Sustainable ExxonMobil Technologies
Licensing & Corporate Initiatives

Energy lives here™

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Agenda

ExxonMobil Catalysts & Licensing Technologies
• Badger EBMax\textsuperscript{SM} Process with ExxonMobil Catalysts
• Badger Acetone-To-Cumene Process with ExxonMobil Catalysts
• ExxonMobil Liquid Phase Isomerization
• ExxonMobil EMTAM: Breakthrough process for paraxylene production

ExxonMobil Sustainability Efforts
• Innovating Energy Solutions
• Continuously working to lower emissions

Questions?
There are few challenges more important than meeting the world’s growing demands for energy while reducing environmental impacts and the risk of climate change.”

Darren Woods, ExxonMobil  
Chairman & CEO  
2019 Energy & Carbon Summary
ExxonMobil Catalysts and Licensing

We provide differentiated technology solutions to customers who value improved operations, lower emissions and growth of high-value products.

Backed by our commitment to technology innovation as the industry-leading refining and petrochemical company.
ExxonMobil Catalysts and Licensing’s Technologies

- SYNTHETIC FUELS MTG
- LUBES MSDW™ MAXSAT™
- FUELS MIDW™
- GAS TREATING™ FLEXSORB™
- RESID CONVERSION FLEXICOKING™
- BENZENE ALKYLATION
  - Badger
  - EBMax™
- XYLENES
  - XyMaxSM 2/LPI
- XYLENES
  - EMTAMSM PxMaxSM
Badger EBMax\textsuperscript{SM} Process (ethylbenzene)

Technology Benefits

- Selective catalysts
  - Lowers energy consumption
  - Reduces equipment size
- Highly heat-integrated process
  - Lowers energy consumption
- Flexible use for dilute ethylene feed

Customer Benefits

- High feed utilization -- >99.9%
- Long catalyst life reduces waste
- Reduces catalyst cost
- Lower energy consumption
Badger Acetone-to-Cumene Process

Technology Benefits
- Exxon Mobil Catalysts enable High Yield / Low energy consumption
- Decouples 1:1 acetone/phenol production
- Reduced propylene consumption
- Reduced acetone production
- Revamp enables propylene free expansion

Customer Benefits
- Flexibility - Maximizing profitability through Propylene/IPA/Acetone market swings
- Upgrading to phenolic products in regions with limited propylene
- Diversification of the product slate to IPA
- Extension of well-established Cumene technology (35 operating plants)
ExxonMobil Liquid Phase Isomerization Process

Technology Benefits
- ExxonMobil Catalysts enable High Yield / Low energy consumption
- Novel configuration reduces the number of phase changes
- May be integrated into Grassroots designs or Revamps
- Long catalyst life reduces waste

Customer Benefits
- Reduction of energy consumption (constant p-xylene production)
- Expansion of p-xylene production (in existing facilities)
- Reduces feed consumption or improves energy efficiency

Xylene Loop in an Aromatics Complex
Exxon Mobil EMTAM Process

Technology Benefits

• Exxon Mobil Catalysts enable highly selective conversion of toluene to paraxylene
• Process may be integrated into grassroots designs or revamps
• Multiple configurations enable product flexibility
• High concentration of Px reduces xylene loop capex and opex

Customer Benefits

• Expanded capacity with reduced equipment sizes and capital costs
• Reduced paraxylene recovery costs
• Flexible benzene/para-xylene production
• Reduced catalyst costs
ExxonMobil Sustainability
Innovating energy solutions – ExxonMobil Research and Development highlights

$300M
ExxonMobil has invested more than $300 million on biofuels research in the past decade.

40%
Since 1970, ExxonMobil has cumulatively captured more CO₂ than any other company – accounting for more than 40% of cumulative CO₂ captured.

$10B+
Since 2000, ExxonMobil invested more than $10 billion in R&D of lower-emission solutions.

15%
ExxonMobil is taking steps to reduce methane emissions from our operations by 15%, and flaring by 25%, by 2020 versus 2016.
Continuously working to lower emissions

$10B+ invested in lower-emission energy solutions*

Cogeneration capacity = power for

4.3M U.S. homes

Involved in

>20% of world's carbon capture and storage capacity

400M tons of CO2¹

Captured or eliminated from our operations

*Since 2000
Source: ExxonMobil 2019 Energy & Carbon Summary
Thank you
Integrated Solutions

Process configuration optimization

Crude
- Refining
- Basic chemicals
- High value products

Chemicals

Optimal configuration is markets and capital / operating costs dependent