

# DISCOVER THE POWER OF ICE:



TRANSFORMING ENERGY SYSTEM EFFICIENCY AND IMPROVING GRID RELIABILITY

*Ice Energy is transforming system efficiency and grid reliability through proven distributed energy storage and certified smart grid solutions for utilities.*

*Our solutions integrate distributed energy storage technology and two-way, smart grid functionality to enable utilities to intelligently manage their load profile, permanently level system demand, and better absorb the impact of intermittent renewable resources.*

*This transformational solution has been recognized as a renewable portfolio resource, further helping utilities meet current and future renewable regulatory requirements.*

Our economy, national security, comfort, and the health of our planet all depend upon our ability to reliably meet the increasing demand for electricity, while reducing greenhouse gas emissions.

As our dependence on electricity grows, demand is quickly outpacing supply. Over the next decade, demand in the U.S. is expected to increase by 18%; new generation infrastructure will grow by less than 8%.

The traditional approach to meeting demand has been to build more power plants and add transmission capacity. But today's utilities — already facing rising energy costs, peak demand growth, overstressed and aging infrastructure, stringent environmental standards, and mandated integration of solar and wind powered generation — are hard pressed to overcome the environmental, regulatory, permitting, and financing barriers that building new generation requires.

Energy efficiency, time-of-use rates, direct load control, demand response, and other solutions address the symptoms of the problem. But the effectiveness of these solutions in addressing the critical, underlying issues of total system efficiency and grid reliability have been blunted by cost inefficiencies, the complexity of technical integration, environmental degradation, and the changes in consumer behavior or sacrifices in comfort they require.

***Only Ice Energy delivers a proven, cost effective, utility scale solution that solves the core problem, not just its symptoms.***

## THE CORE PROBLEM

Simply put, the core problem is thermally driven peak load.

Generation, transmission, and distribution systems all must be sized to serve the few hours each year when extreme temperatures and associated peak energy demands strain system capacity and tax the grid to the point of failure.

Virtually all machines, including the grid itself, work less efficiently when hot. Generation facilities use more fuel to produce less energy, transmission and distribution line efficiencies droop, and end-use air conditioning devices consume more electricity to produce less cooling comfort. The hotter it gets outside, the greater the air conditioning energy intensity and its impact on the grid.

### *This causes even more problems:*

- The peak is getting "peakier." Driven in large part by the growth in air conditioning load, peak demand is growing faster than average annual energy consumption.
- A very small amount of time accounts for a disproportionately large percentage of capacity required. Built only to address peak demand — roughly 5-10% of the hours in any year — peaking generation plants are, by definition, underutilized utility assets, sitting idle most of the year.
- Peakers operate during the hottest, most thermally inefficient time of day, burn more source fossil fuel per megawatt hour than non-peaking plants, and experience significant losses during transmission, distribution and consumption. The result? A decrease in energy system efficiency and an increase in greenhouse gas emissions.
- To balance the relatively few hours each year that a peaking plant operates, owners must charge enough per megawatt hour to recover their costs and still make a profit. The volatility of natural gas prices and high hourly plant recovery costs lead to extremely high and volatile peak electricity prices.

# A TRANSFORMATIONAL SOLUTION FOR URGENT TIMES

*Ice Energy delivers a proven, transformational solution that directly addresses the core problem **TODAY**.*

## REVOLUTIONARY STORAGE TECHNOLOGY

- *Solves the problem of thermal peak demand.*
- *Delivers thermal efficiency through off-peak consumption*
- *“Plug and play” for rapid deployment.*
- *Predictable, measurable and 100% verifiable in real-time, automatically storing energy off-peak and dispatching it on-peak.*
- *Cost-effective alternative to new generation*

Storage is used in all industries to balance supply and demand, effectively buffering price volatility by increasing stock when it is plentiful and cost-effective, and distributing it when demand is high. The utility industry has never had a cost effective storage solution — until now.

An effectively lossless, highly distributed, cost effective, and proven energy storage technology is now available for wide scale deployment — enabling utilities to shift significant amounts of energy consumption from peak to off-peak, with no significant inefficiencies or losses.

The first aggregated, end-use energy storage solution that addresses for the vast majority of today’s commercial buildings, Ice Energy’s distributed energy storage technology decouples daytime air conditioning use from peak to off-peak, with significant improvements to system efficiency and grid reliability.

This makes it possible for utility companies, for the first time, to use cleaner, less expensive off-peak power to produce and store energy for use during peak demand periods — reducing carbon emissions, permanently reshaping the load curve, and lowering the cost of service.

The unique and revolutionary nature of the technology delivers a 1:1 round-trip site efficiency in its conversion process, rendering it effectively lossless, unlike batteries and other storage technologies that incur losses with each AC to DC and chemical conversion.

## SMART GRID SOLUTION

- *Scalable technology architecture*
- *Low barrier of entry to smart grid initiatives*
- *Provides reliable, predictable, granular resource*
- *Can provision ancillary services*

There is no longer debate around the need for a smart grid - one that provides two-way digital interaction, responds and restores itself, integrates a wide range of generation options, optimizes assets, increases reliability and power quality, and empowers and incorporates the consumer.

Ice Energy provides a proven, easy to deploy, certified interoperable smart grid solution that delivers benefits from day one. This dispatchable and/or “set and forget” solution provides two-way, closed loop control of the storage devices, as individual or aggregated sets, as well as direct load control capabilities for other consumer assets.

This gives utilities unprecedented ability to intelligently manage the load profile of a single building, a feeder, a substation, a region or their entire grid. It forever transforms system efficiency and reliability by optimizing load shape for the entire energy ecosystem, improving thermal efficiency from source to consumption, and relieving or eliminating congestion.

## RENEWABLE PORTFOLIO RESOURCE

- *25-year clean storage asset*
- *Improved source fuel efficiency*
- *Measurably reduces carbon footprint*
- *Firms off-peak wind and moves it on-peak*
- *Firms on-peak solar and eliminate post-solar peak*
- *Emissions credits*

Recognized as a qualifying renewable portfolio resource, Ice Energy’s solution enables utilities to more easily, affordably, and reliably meet their renewable energy goals.

Distributed energy storage can be deployed quickly to balance other renewable resources, such as wind and solar, which are intermittent by nature and often out of sync with peak demand. Storing off-peak wind and solar power and making it available when it is needed most makes it more useful, predictable, valuable and efficient,

By effectively lowering integration costs, off-peak storage increases the amount of renewable resources that can be realistically absorbed onto the electrical system, providing maximum peak load reduction while delivering a balanced load profile.

Storing power at the point of future consumption also relieves strain on the transmission and distribution infrastructure, reducing transmission losses associated with delivering that power over congested and thermally limited transmission and distribution lines.

## THE POWER OF ICE

- *Distributed, controllable, clean, cost-effective, scalable and available to deploy today.*

To some, this represents a new form of energy efficiency. To others, it is a new kind of renewable resource, or a way to make better use of the intermittent renewables we already have.

It is unquestionably the first cost-effective, smart grid-enabled distributed energy storage solution, one that forever transforms system efficiency and reliability.

Until now, the industry has only imagined a technology that could completely reshape the load curve and optimize the grid, improving system reliability. While other technologies address the symptoms, Ice Energy solves the problem.

**THIS CHANGES EVERYTHING!**