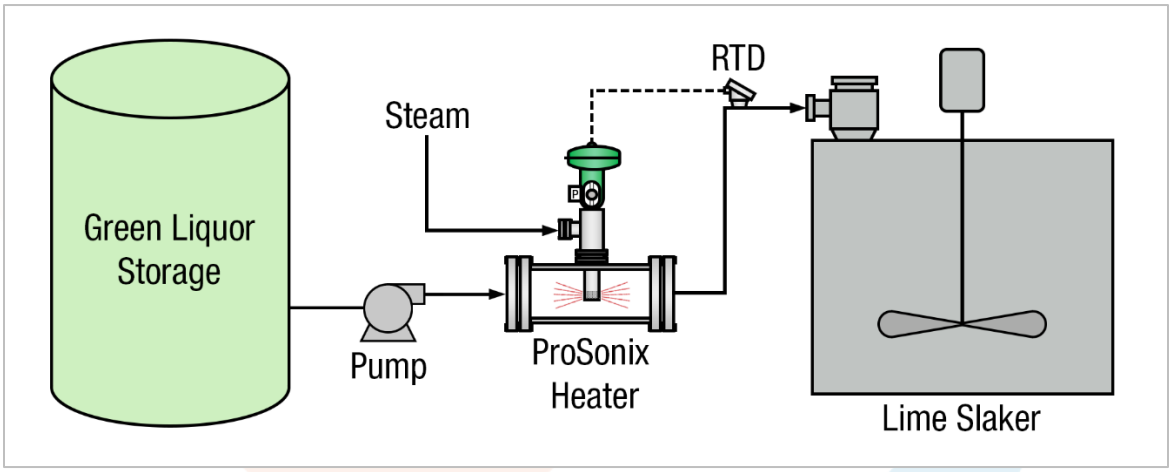
Application: Green Liquor Heating & Recausticizing

Kraft pulp mills convert wood chips into pulp through a chemical process that produces *green liquor*—a mixture of recovery boiler smelt and dilute white liquor. After dregs are removed, the liquor is sent to recausticizing tanks to generate fresh white liquor for reuse in pulping. Flow rates vary by mill size, typically ranging from 350 to 1,400 gpm.



Recausticizing is carried out in two stages. In the first stage, green liquor reacts with lime in a highly agitated **slaker** operating at high temperatures (180–215°F). The second stage occurs in a series of **causticizers**, where the reaction is completed under continuous agitation. Together, these steps enable chemical recovery and recycling, which are essential to the efficiency and economics of the Kraft process.

Process Heating Challenges – Heating green liquor improves the performance of the process, but conventional heating methods create problems. These issues cause many mills to operate at reduced temperatures, sacrificing performance for stability.

- Sparging in the vessel tends to create “hot spots” in the slaker or causticizers, resulting in uneven reactions within the vessel. This can cause incomplete regeneration, chemical carryover, or excessive reaction times. Sparging also exaggerates dust formation from the vessel during operation, producing cleaning and maintenance issues.
- Heat exchangers are subject to damage as green liquor is corrosive at elevated temperatures. Stainless steel welds, in particular, are susceptible to stress corrosion, which can lead to shortened heat exchanger life and cross-contamination between the steam and liquor.
- Eductor-style steam injectors with limited turndown (2:1) are prone to steam cavitation and accelerated wear.

ProSonix solution - A PSX heater can be installed in-line upstream of the slaker. The PSX Heater uses high-velocity steam injection for rapid and complete condensation of the steam into the green liquor. Our Radial Multi-Port Jet Diffuser ensures smooth and uniform heating of the liquor. This results in a more complete causticizing reaction, reducing lime costs and allowing better process control. The end result is higher quality white liquor for use in the digesters and reduced operating costs. The PSX heater can also be supplied in appropriate metallurgy to address thermal cracking that can occur when heating green liquor.

Key ProSonix Heater Benefits:

- **Fewer process upsets** and reduced steam vibration through more efficient internally modulated steam injection
- **High liquid turndown** up to 10:1 to match the mill’s operating conditions
- **Precise temperature control** of +/- 1°F across the operating range, producing higher quality liquor with less carryover
- **Lower production costs** through more efficient slaker operation and lower lime feed costs
- **Reduced maintenance costs** and downtime with appropriate metallurgy and elimination of steam cavitation and violent steam mixing from tank spargers

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