CST SOLAR-TRIGEN™ System

Solar-Driven Trigeneration for Cooling, Hot Water & Potable Water

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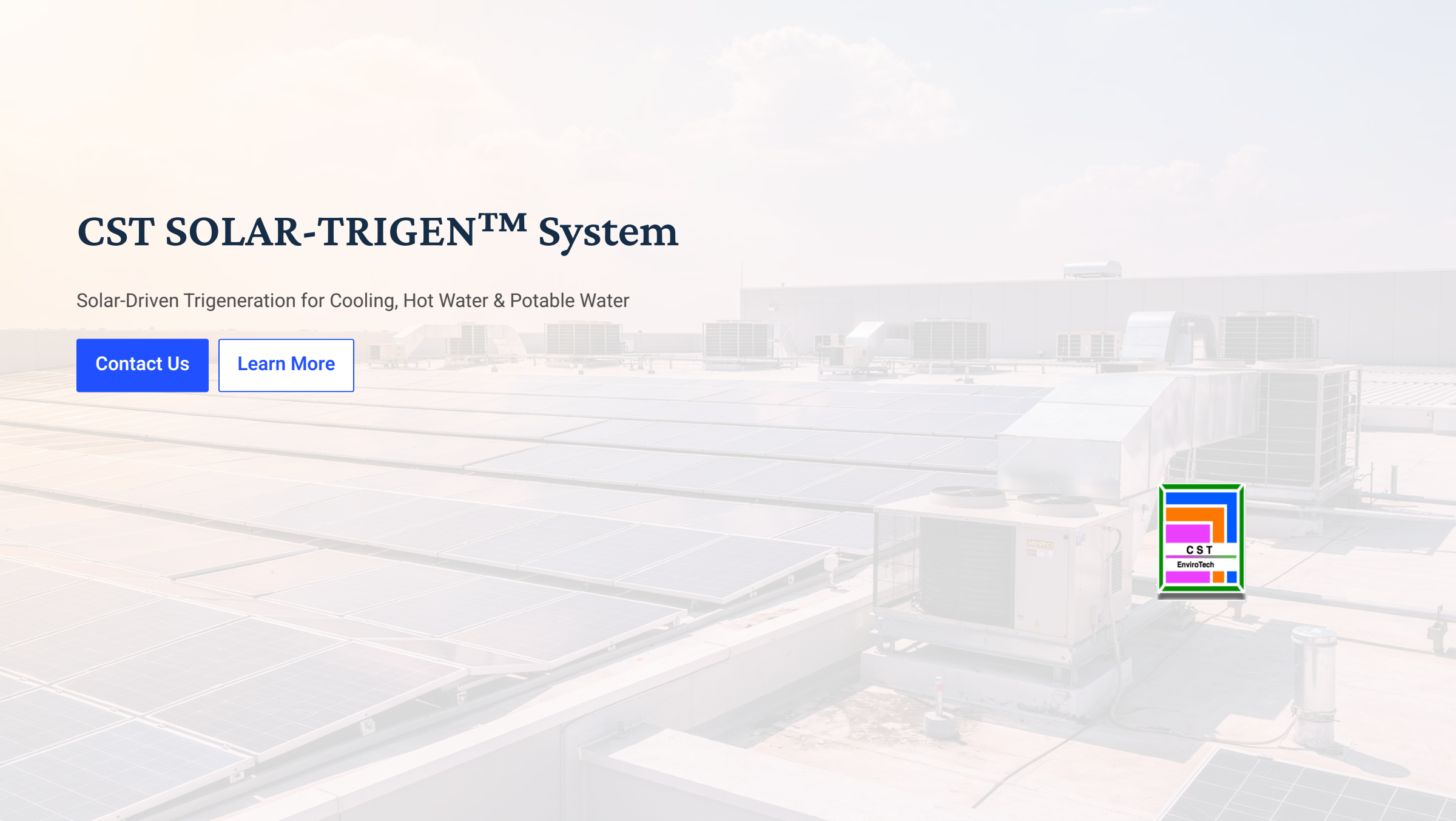

INNOVATION

Rethinking Energy Utilization

The CST SOLAR-TRIGEN™ System is a solar-powered trigeneration solution delivering **cooling, useful heat, and potable water conditioning** from a single integrated refrigeration platform. Based on the principle of maximum energy utilization, compressor work is not treated as waste but as a recoverable and usable resource.

Conventional cooling systems reject nearly all condenser heat directly to the atmosphere, contributing to higher ambient temperatures and increased energy demand. CST SOLAR-TRIGEN™ fundamentally rethinks this approach by recovering and utilizing a major portion of condenser heat for domestic and sanitary applications.

Core Philosophy

> **Cooling should not be achieved at the cost of heating the environment.**

CST SOLAR-TRIGEN™ treats energy as a **closed-loop resource**, delivering multiple utilities from a single energy input. This integrated philosophy enables higher system efficiency, reduced operating costs, and lower environmental impact.

Cooling

Space conditioning for comfort

Chilled Water

Drinking and process use

Hot Water

Showers, kitchens, and sanitation

TECHNOLOGY

System Architecture

The system is driven primarily by **solar power**, which operates the refrigeration compressor during peak daytime availability. The refrigeration cycle is engineered with priority heat recovery, ensuring that useful heat is captured before any residual heat is rejected to ambient air.

01

Solar-Powered Compressor

Drives the refrigeration cycle using clean solar energy

02

PCM Thermal Storage

Phase Change Material storage for hot water generation

03

Air-Cooled Condenser

Controlled residual heat rejection system

04

Flake Ice Evaporator

High-efficiency cooling and thermal buffering module

05

Closed-Loop Circuits

Chilled water for space cooling and drinking water

06

Potable Water Conditioning

Heat exchangers fully isolated from refrigeration circuits

Energy Utilization Strategy

Conventional Systems

100% of condenser heat rejected to atmosphere, contributing to urban heat islands and environmental stress.

CST SOLAR-TRIGEN™

- Recovers substantial portion of condenser heat into PCM storage
- Supplies hot water at controlled temperatures (42–60°C)
- Reduces peak heat discharge to ambient air
- Delays and lowers thermal impact on surrounding environment

Key Result: Significant reduction in direct atmospheric heat rejection, particularly during peak cooling hours, while maximizing productive energy use.

APPLICATIONS

Ideal Use Cases

The CST SOLAR-TRIGEN™ System is ideally suited for facilities requiring simultaneous cooling, hot water, and potable water, making trigeneration a natural fit for diverse institutional and community settings.

Educational Campuses

Universities, colleges, and hostels requiring comprehensive climate control and water services

Healthcare Facilities

Hospitals and clinics needing reliable cooling, hot water, and sanitation systems

Worker Housing

Staff colonies and dormitories with high demand for multiple utilities

Remote Installations

Off-grid locations where integrated solutions maximize efficiency

Institutional Facilities

Ashrams, community kitchens, and religious institutions

Defense & Relief

Military, police, and disaster-relief facilities requiring robust systems

Ready to Explore Trigeneration?

Whether you're planning a new facility or upgrading existing infrastructure, our team can help you evaluate if the CST SOLAR-TRIGEN™ System is right for your needs.

Schedule Consultation

Discuss your facility's requirements

Technical Assessment

Evaluate system feasibility and ROI

Custom Proposal

Tailored solution for your application

Contact Our Team

Download Brochure

Sustainability & Environmental Impact

CST SOLAR-TRIGEN™ represents a shift from **component efficiency** to **system efficiency**, delivering comprehensive environmental benefits that align with ESG and climate-resilient infrastructure goals.

Reduced Grid Dependency

Solar-powered operation minimizes electrical grid consumption during peak hours

Productive Waste Heat Use

Converts rejected heat into valuable hot water resource

Lower Urban Heat Island Effect

Significantly reduces atmospheric heat rejection in urban environments

Reduced Water Consumption

Eliminates cooling tower water requirements compared to traditional systems

Climate-Resilient Design

Supports sustainable development and environmental stewardship goals

Performance Advantages

Maximum Value Per Energy Unit

Unlike conventional systems that waste condenser heat, CST SOLAR-TRIGEN™ captures and redirects this energy for productive use. The result is higher value per unit of energy consumed while simultaneously reducing environmental impact.

This systems-level approach delivers measurable benefits in operational costs, energy independence, and environmental performance—making it an ideal solution for institutions committed to sustainability.

Utilities

From one integrated system

Solar Powered

During peak daytime operation

Hot Water

Controlled temperature output

INNOVATION

A Systems-Level Solution

The **CST SOLAR-TRIGEN™ System** is not a single machine, but a comprehensive systems-level solution for modern cooling and water needs. By integrating solar power, refrigeration, heat recovery, and thermal storage into one coherent platform, it delivers higher value per unit of energy consumed while reducing environmental impact.

Solar Energy Input

Clean renewable power source

Refrigeration Cycle

Efficient cooling generation

Heat Recovery

Productive waste heat capture

Thermal Storage

PCM-based energy buffering

Multi-Utility Output

Cooling, hot water, potable water

This approach reflects CST EnviroTech's commitment to **engineering solutions that serve both performance and the planet**.

Partner With CST EnviroTech

Ready to Transform Your Facility?

For technical discussions, pilot applications, or institutional collaboration, our team is ready to help you implement the CST SOLAR-TRIGEN™ System. We work closely with educational institutions, healthcare facilities, and organizations committed to sustainable infrastructure.

Contact us today to explore how trigeneration can deliver cooling, hot water, and potable water from a single solar-powered platform—maximizing efficiency while minimizing environmental impact.

Get In Touch | About Us

CST EnviroTech - Engineering solutions that serve both performance and the planet.