

# Maximizing SAF and renewable diesel yields with ExxonMobil Process Technology

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**European Sustainability Forum**

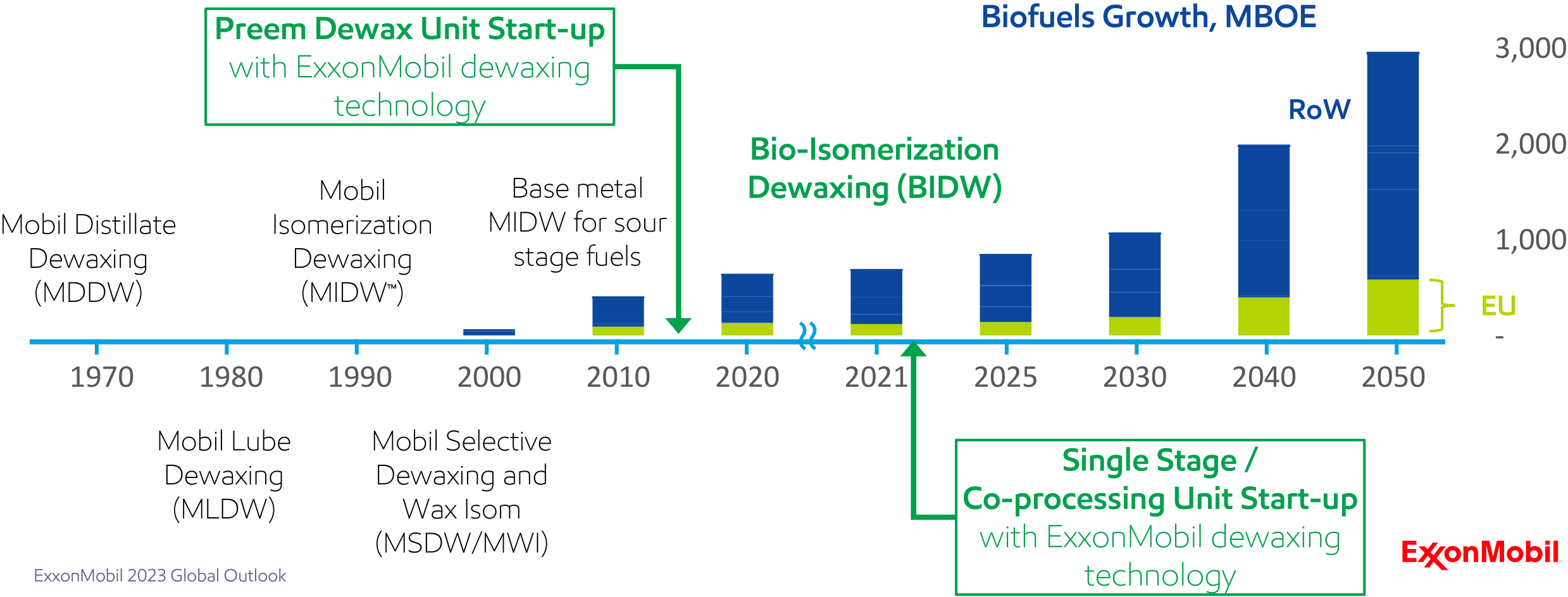
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**ExxonMobil**

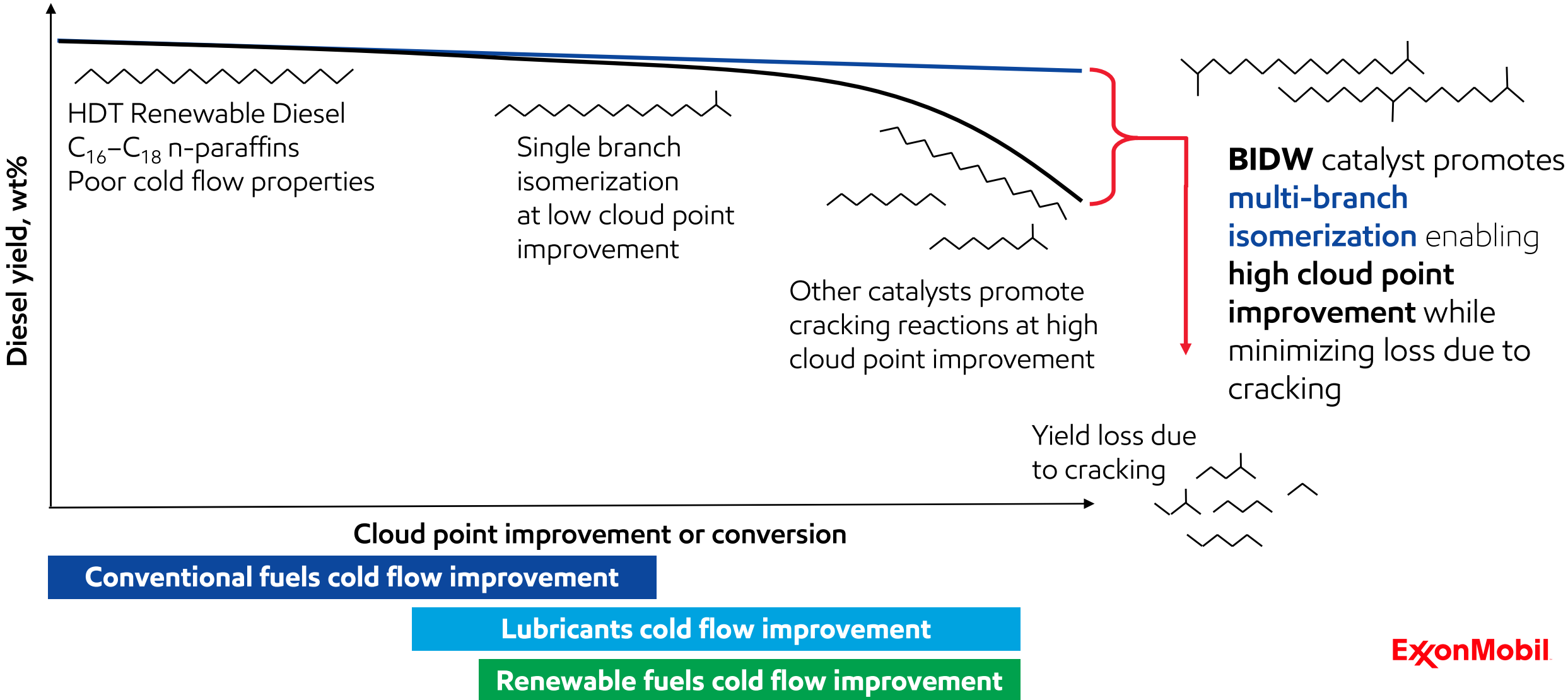
# ExxonMobil: Technology leader and operating excellence

BIDW™ catalysts leverage ExxonMobil’s proven track record of deploying dewaxing technologies and integrating into ExxonMobil and third party facilities



ExxonMobil 2023 Global Outlook

# BIDW™ isomerization catalysts maintain long-chain products

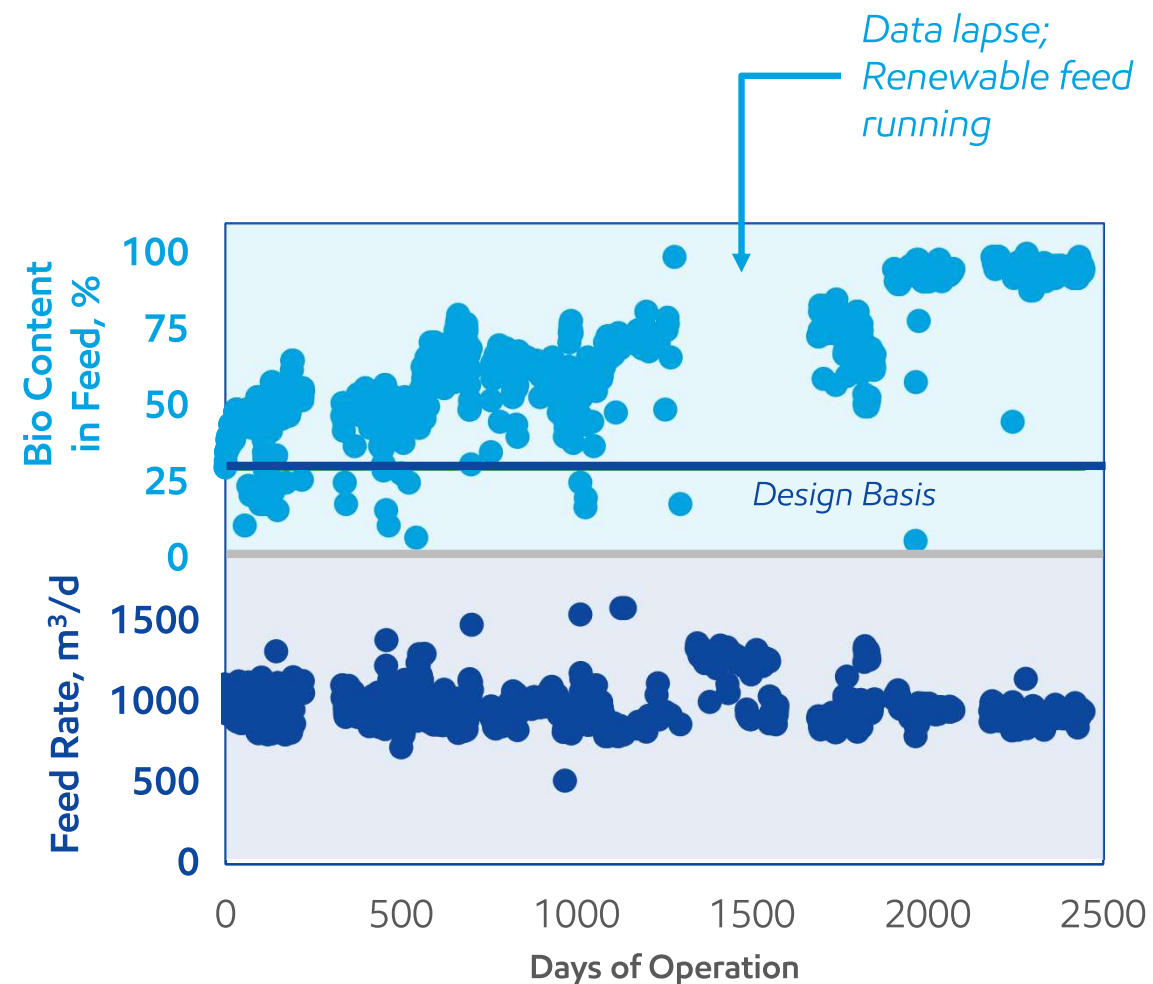


# BIDW™ catalyst

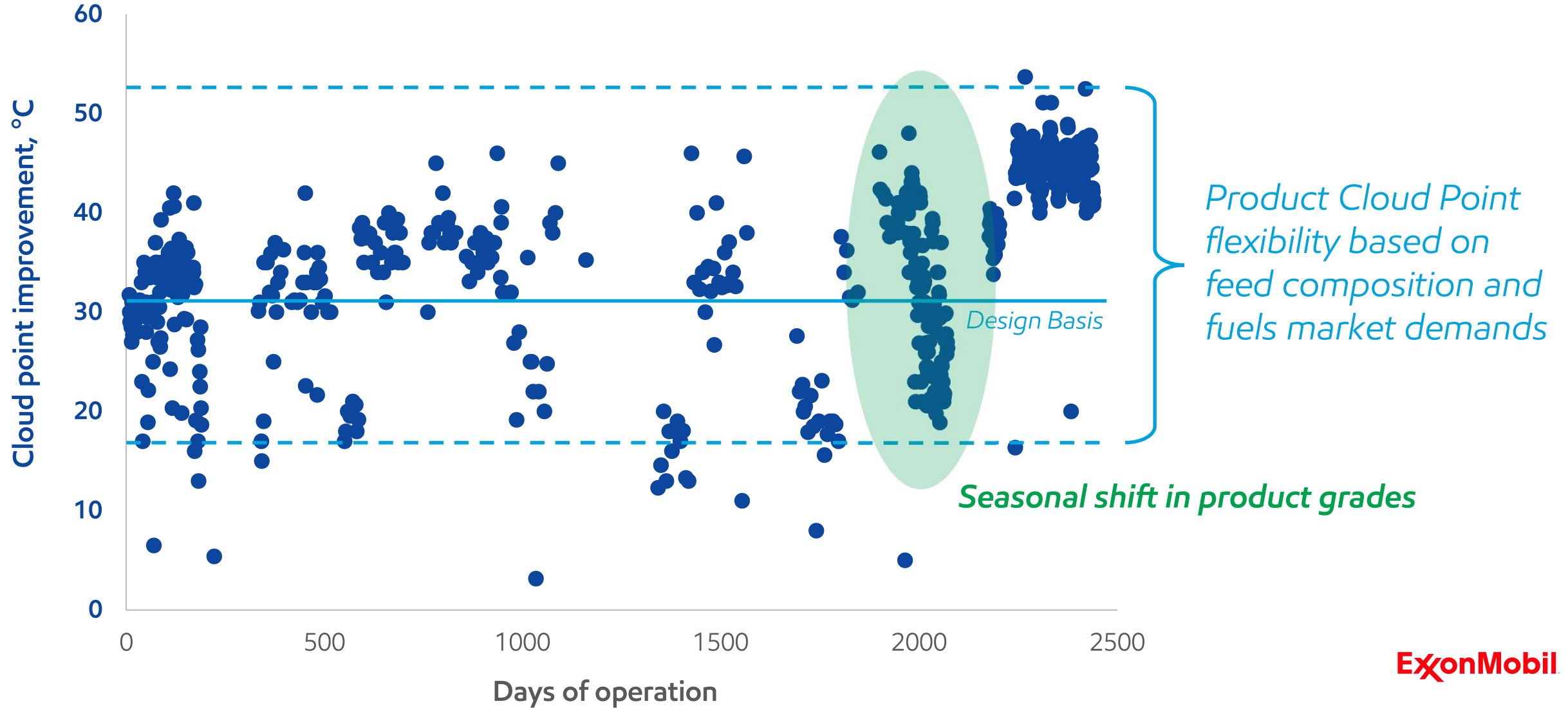
- Maximize yields & feed flexibility
- Meet stringent product quality requirements
- Long, robust catalyst life

# BIDW™ catalysts enable stable, robust operation with feed flexibility

- Stable operation despite varying feed composition and desired product cold-flow property specifications
- Feed co-processing renewable content varies from ~30% (Design Basis) up to 100%
- No need to reduce unit feed rate to accommodate increased renewable content
- Stable performance through upsets

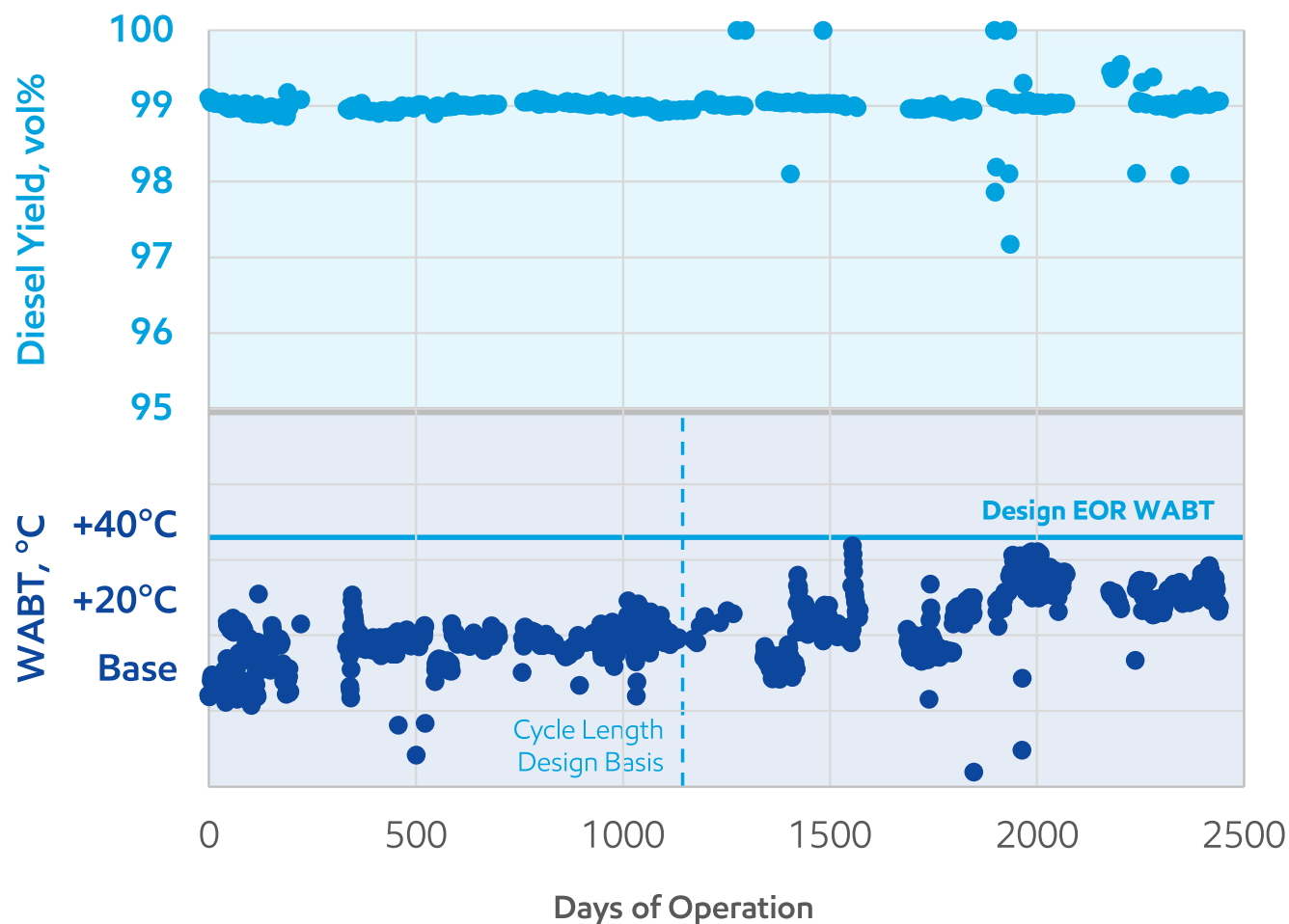


# BIDW™ catalysts offer high delta cloud operation & seasonal flexibility



# BIDW™ catalysts maximize yields & provide operational stability

- Diesel yield remains near 100% during entire operation
- Weighted-Average Bed Temperature (WABT) remains stable despite site upsets
- Feed N spikes up to 2-4 ppm for extended periods of time
- Multiple power outages
- Cycle length set not by dewaxing, but by aromatics
- **Customer selected BIDW-3 catalyst for reload; successful 4Q 2023 start-up**



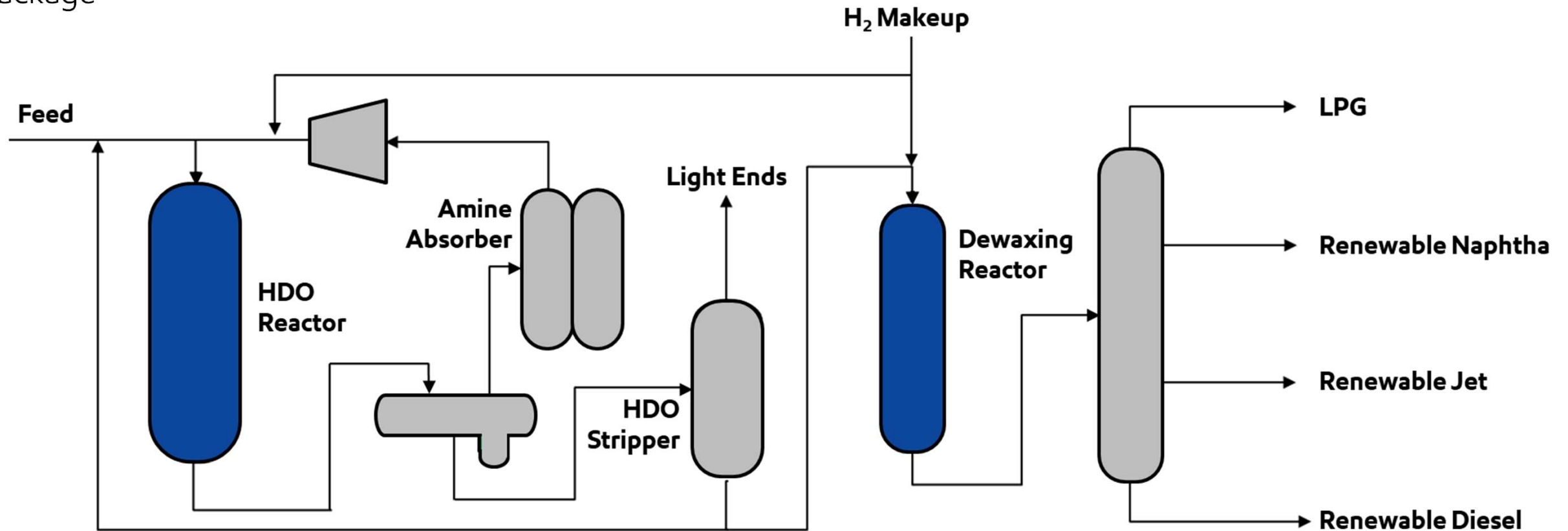
# EMRD™ & EMRJ™ advanced process technologies

- Enabled by high performance BIDW™ catalyst
- Decades of deep dewaxing & licensing experience
- Operator know-how

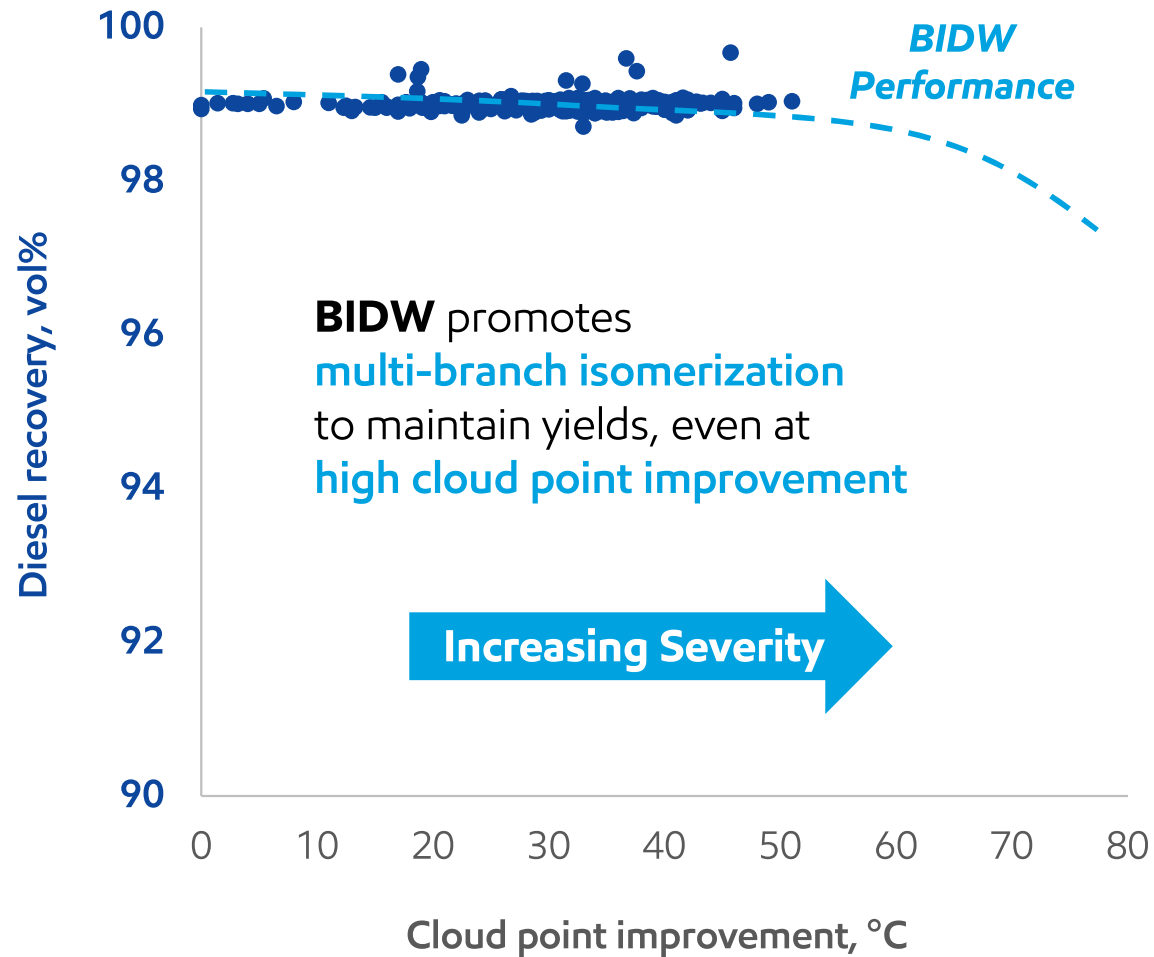


# ExxonMobil Renewable Diesel (EMRD™) & Renewable Jet (EMRJ™) processes with BIDW™ catalyst

ExxonMobil is an **industry leader** in design and operation of hydroprocessing units and **advantaged dewaxing technology**, and is utilizing this expertise to provide an integrated SAF and renewable fuels technology package



# EMRD™ process with BIDW™ catalyst: High diesel yields at high dewaxing severity



## Example: EMRD with BIDW vs. Alternatives\*\*

	Units	Base 30°C dCP		Arctic Diesel	
		NBA	BIDW	NBA	BIDW
Cloud Point Improvement (dCP)	°C	30	<b>30</b>	60	<b>60</b>
Hydrotreated Veg Oil Cloud Point	°C	25	<b>25</b>	25	<b>25</b>
Renewable Diesel Cloud Point	°C	-5	<b>-5</b>	-35	<b>-35</b>
Yield Advantage	wt%		<b>+1.0 to +2.0</b>		<b>+6.0 to +8.0</b>
Incremental Diesel on <b>1600 m<sup>3</sup>/d</b> Bio Feed Rate	bpd		<b>+100 to +200</b>		<b>+600 to +800</b>
Incremental Margin Estimates	M\$/yr		<b>+11 to +21</b>		<b>+63 to +84</b>

Notes: Cutpoint between naphtha and diesel assumed at 135°C, actual operations will set absolute diesel yields. Margin credit assumes ~1800 \$/m<sup>3</sup> value on renewable diesel.

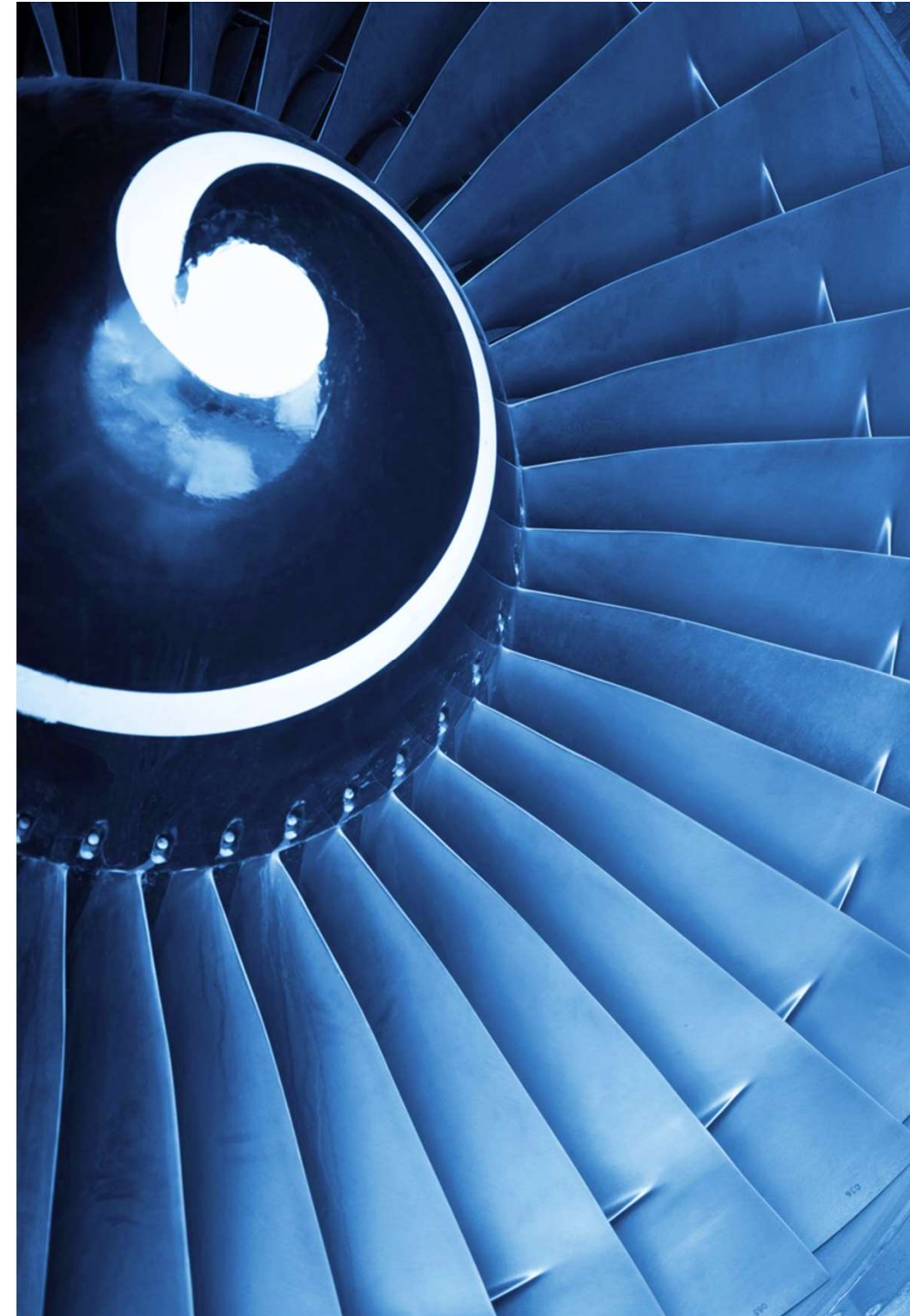
\*Source: IHS Markit, long term forecast, RD HVO US West Coast- naphtha value

\*\*Source: ExxonMobil data

## EMRJ™ process: High SAF yields at very high dewaxing severity

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- ExxonMobil is a recognized leader in isomerization catalysis
- 40+ year history of deep isomerization design and operation
- Developed with an eye **from feed sourcing through SAF blending**
  - Designed from an operator's perspective
  - High liquid yields throughout cycle
  - Robust performance and tolerance to upsets
  - Product quality



# Conclusions

# ExxonMobil: Differentiated solutions to maximize profitability

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- ExxonMobil is an industry leader in the design and operation of hydroprocessing units and advantaged dewaxing technology
- EMRD™ and EMRJ™ processes leverage BIDW™ catalysts and enable **front and back-end flexibility with advantaged activity and yield profiles**
- BIDW catalyst platform offers **proven, commercially available, drop-in solutions** that
  - Enable feed flexibility
  - Maximize yields
  - Meet stringent product quality requirements
  - Offer long, robust operation over long cycle lengths
  - Fit existing dedicated and co-processing units

# BIDW™ Portfolio: Solutions to maximize product yields & quality

Hydro-Dewaxing Catalyst	BIDW-1	BIDW-3	BIDW-2
Applications	Refills / Grassroots		Refills
<b>Processing Objective</b>	<b>Diesel</b>	<b>Max Jet</b>	<b>Co-processing</b>
Typical Renewable Feed, %	100%	100%	Up to 100%
Feeds	Vegetable Oils (HVO), Animal Fats, UCO, Others		
Yields			
<b>Diesel</b>	<b>High</b>	<b>High</b>	<b>Medium</b>
<b>Jet / SAF</b>	<b>Medium</b>	<b>Highest</b>	<b>Medium</b>
Contaminant Tolerance	Medium	Medium	High
Upset Tolerance		High	
H <sub>2</sub> Consumption	Low/Minimize	Low/Minimize	Medium
Cycle Length	High	Highest	Medium*
<b>Potential Cloud Improvement, °C**</b>	<b>90</b>	<b>120</b>	<b>40-50</b>

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\*Often limited by HDO catalyst cycle length

\*\*Dependent on feed, process conditions, and desired cycle length

# ExxonMobil BIDW™ catalyst for Renewable Diesel at Strathcona Refinery

- 20 kbd renewable diesel facility currently under construction at ExxonMobil/Imperial refinery
- \$500M+ USD investment; planned 2025 start-up
- Utilizing BIDW catalyst for dewaxing of paraffinic species to produce Renewable Diesel product



\*ExxonMobil Announcement, August 2021

**Building Canada's largest renewable diesel facility**

Combining agriculture and technology to lower emissions to support Canada's ambition to net zero

**ExxonMobil**  
**Imperial**

Canadian-grown crops supply feedstock

Sourced hydrogen produced with carbon capture and storage technology

Hydrogen and renewable feedstock, refined with proprietary catalyst, produces high-quality renewable diesel

More than 250 million gallons of renewable diesel to be produced every year to fuel vehicles, trains and industry

CO<sub>2</sub> = planting 3.7 million acres of forests\* in the size of Vancouver Island

~ 3 million metric tons/year of reduced CO<sub>2</sub> emissions

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\*Per U.S. EPA GHG equivalencies calculator

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Thank you!

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