AEE WORLD
ENERGY CONFERENCE & EXPO

Update on Federal Tax Credits for Thermal Batteries

TRANE

SEPTEMBER 17, 2025

Agenda

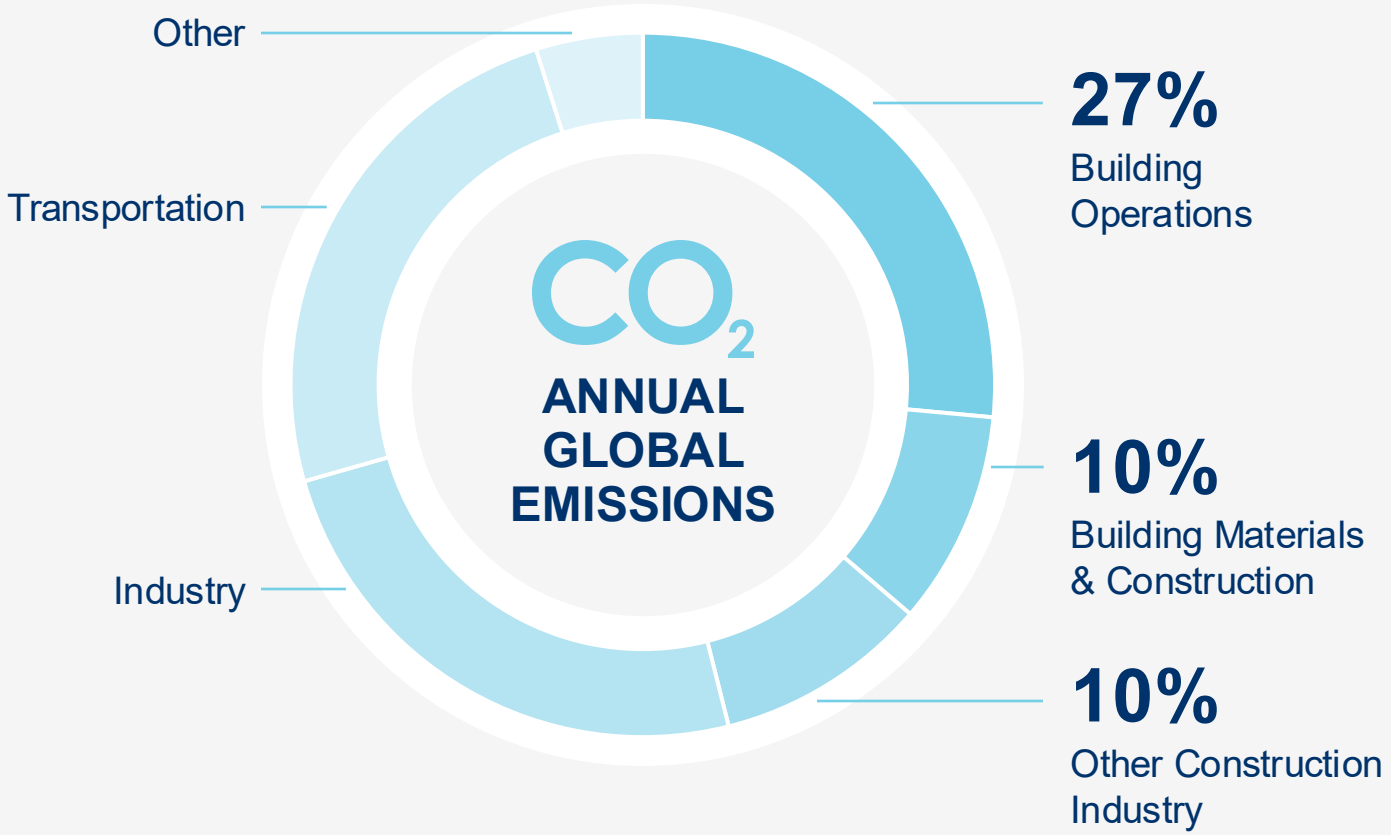
- Energy Demand & The Built Environment
- Thermal Energy Storage
- Clean Electricity Investment Tax Credit (ITC)
- One Big Beautiful Bill Act (OBBA)
- Case Studies
- Questions

Presented by Alan Clayton

Sustainable Systems and Commercialization Leader

Energy Demand & The Built Environment

Global Emissions



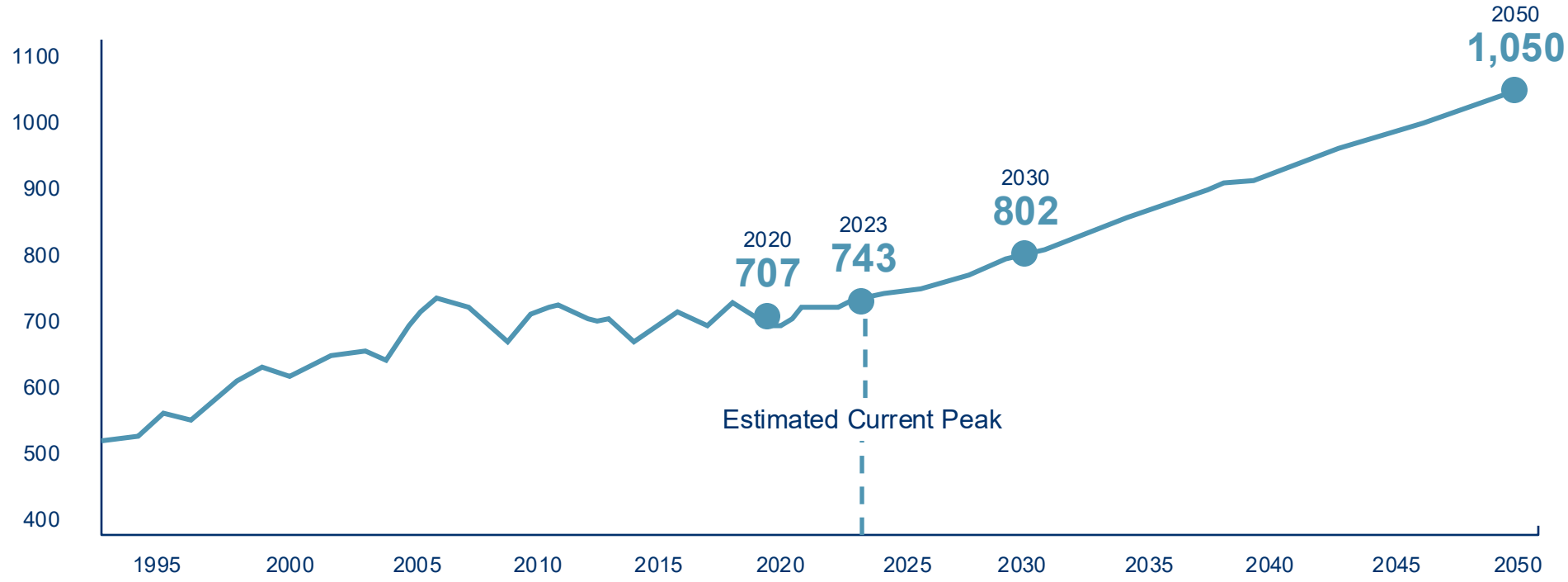
40%

Generated by Built Environment

Source: https://architecture2030.org/why-the-building-sector/

Energy Demand is Rising

U.S. SYSTEM PEAK DEMAND, HISTORICAL AND PROJECTED, GW (1995–2050E)



Note: National coincident peak demand is based on sum of peaks across FERC regions.
Source: Historical energy demand sourced from AEO. Coincident peak demand (point-in-time peak, not total energy consumption) estimated by The Brattle Group (2023) based on forecasted total energy consumption sourced from OP-NEMS mid-case scenario. This mid-case scenario includes increasing consumption from industrial electrification and electrification of HVAC; however, the EVs contribute the most demand to coincident peak according to estimated hourly consumption patterns that will vary by region.

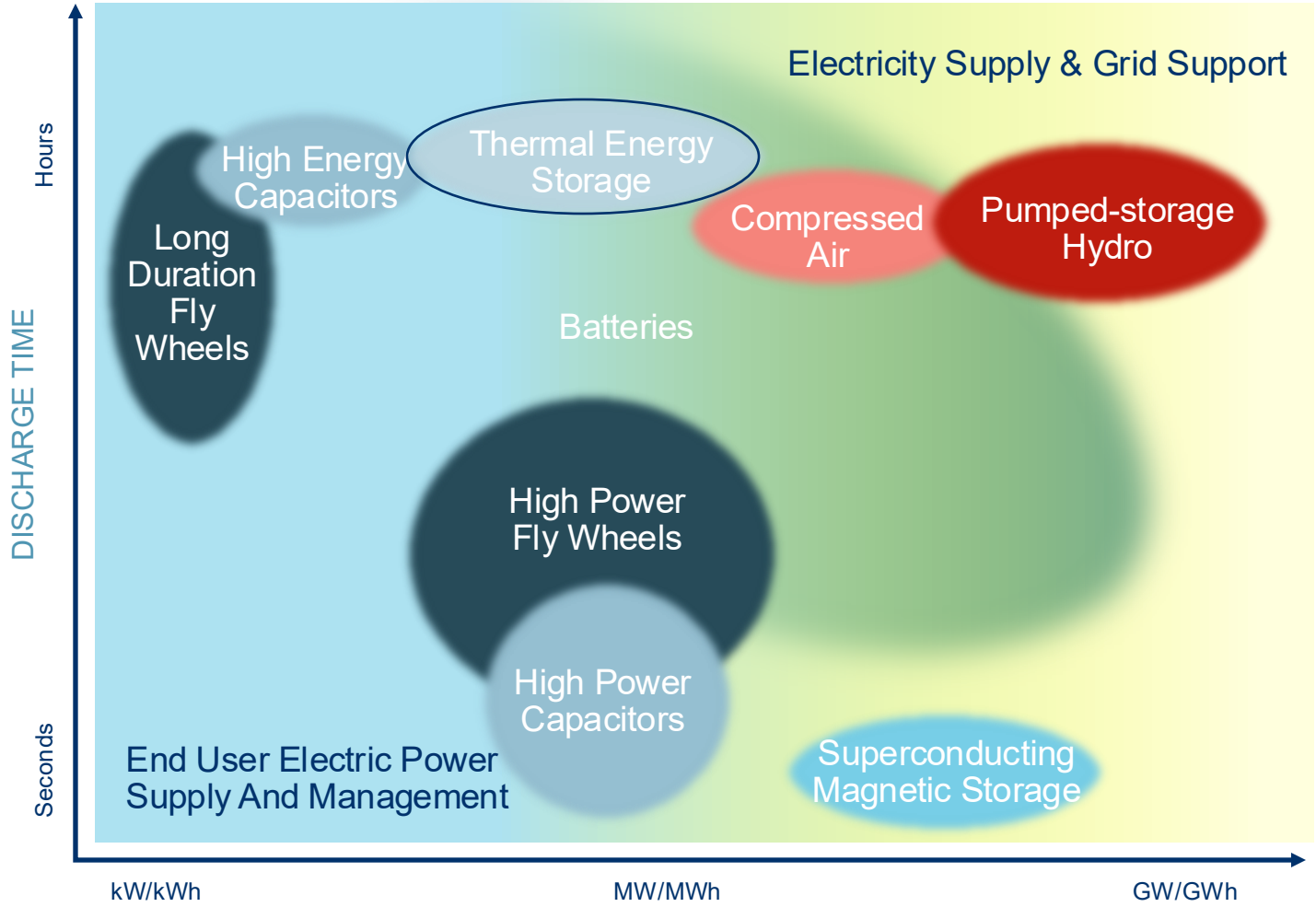
Thermal Energy Storage

Where is the storage?

Energy Storage Types

Grid energy storage in commercial use as of the end of 2022 for electricity generation

Distributed energy storage has been in commercial use as of the 1970's for cooling and heating



Source: https://www.eia.gov/energyexplained/electricity/energy-storage-for-electricity-generation.php

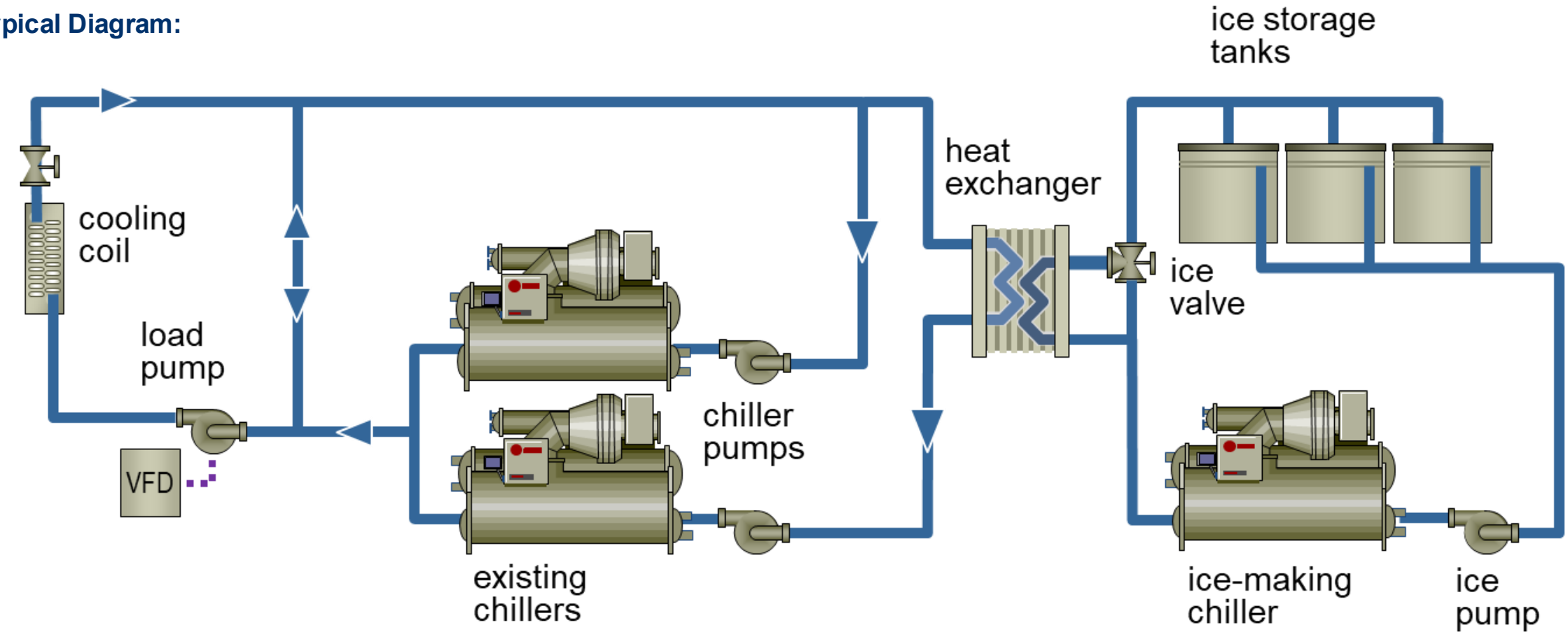
Two Basic Systems

Water

Ice

Adding Thermal Storage to a Chiller Plant

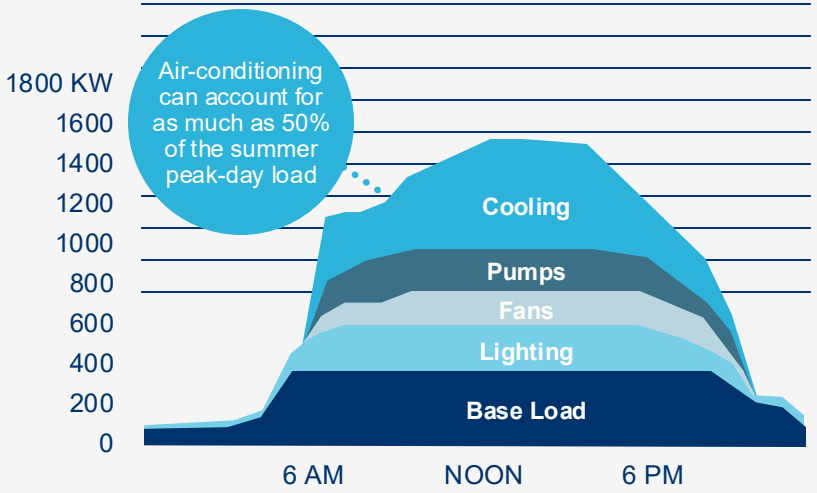
Typical Diagram:



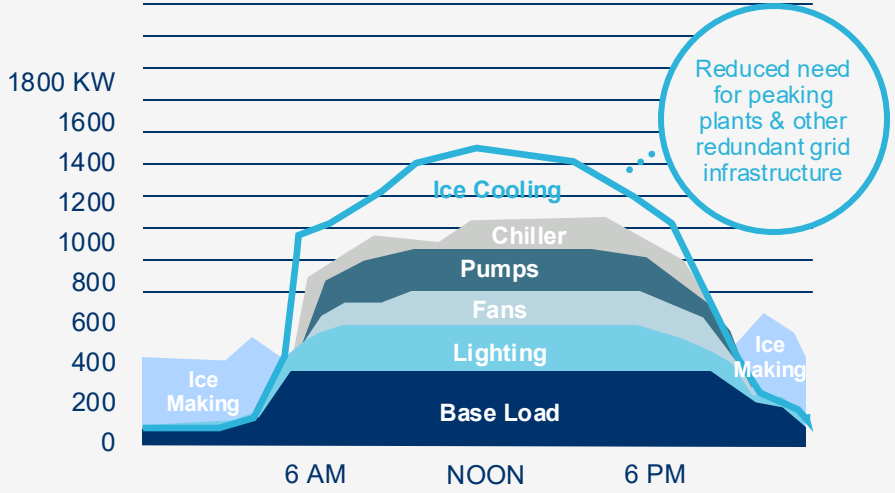
Shift Building Demand by Cooling with Thermal Storage

Comprehensive Solutions Completion Package

Building Electric Load Profile…



…With Thermal Energy Storage



Thermal Storage Meet Grid Challenges

- Addressing critical utility/grid peaks
- Avoid expensive and high-emission peaking plants
- Supporting advanced grid services and demand response

Source: (U.S. Dept of Energy. Electricity explained. Last updated Aug 28, 2023) https://www.eia.gov/energyexplained/electricity/energy-storage-for-electricity-generation.php

Load Profile for School with Partial Storage

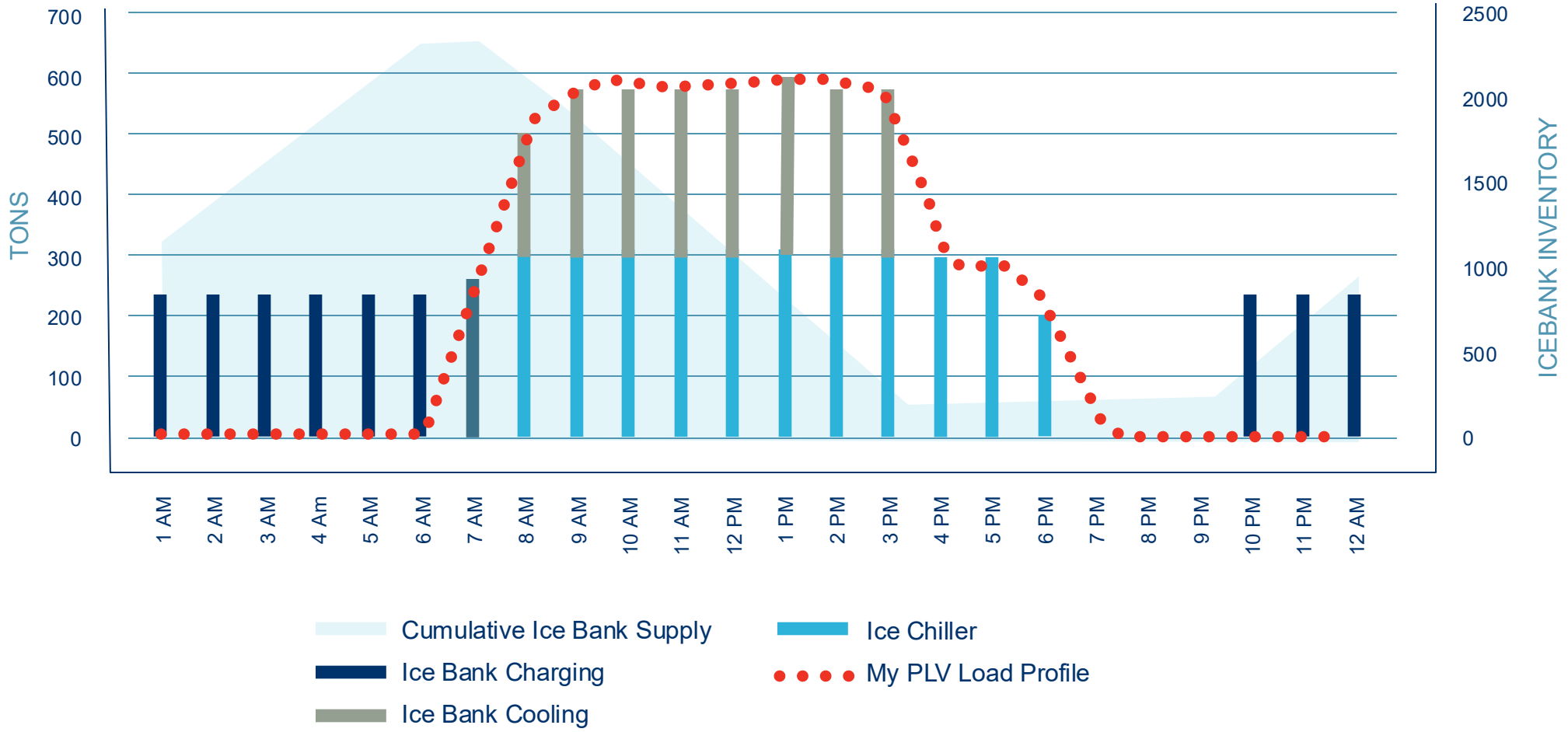
EXAMPLE:

327 nominal tons

2,124 ton-hours of TES (14)

On-Peak = 486 kW

A.K.A. Peak Load Contribution



Source: Trane Technologies

Load Profile for School with Full Storage 1PM–9PM

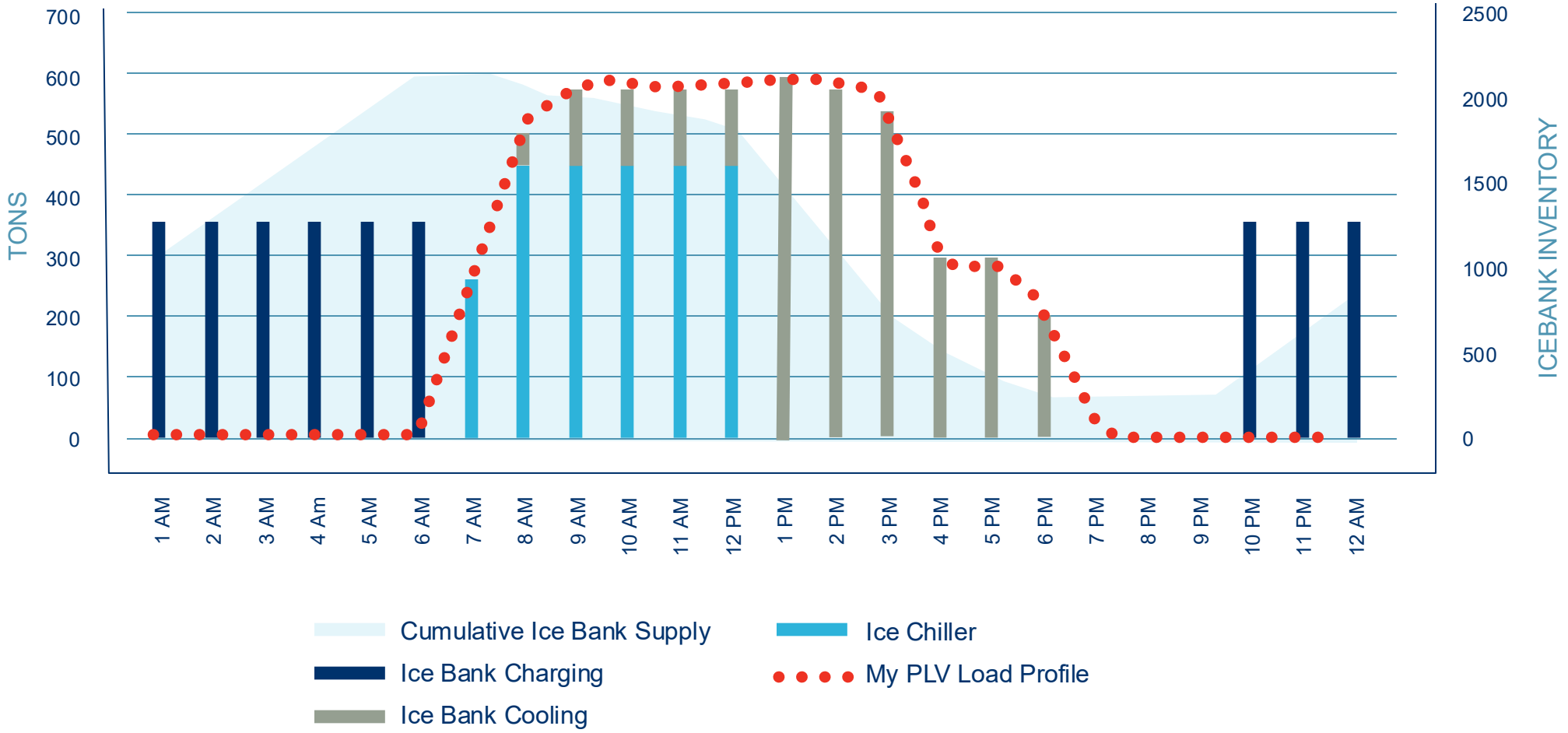
EXAMPLE:

460 nominal tons

2863 ton-hours of TES (20)

On-Peak = 0 kW

A.K.A. Peak Load Contribution



Source: Trane Technologies

Clean Electricity Investment Tax Credit (ITC)

Section 48E

Long-standing **tax credit** for **private** and **non-taxable** entities

Historically for qualified "energy property,"
(Including solar, geothermal heat pumps, combined heat and power, and more)

Key Details About the ITC

Tax credits of **up to 50% of the cost** for energy property projects

Expanded to addt'l technologies, incl. **thermal energy storage property**—defined as property comprising a system which:

- is directly connected to a heating, ventilation, or air conditioning system,
- removes heat from, or adds heat to, a storage medium for subsequent use, and
- provides energy for the heating/cooling of the interior of a residential/commercial building

New Rules being added in 2025 from One Big Beautiful Bill Act (OBBBA)

Timeframe base credit rates apply: **Thermal energy storage available through 2032** with phase down thereafter.

Section 48E Investment Tax Credit (ITC)	
Base Rate	**6%**
Increased Credit Amount*	**5X multiplier**
Meets Domestic Content Requirements**	**2% or 10%**
Meets Energy Communities Requirements***	**2% or 10%**
Total Potential Credit Value	**Up to 50% with Bonuses**

*Increase Credit Amount: must be less than 284 tons **(OR)** meet prevailing wage and apprenticeship requirements. **Domestic Content: i.e., materials/components made in the USA

***Energy Communities: See most recent map at https://arcgis.netl.doe.gov/portal/apps/experiencebuilder/experience/?id=a2ce47d4721a477a8701bd0e08495e1d

One Big Beautiful Bill Act (OBBA)

Key Takeaways

Updates as of 7/9/2025

IRA/BIL Funding Rescinded

(only unobligated $)

Impacts minimal - most $ already flowing to recipients

Substantial Tax Incentives for Our Energy Storage Still Available

- Incl. solar, TES, GSHPs + geothermal **(up to 50-70% of costs)**
- Government, Education and Healthcare industry can still benefit from Direct Pay **($ reimbursement)**
- Some credits expire after 1/1/2028; plenty of time to leverage – **begin construction ASAP**
- Updated regs (for domestic content, construction start/end + foreign entity ownership); **requires close CPA collaboration**

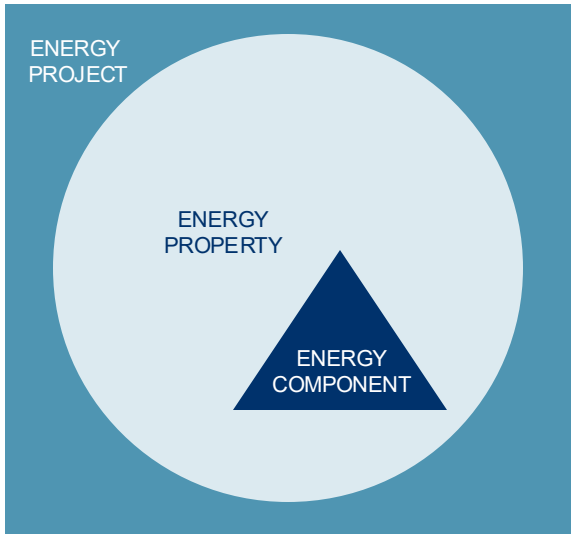
Program Clarifications Anticipated

55 Water Street

- New York City, NY
- Commercial Real Estate
- Repurposed 134 existing thermal energy storage tanks; Installed new chillers and heat pumps
- **Secured 14.5M in tax credits and utility rebates**

New 48E ITC Eligibility Requirements

Updates as of 7/9/2025



Domestic Content

(Made in USA)

- Determined by component **AND** system
- 2026 on – required for MUSH entities to be eligible (unless <1MW)
- **NEW** Compliance Value Timeline:
  - BoC 6/16/2025 – 12/31/2025: **≥ 45%**
  - BoC 1/1/2026 – 12/31/2026: **≥ 50%**
  - BoC after 12/31/2026: **≥ 55%**

NEW Prohibited Foreign Entities (PFE)

After 7/4/25, eligible projects must not benefit from either ownership or material assistance from a PFE

- **Ownership:** Highly complex; any gov't, individual or business operated by a FEOC (China, Russia, Iran + N. Korea)
- **Mat. Asst.:** legally defined – complex; property can't be predominantly produced or made of materials made in a FEOC

PENDING New Definitions of BOC

- EO to redefine before September
- Currently defined per 2 tests:
  - **Physical work test**: requires physical work of a "significant nature" (on-site or off-site); excludes designing, planning, etc.
  - **5% Safe Harbor**: requires the taxpayer to pay or incur >5% of the total cost of the energy property. Taxpayer must take possession of, and capitalize, qualifying property.

Notable Tax Changes

Updates as of 7/9/2025

Applicable to most ITCs + PTCs

- Direct pay (cash refund to MUSH entities) – retained
- "Made in the U.S.A." DC reqs – retained + modified
- NEW: Prohibited foreign entity (PFE) ownership + materials requirements
- PENDING: New definitions for "beginning of construction" due before October '25

48E ITC

- Must comply with DC + PFE reqs
- TES, GSHPs + geothermal projects (through 2032)
- Solar – projects that:
  - Start construction before 7/04/2026 (+ place in service by 2030), or
  - Are placed in service by 12/31/2027

179D

- Long-standing tax deduction for retrofits worth up to $5.81/sq ft
- Now expires after 6/30/2026*

Bonus Depreciation

- 100% depreciation of qualified property (incl. Controls, HVAC, lighting, etc.)
- Extended indefinitely

30C, 30D and 45W

- Credits for EVs + relevant infrastructure
- Repealed, now expire early

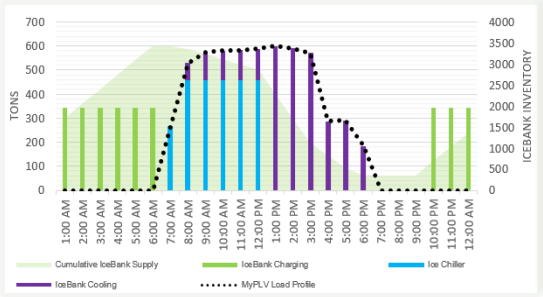
Case Studies

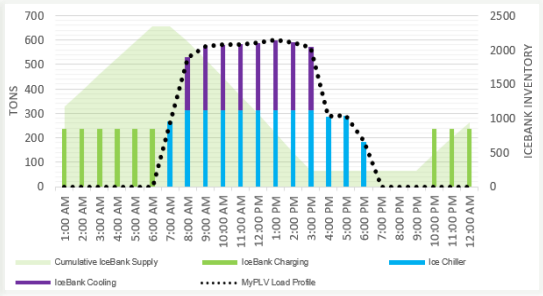
CASE STUDY

New Construction Project

250,000 SQ. FT. BUILDING IN FLORIDA

	Conventional	Full Storage	Partial Storage
Chillers	(2) 300-ton AC	(1) 460-ton AC	(1) 320-ton AC
Ice Tanks	N/A	(20) $693k	(14) $485k
Utility Cost*	$131k	$43k	$85k
First Cost	$900k	$1,360k	$995k
Tax Credit (40%)	$0	$(544k)	$(398k)
Utility Rebate (FPL)	$0	$(468k)	$(224k)
Revised First Cost	**$900k**	**$348k**	**$373k**





* Annual electric utility costs for the chillers.

CASE STUDY

City of Melbourne

CHALLENGE

- New resiliency center for those impacted by hurricane events including housing for emergency operations personnel.
- Category 5 hurricane resistance, wind speeds up to 250 mph

SOLUTION

- Ice storage systems allow for cooling during blackouts with generators serving just pumps and fans, not chillers
- Generators and chillers encased in metal grating to prevent damage from wind debris
- Sized with ice storage systems to shift 180 tons of cooling to off-peak hours

RESULTS

- Installation of ice storage was made possible through a $120k FPL Rebate ($600/kW)

Questions

Thank you

Scan for additional opportunities to connect with Trane at AEE World