

R&D WITH NREL'S **THERMAL AND CATALYTIC PROCESS DEVELOPMENT UNIT (TCPDU)**



INTEGRATED PROCESSING FOR RISK REDUCTION

The TCPDU is NREL's largest thermochemical reactor system, evaluating up to half a ton of biomass per day for thermal deconstruction and catalytic conversion processes.

NREL researchers are using the TCPDU to study process integration and performance of promising technologies. Our data is used to model and assess the economic feasibility of these technologies and provide feedback to industry partners for risk reduction prior to commercialization.



Top Photo: An NREL engineer works with a char collection drum.
Photo by Dennis Schroeder, NREL 48600

Bottom Photo: An NREL scientist measures aldehydes and ketones in catalytic fast pyrolysis oil production samples.
Photo by Dennis Schroeder, NREL 49294

THERMAL DECONSTRUCTION TAILORED TO YOUR NEEDS

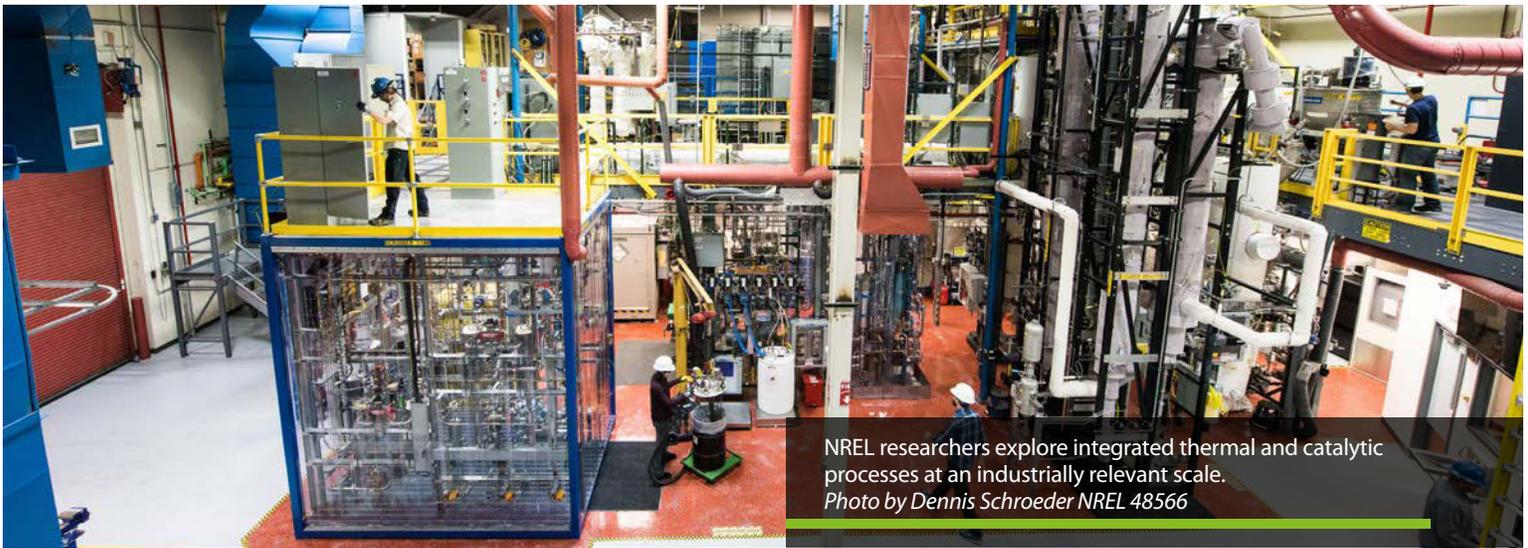
From peanut shells to distillers dry grains, switchgrass to hybrid poplar and pine, NREL's flexible feed system is capable of processing up to one half dry ton per day via pyrolysis or gasification. With a fluidized bed reactor, entrained flow reactor, cyclonic solid product collection, dual liquid product condensation systems, and extensive online and offline analytics, the TCPDU has thermal deconstruction covered.

EVALUATING CATALYST PERFORMANCE

The TCPDU's catalytic reactor system is capable of evaluating catalyst stability and performance under a wide range of operating conditions. Fed from stand-alone bottled gases, upstream biochemical processes, or directly from coupled upstream thermal deconstruction equipment, the TCPDU's 20- to 100-kg packed, fluidized, and circulating fluidized bed reactors support a wide range of catalytic conversion approaches.

YOUR PROCESS, OUR CONNECTIONS

Working with the TCPDU, partners have access to its dedicated operators, engineers, and technicians. Our team also leverages NREL's own advanced in-house analytical and computational capabilities as well as national feedstock and catalyst consortia partnerships. Let our connections work for you.

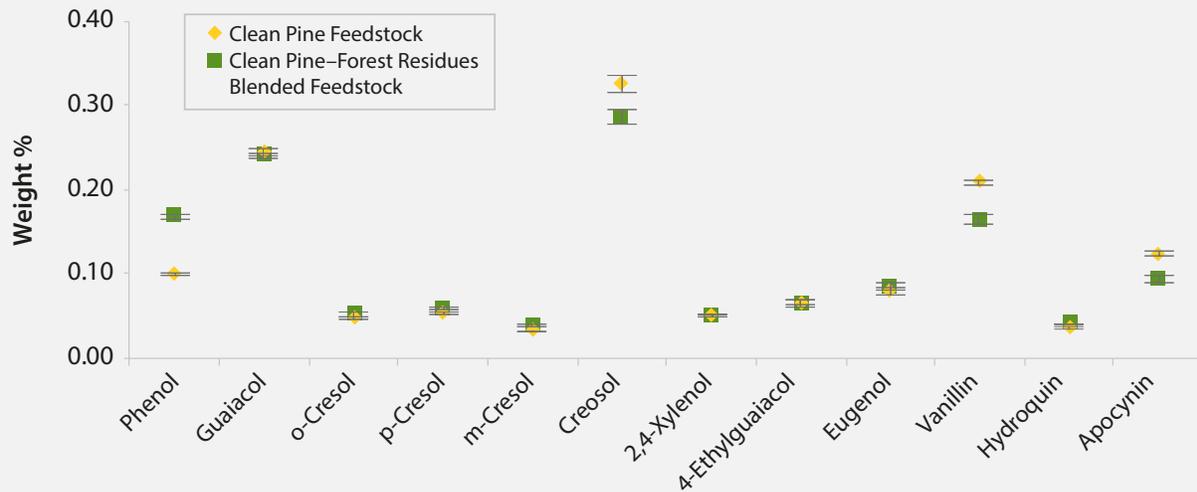


NREL researchers explore integrated thermal and catalytic processes at an industrially relevant scale.
 Photo by Dennis Schroeder NREL 48566

RECENT SUCCESS

The TCPDU produced more than 400 gallons of fast pyrolysis oil for hydrotreatment and distillation at Pacific Northwest National Laboratory.

Recent efforts in the TCPDU over a 2-month period generated more than 400 gallons of fast pyrolysis oil, with resulting products undergoing 19 different analyses. These well-characterized products, containing multiple replicates from two unique feedstocks, provide a new and interesting view into pyrolysis chemistry. Oil properties once thought to vary widely, instead revealed tightly bounded tolerances as shown below.



Lignin-derived compounds analyzed by gas chromatography-mass spectrometry. More than 10 replicate experiments were performed for each feedstock, with 95% confidence intervals for the data sets shown here. These small error bars indicate the ability to generate a chemically consistent product.

Find Out More

For more information and collaboration opportunities, contact:

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