Safer Alternatives to Toxic Solvents and Toxic Ingredients

- Housekeeping
- Introduce Webinar Series:
  - May 8 – Soy-Based Products
  - June 5 – Cleaner & Coating Applications
  - June 19 – Dry Ice Cleaning
- Nevada Green Business Program
- Q&A at End

Dr. Katy Wolf

NV GREEN BUSINESS NETWORK

greenUP!®

WESTERN NEVADA COLLEGE

CATALINA PRODUCTS INTERNATIONAL

Soy Products Applications: Case Studies

May 8, 2025

Katy Wolf, Ph.D.
Consultant

Background

- greenUP! project has focus on EPA's Safer Choice Program
  - Safer Choice program gives labels to certain consumer and institutional products
- P2 Grant proposed to try to get labels for more industrially relevant products to replace products that rely on toxic solvents and certain other toxic ingredients
  - Water-based cleaners used in place of halogenated solvents
  - Water-based cleaners used in place of mineral spirits
  - Soy based cleaners
  - Water-based cleaners for garment cleaning
  - Hydrocarbon with no aromatic components
  - Floor wax strippers without amines and relatively low pH
  - Graffiti removers
  - Floor coatings
  - Acetone and acetone products
  - Dry ice blasting

Background Continued

- Project Issues
  - Many industrial companies do not see a marketing advantage to having an EPA Safer Choice label
  - Approach in industrial applications includes moving to products that improve health and environmental effects but may not be perfect
  - EPA Safer Choice criteria are very stringent and recent modifications have made the standards even more difficult to achieve
  - Program not suited to labels for industrially relevant products
- Webinar Series
  - Cover green industrial products that may or may not be able to get an EPA Safer Choice label
  - All are able to replace more toxic products and improve health and environmental effects

Soy Gold and Soy Clear Products

- Major ingredient is methyl ester
  - Methyl ester in products is classified as a green circle or half green circle ingredient in Safer Choice
  - Got one product listed on CleanGredients
- Soy based products have many health and environmental advantages
  - Naturally occurring biobased materials
  - Close to zero VOC content
  - Low toxicity
  - Can be used in a variety of applications where high VOC content or toxic products are used today

Soy Products Webinar Agenda for Case Studies

- Present examples of soy products from past grants
  - Graffiti removers
  - Industrial cleaning
  - Screen printing cleaning
  - Lithographic printing cleaning
  - Asphalt cleaning
- Case study presentation from Nate Nolte representing the soy manufacturer AGP
  - Range of applications including biofuel and crop protection
- Case Study presentation from Gary Brandt representing Meyer Lab, using soy in products
  - Concrete equipment cleaning
  - Asphalt equipment cleaning
- Case study presentation from Ajit Shahani representing eChem, using soy in graffiti remover

Graffiti Removers

- Formulated graffiti removers containing Soy Gold 2500
  - Two general graffiti removers and one gentle graffiti remover
  - Used soy product containing surfactant
- Taggers use common graffiti instruments
  - Spray paint, marker, postal stickers
- Tested with various organizations
  - Port of S.F., Municipal Transportation System, S.F. Department of Public Works
- Tested in field and on various substrates
  - Concrete, fiberglass panel, steel substrate, street sign in the field
  - Fiberglass panel
  - Steel substrate
  - Street sign
- Project conducted by IRTA in Southern California in 2014
  - Sponsored by EPA, BAAQMD and SFDE
  - https://www.irta.us/reports/GrafEPAfinalrept.pdf

Graffiti Removers Continued

- Compared graffiti removers to commercial graffiti removers
  - Graffiti removers containing soy worked as well as or better than commercial graffiti removers
  - Graffiti removers removed all three graffiti instruments effectively
- Estimated cost of soy graffiti removers
  - Fell within range of prices for commercial graffiti removers


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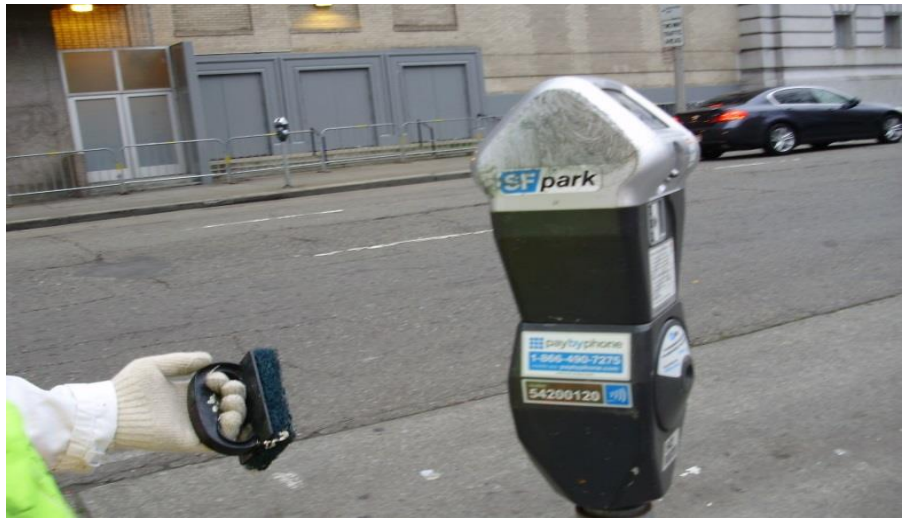
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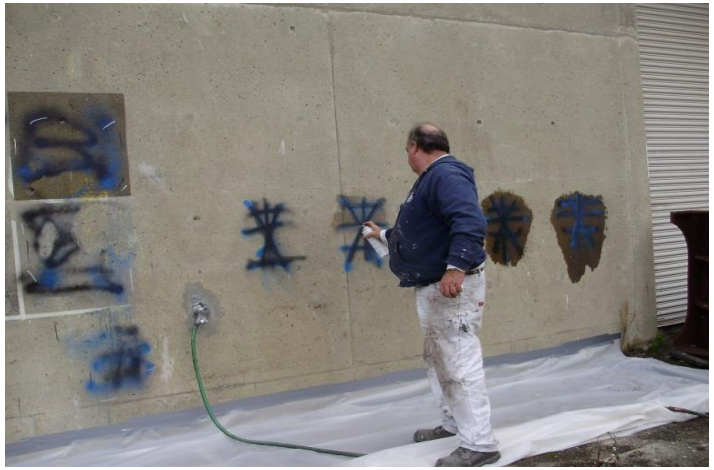
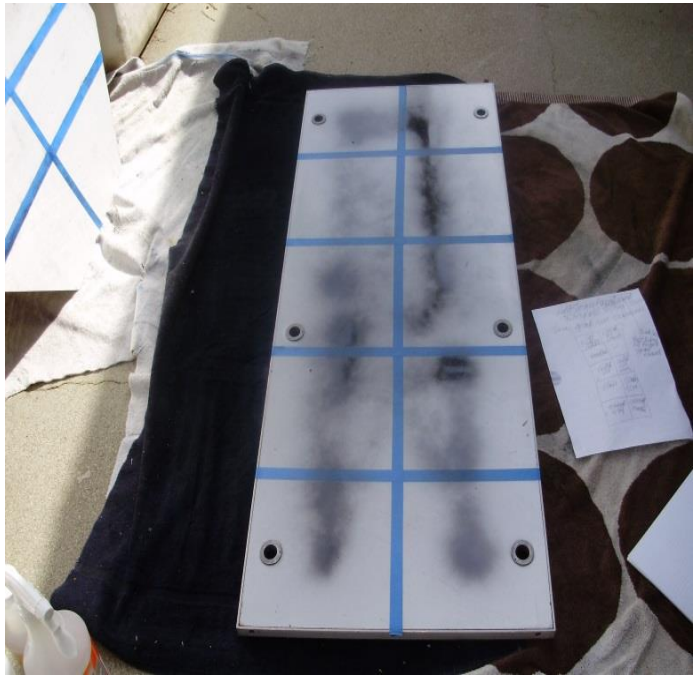





STOP

Industrial Cleaning

- Soy products can be used in certain industrial cleaning applications
  - Soy vapor pressure is very low
    - Some parts need to be residue free and, in other cases, a residue is acceptable
- Worked with small company that manufactures optical components
  - Makes prisms, cylindrical lenses and solid state laser flow tubes and customers include military and medical operations
- Company used vapor degreaser with nPB to clean parts
  - Cleans glass or fused silica parts
  - Needs to remove adhesive residue, black pitch, asphalt, several types of wax

Industrial Cleaning Continued

- Worked with company to test alternatives
- Must use ultrasonic cleaning equipment
- Soy products good at removing wax and pitch which is an asphalt like material
- In this application, need to test soy product with surfactant
- Testing involved using two bath system
  - First bath is soy product
  - Second bath is water rinse to leave part residue free
- Costs of solvent and soy/water cleaning are comparable


CREST

Annualized Cost Comparison for Optical Component Company

Cost Element	Vapor Degreaser	Soy/Water Cleaning System
Equipment	-	$2,548
Cleaner	$5,280	$626
Water	-	-
Filters	-	$72
Energy	$1,416	$2,170
Labor	$50,050	$50,050
PPE	$1,200	-
Disposal	-	$336
Total	$57,946	$55,802

Screen and Lithographic Printing Cleanup

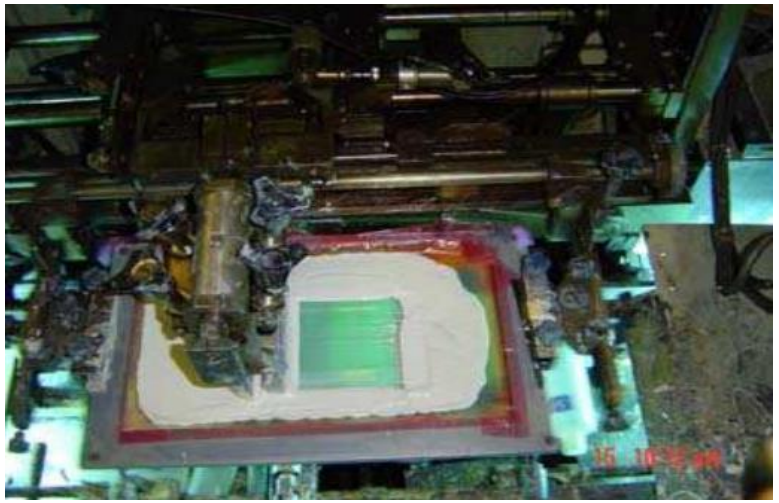
- Worked with screen printers and lithographic printers to test low-VOC content alternatives in projects sponsored by SCAQMD in 2006
  - Link to screen report is https://www.aqmd.gov/docs/default-source/rule-book/support-documents/rule-1171/low-voc-low-tox-solvents-screen-prntng-safer-alts-052006/complete_screen_tech_assess.pdf
  - Link to lithographic report is https://www.aqmd.gov/docs/default-source/rule-book/support-documents/rule-1171/assessment-low-voc-matls-litho-equip-0506/complete_litho_tech_assess.pdf
- In general, soy based cleaners are effective for cleaning many different types of inks
- Need to use water rinseable soy formulations
- Tested Soy Gold 2000 and asked AGP to develop higher surfactant content product
  - Soy Gold 2500
- One screen printing example and three lithographic printing examples

Screen Printing Case Study

- Company called Owens-Illinois
  - Located in La Mirada, CA
- Prints on plastic cosmetic bottles
  - Many different types of plastics
  - Makes bottles on blow molding and extrusion machines
  - Has many customers who offer shampoo and personal products
- Uses UV curable ink
- Has automated in-line decorating machines for printing on bottles
- Workers perform two types of cleaning
  - In-process cleaning with rag to remove ink from screens
  - After-process cleaning of screens

Screen Printing Case Study Continued

- Tested Soy Gold 2000 with company
- Testing was successful for both types of cleaning
- Company converted to cleaner
- New cleaner protects emulsion which forms pattern on the screen better than original high VOC content cleaner
- Cost of alternative cleaner slightly lower than cost of original cleaner



Lithographic Printing Case Studies

- J.S. Paluch
  - Four narrow web presses
  - Prints on uncoated book paper for church newsletters
  - Uses soy based ink
- PIP Printing
  - Sheet fed printer
  - Prints on coated and uncoated paper for flyers and newsletters
  - Uses solventborne ink
- Presslink
  - Two sheet fed presses
  - Prints on coated and uncoated paper flyers and brochures
  - Uses solventborne ink

Lithographic Printing Case Studies Continued

- Tested several different low-VOC content cleaners
- Soy Gold 2000 worked best in all three cases
- Soy Gold 2500 is best choice for cleaning rollers in lithographic printing facilities
  - Need to rinse soy off so press can come back up to color
  - Soy Gold 2000 requires several rinses whereas Soy Gold 2500 requires only one rinse

Other Applications for Soy Products

- Project sponsored by SCAQMD
  - Report link is https://www.irta.us/reports/Finalscaqmdmoldrelrept.pdf
- Tested recycled vegetable oil for colored concrete stamping
  - Use stamp mats to stamp a pattern into the concrete to mimic the look of stone
  - Currently use high VOC content mineral spirits or diesel fuel
  - Vegetable oil worked well but was higher cost on a per gallon basis
  - Used less vegetable oil because the evaporation rate is lower
  - Can use AGP soy products for this application
- Tested recycled vegetable oil in asphalt manufacturing plant and asphalt road applications with city and contractor
  - Cleaned drums and conveyors in plants
  - Cleaned truck liftgates, tractors, shovels and rakes for road application
  - Can use AGP soy products for this application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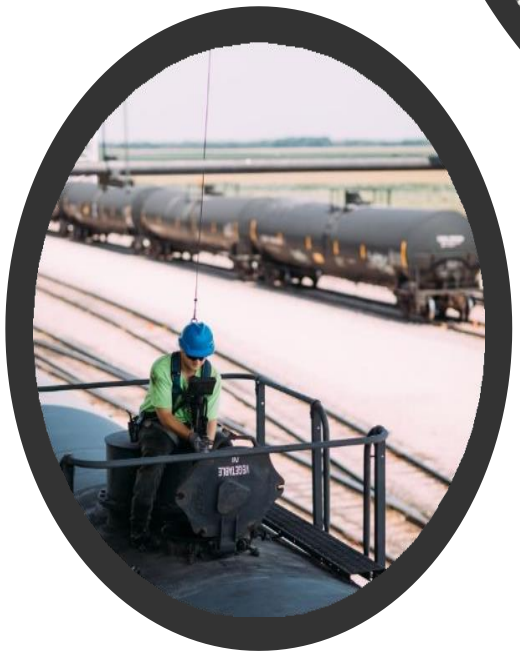
Biodiesel 101

Nathan Nolte

AGP
Ag Processing Inc



Abbreviations

ASTM: American Society for Testing & Materials

BBD: Biomass-Based Diesel (D4)

BTC: Blenders Tax Credit

CI: Carbon Intensity

EIA: Energy Information Administration

EMTS: EPA Moderated Transaction System

EPA: Environmental Protection Agency

FAME: Fatty-Acid Methyl Esters

GHG: Greenhouse Gas

GREET: Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation

LCFS: Low Carbon Fuel Standard

NBB: Clean Fuels Alliance America (CFAA)

OP: Obligated Party

PTC: Producers Tax Credit (45Z)

QAP: Quality Assurance Program

RD/RHD/HVO: Renewable Diesel

RFS: Renewable Fuel Standard

RIN: Renewable Identification Number

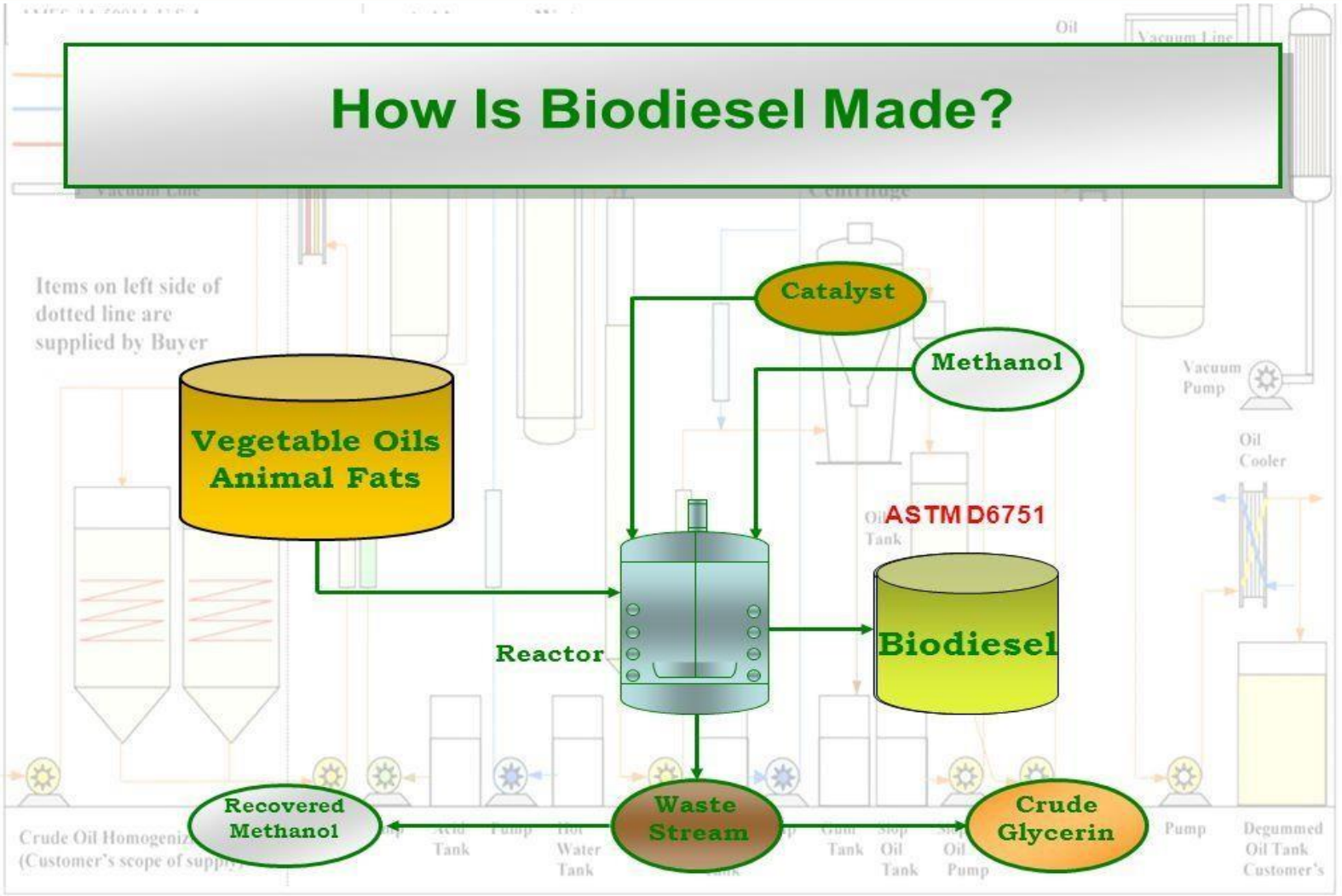
RVO: Renewable Volume Obligation

SAF: Sustainable Aviation Fuel

SME: Soy Methyl Esters

SRE: Small Refinery Exemption

Production Process



Biodiesel

- Definition
  - A fuel comprised of mon-alkyl esters of long chain fatty acids derived from vegetable oils or animal fats, designated B100, and meeting the requirements of ASTM D 6751.
  - Methyl esters
  - FAME, SME, CME, CoME

Biodiesel

- Transesterification
  - Biodiesel is made through a chemical process called transesterification whereby the glycerin is separated from the fat or vegetable oil. The process leaves behind two products -- methyl esters (the chemical name for biodiesel) and glycerin (a valuable byproduct usually sold to be used in soaps and other products). Result is chemically like diesel fuel.

Biodiesel

- Benefits
  - Adds Lubricity to petroleum diesel fuel
  - Increases Cetane Values
  - Lowers Green Gas emissions
  - Lowers Dependence on foreign oil
  - Adds value to soybeans

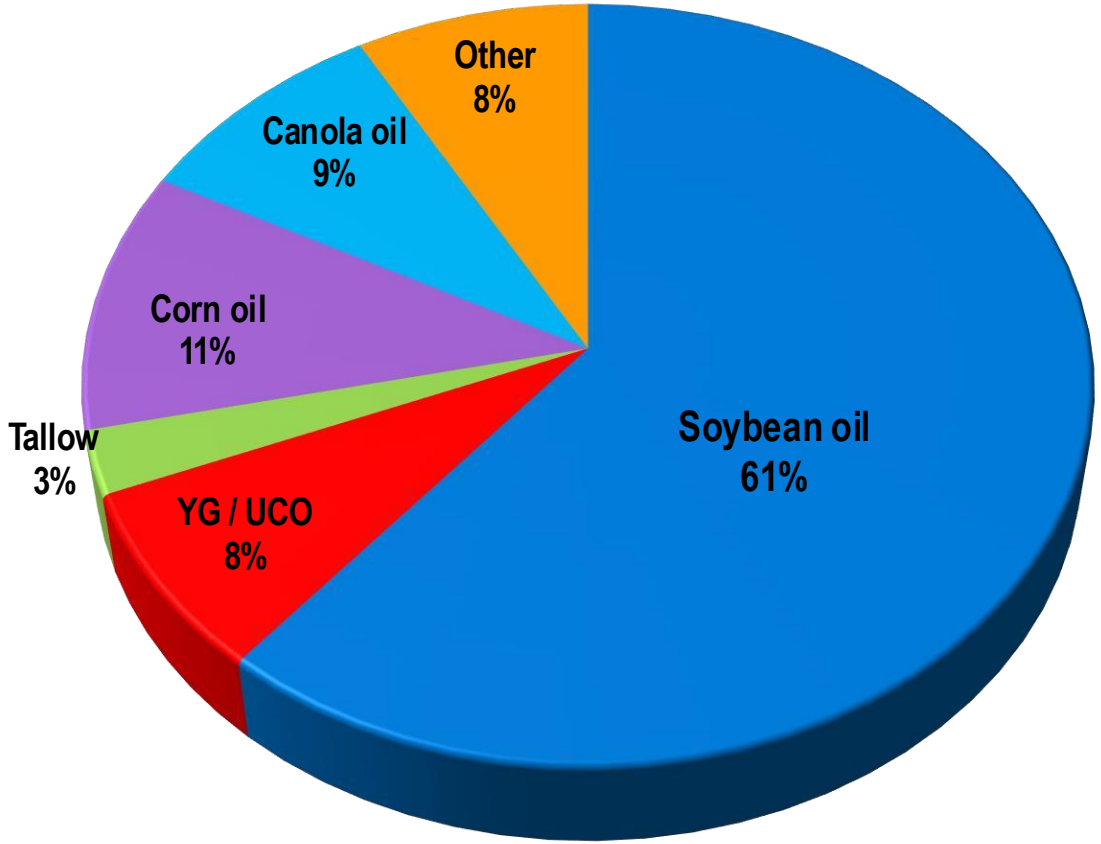
Biodiesel

- Blends
  - Biodiesel fuel meeting ASTM D 6751 with petroleum-based diesel fuel, designated BXX, where XX represents the volume percentage of biodiesel fuel in the blend. (B100, B99.9, B20, B5)

Biodiesel

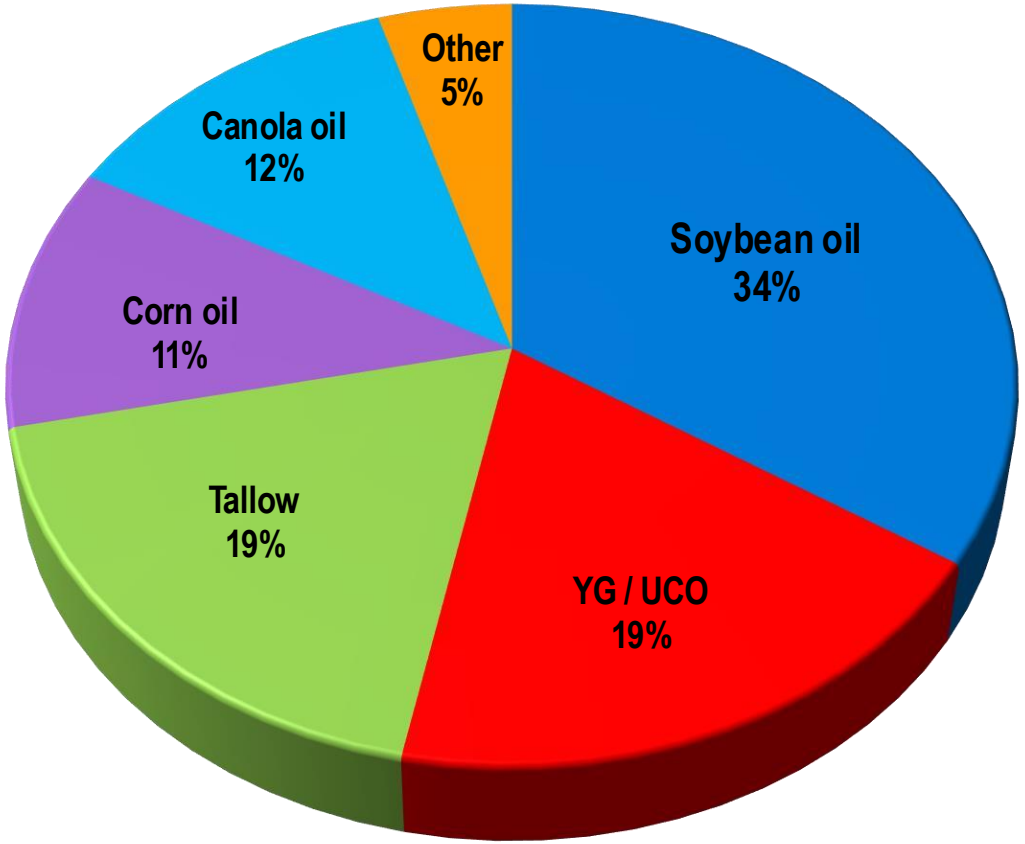
- Industrial Applications
  - AgSoy
    - Spray Adjuvant used in crop protection
    - Mitigates drift by increasing the droplet size
    - Increases droplet retention on the crop
    - Renewably sourced and biodegradable
  - SoyGold
    - Bio-based, biodegradable solvent
    - Green choice for solvents
    - Meets EPA clean air and other environmental challenges
  - SoyClear
    - Distilled SME with no color or odor
    - Non-toxic, low VOC’s and highly rated performance solvent.
    - Listed as a CleanGredient

Biofuels Feedstock (Biodiesel+RD)



2020 EIA Data

Biofuels Feedstock (Biodiesel+RD)



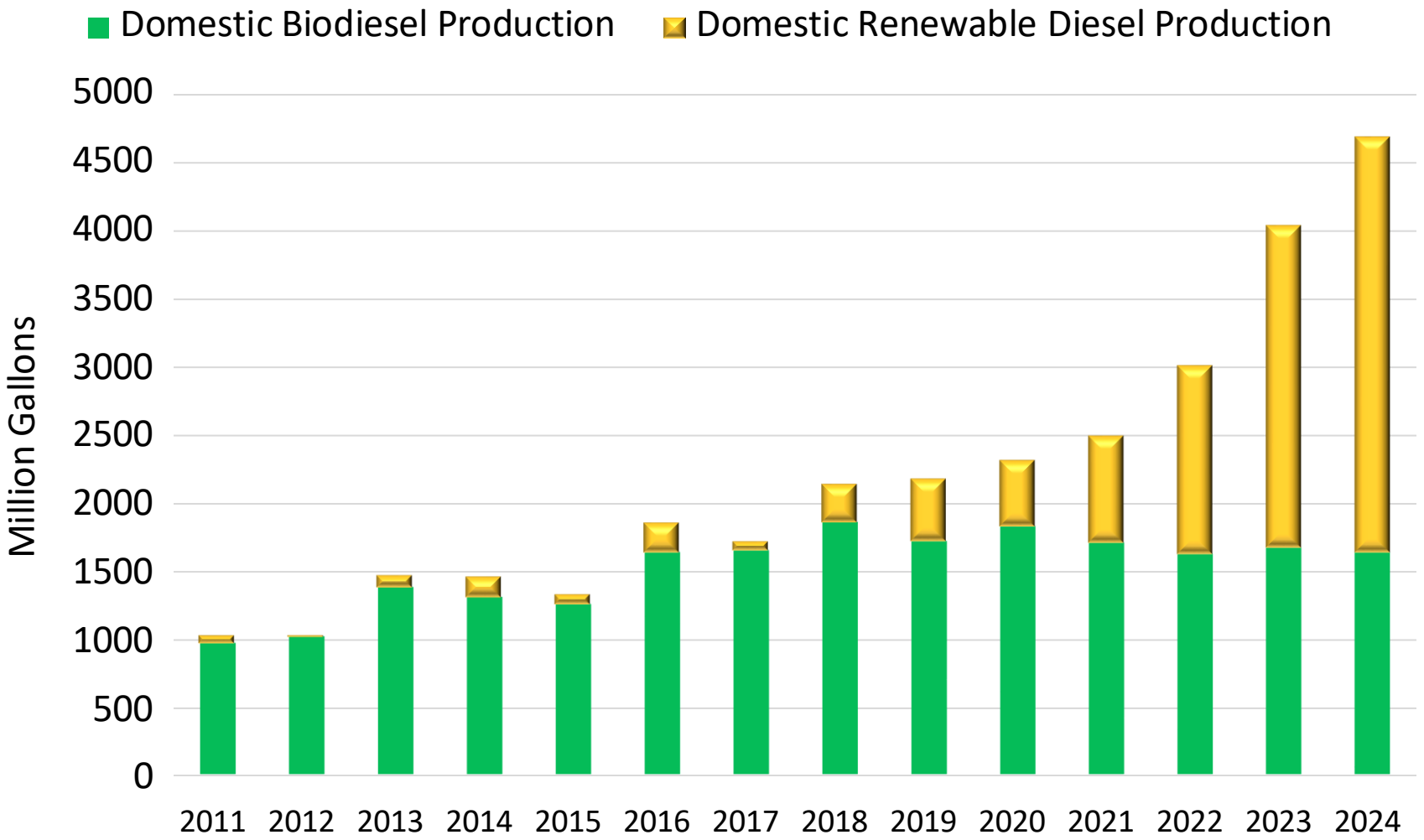
2024 EIA Data

Biodiesel

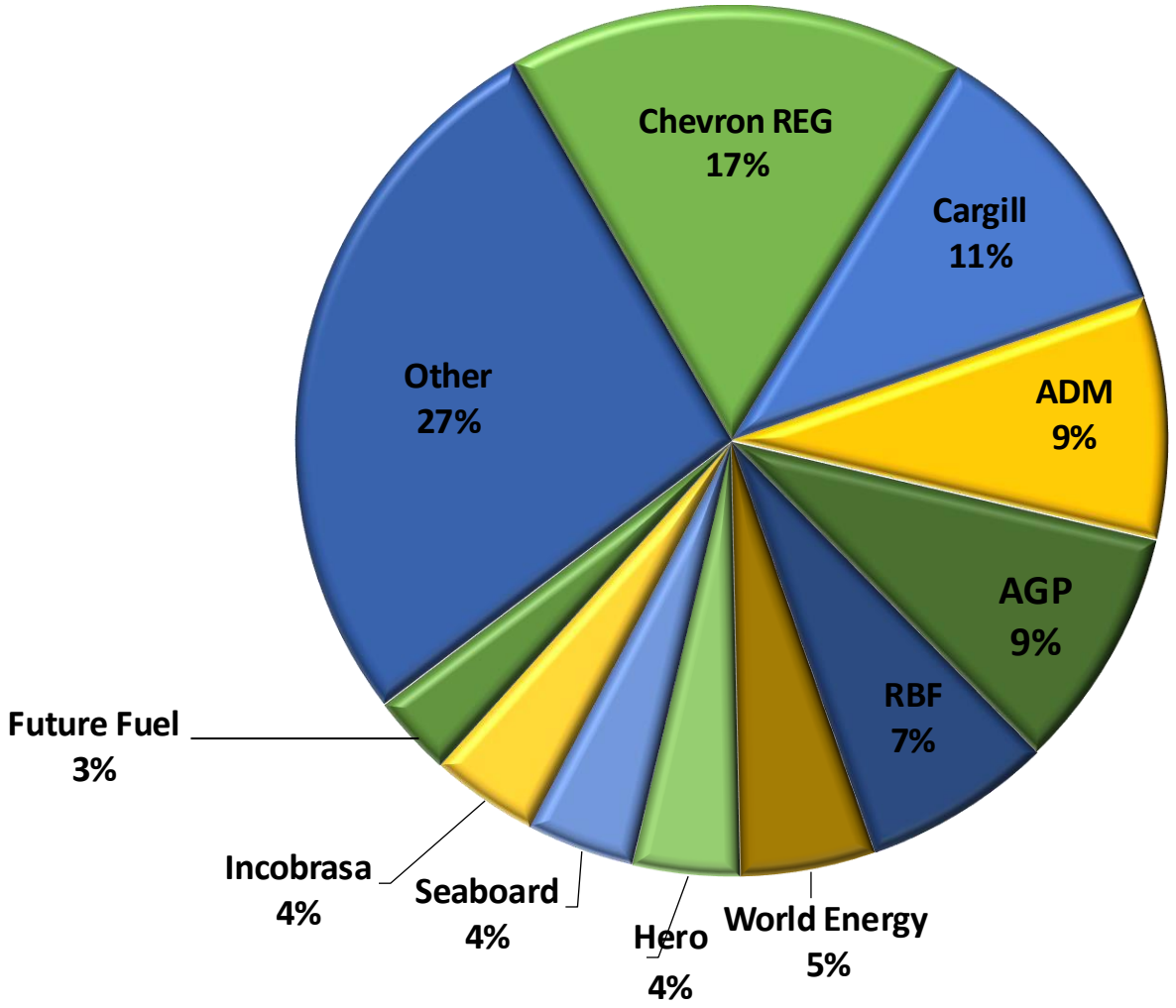
Renewable Diesel

Biodiesel		Renewable Diesel
Tran-esterification *Methanol + Sodium Methylate*		**Hydroprocessing** *H2 + Catalyst*
1.5 RINs per gallon		**1.7 RINs per gallon**
Glycerin		**Propane and Naphtha**
Comparable *Oil crops and animal fats*		**Comparable** *Oil crops and animal fats*
Limited *Requires blending and additional infrastructure*		**Wide range** *100% diesel substitute*

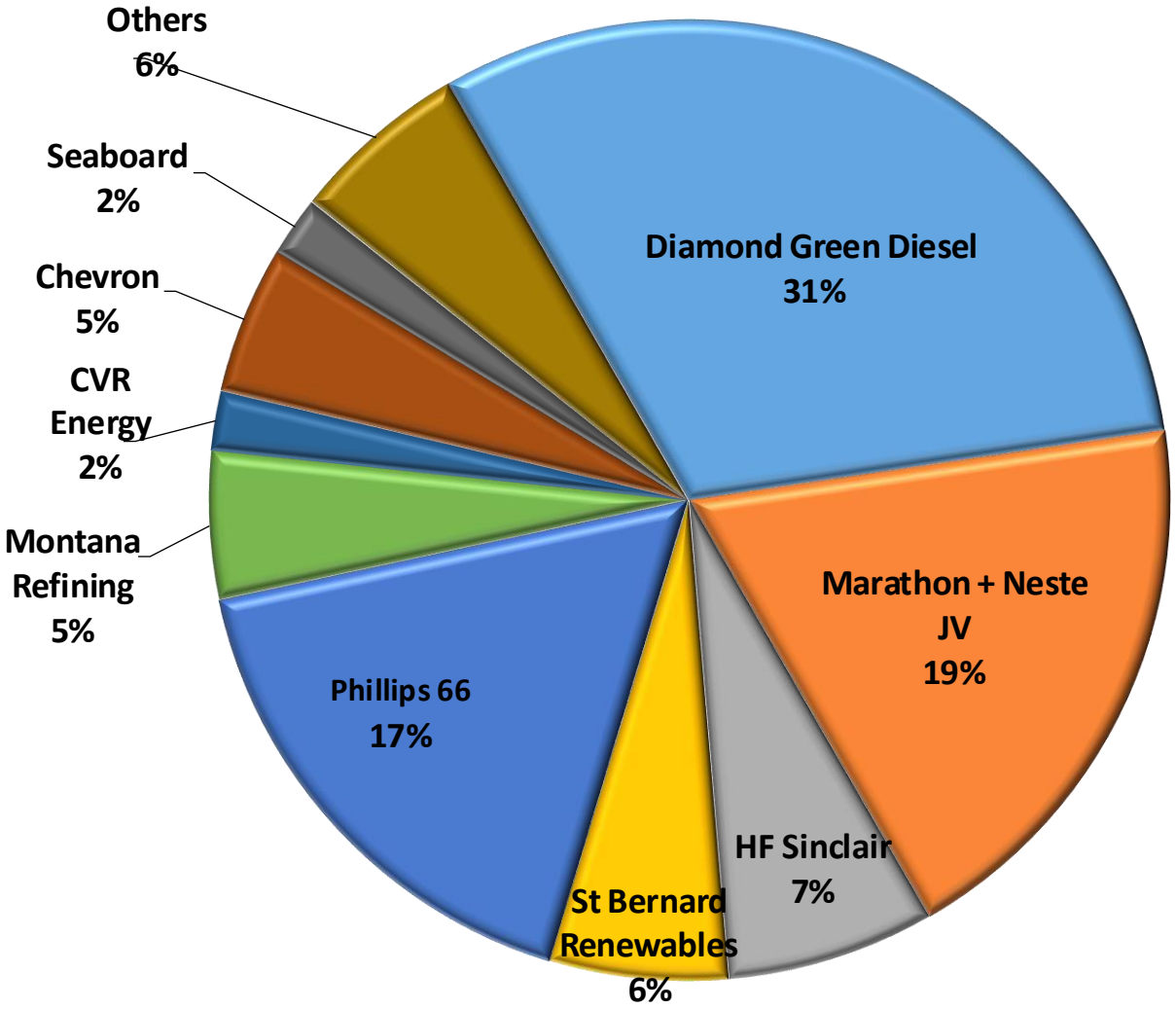
Biomass-Based Diesel Production



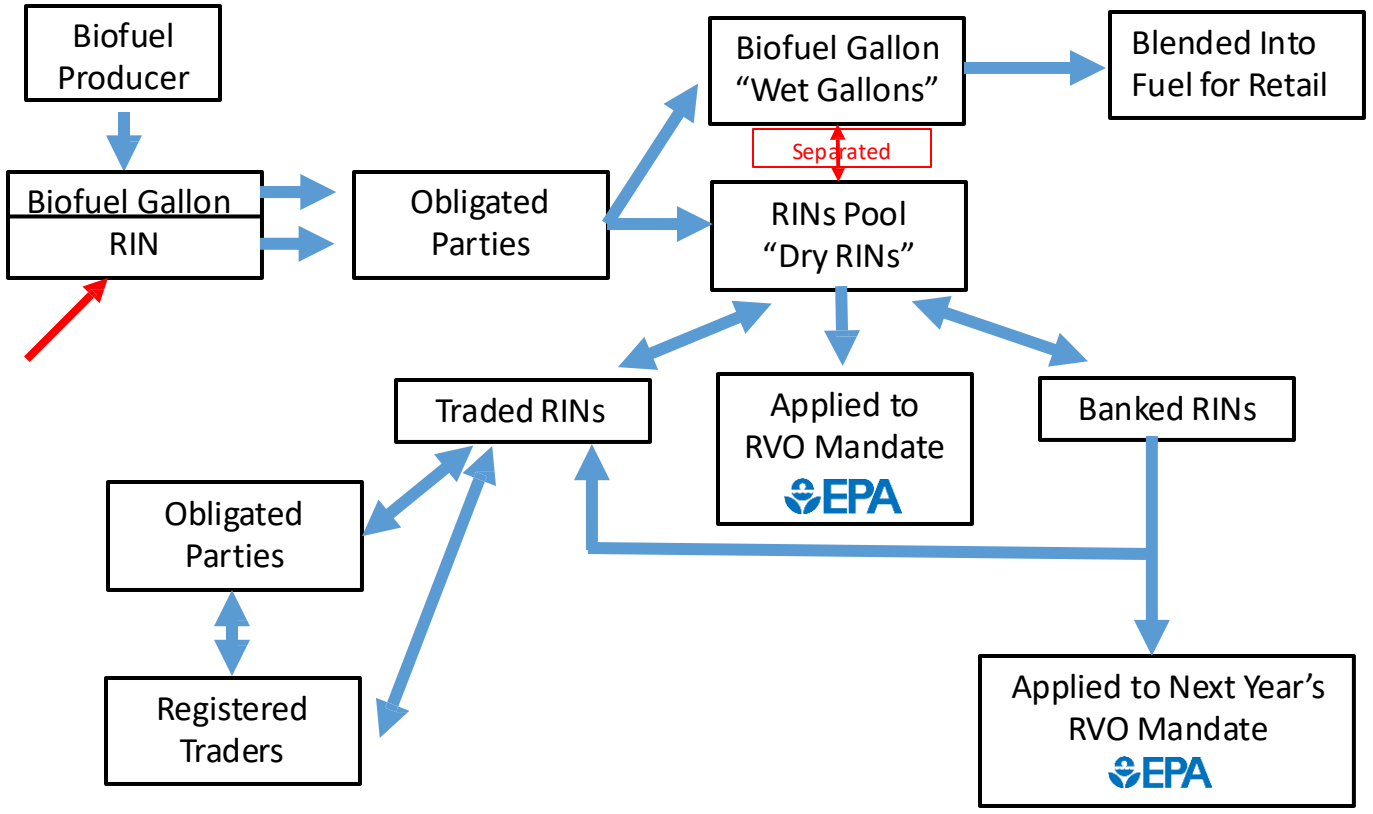
Biodiesel Producers



Renewable Diesel Producers



Renewable Fuel Standard



Blenders / Obligated Parties

EXXON

PBF Energy

MARATHON

Loves Travel Stops

bp

TA TravelCenters of America

VALERO

Chevron

pilot FLYING J

FS GROWMARK

HF Sinclair

MURPHY USA

CENEX Our Energy Comes Through

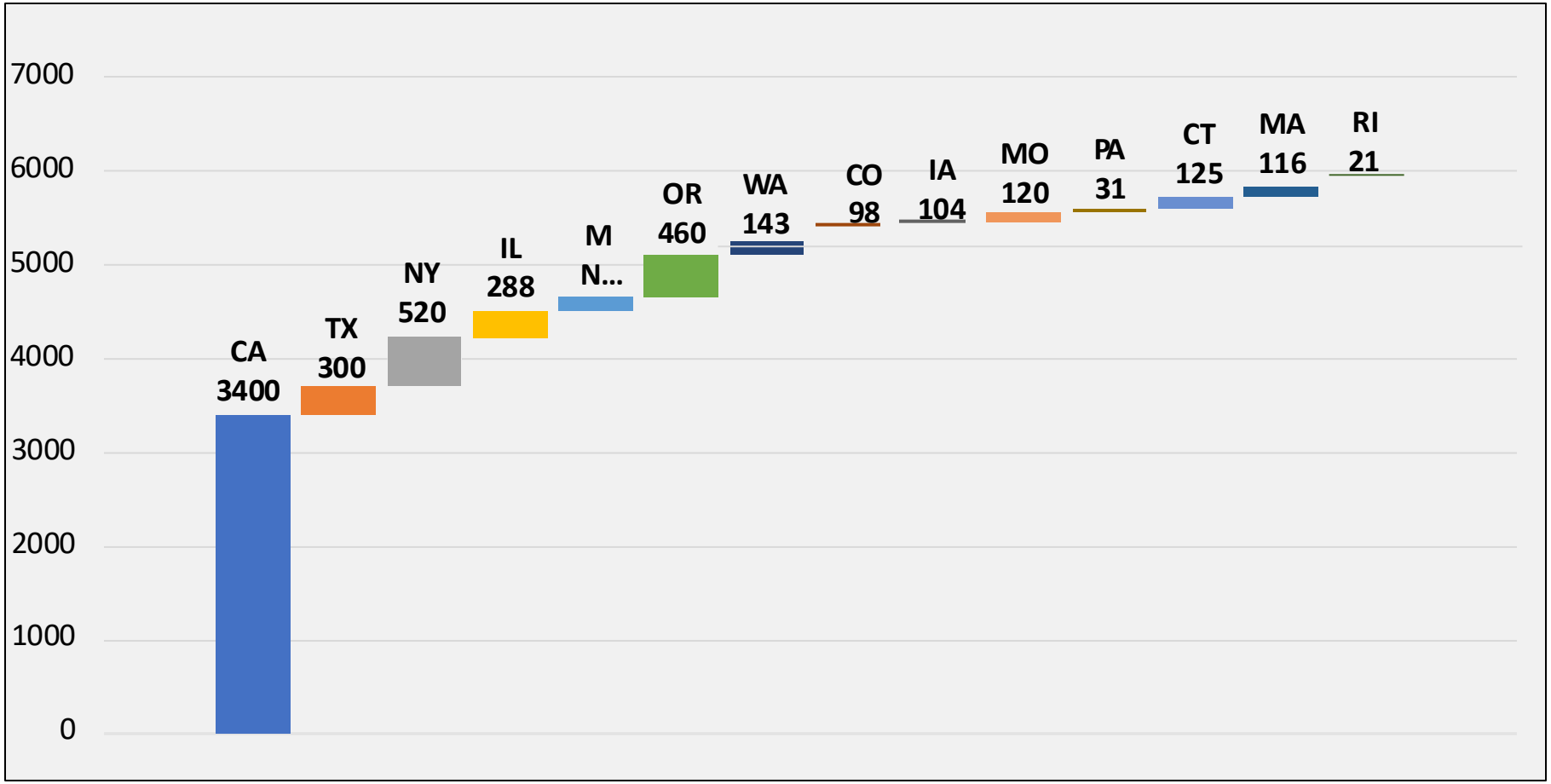
CHS

PHILLIPS 66

Volumes from State Programs

2030 5.9 Billion Gallon State Market*

Potential growth based on established or proposed requirements



Unmatched service. Customized solutions. Unparalleled results.

Soy-Based Solutions for Industrial Applications

Gary Brandt

8 May 2025

About Meyer

We offer customized solutions and programs that meet your specific needs

Meyer is a US-based chemical manufacturer focused on delivering customized industrial cleaning programs that address our customers' most critical needs. Our commitment to providing tailored solutions, expert installation, and unmatched service has not changed in 45+ years.

With an expansive, dedicated, and knowledgeable sales team, we are proud to offer that same unmatched service to a diverse and expanding customer base in the US and Canada.

Soy-Based Products in Industrial Applications

Soy Methyl Esters

Soybean Oil

Soy Methyl Esters

Advantages

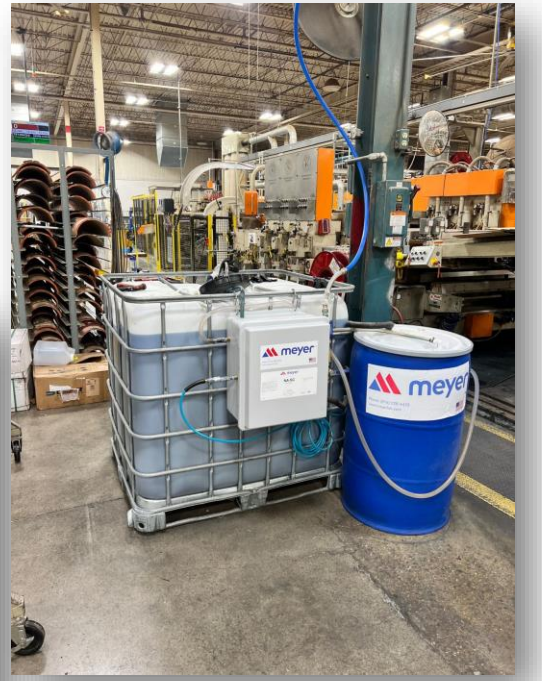
- Solvent Replacement
- Biodegradable
- High Flash Point
- Low VOC
- Non-Toxic
- RCRA Non-Toxic

Meyer NPS

Non-Petroleum Solvent (NPS)

Applications:

- Printing Industry
- Manufacturing
- Maintenance



Meyer NPS

What It Removes

- Inks
- Adhesives
- Tar
- Grease
- Graffiti
- Concrete Cleaner

Meyer DSC-HT

Asphalt Remover

Applications:

- Drag slats
- Equipment

Meyer BlackOut

Enhanced Asphalt Remover

Used on:

- Drag slats
- Equipment
- Pavers
- Rollers
- Mixing Drums

Application Methods:

- Pump-up sprayer
- Spray manifold

Soybean Oil

Release Agent

Industries:

- Asphalt
- Concrete

Meyer SlipCoat

Use Cases:

- Concrete truck drum
- Wet batch plants
- Central mixers

Application Methods:

- Spray arch
- Spray wand

SlipCoat Results—Argos Houston

The results are impressive and speak for themselves

- 91% reduction of concrete buildup in mixer trucks
- Increase in mixer capacity during trial period
- 15-20 minute decrease in driver washout times
- New trucks went almost an entire year without chipping
- Decreased damage from chipping to trial trucks
- Fuel savings?

Fully Automated SlipCoat System

Meyer Slider SB

Used on asphalt truck beds

Application:

- Spray arch

Asphalt Release & Cleaners

Asphalt Release Program:

- AASHTO/DOT tested and approved as required
- Delivered and priced in concentrate form
- Water soluble release agents: Highly dilutable up to 20-1 from concentrate; dilution ratios will vary depending on mix type, use case, and weather conditions
- Release Agents do not strip or otherwise degrade asphalt
- Highly effective on all mix designs, including modified polymer mixes

Asphalt Cleaner/Lube Program:

- Highly effective, safe cleaners with high flashpoints
- Can be used on drags, equipment, vehicles, etc.
- Water based drag lubes that are more economical than solvents
- Reduce cleaning need and frequency and increase plant efficiency
- No flash point so very safe

State-of the Art Application Equipment

Fully automated “Arch” application systems for asphalt release

- **Have a standard system and upgrade dilution arch system**
  - Dilution arch system allows easy switching from low dilution to high dilution depending on mix design runs for individual plants
  - Allows maximum efficiency of chemical use and cuts down on chemical costs
  - Allows drivers to spray bed of trucks without having to leave cab
  - Mobile spray systems are also available for mobile plant operations

Why Choose Meyer?

- ✓ Customer-First Approach
- ✓ American Made
- ✓ Custom Programs
- ✓ Nationwide Coverage
- ✓ State-approved & NTPEP-listed products

State-of the Art Application Equipment

Drag Slat Spray Application Systems

- Highly customized for each plant
- Can deliver asphalt cleaners and releases anywhere on drag or traverse it is needed
- No more need to plant operators to send personnel to top of drag or traverse to apply cleaners or chip

Overview

Soy-based solutions

- Eco-friendly
- Industrial versatility
- Proven performance

Erase HD Graffiti Remover

Soy Based Product developed by eChem in collaboration with
Dr. William Fruscella

About eChem

- Incorporated in 2003
- Our primary markets for metal processing (cleaning, degreasing, passivation, etc.) are Aerospace and Biomedical
- Approached by Dr. Kathleen Wolf to develop a soy-based Graffiti Remover.
- Sought the expertise of Dr. Fruscella in developing a product

Objectives

- Low toxicity
- Multi-surface capability
- Capable of removing most types of graffiti
- Formula to be free of Methylene Chloride, NMP or Glycol Ethers
- Zero VOC formula
- Water Rinseable

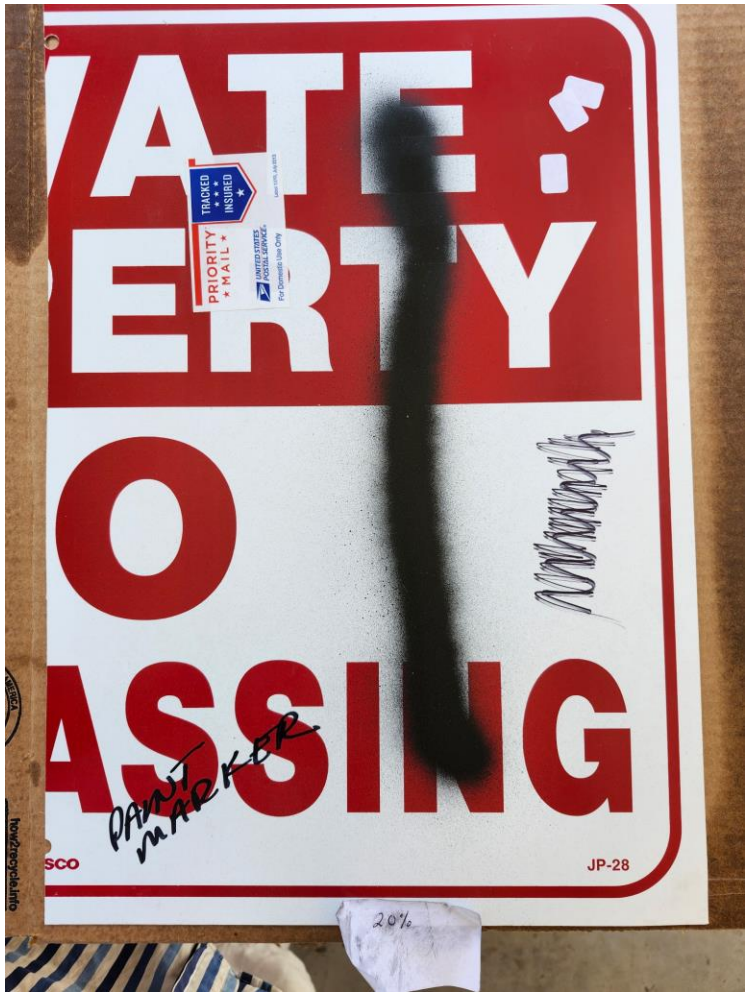
Test Application 1

Plastic sign contaminated with:

- Sharpie
- Paint Marker
- Spray Paint
- Various Labels/Stickers

Application:

- 100% concentration
- Spray application
- 30 seconds paint/ink
- Up to 5min adhesives



Before treatment

After treatment with Erase HD

Test Application 2

Metal sign contaminated with:

- Sharpie
- Paint Marker
- Spray Paint
- Various Labels/Stickers

Application:

- 100% concentration
- Spray application
- 30 seconds paint/ink
- Up to 5min adhesives

Before treatment

After treatment with Erase HD

ERASE HD GRAFFITI REMOVER

ERASE HEAVY DUTY GRAFFITI REMOVER quickly and effectively removes most types of graffiti including spray paint, marker, and stickers from fiberglass, metal, concrete, and other surfaces. This product is not suitable for use on screen-printed or some painted surfaces On painted surfaces and plastics, always test product on an inconspicuous area prior to use.

FEATURES

- Soy based formula
- No methylene chloride, NMP or glycol ethers
- Zero VOC Formula
- Water rinseable

DIRECTIONS FOR USE

1. Mix or shake well before using.
2. Apply product as supplied with cloth, brush, or spray to thoroughly wet the area.
3. Wipe or rinse off. Several minutes or a second application may be required for stubborn stickers. A plastic scraper blade may be used.

Thank you

To receive additional information, SDS and TDS;
Please contact:
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email: kory@echemproducts.com