KOCH TECHNOLOGY SOLUTIONS

A KOCH ENGINEERED SOLUTIONS COMPANY

DTL™ DRY GAS TO LIQUIDS TECHNOLOGY

Koch Technology Solutions (KTS), a Koch Engineered Solutions (KES) company, can deliver a DTL™ Unit to capture the gas to liquid spread by converting Olefins in FCC and/or Coker off-gas to a more valuable liquid product stream. The dilute olefins in the off-gas can be recovered and converted to high-octane gasoline blend stock or to BTX product for petrochemical feedstock while reducing Scope 1 emissions. Alcohols like Methanol and Ethanol can also be fed to the Unit to create an aromatic product or high octane gasoline blend stock. KES companies can work together to provide a modular plant that can be operational in two years.

By bringing our capabilities to bear across our affiliate companies and acting as a single counterparty, KES offers a unique, comprehensive solution that offers favorable returns.

Multiple Benefits of a DTL Unit

A DTL Unit can handle flexible feedstocks that contain Olefins that are converted to valuable products instead of burning them as fuel in the refinery. In certain regions, the DTL Unit can be used to help meet zero emissions from burning hydrocarbons in process heaters. The DTL unit can convert the hydrocarbons to a valuable liquid product allowing the complex to only burn hydrogen. KTS will work with KES companies to provide a full solution to upgrade the refinery fuel system. The DTL Unit can also be used to lower imports of high octane liquids as the DTL Unit will maximize the available liquid pool in a refinery. A modular Unit can typically be paid off within two years of startup.

Key Benefits

- Olefin conversion greater than 95% and a product with a ~93 RON
- CO_2 emission reduction while creating a lower C.I. octane barrel
- Compact design that allows for modular construction
- Low OPEX and CAPEX cost

Facility Construction

- KES-led project management, lump sum turnkey EPC and engineered equipment services can deliver a modular plant that can be operating in two years

Economic Benefits

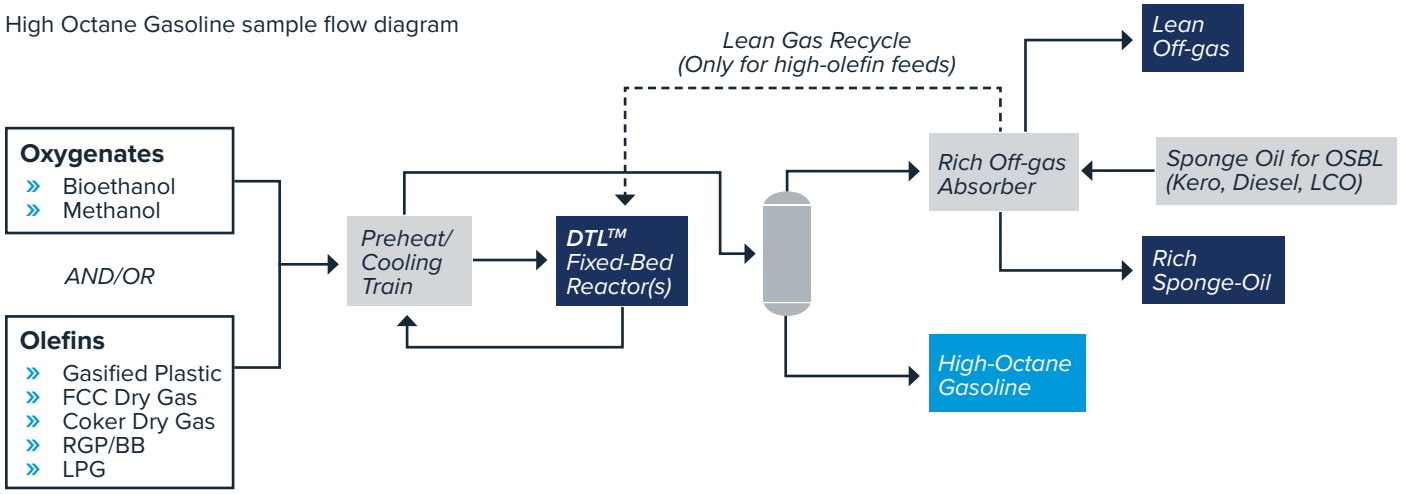
- DTL can provide an uplift of ~$50/Barrel while lowering CO_2 emissions. (Based on a $75 crude price)

FAVORABLE ECONOMICS WITH KES AS AN EXECUTION PARTNER

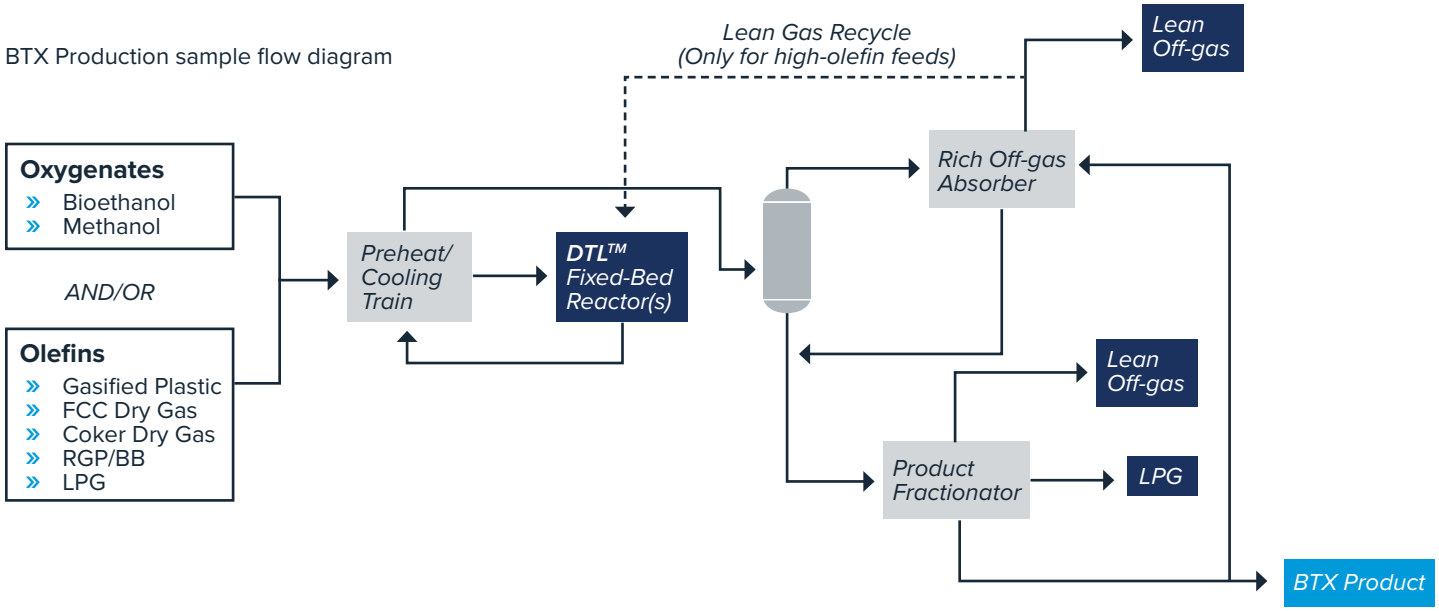
For a DTL™ unit processing off-gas from an 80,000 BPD FCC and 30,000 BPD Delayed Coker producing high octane gasoline blend stock, the Unit will provide an economic benefit greater than $14 MM/YR USD. The project would have an IRR over 35% and payback of the unit in 1-2 yrs. This is based on WTI based at $75/BBL

DTL™ Unit Process Flow Diagram

High Octane Gasoline sample flow diagram



BTX Production sample flow diagram



Koch Engineered Solutions (KES) is a global solutions provider that encompasses products, services and expertise across a wide range of industries. KES companies design, manufacture and install process, pollution control and sustainability solutions for industries and cities around the world. More information is available at KochEngineeredSolutions.com.

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