



# **NATGUN**

**PRESTRESSED CONCRETE TANKS**

**FOR THERMAL ENERGY STORAGE**



# Natgun turns chilled water into cold cash...

Natgun Corporation designs and builds naturally stratified chilled water thermal energy storage (TES) tanks for use as an integral part of a facility's air-conditioning system, as well as other applications. When used on university or corporate campuses, government facilities, district energy projects, or commercial buildings, a Natgun TES tank can yield annual savings in the hundreds of thousands of dollars. Natgun tanks are designed to provide continuous maintenance-free performance, delivering peace of mind and convenience unavailable with other types of TES tanks.

## LIFE CYCLE COST SAVINGS EXAMPLES

20 Year Life Cycle • Time-of-Use Rates •  $\Delta T=12^{\circ}\text{F}$

### RETROFIT

FACILITY TYPES	COOLING CAPACITY (TONS)	LIFE CYCLE COST SAVINGS
Commercial Building	750	\$2,203,100
Campus Facility	2,000	\$5,874,900
District Energy	4,750	\$13,953,000

### FACILITIES EXPANSION

1000 TONS OF COOLING	ANNUAL ENERGY COSTS	LIFE CYCLE ENERGY COSTS
Add chiller & cooling tower, or Add 3 million gallon TES system	\$494,857	\$10,287,500
Savings	\$132,599	\$4,356,900
	\$362,256	\$5,931,300

## and zero maintenance

- LOWERS LIFE CYCLE COST
- NO MAINTENANCE, NO PAINTING
- NO DOWNTIME, 100% RELIABILITY
- BACK-UP TO PRIMARY COOLING
- ENERGY COST SAVINGS
- SITING FLEXIBILITY
- SIMPLE TO INSTALL

## into peace of mind

Left: Partially buried 2.5 MG TES tank at the University of California in Riverside, CA

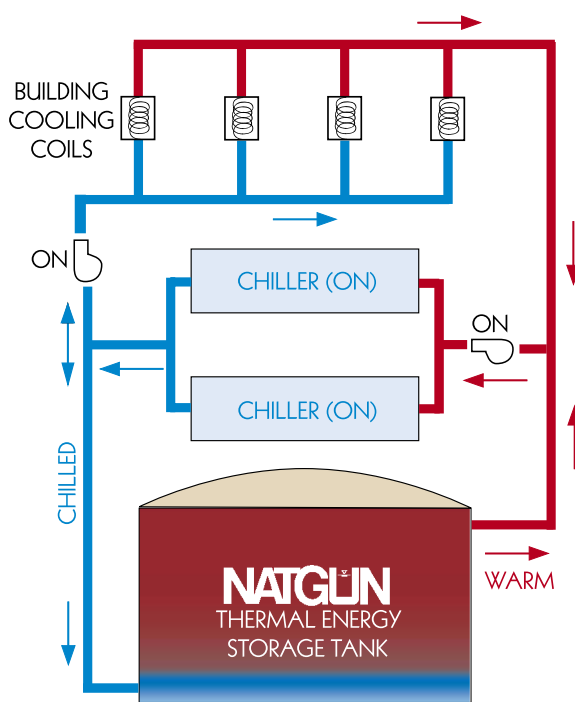
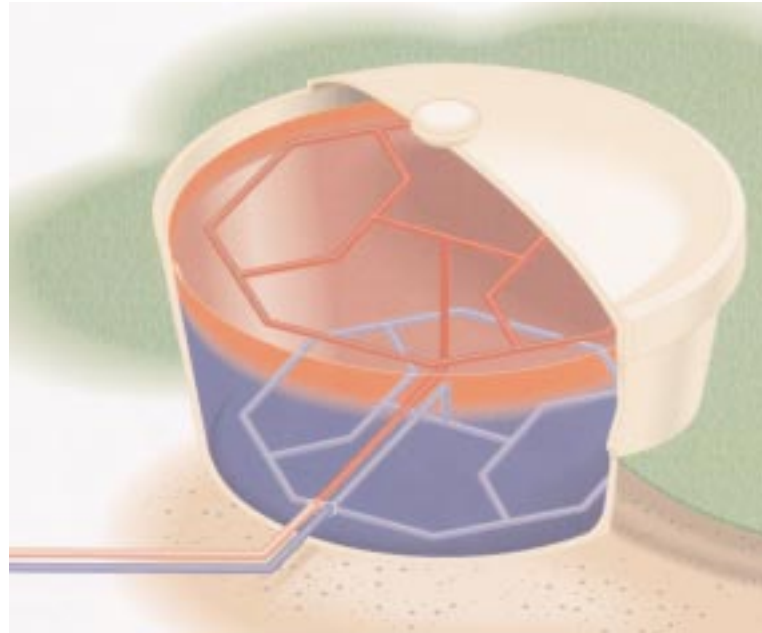
Below: 3.3 MG TES tank at the VA hospital in Dallas, TX

Cover: 1.4 MG TES tank at the University of Texas in Edinburg, TX

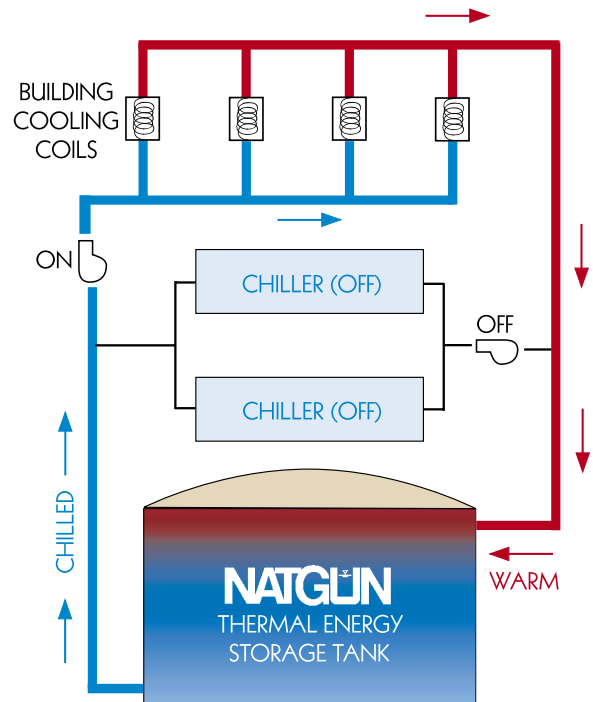


# How Thermal Energy Storage Works

Thermal energy (chilled water) is produced during periods of off-peak electrical demand (usually at night), collected in a thermal energy storage tank, then withdrawn and distributed through the facility during peak rate demand hours. Warm and chilled water enters and exits the tank through diffusers located at the top and bottom of the tank. These diffusers are designed to eliminate turbulence and provide a stable, sharply defined transition layer, or “thermocline,” thus allowing for the natural stratification of warm water at the top of the tank and chilled water at the bottom of the tank.



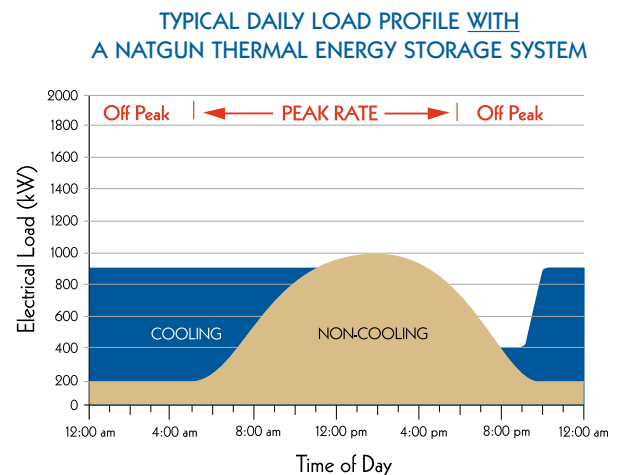
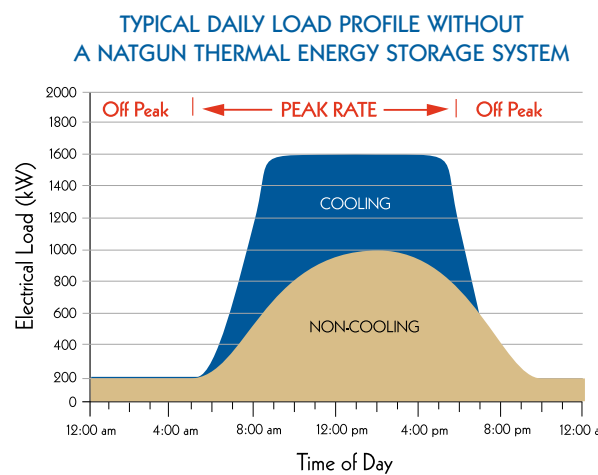
**Off-Peak Cooling Mode** A TES tank is “charged” with chilled water at night to take advantage of lower off-peak rates and cooler ambient conditions, which improve chiller efficiency. By morning, the tank has been filled with chilled water.



**Peak Rate Cooling Mode** During the day, chilled water is withdrawn from the bottom of the tank, providing the facility with the necessary cooling. Chillers and cooling towers are turned off, reducing power consumption.

# Five ways a Natgun thermal energy system lowers high energy costs

**1- REDUCE DEMAND SURCHARGES** Most commercial and industrial utility rates include a “demand charge” – a monthly surcharge based on the maximum kilowatts used by the individual customer during any peak rate period each month. A thermal energy storage tank allows customers to operate their chiller plant during the local utility’s off-peak rate period, dramatically lowering the utility’s peak rate demand surcharges.



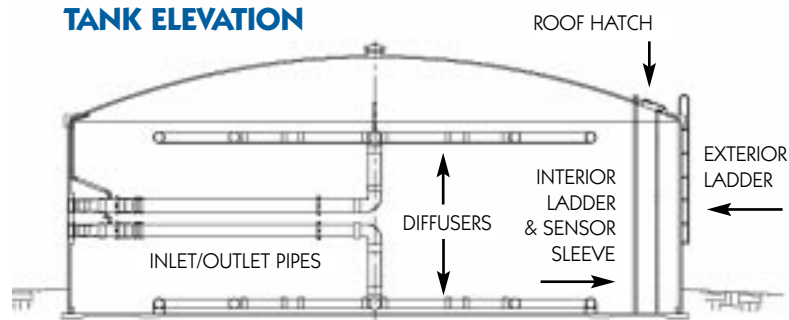
**2- LOWER USAGE RATES** Many utilities have established “time of use” rates as a way of encouraging customers to use less energy during daylight hours. Operating chillers during the evening, when off-peak rates are in effect, lowers the cost of electricity used for cooling.

**3- REDUCE POWER CONSUMPTION** With thermal energy storage, chiller operation is shifted to evening hours, when ambient temperatures are cooler. As a result, chillers operate more efficiently and consume less energy for a given cooling load.

**4- DEFER CAPITAL EQUIPMENT PURCHASES** In both new construction and facility expansion projects, a thermal energy storage system is often a cost-effective alternative to purchasing expensive chiller plant equipment. By utilizing a Natgun TES tank, capital expenditure outlays can be deferred and future operating costs dramatically reduced for years to come.

**5- LOWER CONSTRUCTION COSTS** Some utilities offer substantial cash incentives or rebates to customers installing thermal energy storage systems.

## TYPICAL NATGUN TES TANK ELEVATION





0.6 MG TES tank beneath the quadrangle at Johnson Community College in Overland Park, KS

## No maintenance

Because a Natgun TES tank is built with prestressed concrete, it never rusts and never needs repainting. Natgun TES systems employ PVC diffusers, have no moving parts, and provide 100% reliability with no maintenance.

## Back-up cooling

A Natgun TES tank protects your mission-critical operations by ensuring that you have cooling capabilities during planned and unplanned downtime of your chiller equipment. From data processing centers, to hospitals, to military bases; a Natgun TES tank provides peace of mind with chilled water at the ready.



0.6 MG TES tank at the UPS data processing center in Mahwah, NJ

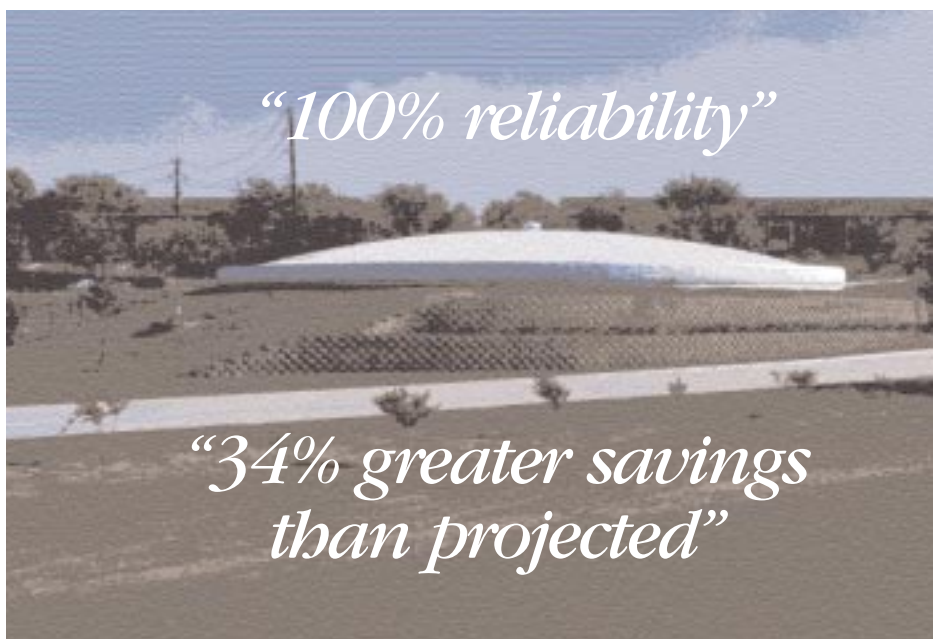
## Our customers say it better than we can

Here's what the Facility Engineer for a major electronics manufacturer in the southwest had to say about his 2.7 MG (24,500 ton/hours) Natgun chilled water thermal energy storage system.

"It was installed as a retrofit project (in 1989). Since start-up, it's performance has exceeded our expectations. In particular, we've enjoyed 100% reliability, 92.7% cycle thermal efficiency, 34% greater savings than projected, and 13% greater capacity than designed.

"In addition to reducing our on-peak electric demand by 2,900 kW, we have reduced electric usage by an average of 175,000 kWh per month, or 3.7%."

2.7 MG TES tank partially buried at an electronics manufacturer in Dallas, TX



# A Natgun TES tank delivers the lowest possible life cycle cost

## ✓ Simple to install

Compatible with most chilled water systems.  
No chiller modifications required.

## ✓ Zero maintenance equals 100% reliability

No rust removal. No repainting.  
No moving parts. No downtime.

## ✓ Energy and operational cost savings

Reduced on-peak demand surcharges.  
Greater use of lower off-peak electric rates.  
Improved chiller performance.

## ✓ Capital equipment savings

On new construction or facilities expansion projects, a Natgun TES tank can defer the capital expenditure of a new chiller and reduce the operational costs of the chilled water system.

## ✓ Siting flexibility

A Natgun TES tank may be partially or totally buried to minimize additional insulation, and to allow multiple use of valuable real estate.

## ✓ Exceptional ROI

Depending on utility rates and rebates, a Natgun TES system can have a simple payback of less than two years.



3.2 MG buried TES tank nearing completion beneath the track facility at the University of California in Pasadena, CA



5.2 MG TES tank buried beneath the parking lot of an electronics manufacturer in Dallas, TX

# NATGUN

## NATGUN CORPORATION

Thermal Energy Storage Division  
Eleven Teal Road, Wakefield, MA 01880  
Tel: 800-TES-6133  
Fax: 781-224-5196  
www.natgun.com

Natgun Corporation is headquartered in Wakefield, MA and has regional offices in Dallas, TX; Kansas City, MO; Chicago, IL; Columbus, OH; Baltimore, MD and Syracuse, NY.