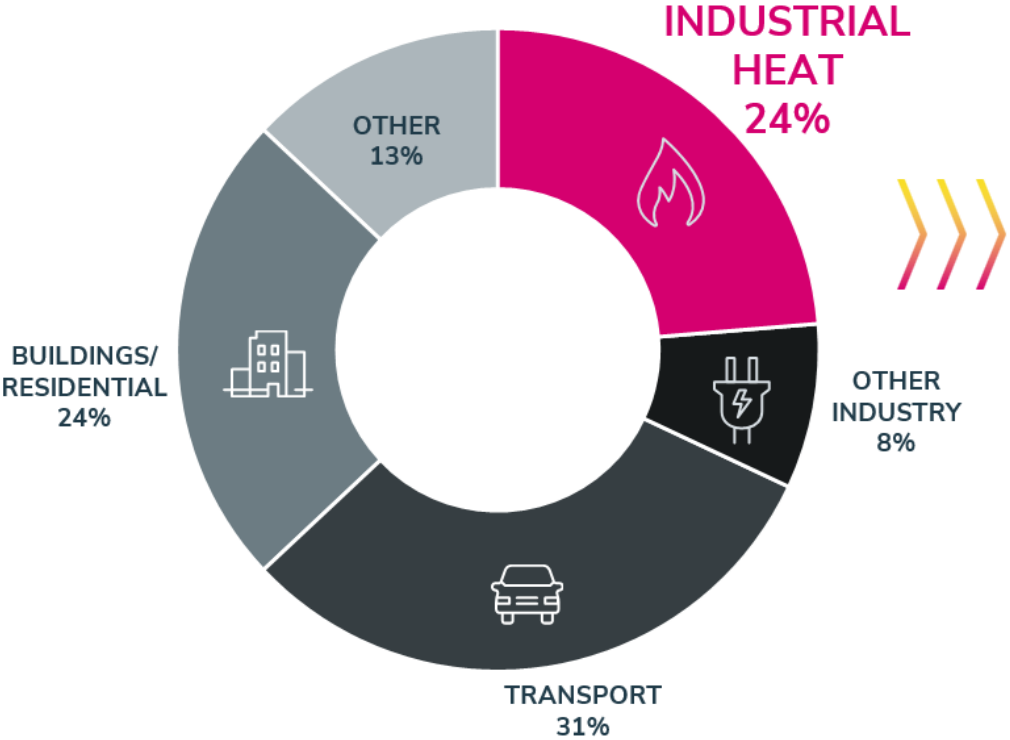# Rondo Heat Batteries
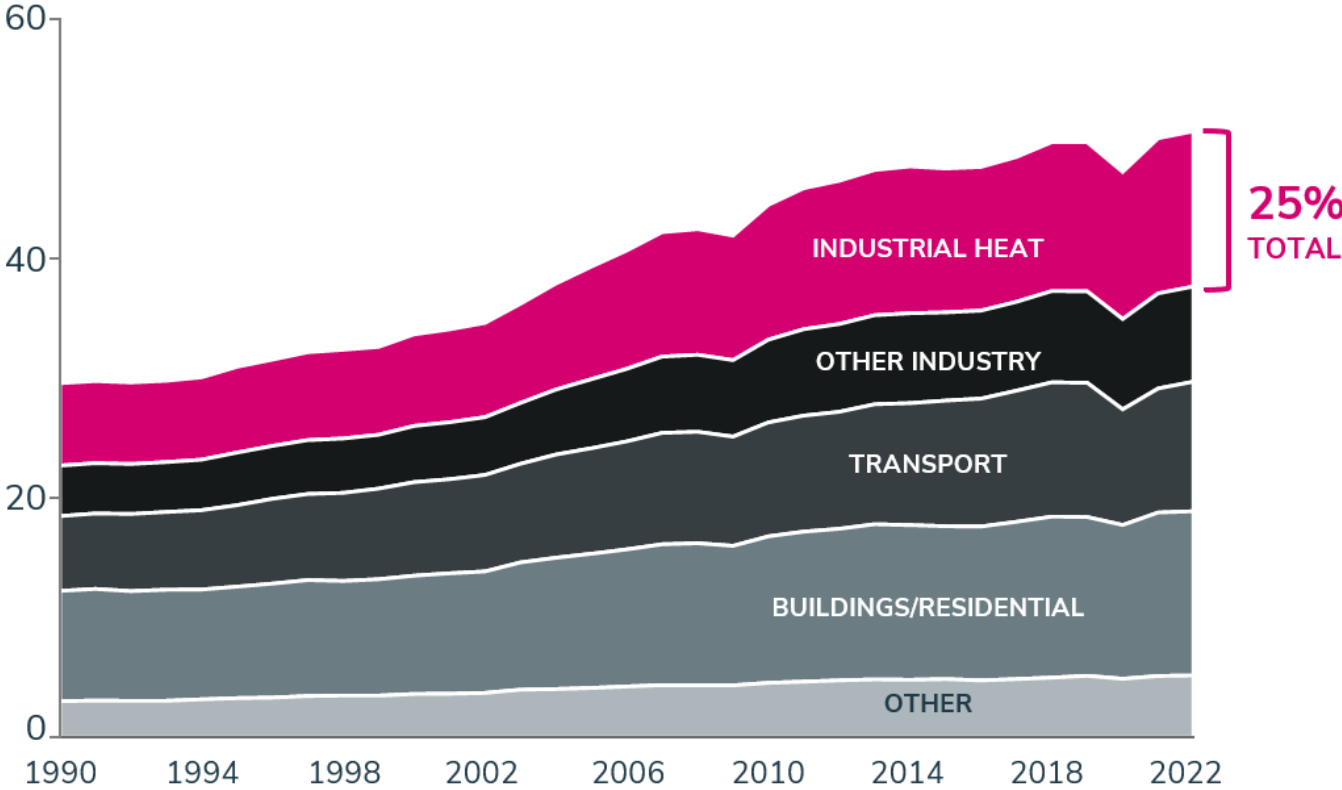
Repowering American Industry with zero-carbon heat

Industrial heat is ~25% of global energy & emissions

GLOBAL ENERGY DEMAND[1]

- INDUSTRIAL HEAT 24%
- OTHER 13%
- BUILDINGS/RESIDENTIAL 24%
- TRANSPORT 31%
- OTHER INDUSTRY 8%

GLOBAL EMISSIONS (Gigatons, CO_2e)[2]

- INDUSTRIAL HEAT
- OTHER INDUSTRY
- TRANSPORT
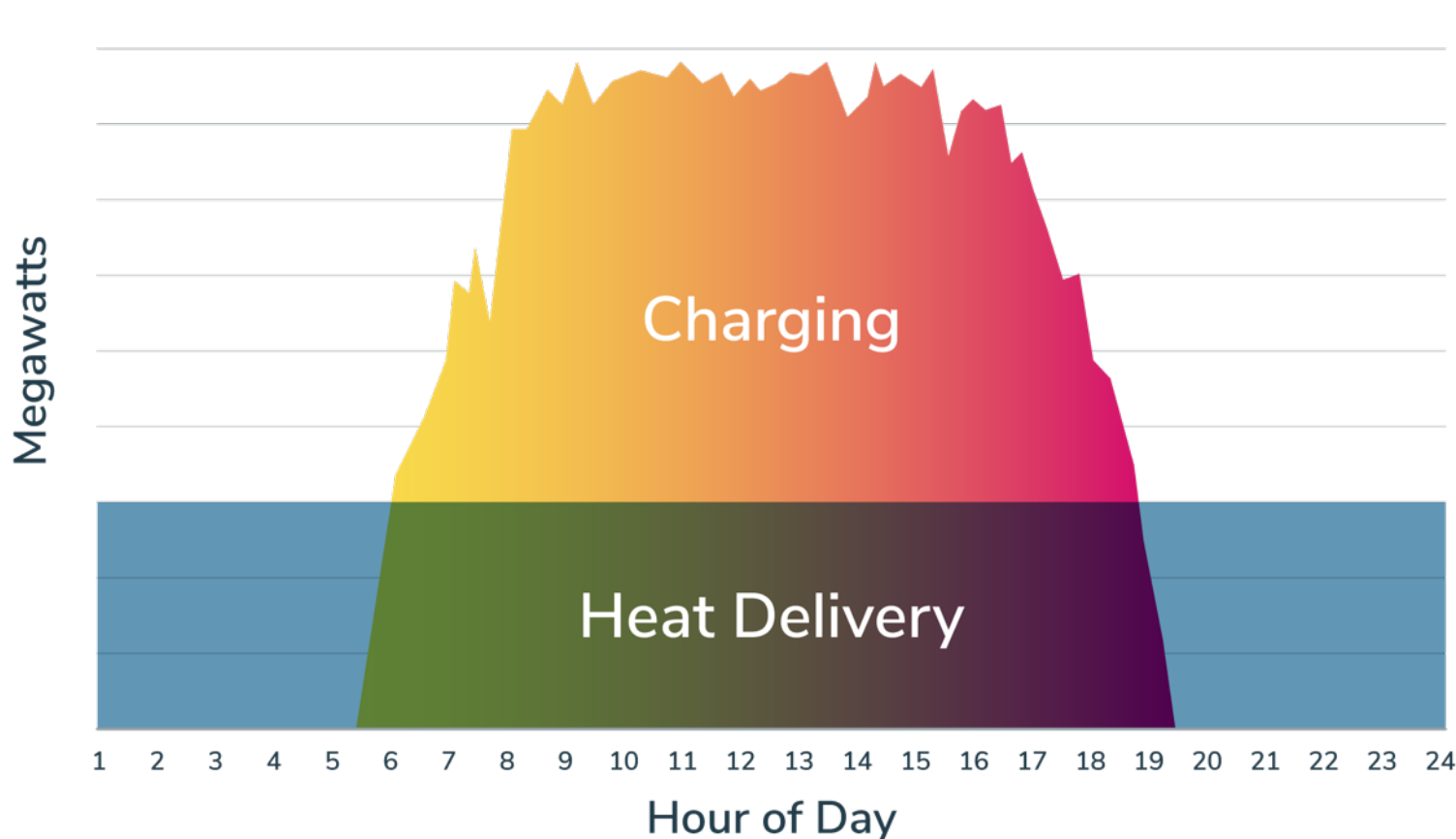- BUILDINGS/RESIDENTIAL
- OTHER

25% TOTAL

1 - IEA, 2 – IEA, EDGAR, and ClimateWorks Foundation

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Renewables have one major problem: intermittency

RENEWABLES AVAILABILITY VS. INDUSTRIAL HEAT DEMAND

Megawatts (y-axis) | **Hour of Day** (x-axis: 1–24)

Charging

Heat Delivery

1 Wind and solar power generation are **inherently intermittent**

2 Industry requires **24/7 heat or steam** to support continuous operations

3 Cost-effective **energy storage** that can charge intermittently and deliver continuous heat is **essential to decarbonizing the industrial sector**
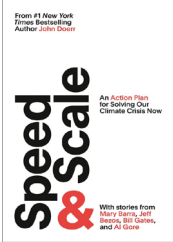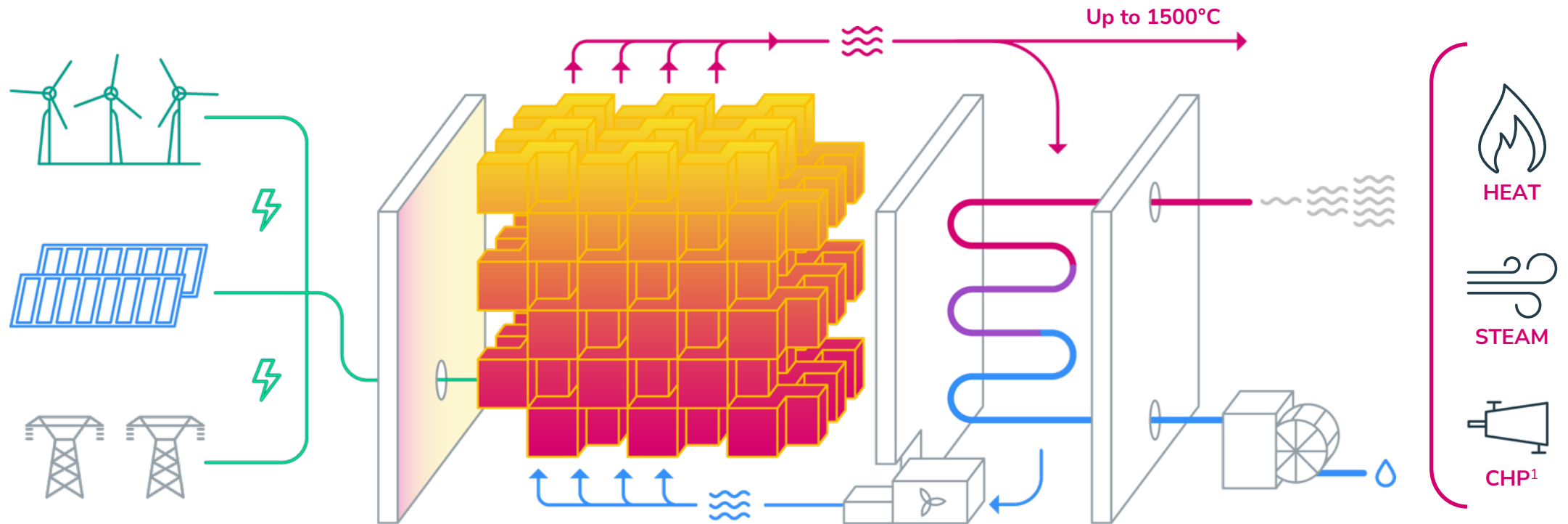
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Rondo is backed by energy leaders

Rondo's solution:

The Rondo Heat Battery

The Rondo Heat Battery (RHB) converts renewable energy into 24/7 heat, steam, or CHP for industry

Up to 1500°C

HEAT

STEAM

CHP[1]

1 The Rondo Heat Battery charges with **intermittent electricity** from local wind & solar or from the grid

2 Electricity powers radiant heaters with zero loss; refractory brick is rapidly and uniformly heated to **1100 - 1500°C**, and stores heat for hours or days

3 The battery delivers **continuous superheated air** for use as process heat, steam, or electric power at over 98% total efficiency

1 – Combined Heat & Power; high pressure steam can drive a steam turbine to produce electric power and low-pressure steam, providing 95% efficient combined heat and power

Page 6 | © Rondo Energy, Inc. 2024 | Confidential and Proprietary

RONDO

Mature, proven technology. Deploying now.

RHB100

Typical Max Discharge Rate: 7 MW

Typical Peak Charge Rate: 20 MW (AC)

Heat delivered: Continuously 24/7

Footprint: 15m x 12m x 12m

RHB300

Typical Max Discharge Rate: 20 MW

Typical Peak Charge Rate: 70 MW (AC)
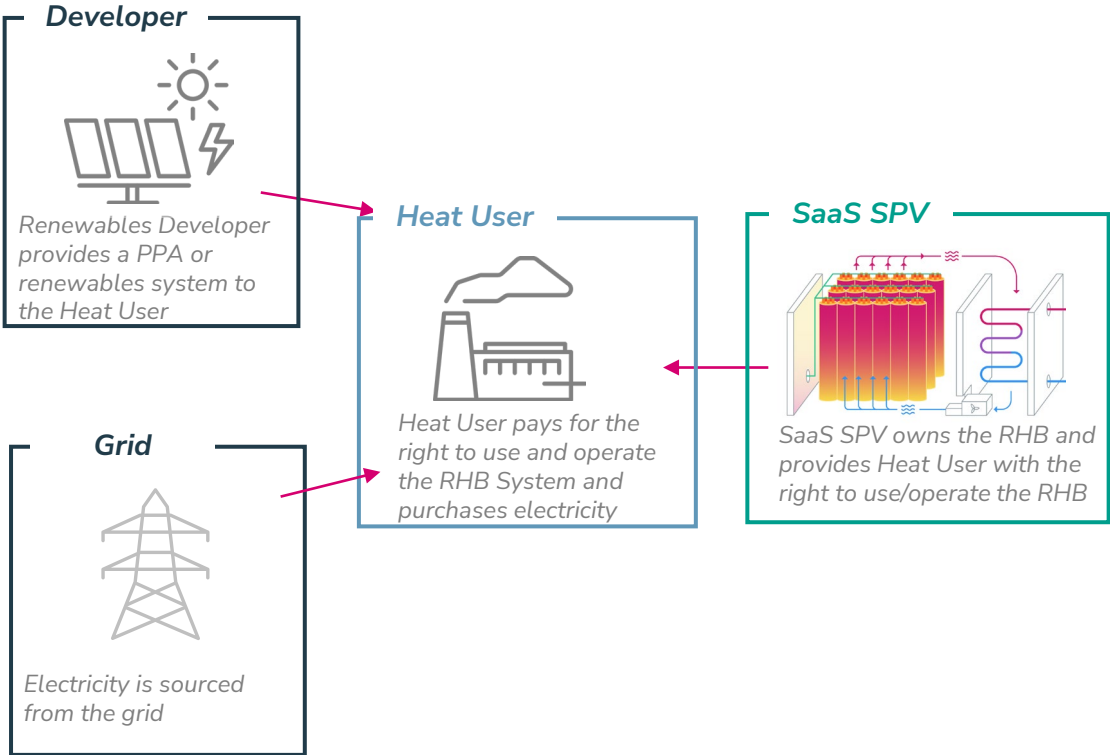
Heat delivered: Continuously 24/7

Footprint: 40m x 15m x 12m

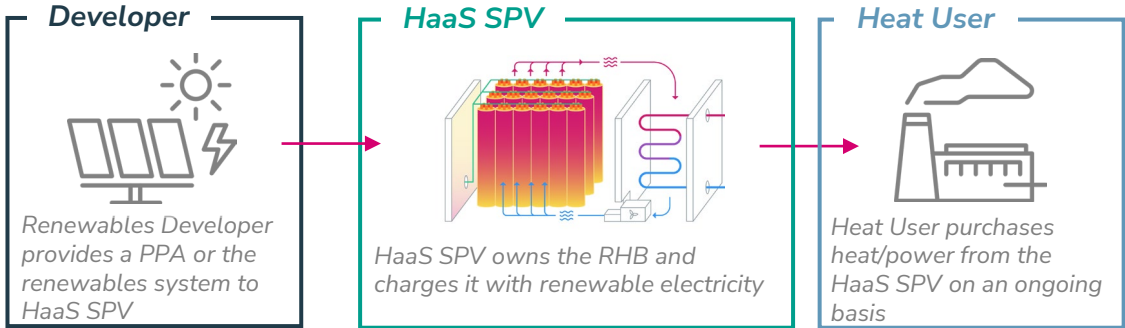The Rondo Heat Battery solution is available
on either a CAPEX or on XaaS basis.

RONDO

We have two XaaS models: SaaS or HaaS

The key difference is *who* is responsible for the electricity used to charge the RHB

Storage-as-a-Service("SaaS")

Developer

Renewables Developer provides a PPA or renewables system to the Heat User

Grid

Electricity is sourced from the grid

Heat User

Heat User pays for the right to use and operate the RHB System and purchases electricity

SaaS SPV

SaaS SPV owns the RHB and provides Heat User with the right to use/operate the RHB

Heat-as-a-Service ("HaaS")

Developer

Renewables Developer provides a PPA or the renewables system to HaaS SPV

HaaS SPV

HaaS SPV owns the RHB and charges it with renewable electricity

Heat User

Heat User purchases heat/power from the HaaS SPV on an ongoing basis

RONDO

Broader Implications of Thermal Batteries

Thermal batteries are now backed by significant federal investments and creating jobs

## DOE's Recently Announced Thermal Battery Demonstration Projects

KraftHeinz

Federal Investment: $170.9M	
Technologies: Heat pumps, electric heaters, electric boilers, solar thermal, solar pv, and thermal energy storage	
Announced partners: ENGIE	

DIAGEO

Federal Investment: $75M	
Technologies: Thermal batteries	
Announced partners: Rondo	

Ashland always solving

Federal Investment: $35.2M	
Technologies: Thermal batteries	
Announced partners: Electrified Thermal Solutions	

EASTMAN

Federal Investment: $375M	
Technologies: Thermal batteries	
Announced partners: Rondo	
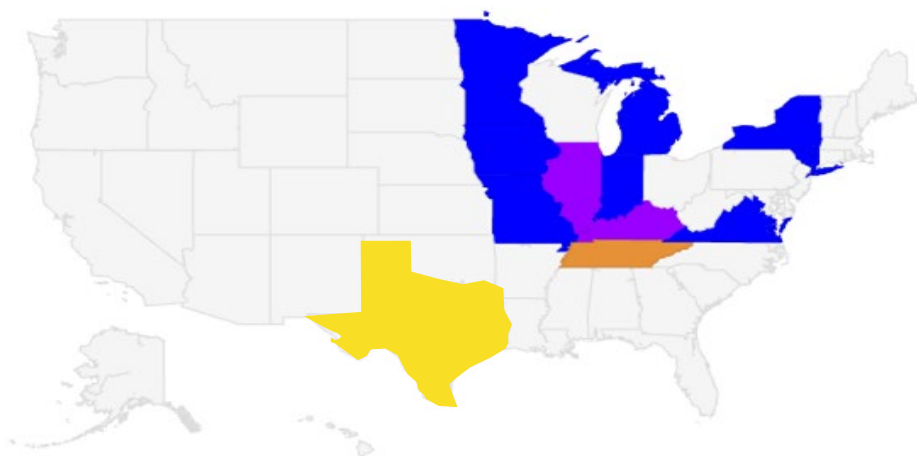
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Thermal batteries are a new class of fully dispatchable resource with meaningful grid benefits

Dispatchable Load ≠ Demand Response

- Traditional **demand response** programs assume that a load runs for most hours, and will only curtail from baseline conditions if incentivized to do so. These programs are designed to provide capacity to the system and relieve strain at the highest net-demand hours.

- **Dispatchable thermal batteries** only charge when there is excess generation and network capacity. Thermal batteries have no baseline power draw, as they will idle at zero load until dispatched either by a utility or system operator, or in response to price signals.
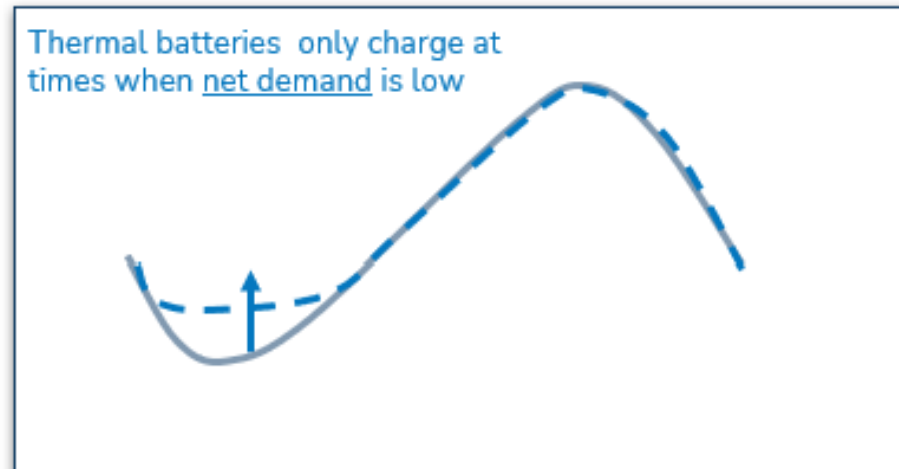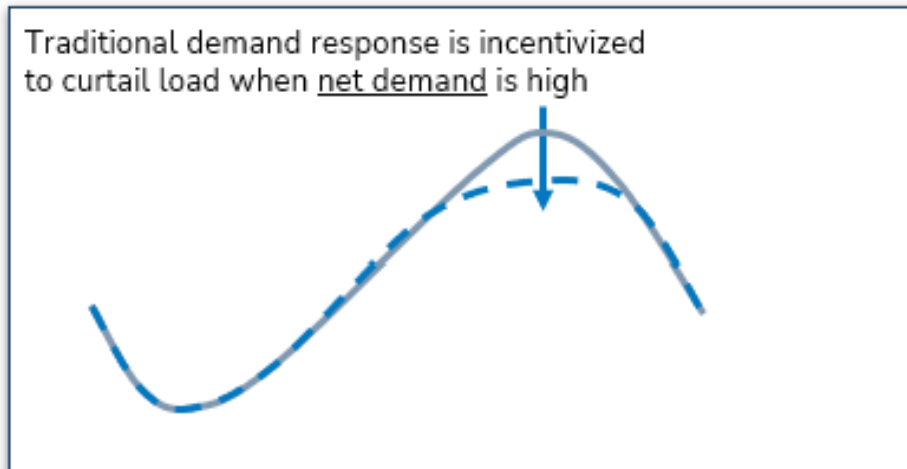
Traditional demand response is incentivized to curtail load when <u>net demand</u> is high

Thermal batteries only charge at times when <u>net demand</u> is low

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Thermal batteries are a new class of fully dispatchable resource with meaningful grid benefits

Thermal battery storage systems bring highly desirable attributes into electricity systems and markets, such as:

- Non-coincident peak load that increases the utilization of system assets

- Quick response times enabling provision of ancillary services

- Large scale (GWs) flexible assets enabling economic integration of new clean resources

- Price responsive demand that can set prices

RONDO