

Sustainable Cooling Tower Water Treatment with Onsite Green Oxidant Generation

No chemical inputs needed



Abstract

The growing urgency to adopt sustainable practices in various industries necessitates innovative and efficient solutions that align with global sustainability goals. This whitepaper provides an in-depth exploration of onsite peroxide generation, a Green Oxidant, using HPNow's patented GOgen® systems in the context of cooling tower water treatment. It accentuates the significant advantages such as enhanced sustainability, improved safety, and operational benefits over traditional water treatment methods. By leveraging HPNow's GOgen® systems, industries can ensure optimized water usage, reduced chemical usage, and minimized risks, contributing towards a resilient and sustainable operational framework.

Introduction

Traditional cooling tower water treatment methods have relied heavily on the usage of chemicals such as chlorine or bromine, which pose substantial challenges concerning environmental impact and operational safety. Excessive use of chemicals can be toxic and can corrode the equipment in the cooling tower. Typical challenges of using traditional biocides for cooling water treatment include:

- **Increased corrosion:** Traditional biocides are corrosive to cooling tower equipment such as pipes, seals and gaskets leading to reduced equipment lifespan.
- **Environmental impact:** Traditional biocides, and their disinfection byproducts, are toxic to aquatic life and can pollute the environment if they are not disposed of properly.
- **Human health risks:** Traditional biocides can also be harmful to human health, especially if they are inhaled or ingested.
- **Cost:** Biocides are expensive to purchase and use.

In addition to these, biocides can also be corrosive to cooling tower equipment and can reduce the efficiency of cooling towers. This further leads to the addition of more chemicals such as corrosion inhibitors and anti-scaling agents. With the evaporation from cooling towers, the chemical load in the water increases over time, so to limit salinity and avoid losing cooling performance (due to change of vapor pressure) operators face a high consumption of make-up water.

GOgen® A Sustainable Alternative

Onsite generation of hydrogen peroxide, a Green Oxidant, is more environmentally friendly and has significantly less safety risks than traditional cooling tower water treatment agents. Hydrogen peroxide (H₂O₂) is a powerful oxidizer with known water sanitation properties. In recent years, H₂O₂ has become increasingly popular as a cooling water treatment agent. It is particularly effective at cooling tower water treatment.

H₂O₂ is a safer and more environmentally friendly solution for cooling water treatment than traditional chemical treatments, such as chlorine and bromine. H₂O₂ is non-toxic and biodegradable, and it does not produce any harmful byproducts. It is also less likely to cause corrosion than other chemical treatments.

In this landscape, onsite generation of green hydrogen peroxide using HPNow GOgen® systems emerges as a revolutionary solution, mitigating the challenges posed by conventional methods. This technology fosters an environment where industries can enhance operational efficacy while adopting a green solution and improving workplace safety.



GOgen® onsite peroxide generation
No chemical inputs - only water and electricity.
Safe concentration.

Cooling tower water treatment
Broad material compatibility

Becomes water and oxygen
No byproducts



GOgen®

It starts **with water**,
It ends **with water**

Chemical Input Free

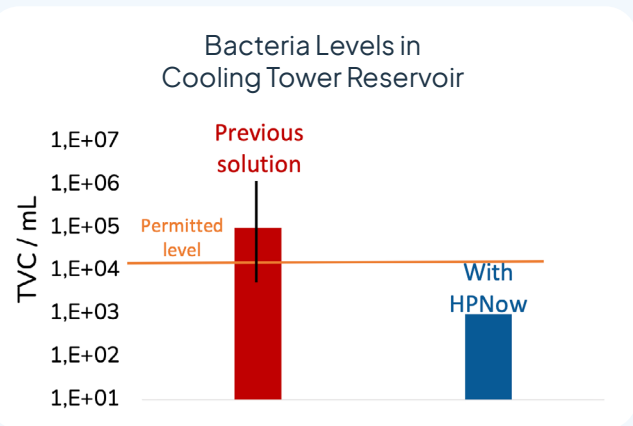
HPNow's GOgen® systems generate a green oxidant, hydrogen peroxide, from only water and electricity through a patented electrochemical process. Green peroxide is then introduced in the cooling tower loop, where it acts as a powerful oxidizer. No chemicals are needed throughout the process. The need for transporting bulk chemicals is also eliminated, reducing the carbon footprint associated with logistics.

Case study 1: Cooling tower in Denmark

A Danish cooling tower using chlorine was struggling to keep bacteria levels within the permitted limit.

Dosing of chlorine-based biocides was not sufficient, as spikes of up to 100 times higher than the permitted limit were measured.

After HPNow installed a GOgen® system bacteria levels were kept under the permitted threshold.



Type of cooling tower	Evaporative, closed loop
Cooling tower capacity (kW)	10
Water volume	3
Water flow (m ³ /h)	7.5
Evaporative rate – normal (L/day)	250
Evaporative, closed loop	1000

Unlike traditional methods that require the use of chemicals that leave residues in the environment, Peroxide UltraPure™ becomes water and oxygen after use, without leaving a trace in the environment. This approach significantly reduces the dependency on harmful chemicals, minimizing the environmental impact and aligning operations with sustainability goals.

Safe

Onsite generation of peroxide eliminates the risks associated with handling, storing, and transporting hazardous chemicals. HPNow systems generate green peroxide onsite, on-demand at a safe concentration, which mitigates potential hazards. The concentration generated by the HPNow system is of 1%, which is similar to what is available at a pharmacy for personal care. At the same time, Peroxide UltraPure™ features a broad material compatibility, including with plastics, stainless steel and aluminum. This leads to less corrosion than alternatives, and as a result lower maintenance and replacement parts for the cooling tower components.

Case study 2: Chemical input free cooling tower in pharmaceutical industry

A global pharmaceutical company wanted to improve the sustainability and safety profile of their manufacturing site, and a key aspect was implementing a green solution for cooling tower water treatment.

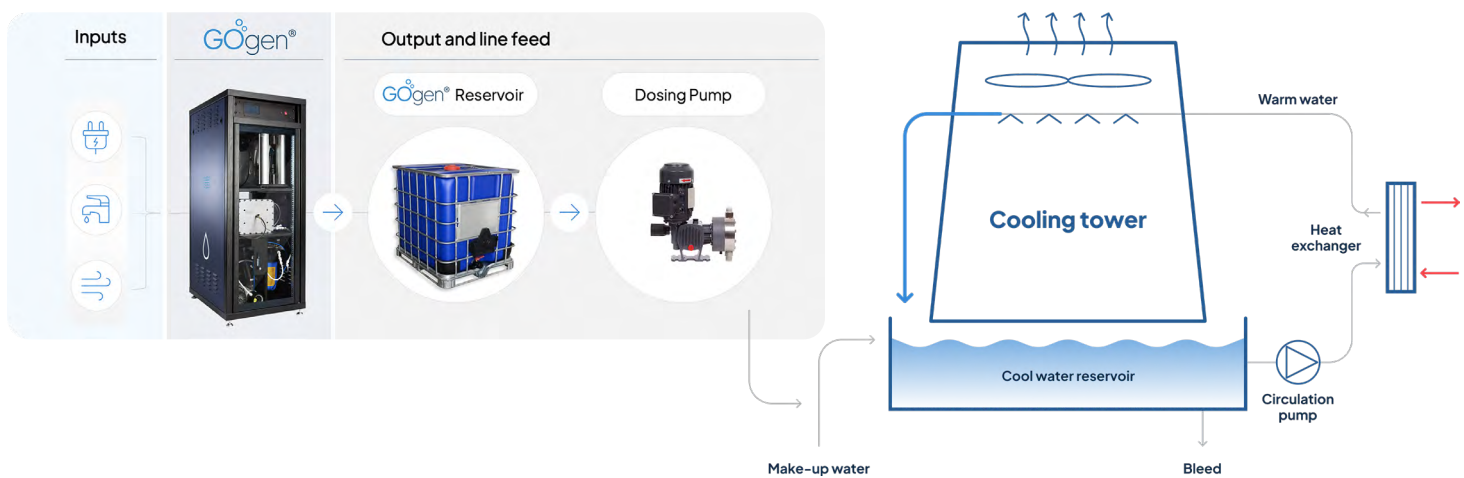
The HPNow solution proved effective, and allowed the pharmaceutical company to eliminate chemical inputs and improve site safety profile.

Type of cooling tower	Evaporative, closed loop
Cooling tower capacity (kW)	25
Water volume	12
Water flow (m ³ /h)	30
Evaporative rate – normal (L/day)	1500
Evaporative, closed loop	5000



Secure Oxidant Supply

The GOgen® offers a substantial advantage in terms of supply security for cooling tower water treatment processes. By generating green peroxide onsite, the dependency on external suppliers is eliminated. This autonomy in production not only ensures a consistent and uninterrupted supply of the necessary treatment compounds but also alleviates vulnerabilities associated with supply chain uncertainties, disruptions, or fluctuations. Consequently, HPNow's GOgen® enhances operational resilience, providing industries with a more stable, reliable, and secure approach to maintaining the continuity and effectiveness of their water treatment processes.




The logistics involved in transporting and handling chemicals in traditional methods contribute to increased operational costs and carbon footprints. HPNow systems, with their onsite generation capabilities, eliminate these logistic requirements, further promoting sustainability and operational efficiency.


Conclusion

Adopting onsite peroxide generation using GOgen® for cooling tower water treatment presents important advantages that align with contemporary sustainability and safety objectives. These systems signify a progressive step towards achieving optimized operational practices that minimize environmental impacts and enhance safety protocols. By embracing this innovative technology, industries can pave the way for a future where operational excellence and sustainability coalesce seamlessly.

About HPNow

HPNow is a technology and market leader in onsite green oxidation through its range of safe, sustainable, onsite hydrogen peroxide generation solutions. HPNow's solutions address growing global challenges in clean water and sanitation through autonomous, safe and sustainable green-oxidation solutions. Headquartered in Copenhagen, and with representation across Europe, the Americas and Asia, HPNow addresses their clients' water treatment needs in market segments ranging from agriculture and aquaculture, to industrial and drinking water treatment.

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