IceEnergy

PLMA GI-BTMS Workshop
Session 2: Behind-the-Meter Storage panel

Ice Energy & Our Ice Batteries

April 18, 2016

Introduction to Ice Energy

Thermal energy storage company founded in 2003

Headquartered in Santa Barbara California

- Distribution center in Costa Mesa CA
- R&D facility in Riverside CA
- Manufacturing in New York, outsourced to Mercury Corporation

Our ice batteries, aka Ice Bears, enable the owner to decide when electricity is used to create cooling, and include the ability to use stored cooling to cool a building for up to 6 hours using virtually no electricity

Most of our business is selling our systems to utilities in MW scale, turning their problematic AC load into a clean, flexible and reliable grid asset.

- 11 MWs installed to date
- 41 MWs contracted to be installed; expected to triple by year end
- Moving into retail market, especially with new residential product

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Ice Bear 30

Connects to 5-20 ton Direct Expansion AC units, the most common AC units for C&I buildings

Creates and stores cooling off-peak for delivery on-peak with 100% efficiency (85% roundtrip efficiency plus 15% efficiency gain creating cooling off-peak)

Optimized for Utility ownership

Behind-the-meter, fully networked and dispatchable (both charge and discharge)

Typically used to reduce peak demand but also can flatten the so-called duck-curve caused by solar by charging with solar, making ”Sun & Ice” a great pairing

How it Works

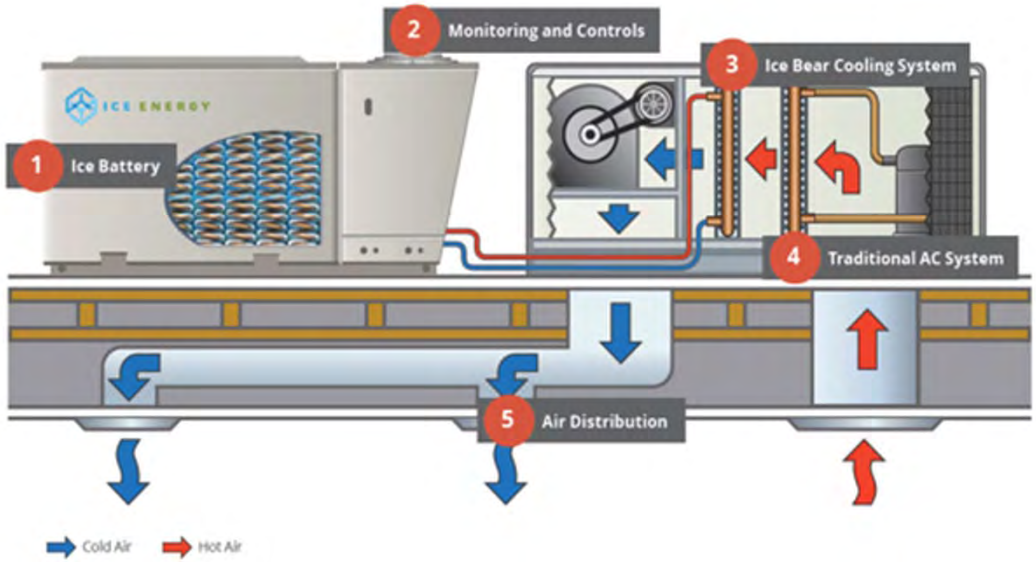
1. ICE BATTERY
A system of copper coils pumps cold refrigerant through regular tap water to make ice when desired (typically at night when electricity is abundant).

2. MONITORING AND CONTROLS
The Ice Bear's award-winning smart grid technology seamlessly monitors the cooling process, providing full visibility and control to the utility / project owner.

3. ICE BEAR COOLING SYSTEM
When dispatched to reduce peak demand, the Ice Bear turns off the compressor of the AC unit and uses the ice produced off-peak to efficiently provide exactly the same level of cooling for the building.

4. TRADITIONAL AC SYSTEM
The Ice Bear connects directly to a 5-20 ton rooftop AC unit, providing 3 to 6 hours of energy-efficient cooling during peak hours. If needed, the existing AC cools the building during off-peak hours.

5. AIR DISTRIBUTION
By using existing ducting to distribute cooled air, there are no costly ductwork retrofits.



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Example Installation – Ice Bear 30

Municipal Building Redding, CA operational since 2010

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Ice Bear 20

Residential unit scheduled to begin manufacturing early this year

Based on the core technology of the Ice Bear 30 but:

- Sized for houses, which represent more of the grid's peak
- Replaces the AC unit

Early indications confirm sales can quickly exceed Ice Bear 30 sales and start replacing conventional home AC units

- MW scale project pre-sold to National Grid to solve Nantucket capacity shortfall
- Selected as cooling system for show home in new sustainability focused housing development in the UAE

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Ice Bear 20 Unveiling at DistribuTech 2016

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Ice Battery Storage:

Transforms AC load into clean, flexible & reliable grid asset

Lowest cost - now even lower cost than gas fired peaking power plants

Most reliable - 98%+ availability over 34 million operating hours

Environmentally Friendly & Safe – unlike chemical batteries, no heat or hazardous material spillage / disposal risks. Storage medium tap water, filled once. All parts recyclable.

20 year life – unlike chemical batteries no repowers, no cycling limitations. no degradation

Fast deployment – no complex interconnection and permitting, only building permit

High efficiency - 100% effective efficiency, 85% round-trip efficiency

Economic development - up to 40% of project cost flows back into local economy

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Example Utility Project: Southern California Edison

Contract Award:

- December 2014 awarded 25.6 MW in first-time competitive RFO

Contract Overview:

- 20-year PPA
- Deployment in Orange County CA

Purpose:

- Cost effectively eliminates need for new substation

Product Innovation and Cost Reduction

Cost of manufacturing and installing Ice Bears will drop by 50% over the next 5 years, much of this straightforward economies of scale

Work underway to increase effective capacity of current Ice Bear models without increasing form factor or materially increasing cost. Expect to decrease $/kW cost by as much as 40% in 12 months.

Preliminary work has begun, in collaboration with NRG and Danfoss Group, on a reimagined Ice Bear for the home (code name “Ice Cub”), optimized for consumer vs utility.

Cub will be premium product that changes how people think of home cooling, making home cooling high tech and green.

Ultimately our IP will be integrated into mainstream AC systems