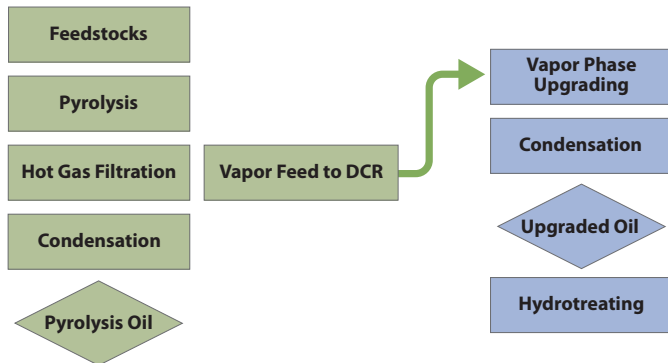


# Vapor Phase Upgrading With NREL's Davison Circulating Riser (DCR)

Advancing technologies in  
biomass conversion to fuels  
and fuel intermediates



# DCR System With Custom Biomass Prolyzer



## Highlights

- Custom biomass prolyzer provides vapors to the DCR for upgrading to hydrocarbon fuel intermediates
- 2 mass balance runs per 8 hrs: 3–6 liters of upgraded oil and 1–2 gallons raw oil produced
- Online quantitative vapor analysis
- Comprehensive condensed raw and upgraded oil analysis
- Comprehensive pre- and post-use catalyst characterization

## Overview

### Scale of Research

- 1–3 kg/hr biomass feed
- 2 kg DCR upgrading catalyst

### Configuration

- Ex-situ upgrading of biomass pyrolysis vapors to condensed fungible hydrocarbon products
- Continuously pyrolyze biomass for 8–10 hr runs

### Data Collection Periods

- Will be operated on a daily basis

### Analytical Capabilities

#### Online

- Gas chromatographs
- NDIR and H<sub>2</sub>-TCD millisecond sampling
- MBMS (>400°C) for vapor species

#### Offline

- DI catalyst attrition testing
- 2D GCTOFS and FID, NMR, and HPLC for oil analysis
- Catalyst characterization via SEM, EDS, XRD, ICP, particle size, surface area

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