nVent RAYCHEM: Supporting high-temperature mission-critical applications in the energy transition

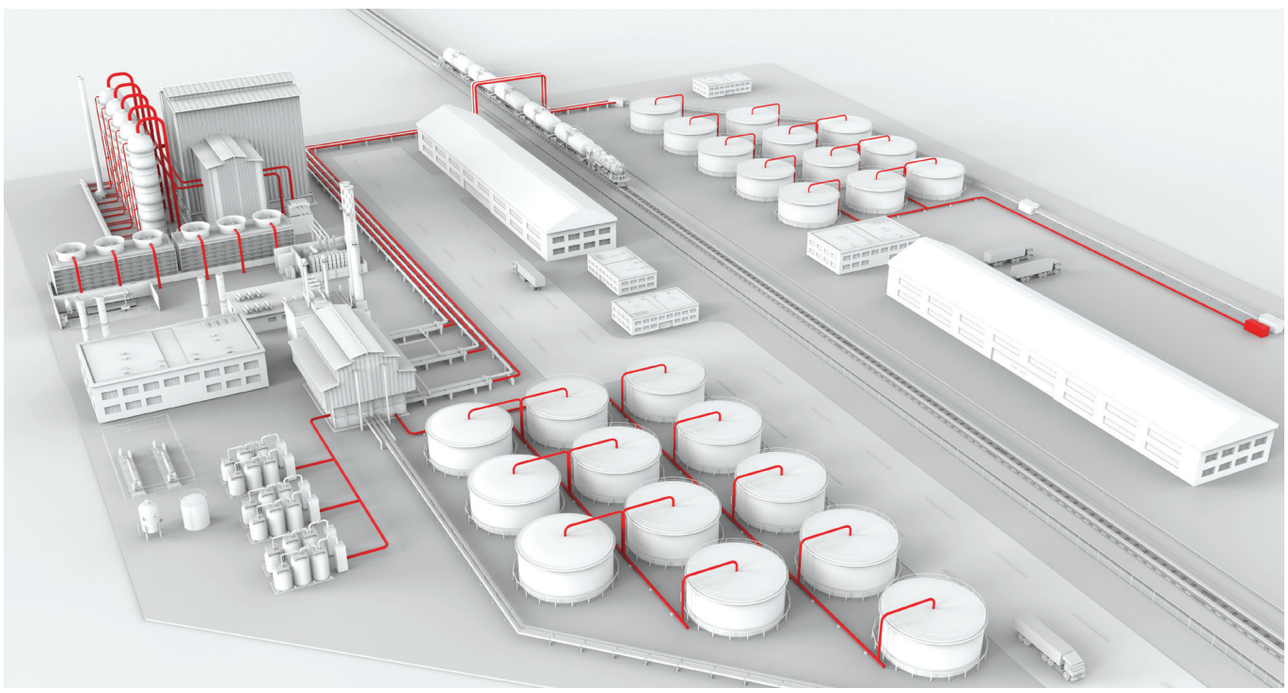
Reliable heat management with self-regulating cables, including high-power retention technology

The energy transition mainly focuses on four main industries: LNG, biofuels, hydrogen, and carbon capture and storage (CCS). Each of these industries brings unique challenges from a heat management system perspective. These applications range from conventional utility system freeze protect heat tracing applications to critical process maintenance applications associated with very interesting feedstocks being utilised in biofuel facilities.

The LNG industry requires a lot of freeze protection and process maintenance designs. In many applications, very cold temperatures can be more of an operational than a heat issue due to the fact that LNG is refrigerated and compressed to a temperature of -162°C/-260°F. At nVent, a lot of research and testing has gone into the development of heating cable technology and components that can be installed at these cryogenic temperatures. Raychem self-regulating (SR) heating cables are used in applications associated with utilities, fire water systems, gas condensation, and frost heave prevention under LNG storage tanks. High-temperature SR applications are mainly associated with the site-based power plant steam system, including designs for steam lines, boiler feedwater, blowdown lines, and condensate.

The hydrogen generation industry is still largely steam methane reformer (SMR) technology-driven. This is called grey hydrogen. When the CO_2 generated in SMR is captured and stored, the resultant hydrogen is called blue hydrogen. The latest technology to produce what is classified as green hydrogen is based on the electrolytic splitting of the water molecule using green power, resulting in hydrogen and oxygen with no CO_2. High-temperature SR applications in the hydrogen industry are similar to those described for LNG because an SMR plant in many ways is like a power plant producing waste heat steam. Thus, high-temperature applications include steam lines, boiler feedwater, blowdown lines, condensate, and some process maintenance applications associated with fuel gas and the pressure swing adsorption (PSA) units.

The CCS industry is growing rapidly and is typically associated with the refining, hydrogen, ammonia, power, steel, and cement industries, which all generate a significant amount of the greenhouse gas CO_2. CO_2 is removed from the



Biofuels and clean fuels are essential in the energy transition towards attaining carbon neutrality but their production is more complex and comes with extra challenges

flue gas of the processes in these facilities through a few different technologies, with the most common one today being regenerant amine absorption. The CO_2 is then dehydrated, compressed, and typically piped to an underground storage facility. Higher temperature SR heat management applications are typically associated with the steam system, the regenerant amine system, the dehy unit, and the lube oil systems in these facilities.

nVent's high-temperature SR heating cables with innovative High Power Retention (HPR) technology

The biofuels industry includes ethanol, biodiesel, renewable diesel and sustainable aviation fuel (SAF). The feedstocks include plant oils, animal fats, and used cooking oils, which often require process maintenance temperatures in the 50°C/122°F range. Biodiesel as an end product requires a similar process temperature maintenance. This requirement impacts the (un) loading and storage facilities of feedstock and the end product.

nVent recently developed high-temperature SR heating cables with innovative High Power Retention (HPR) technology:

- Raychem XTVR heating cables are designed for continuous operating temperatures up to 302°F (150°C) and withstand temperatures up to 482°F (250°C).
- Raychem HTV heating cables are designed for high continuous operating temperatures of 205°C/400°F and withstand temperatures up to 260°C/500°F.

The power retention levels for both XTVR and HTV cables surpass previous self-regulating heating cables in performance and design life. These cables guarantee a minimum of 95% of rated performance even after 10 years of operation at continuous exposure to maximum temperatures, and a heating cable design life of 30+ years. Plus, with more available power variants (XTVR has seven at 200-277V and four at 100-130V; HTV has eight at 200-277V), a more efficient heat-trace design that closely matches the heat loss of industrial process pipes is now possible. This, in turn, helps with cost savings on energy consumption and power infrastructure, and reduces downtime risk and maintenance costs for decades.

High-temperature self-regulating cables with HPR are a perfect solution for energy transition industries. Not only is this novel technology ready to keep critical processes operational, protect pipes, tanks, and equipment from freezing, and meet the maintenance demands of new biofuel feedstocks, but it also helps us create a more sustainable future.

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