

Bio-Feedstocks: Fueling a Path to a Net-Zero Future

Tuesday, March 22

8:00 am - 5:00 pm (CST) / 6:00am- 3:00pm (PST)

Topics Addressed

The energy industry is in transition given the impact of legislation in response to climate change, refinery. Biofuels will play an increasingly important role in the transportation fuels industry for gasoline, diesel, jet fuel and bunker fuel. The course will cover current and emerging process technology together with energy transition issues and industry developments with respect to decarbonization. The biofuels to chemicals interface will also be discussed.

Course Content

- Essential background on the biofuel value chain, together with its historical development from the earliest days of motor transport, through to a discussion of the changing regulatory environment.
- A review of market and pricing dynamics and how these will influence and by influenced the impact of the energy transition in refining industry in the short to medium term.
- Insight into biofuel manufacturing technology covering established 'First Generation' processes for ethanol and biodiesel, together with insight emerging technologies for 'Advanced Biofuel' development.
- Supporting background on conventional and emerging feedstocks for biofuels production, as well as insight into waste products that also serve the industry like used cooking oil.
- A review of the key players in the biofuel and feedstock supply chain to understand the structure of the market.
- A review of the strategic impact of the role of biofuels in refining industry decarbonization efforts and the need to better take advantage of the biofuels-chemicals interface.

Key Benefits

Acquaints the learner with the complete biofuels value chain from agriculture, biofuel manufacturing and downstream into retail transportation fuels as well as impact on chemicals markets

Trainers

Dr. Mark Morgan
VP, Chemical
Consulting



Juan Sacoto
Exec. Director,
Agribusiness



Sana Khan
Agribusiness
Consulting



Stephen Li
Director, Oil Markets/
Downstream Consulting



Course Outline

Session 1: Biofuels Fundamentals

Introduction, Historical Development and Value Chain

- What are Biofuels and their markets?
- History (from original engine conceptual design, through to MTBE Phaseout in the United States, etc.)
- Supply Chain: Agriculture to Biofuel to Rack/Spike Blending

Why is policy so important? - Near Term Legislation, Quotas and Mandates

- Why is policy so important? Common policy instruments
- Differing paths taken by US and EU biofuels policies
- Historical Development and Challenges, e.g., splash and dash
- US RFC and LCFS and Europe's RED II
- Overview of mandates/targets in other regions
- What to expect in future policies and regulations: meeting net zero GHG emission targets, EV penetration, sustainable aviation fuel (SAF), etc.

Session 2: Biofuel Demand and Outlook

Biofuel Demand Drivers

- Where are biofuels consumed?
- bioethanol blending, bio ethers
- FAME biodiesel/renewable diesel blending
- Biojet blending
- Impact of legislation/incentive mechanisms (e.g. credit and tickets)

Session 3: Agricultural Crops

Background on Agricultural Feedstocks for 1st Generation Technologies (Grains, Natural Oils, Sugars, etc.)

- Overview of 1st, 2nd and next generation feedstocks
- Availability and use of 1st generation feedstocks
- Availability and use of 2nd generation feedstocks
- Biofuels market penetration – Case of UCO & tallow in the US
- Major regional players in feedstock

Crop Technology to Serve Biofuel Production

- Advances in feedstocks for Dry/Wet Corn Milling
- Technologies & feedstocks used for bioethanol & biodiesel
- Case Study: Ethanol to jet
- Cast Study: Increase the oil content of oilseeds

Session 4: Fundamental Biotechnologies

1st Generation Bioethanol Technologies (from Grains, Sugarcane and Others)

- Wet and Dry Corn Milling Processes and enhancements
- Processes based Sugarcane/Sugarbeets and others
- Manufacturing economics

Background on Alternative Feedstocks

- Challenges of managing cellulosic feedstocks to support advanced biofuel development
- Mixed Feedstock portfolio considerations
- Scale versus feedstock flexibility
- Feedstock properties to facilitate advanced biofuel production
- Impact on supply chain relationships
- Challenges facing the development of feedstocks for advanced biofuel production

1st Generation Technologies, from Natural Oils

- Conventional FAME (Fatty Acid Methyl Esters) with glycerine by-product
- Advances in FAME technology – heterogeneous catalysis
- Feedstock flexibility
- Manufacturing Economics

Background on Alternative Feedstocks for Advanced Biofuel Technologies (Farmed Wood, UCO, Energy Crops, etc.)

Session 5: Advanced Biofuels Technologies

Advanced Bioethanol Technologies from Biomass

- Cellulosic Approaches
- Thermochemical Approaches
- Comparative Manufacturing Economics

Advanced Biodiesel/Jet Fuel Technologies, ex Natural Oils and Biomass

- Focus on processes like NexBTL
- Comment on other approaches from UOP and Axens
- Thermochemical approaches, e.g., CHOREN® (Cobalt-based FT) and Rentech (Iron-based FT)
- Comparative Manufacturing Economics
- Conventional FAME (Fatty Acid Methyl Esters) with glycerine by-product
- Advances in FAME technology – heterogeneous catalysis
- Feedstock flexibility
- Manufacturing Economics

Technologies (Farmed Wood, UCO, Energy Crops, etc.)

- UCO revisited – Availability, Supply Chain Management, Constraints and Logistics
- Energy Crops – Myscanthus Agronomy and Properties/Challenges/margin per acre
- Other Sources – Corn Stover, Farmed Wood, Rice Straw, Wheat Straw, etc.

Session 6: Market Dynamics Revisited

Biofuel Supply, Valuation and Pricing

- Biofuel supply outlook
- Biofuel key trade flows
- Key biofuel pricing hubs/locations
- US biofuel credits: RINS, LCFS, BTC
- Europe biofuel tickets, multipliers
- Renewable diesel valuation in US and Europe

Session 7: De-carbonization

Refinery decarbonization with biofuels integration

- What's driving the downstream transformation
- Process basics and synergies with refinery equipment
- Where are the likely units to repurpose?
- Biorefinery conversions economics
- Case study of a refinery conversion
- Deep decarbonization investments: green H2, carbon capture

Refinery and Petrochemical decarbonization biofuel/bio-based Chemicals Integration

- Bio-naphtha/Bio-LPG from Renewable Diesel
- Chemicals from Bioethanol
- Bio-butanols, Bio-BTX, Bio-JET and Bio-PX (Gevo)
- Negative carbon from biofuels