American Chemistry Council | Pine Chemistry

PINE CHEMISTRY'S LIFECYCLE AND ENVIRONMENTAL BENEFITS

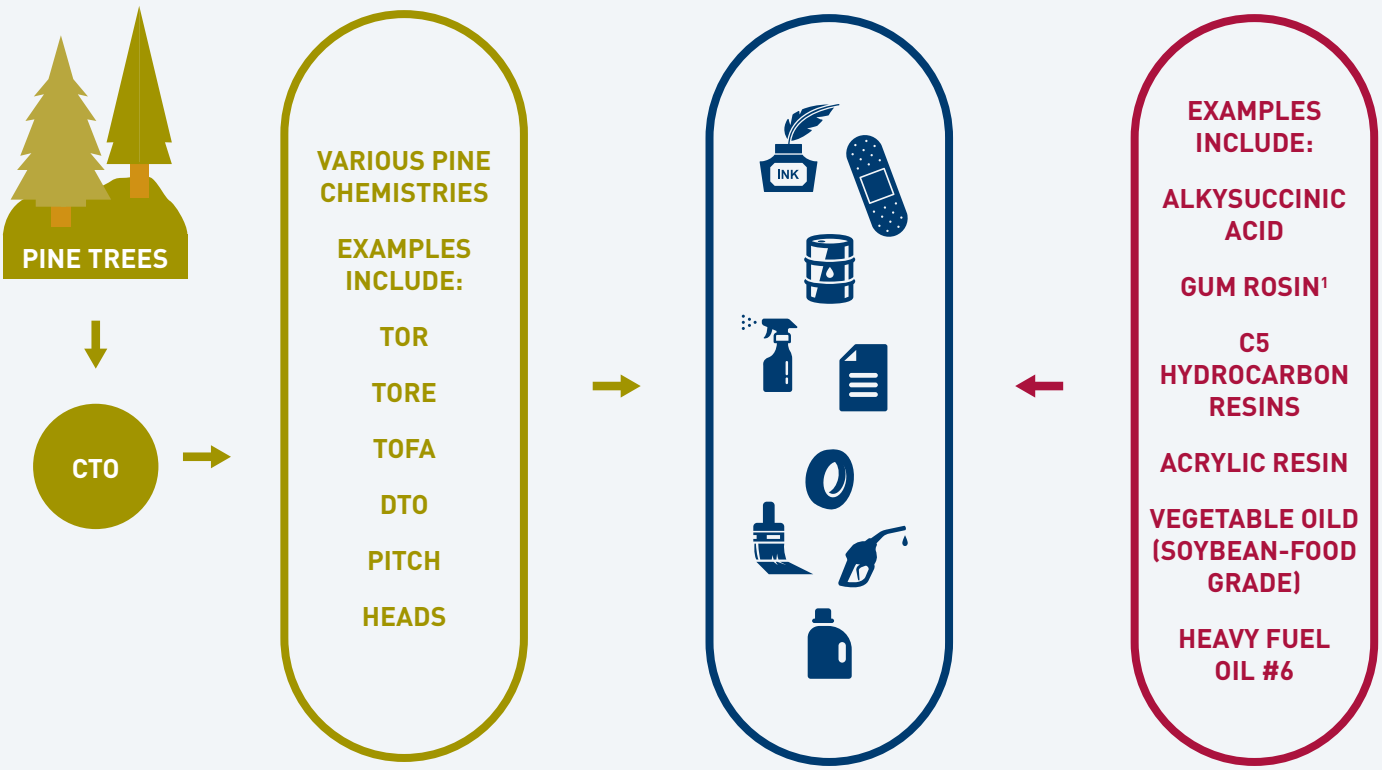
Pine Chemistry: A Chemistry With Environmental Benefits

Pine chemistry refers to the co-products derived from the papermaking process that are upgraded into crucial ingredients used in a variety of goods important to our everyday lives.

CTO: A Sustainable Building Block for Modern Life

Crude tall oil (CTO) is a key pine chemical used to make many of the products that are important to our everyday lives. CTO can be further distilled into other pine chemicals such as heads, pitch, distilled tall oil (DTO), tall oil fatty acid (TOFA), tall oil rosin ester (TORE) and tall oil rosin (TOR).

CTO can also be used as a feedstock in the production of biodiesel, often referred to as renewable fuel or advanced biofuel.



[1]Gum rosin is derived from pine trees, but not from CTO. Therefore, it is considered an alternative to CTO derivatives in this analysis.

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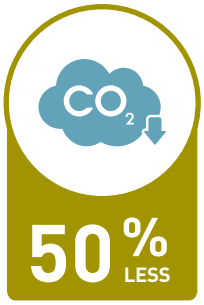
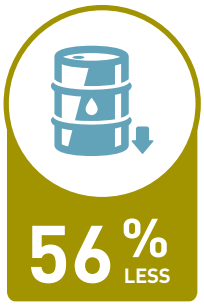
HOW CTO STACKS UP AGAINST ITS PRIMARY SUBSTITUTES

When comparing the life cycle environmental impacts of substituting a typical replacement with a comparable amount of pine chemical required for production of a common end product in a cradle-to-gate scenario (i.e., from raw material extraction through final material production), the carbon and energy footprint results are stark.



Globally, the production of a product with pine chemicals results in a 50% weighted average reduction in carbon footprint when compared to the production of a product made with substitutes.

- This means making a product with pine chemistry releases half as much greenhouse gases (GHG) than if the same product were made with the most likely substitute.



Globally, products made with pine chemicals are manufactured with a weighted average non-renewable energy footprint 56% less than products made with substitutes.

- This means making a product with pine chemistry typically uses less fossil fuels (e.g., coal, oil) and nuclear energy.

Both of these differences are strongly demonstrated through products such as adhesives, ink, fuel, paper sizing, and rubber compounding.

DOES CTO AS A FEEDSTOCK FOR BIOFUEL MAKE SENSE?

When comparing CTO used for biodiesel versus CTO used for pine chemicals, there is **no significant difference** in

- carbon footprint
- non-renewable energy footprint

Therefore, there is no carbon or energy footprint benefit that accrues by diverting CTO that is currently used as feedstock for pine chemicals to biodiesel production.

While the Pine Chemistry sector supports the use of renewable energy, it is imperative that policies regarding biomass or other renewable resources not directly or indirectly disadvantage another industry's raw feedstock. Inappropriately diverting renewable resources such as CTO for fuel production could trigger a market-distorting demand on the already scarce pine chemistry renewable feedstock. Any incentives or mandates related to new technology should be tailored to those with underutilized feedstock and where an environmental benefit over its alternative uses exists, so as to avoid potentially harming an economically important and established sustainable job sector like the pine chemistry industry.

Source: Greenhouse Gas and Energy Life Cycle Assessment of Pine Chemicals Derived From Crude Tall Oil and Their Substitutes
American Chemistry Council/Franklin Associates, a Division of ERG 2013

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Executive Summary available at **pinechemistry.americanchemistry.com/Environmental-Benefit-of-Pine-Chemicals**