

Croda Home Care



100% bio-based
ECO range



Smart science to improve lives™

CRODA

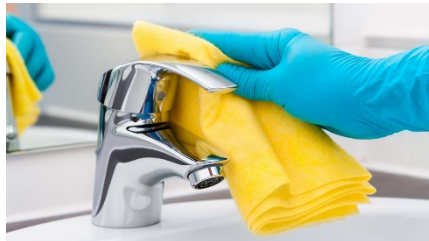
Global megatrends Home Care



Globalization
Growing Middle Class



Convenience



High Performance



Scarce Resources

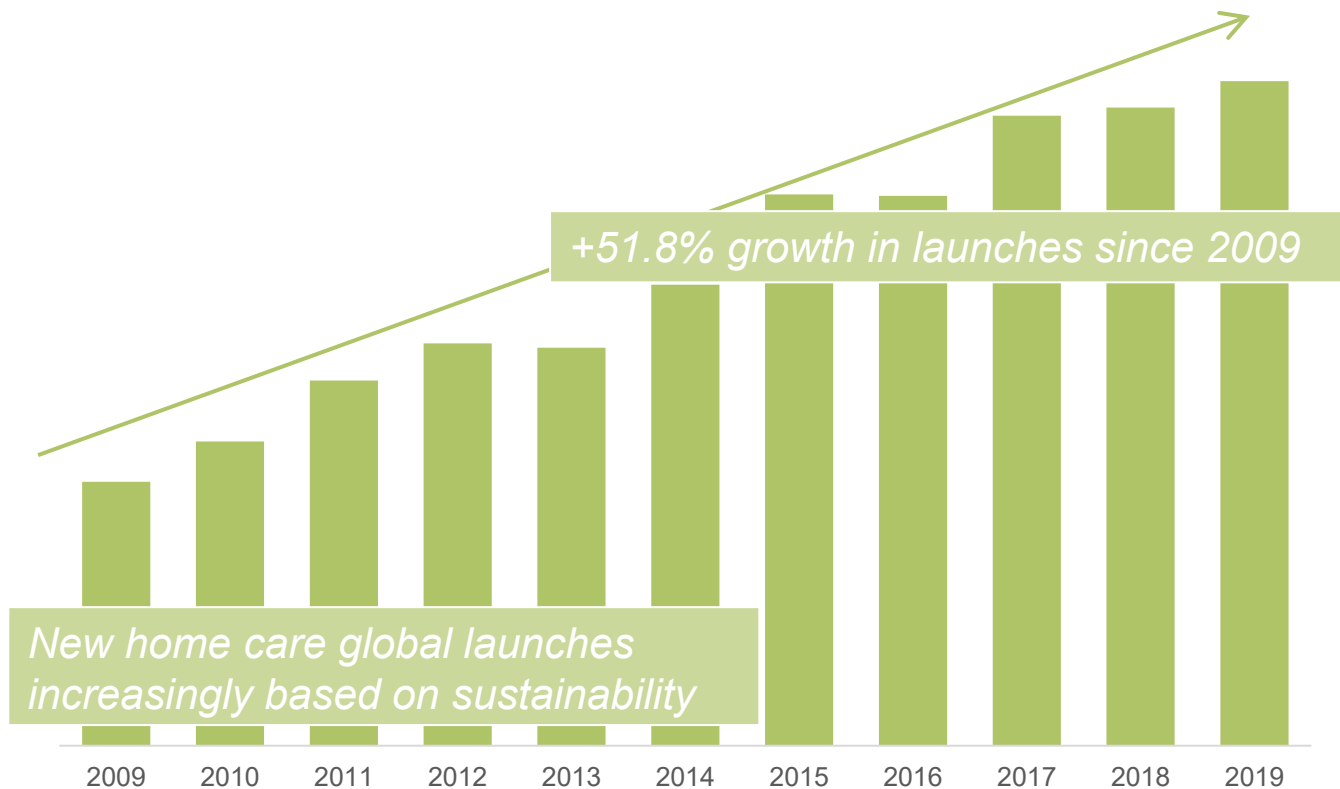


Safety



Climate Change

Conscious consumerism



72%

of consumers said they're currently buying more environmentally friendly products than they were five years ago

*Sources: Sustainable claims (searching terms *Carbon Neutral*; *Ethical - Environmentally Friendly Product*; *Ethical - Sustainable (Habitat/Resources)* as the claim in Household launches Mintel GNPD, Apr 2020
https://newsroom.accenture.com/news/more-than-half-of-consumers-would-pay-more-for-sustainable-products-designed-to-be-reused-or-recycled-accenture-survey-finds.htm?_ga=2.163186235.684168004.1586906551-1720889363.1586906551

CRODA

The Carbon Iceberg



CRODA

Croda Home Care



Croda's sustainability programme



Our sustainability commitment



Top 1% of all companies assessed



Britain's Most Admired Chemicals Company



FTSE4Good

Listed on the FTSE4GOOD UK 50 Index



A- rating from CDP Supplier Engagement

BARRON'S

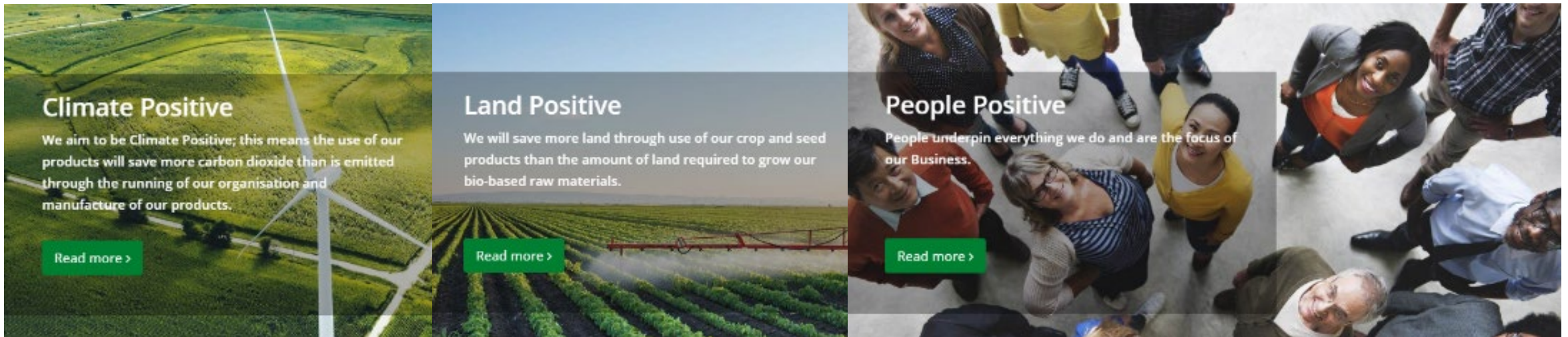
#1 Most Sustainable International Company

CRODA

Our sustainability commitment

We will be the most sustainable supplier of innovative ingredients. We will create, make and deliver solutions to tackle some of the biggest challenges the world is facing.

By 2030 we will be Climate, Land and People Positive.



Sustainability means a positive impact



“We must further accelerate our positive impact by creating and delivering solutions to tackle some of the biggest challenges the world is facing.”
Steve Foots, Group Chief Executive

Our Strategy



Growth

Consistent top and bottom line growth, with profit growing ahead of sales, ahead of volume



Innovation

The lifeblood of our business, we seek to increase the proportion of New and Protected Products (NPP) that we sell



Sustainability

Aligning our business with our Purpose and accelerating our customers' transition to sustainable ingredients

CRODA

Our Commitment to UN SDGs

"As we launch our Commitment to be Climate, Land and People Positive by 2030, it's an exciting time to be helping to provide solutions to some of the world's biggest challenges in the coming decades."

Phil Ruxton

Vice President Sustainability, Croda

Smart Science to Improve Lives™

CRODA

Fundamental



Drivers



CRODA

Croda Home Care



Increasing renewables
and lowering carbon
footprint with bio-based
ethylene oxide (EO)

Atlas Point, DE & ethoxylated surfactants

- Iconic surfactants & emulsifiers: Tween™, Brij™ and Myrj™ were **invented** here in the 20th century
 - Ethoxylation in Atlas Point, DE since the 1940's
 - Globally recognized brands
 - Supplied widely to Personal Care, Crop Care, Coatings,



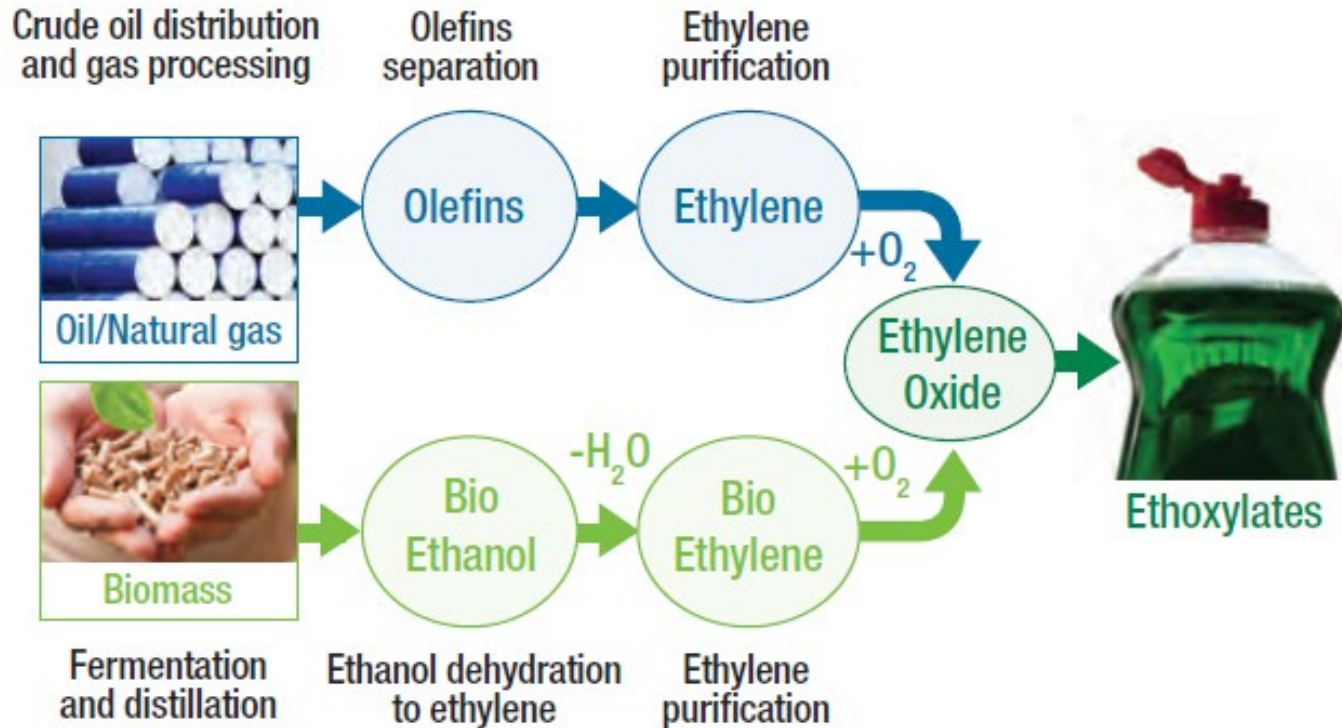
Atlas Point, DE & ethoxylated surfactants

- Therefore, it is no surprise that Croda would be the first company to produce 100% bio-based ethoxylated surfactants in North America.
- The ECO plant began continuous production of bio-EO from ethanol in 2020



CRODA

EO production petrochemical vs bio route



Reinventing Tween

- Petrochemical ethylene oxide is a major obstacle to going bio-based-- we are solving the problem with a sustainable lower carbon solution.



CRODA

CRODA

Step change in sustainability

20th Century Feedstock



21st Century Feedstock



Sustainable raw materials



Committed to responsible sourcing, Croda has taken a leading position in the industry with Sustainable Palm ingredients and is helping to develop the pathway to full traceability

12

manufacturing sites have RSPO certification, handling more than 99% of our global palm derivatives

63%

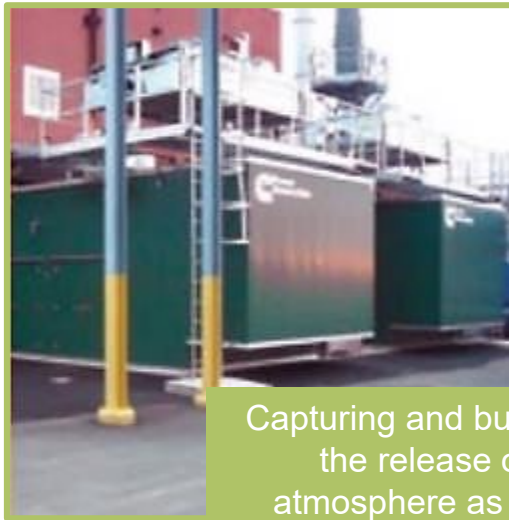
of our organic raw materials, globally, were bio-based in 2019, coming from renewable crops and biotechnology

CRODA

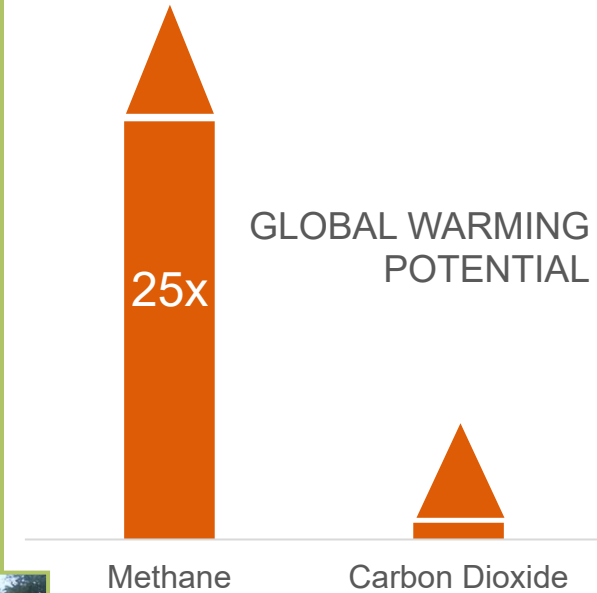
CRODA

Renewable energy

- Local landfill gas is purchased for electricity and steam generation at Croda's Atlas Point site
 - Gas travels from the landfill location to Atlas Point to power the facility



Capturing and burning landfill gas avoids the release of methane into the atmosphere as methane has a global warming potential 25 times greater than CO₂, when measured over 100 years



CRODA

CRODA

Made with renewable energy

- Local landfill gas purchased for electricity and steam generation on site
- On-site solar farm generates extra renewable electricity
- Topped up to 100% renewable electricity through RECs
- 1.3m tonnes CO₂e avoided since 2012

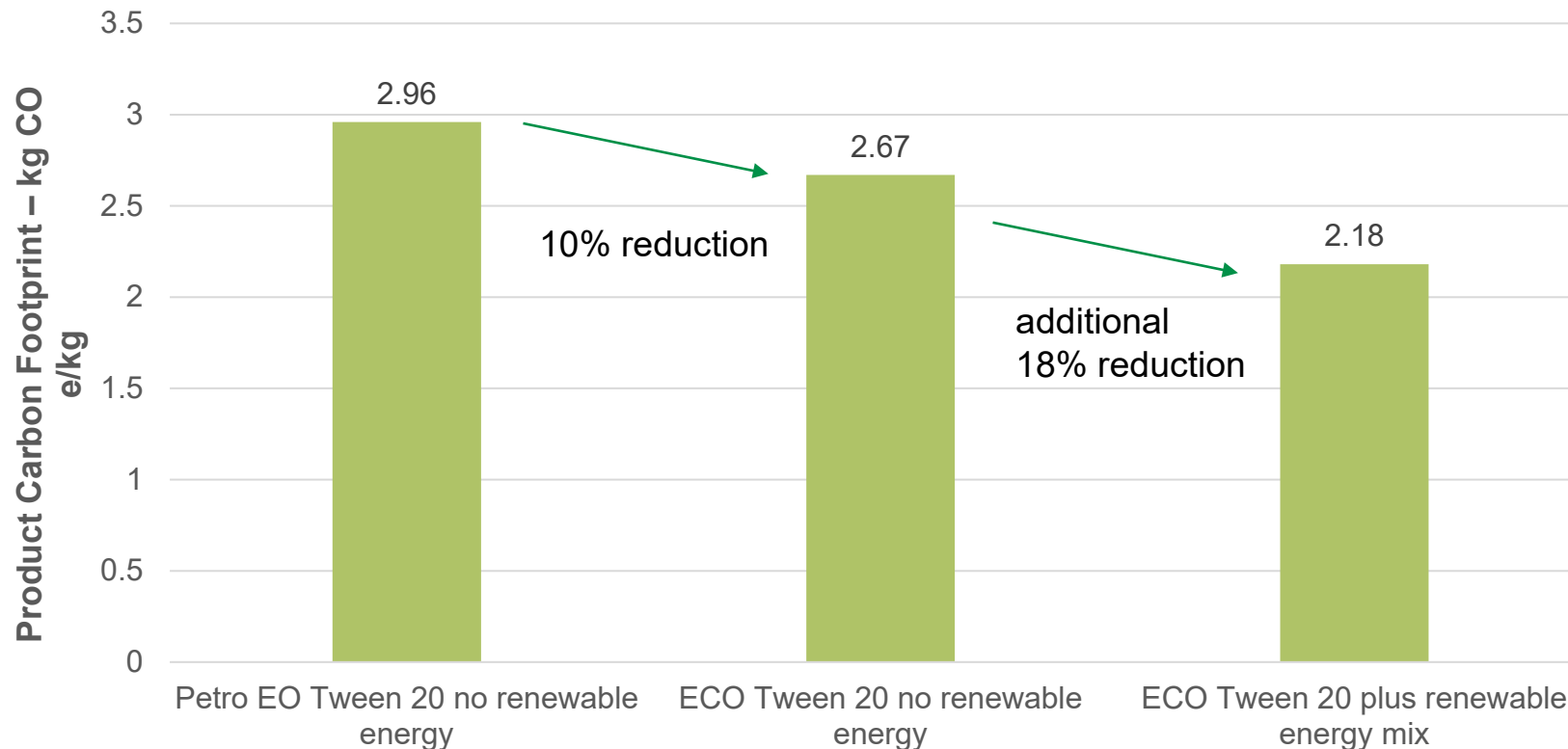


RECs are Renewable Energy Certificates

CRODA

Cradle-to-Gate carbon footprinting

ECO plant uses renewable energy, providing **unique carbon footprint reduction** for these ingredients



ECO Tween 20 + renewable energy = **28% total carbon footprint reduction**

CRODA

Croda Home Care



100% bio-based
technical overview



Petroleum EO limits renewable content

- Currently, most EO in the U.S. is derived from non-renewable petrochemical sources
- This limits the bio-based content when EO is used to make ethoxylated surfactants
- Even with natural sourced fatty alcohol, the renewable content can be low



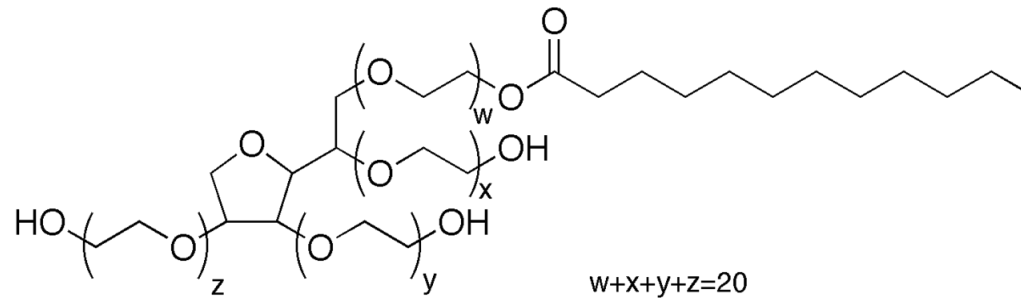
Example – Laureth-6 (Brij™ L6)

- Natural C12 alcohol with 6 moles of EO
- 12 bio-based carbon atoms, 12 synthetic
- $12/24 = 50\%$ bio-based content (count carbon only)

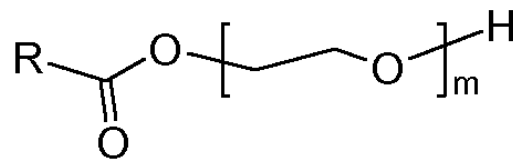
CRODA

EO limits renewable content in other products

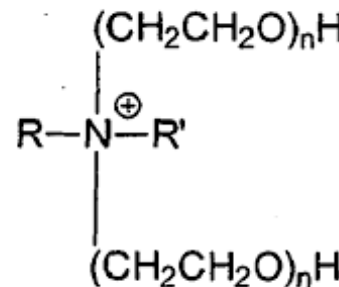
- Same issue applies to wide range of other ethoxylated surfactants:



Polysorbate 20
(Tween 20, ~30% bio-based)



**Ethoxylated
fatty acids (Myrj)**



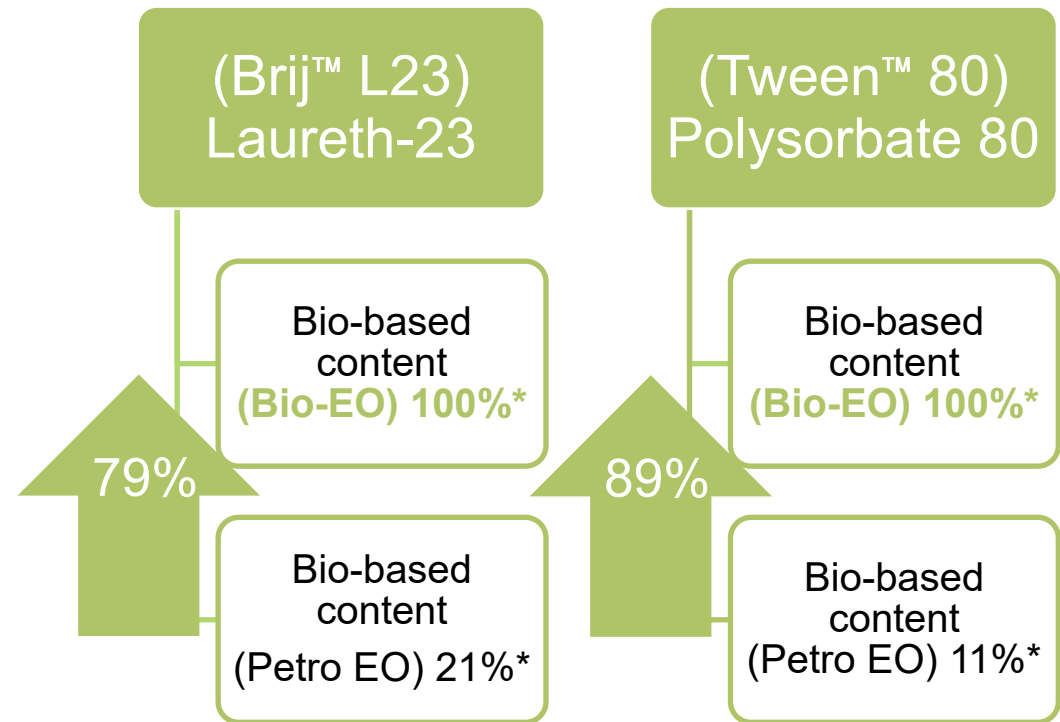
X^{\ominus} **Ethoxylated quaternary amines**
(e.g., Crodaquat)

CRODA

Revitalisation of core ingredients



- **Widest range** of surfactants – **now 100% bio-based!**
- More than 50 ingredient codes in the ECO Range
- Natural alcohol ethoxylates (ECO Brij™)
- Polysorbates (ECO Tween™)

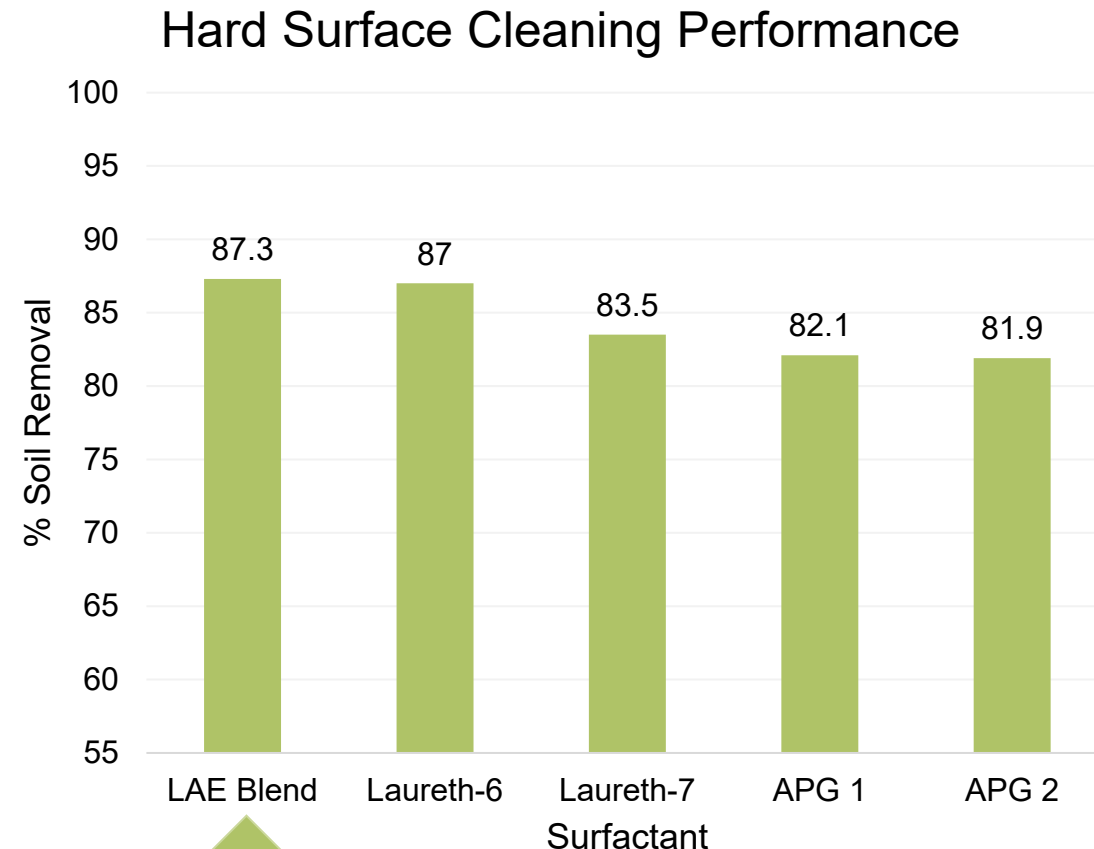


**Calculated using prEN16785-2 which is to be validated by carbon 14 testing (ASTM D6866)*

CRODA

High performance, renewable surfactants

- Bio-based ethoxylates are equivalent in performance to petroleum derived materials
- Perform better than alkyl polyglucosides (APG's)
- **No sacrifice in performance for choosing 100% renewable material**

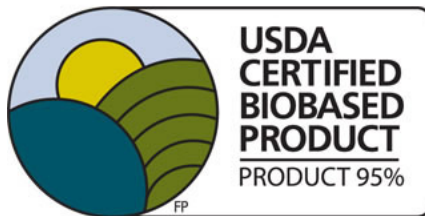


ECO NatraSense™ 205

Drivers for renewable content

- BioPreferred® Program

- USDA-managed program to “increase the purchase and use of bio-based products”
- Mandatory purchasing requirements for all federal agencies and their contractors
- Establishes minimum bio-based content in >100 different categories
- Also provides a voluntary labelling program designed to provide useful information to consumers about the bio-based content of the product



Product Category	% Bio-based
Bathroom Cleaner	74
Dishwash Product	58
Laundry Product	34

Voluntary labelling offers:

- Certification from 3rd party
- Transparency of information on bio-based content

CRODA

Testing for bio-based content

- How do you know a product is bio-based?
- ^{14}C is produced in the atmosphere and fixed by plants, but has a half-life of 5,700 years
- Petroleum based materials contain less than 1% of the amount of ^{14}C found in bio-based materials
- ASTM D6866 is a radiocarbon analysis method that measures $^{14}\text{C}/^{12}\text{C}$ ratios
 - Used by BioPreferred® Program
 - Croda has certified over 120 bio-based products

CRODA

Enhanced bio-content products

- Bio-based EO can also bring renewable content to formerly 100% synthetic products
 - We call these “Enhanced Bio-Content” products
 - We can help formulators hit bio-based targets with
 - ECO – 100% Bio-based
 - EBC – Enhanced Bio-Content products
- Example of an EBC:
 - Synperonic™ synthetic alcohol ethoxylate products can be made partially bio-based

Example – Synperonic™ 91/6

- Synthetic C9-C11 alcohol with 6 moles of EO
- 10 synthetic carbons (avg), 12 bio-based
- $12/22 = 55\%$ bio-based content, formerly 0%

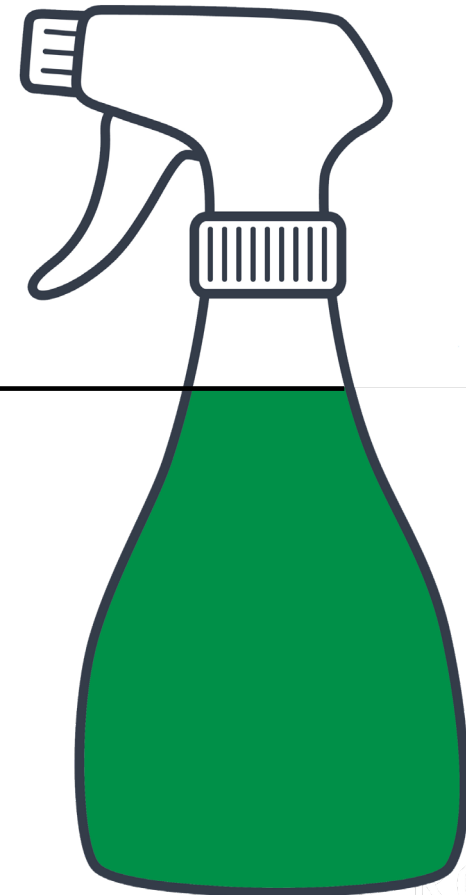
CRODA

Formulating to bio-based targets

Acidic Bathroom Cleaner (Safer Choice Suitable)	
Ingredients	%
Water	94
NatSurf™ 265 (Alcohol ethoxylate)	2.0
NatSurf 125 (Alcohol ethoxylate)	1.0
Citric acid	2.0
Lactic acid	1.0

Bathroom Cleaner USDA BioPreferred Minimum: 74%

Bio-based content
(petro-EO): 68%



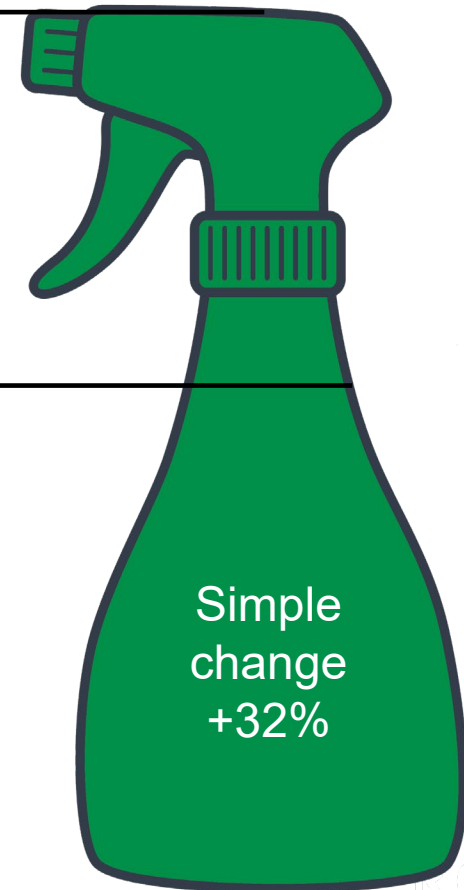
Formulating to bio-based targets

Acidic Bathroom Cleaner (Safer Choice Suitable)	
Ingredients	%
Water	94
ECO NatraSense™ 265 (Alcohol ethoxylate)	2.0
ECO NatraSense 125 (Alcohol ethoxylate)	1.0
Citric acid	2.0
Lactic acid	1.0

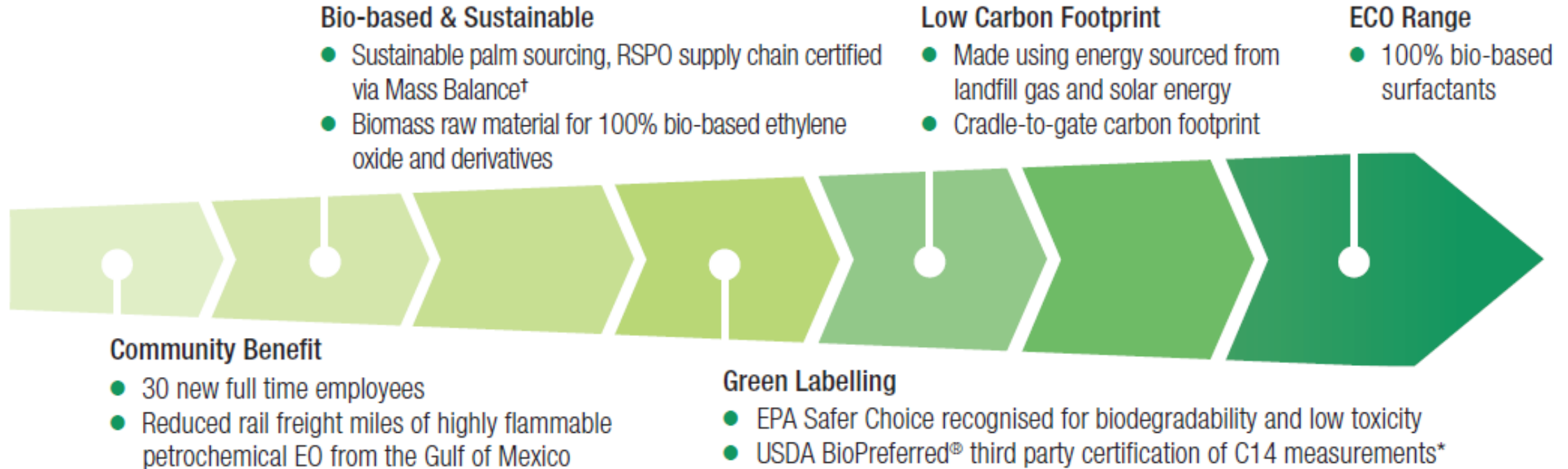
Bathroom Cleaner USDA BioPreferred Minimum: 74%

Bio-based content
(bio-EO): 100%

Bio-based content
(petro-EO): 68%



New ECO range ethoxylates



*Calculated using prEN16785-2 which is to be validated by carbon 14 testing (ASTM D6866)

**Products containing palm derivatives

Smart science to improve lives™



CRODA

CRODA

ECO products by application area

Non-Woven Finishes

- ECO Cirrasol™ Care
- ECO Cirrasol™ PE1185

Hard Surface Cleaning

- ECO Diversaclean™ Series
- ECO NatraSense™ Series

Air Care

- ECO Croduret™ Series
- ECO Etocas™ Series
- ECO NatraSense™ Series

Industrial

- ECO Brij™ Series
- ECO Renex™ Series
- ECO Tween™ Series

Fabric Detergent

- ECO Brij™ Series
- ECO NatraSense™ Series
- ECO Renex™ Series

CRODA

Bio-EO leads to new high bio-based products

- ECO MEG™ – Industrial Grade
 - Bio-based ethylene glycol
- ECO Renex™ PEGs – MW 200 – 8000
 - Bio-based polyethylene glycol
- New ECO Brij L™ Series – lauryl ethoxylates: L3, L6, L7, L9
 - Bio-based laundry detergents
- Crosolv™ 30 and 50 – New green solvents
 - Patent filed, no VOC, high performance, high bio-based

CRODA

Low 1,4-Dioxane products

- Refined manufacturing process removes residuals
 - Ensures extremely low levels
- Maximum spec of <1 ppm, 1,4-dioxane
- Advanced analytical methods confirm quality of ingredients
- Quality levels verified through individual test results of every batch
 - Reported on the Certificate of Analysis
- Ensuring that your products meet new and future regulatory requirements

CRODA

Conclusion

- Corporate, government, and consumer sustainability needs are driving markets to renewables
- Croda meets those needs with the ECO Range of 100% bio-based ethoxylated non-ionic surfactants
- Bio-EO and bio-based ethoxylates deliver 100% renewability while maintaining high performance
- Croda are delivering low carbon footprint ethoxylated surfactants via renewable energy and bio-based raw materials



CRODA

Croda Home Care



Thank you

Non-warranty
The information in this publication is believed to be accurate and is given in good faith, but no representation or warranty as to its completeness or accuracy is made. Suggestions for uses or applications are only opinions. Users are responsible for determining the suitability of these products for their own particular purpose. No representation or warranty, expressed or implied, is made with respect to information or products including, without limitation, warranties of merchantability, fitness for a particular purpose, non-infringement of any third party patent or other intellectual property rights including, without limit, copyright, trademark and designs. Any trademarks identified herein are trademarks of the Croda group of companies.

©2021 Croda Europe Ltd

CRODA