

Point B to Point A

Waste to Sustainable Transportation Fuel:
A business development and financing outlook



EESN Webinar | September 1, 2021

Point B to Point A

Waste to Sustainable Transportation Fuel:
A business development and financing outlook

Irshad Ahmed, MBA'12 (Chemical Engineer)
President & CEO, Auris BioEnergy Inc.

EESN Webinar | September 1, 2021

The Challenges!

- Magnitude of fossil fuels supply-chain infrastructure
- Energy density of alternatives
- Fragmented waste streams
- Diversified fuel types and sources of waste streams
- Financing the business case
 - Sources of capital
 - Scale of WTE substitutes
 - EBITDA and ROI

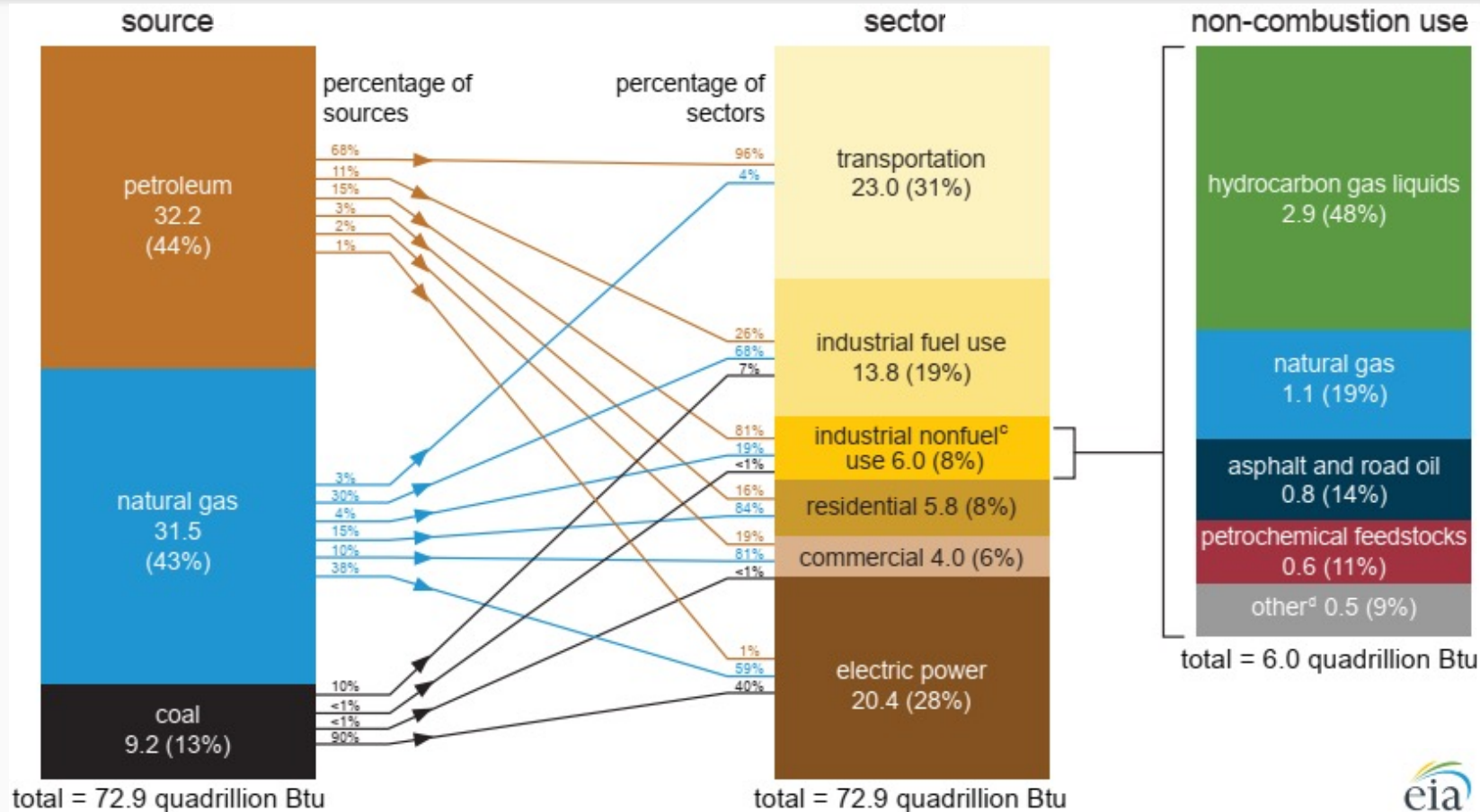
Biofuels from Waste

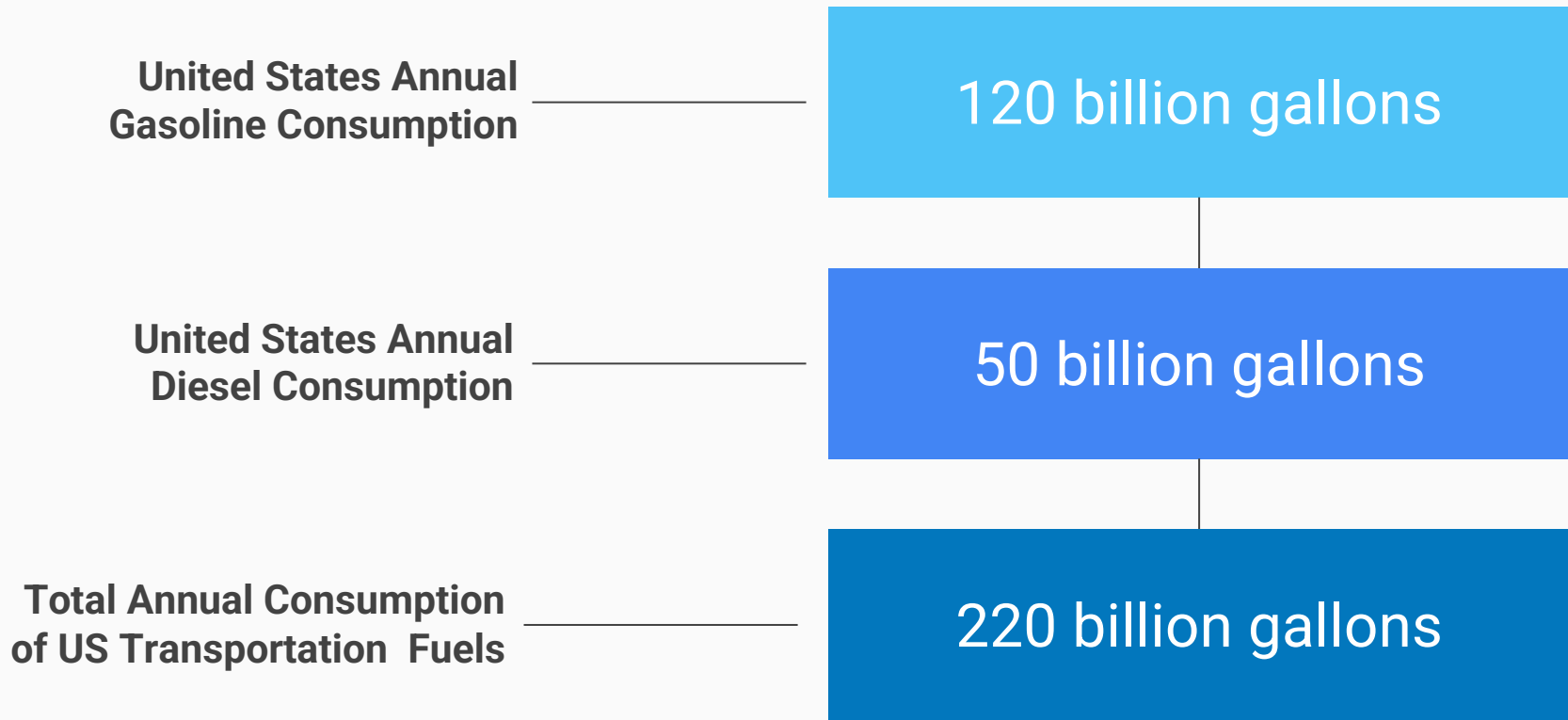
What are we up against?

Role of public policy

Business economy case

U.S. Fossil Fuel Consumption by Source and Sector, 2020 (quadrillion BTUs)



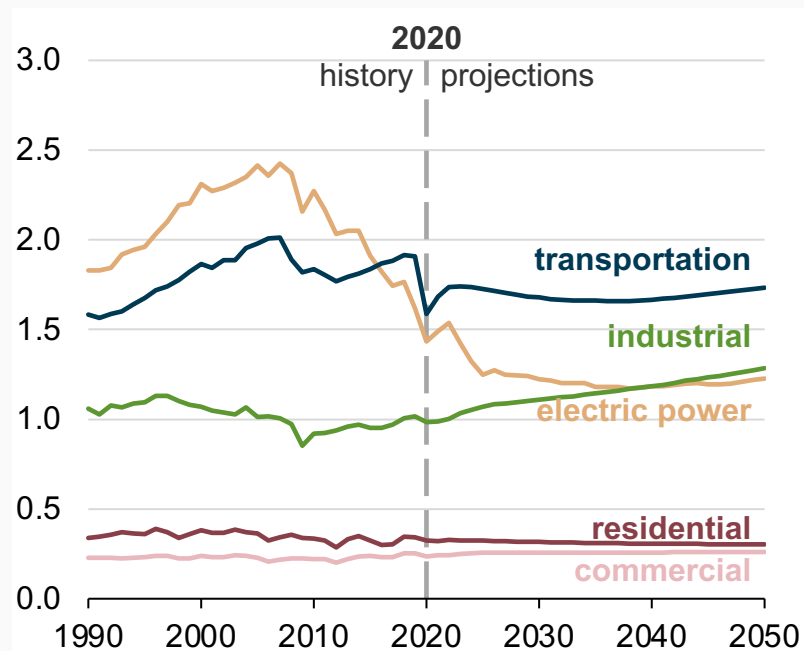


At 16% of AEO biofuels represent 36 billion gallons of annual market share

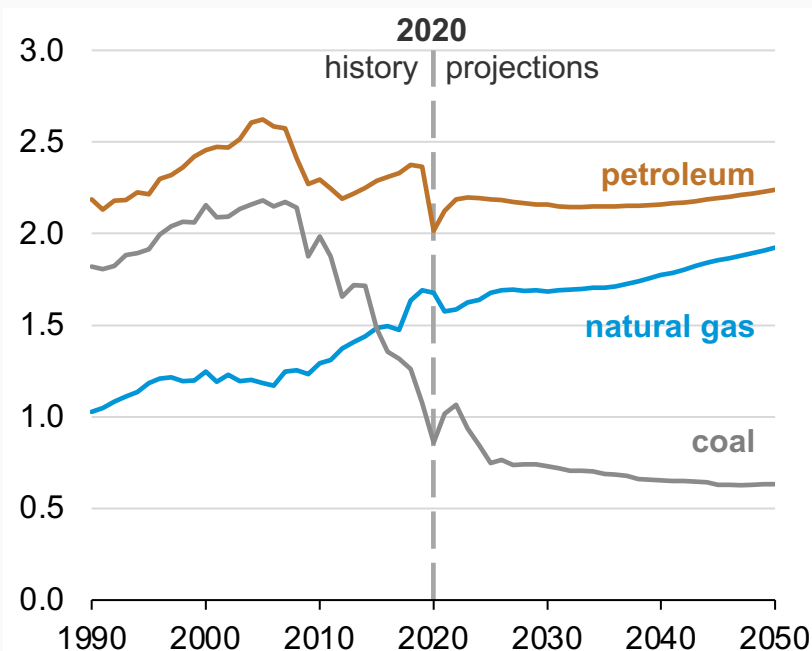
Total Annual Liquid Transportation Fuels Consumption in the United States (2019)

Carbon dioxide Emissions by Sector (billion metric tons)

Energy-related carbon dioxide emissions by sector
AEO2021 Reference case
billion metric tons

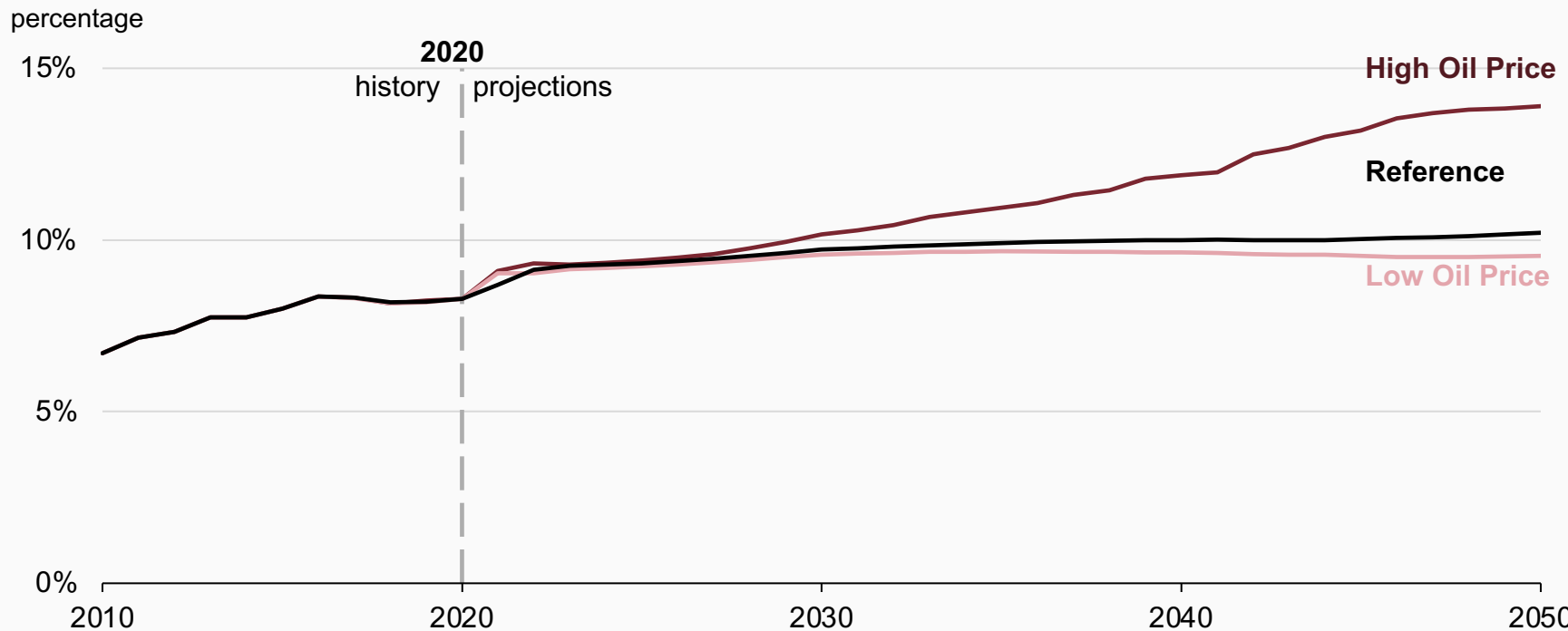


Energy-related carbon dioxide emissions by fuel
AEO2021 Reference case
billion metric tons



Biofuels as a Percentage of Liquid Transportation Fuels

Projected biofuels percentage of gasoline and diesel consumption (AEO2021 oil price cases)

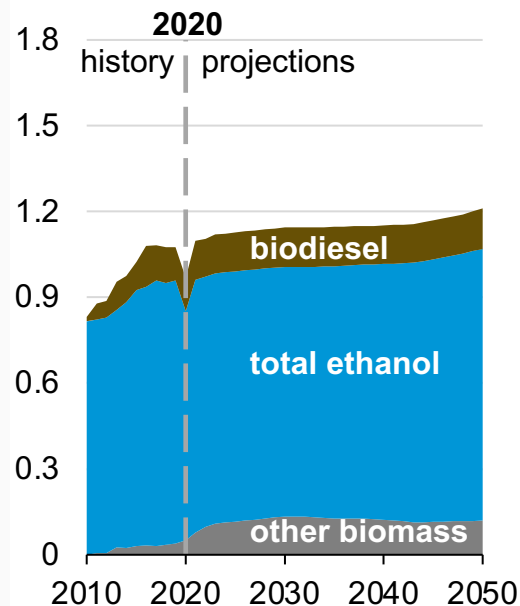


Projected Outlook (waste-to-biofuels potential)

Biofuels production by type (AEO2021 high and low-price cases)

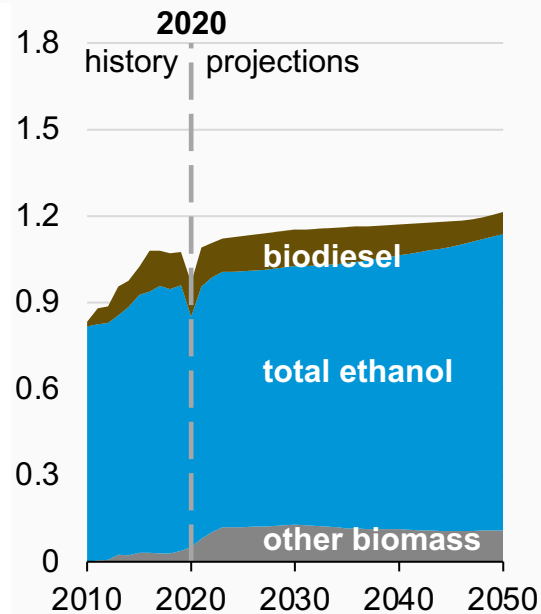
Reference case

million barrels per day



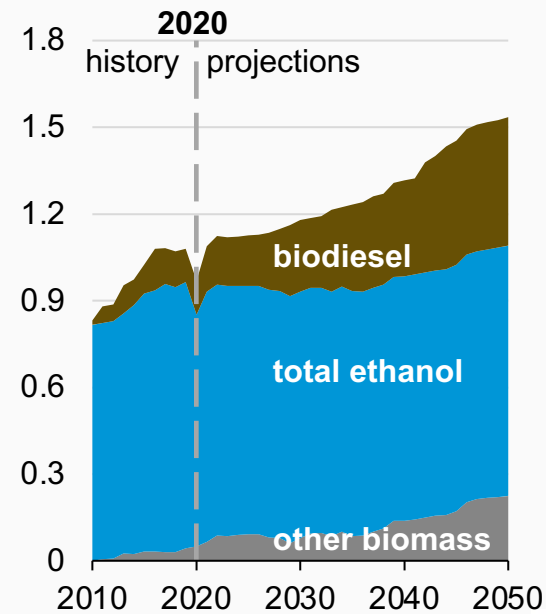
Low Oil Price case

million barrels per day

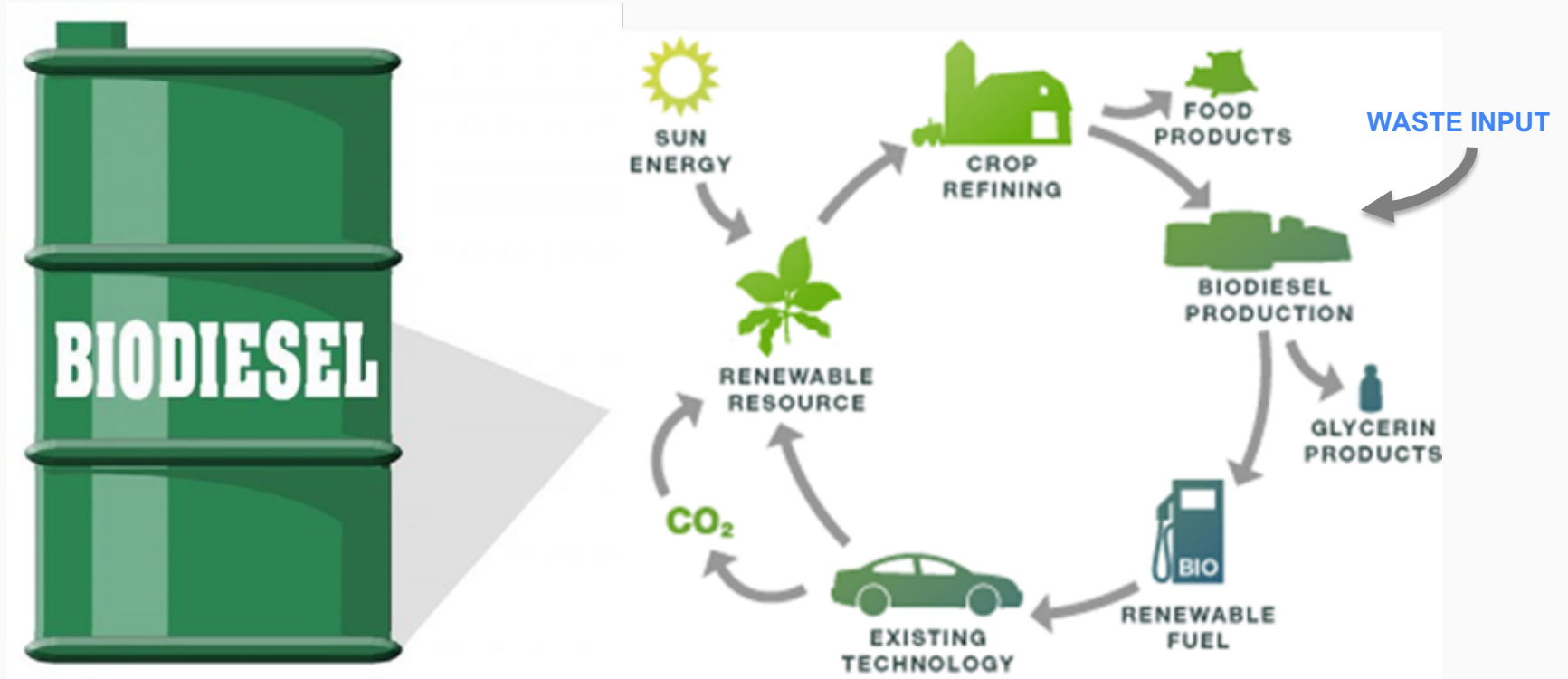


High Oil Price case

million barrels per day



Life-Cycle of Biodiesel Production and Consumption



Public Policy Drivers

Renewable Fuels Standard

California LCFS

Other US States Incentives

European Union Directives

Asia, South/Central America

WTE Biodiesel Incentives

- IRS Blenders Credits (\$1.00/gal)
- RINs (carbon credits; \$2.50/gal)
- CA LCFS Credits (~\$2.00/gal)
- NYC Mandate (5% B100 in HO)
- IL Excise Tax Credit (\$0.54/gal)
- European Union Incentives
 - Renewable Energy Directive (10%)
 - Double counting (1.5x WTE B100)
- India (5% biodiesel mandate)

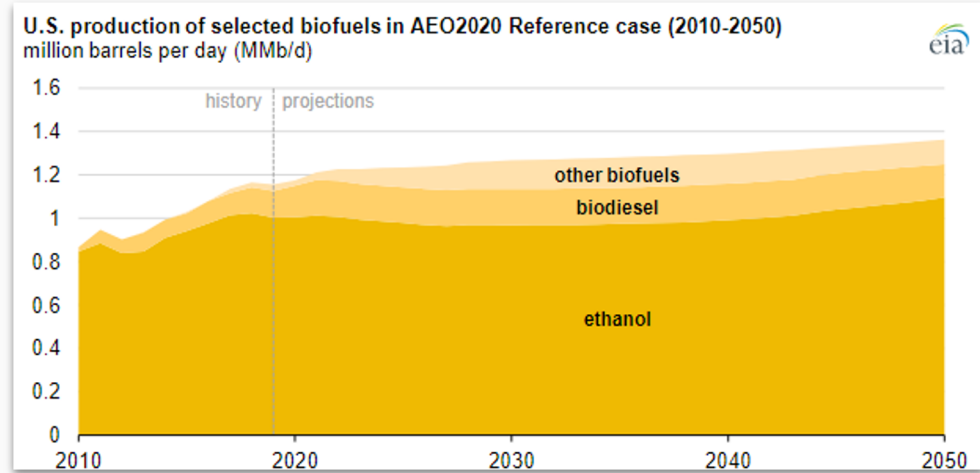
Growing Demand

The Renewable Fuel Standard (RFS-2) has been the single most successful clean fuels policy in the United States. This EPA mandates 2.5 billion gallons and California require 1.5 billion gallons of biodiesel annually by 2025. The CA LCFS mandate will replace 4.2 bil. gal. diesel by 2030.

Additionally, the demand for the export market to the E.U. is expected to reach 2 Billion gallons annually by 2025.

Projected U.S. Biodiesel Demand (2022):

- 2.50 billion gallons (mandated)
- 1.00 billion gallons (US unmandated and export)
- 1.00 billion gallons (California)



Source: U.S. Energy Information Administration, Annual Energy Outlook 2020

~6 Billion

U.S. Annual Biodiesel Demand by 2025

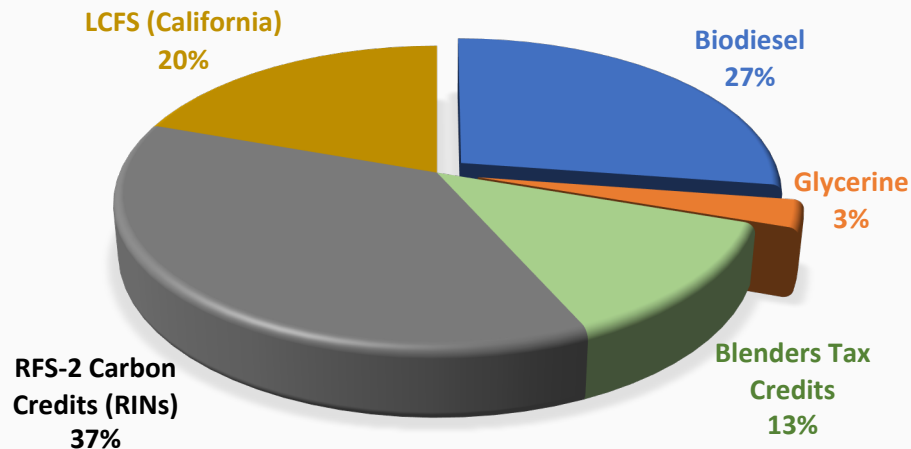
Revenue Model

Revenue breakdown (per gal.)

Biodiesel:	\$2.10
Glycerin:	\$0.23
BTCs:	\$1.00
D4 RINs:	\$2.85
LCFS:	\$1.50
TOTAL:	\$7.68

~30% of revenues are from biodiesel and glycerin sales

Biodiesel Revenue Model with CA LCFS (% revenue source)



Biodiesel Industry Fundamentals

- The United States has over 50 years of biofuels production history utilizing both commodity crops and wastes for ethanol and biodiesel
- Under the Renewable Fuels Standards (RFS-2) the US is committed to producing 36 billion gallons of biofuels for transportation sector annually
- Significant supply-demand disparity for biodiesel exist due to reliance soybean oil (compounding food vs. fuel issues)
- Utilization of waste resources, such as animal fats, used cooking oils, and CO₂-based algae to produce biodiesel is proven
- Auris has invested over \$10M to-date to implement waste-based processing at its plants and now raising \$150M in Series A financing

Waste Feedstock Strategy

The primary feedstock currently used by the industry is soybean oil, canola oil and other cooking oils (low FFA)



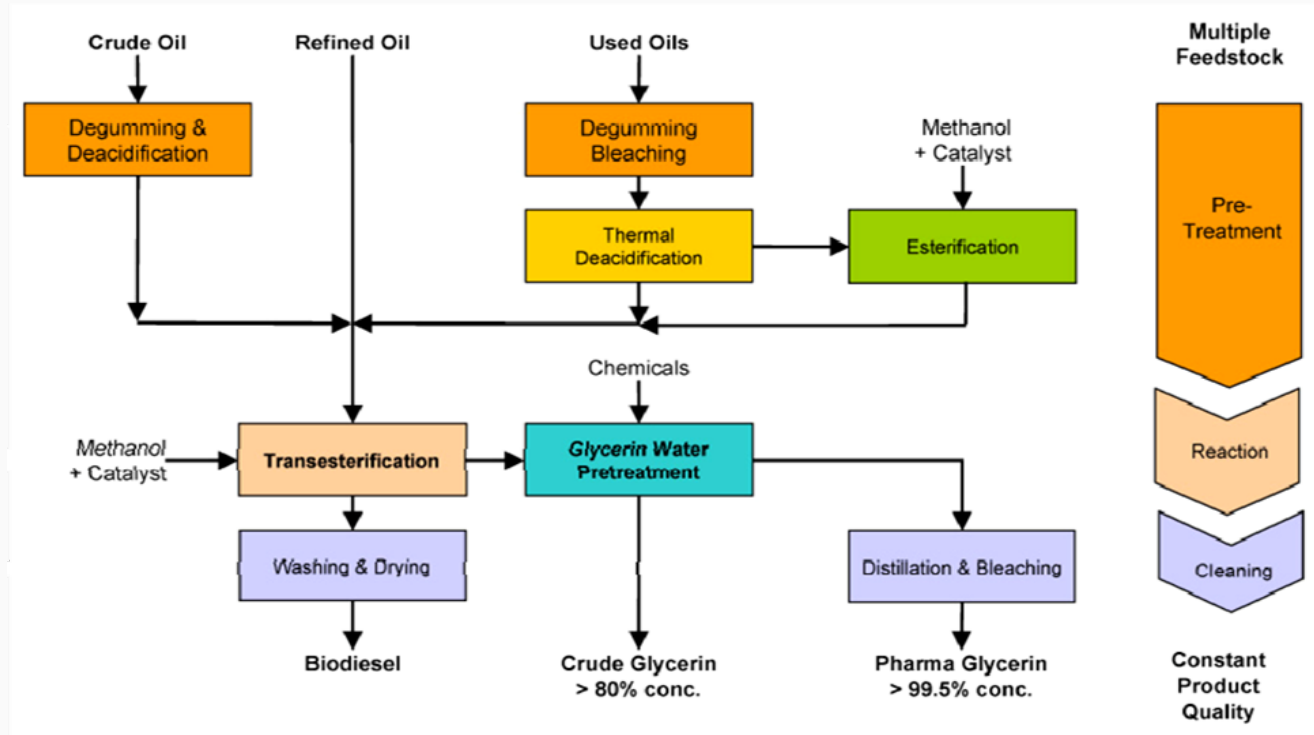
Technology upgrade will support use of cheaper feedstock - UCO (high FFA), chicken fat, tallow, yellow/brown grease



Auris' long-term strategy is to support through technology a comprehensive suite of waste sources of raw materials at scale

Technology Adoption to Utilize Waste Raw materials

Biodiesel Processing Train (1st / 2nd Generation)



Business Financing Thesis | Increased Value

Auris's formula is to decrease the cost of feedstock and increase output through waste-based feedstock and plant-level upgrades that leverage economies of scale

Acquisition (Gen 1)

\$0.30 - \$0.50 per gallon net profit*

Limited feedstock (soybean oil)

1st-Gen Transesterification

5 Million Gallons Per Year Output

First Upgrade (Gen 2)

\$0.70 - \$1.10 per gallon net profit*

Expanded feedstock sources

2nd-Gen Esterification/Transesterification

10 Million Gallons Per Year Output

Second Upgrade (Gen 3)

\$1.25 - \$1.75 per gallon net profit*

Multi-feedstock (waste resources)

3rd-Gen Enzymatic/Renewable Diesel

30-35 Million Gallons Per Year Output

Once upgraded to Gen 3 and producing 100 million gallons of biodiesel annually from waste feedstocks will generate \$600 to \$700 million in annual revenues with an upgraded asset value of \$625 million

250 Million gallon per year output capacity creates over \$1.3 - \$1.5 Billion in annual revenues

*Profit per gallon based on 100 MGPY Output (illustrative) with \$150M investment and considers historical steady-state performance

Financing Sources

Thesis: Tranched capital calls with increasing asset value

Seed capital

Phase I implementation
Mostly debt financing
Proof-of-concept

Series A Round

Convertible debt or equity
Phase I revenues & profits
Build off-take & supply contacts

PPM or SPAC

Target large capital ramp-up
Define exit strategy
Build strategic alliances

Year 1

Year 2

Year 3

Initial scale

~Defined ramp-up plan

Revenues/EBITDA

~Leverage -ve waste value

Exit strategy

NPV and ROI

Capacity

Gallons Per Year

\$\$\$

Annual Revenue/Profits

Collateral

Asset Replacement Value

Structured Financing

- Private Equity Firms
- Hedge Funds and Family Offices
- Municipal Bonds (project based)
- Venture Capital Firms (Innovation)
- SBLC Financing (customer based)
- Crowd Funding (Initial seed capital)
- Government Loan Guarantee Programs
- State and Other Govt. Grants Programs

Point B
to
Point A



Sources:

**\$4.5 billion available under Title 17
US DOE Loan Guarantee Program**

<https://www.energy.gov/lpo/renewable-energy-efficient-energy-projects-loan-guarantees>

Multiple Funding Opportunities

<https://advancedbiofuelsusa.info/resources/funding-opportunities/>

**The US Navy Biofuels Initiative Under
the Defense Production Act**

<https://sgp.fas.org/crs/natsec/R42568.pdf>

Additional Sources:

DOE EERE | ARPA-E | State Energy Program

Thank you!

Questions?

Acknowledgments

Sarah Simon

Ramon Bueno

Emily Taylor



MIT ALUMNI
Energy, Environment
and Sustainability Network
(EESN)



Contact Information

Irshad Ahmed

President & CEO

Auris BioEnergy Inc.

Phone: 617.955.0020

Email: iahmed@Aurisbioenergy.com

Email: Irshad.ahmed@alum.mit.edu



Auris BioEnergy Inc.

245 First Street, Suite 1800

Cambridge, MA 02142