

Sustainability Update

July 25, 2025



JOHN DEERE



Where are we today and projections for tomorrow

How did we get here !!!!!

– JDSN Resources

- ISCC +
 - Bio Mass (Non Filler)
 - Circularity
 - Gas Emissions CO₂ and VOC's Scope 1, 2 & 3
- LCA's Review
- Updates for today : UNESCO
- Regulation Taxes
- Recycled Symbols (State of Confusion)
- Design for the Environment (ISO 14006) EPR Regulation (EU) 2024/1781
- CBAM Carbon Based Accounting Measurements (Metals transition to Polymers)

What is driving the term : Sustainability / Circular Economy



+1992 The first Earth Summit Meeting
+1996 Kyoto Protocol
+2005 Kyoto Ratification
+2008 EU Address Bio-Products
+2012 Doha Protocol
+2015 Paris Protocol
Plus

ISO 14000 Base Guidelines / Agenda 21
ISO 14000 Series Started Development
(LCA: Life Cycle Assessment) ISO 2006
ISCC funded (FUEL) (2009)
Foundations for Sustainability est.
UN 17 Created: ISO / UL / ASTM / ISCC

SUSTAINABLE DEVELOPMENT GOALS





OUR PRIORITIES

DEERE PRODUCTS WILL SET THE STANDARD
FOR SUSTAINABILITY BY 2030 THROUGH:



Integrating circularity principles into product development lifecycle:

- Incorporating 95% recyclable content into our products
- Ensuring 65% of content going into our products is sustainable
- Grow remanufacturing revenue by 50%



Reducing Scope 3 greenhouse gas emissions 30% by:

- Partnering with our supply chain
- Developing a roadmap of low/no carbon alternative power solutions
- Investing in engine efficiency, hybridization, electrification, and renewable fuels
 - Delivering battery-electric turf and compact utility tractor options
 - Delivering electric and hybrid-electric Construction & Forestry solutions

Sustainable and Recyclable Content

John Deere's sustainable content goal incorporates two material types into product parts and components: recycled and renewable. Recycled material is that which has been reintroduced as a new material and therefore been given a second life, like recycled steel. Renewable content is biobased and represents a recurring source found in nature, including options such as soybean oil and plant fibers like rice hull or hemp.

The recyclable content goal is aimed at increasing the number of parts that have an avenue for recyclability at the end of the machine's useful life and thus can be used again as a different product.

To determine our starting point, the company has examined the renewable and recycled content within a subset of products based on material weight, type, and geographic mix. This included highly detailed integration of material data and supplier source data. This same material breakdown was then reviewed to estimate recyclability on global and regional scales.

From the initial phases of product analysis, Deere has estimated its current products incorporate 40 percent sustainable content by weight and 90 percent recyclable content by weight.

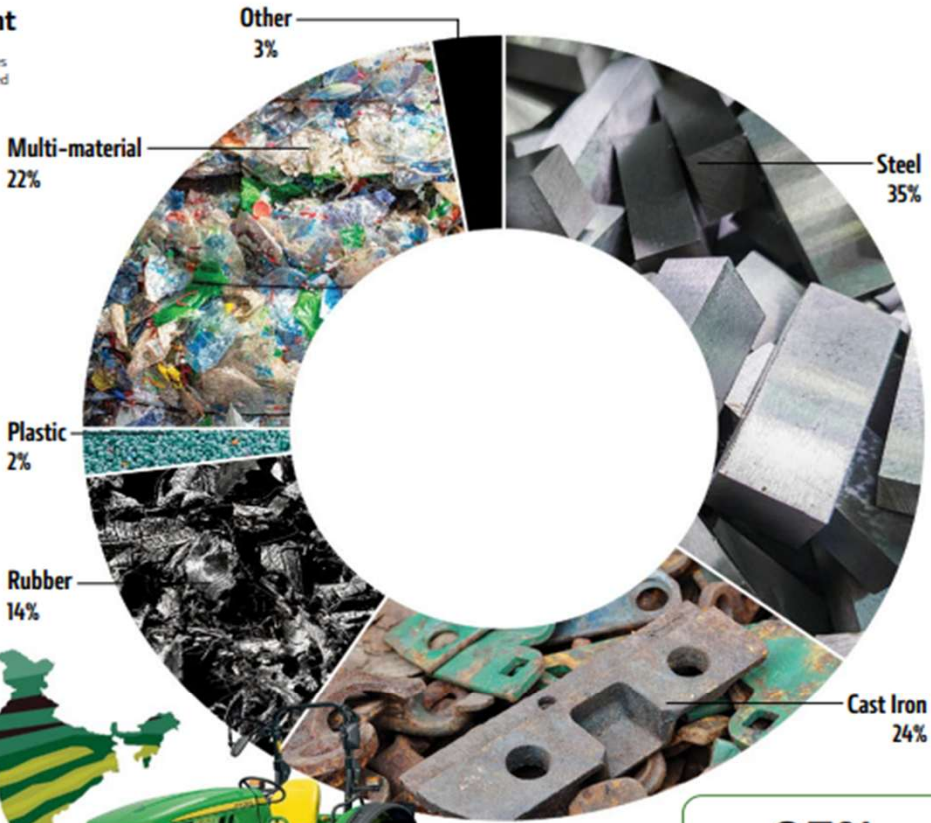
These early results have allowed the company to identify potential areas of focus for its strategy on sourcing sustainable versions or alternatives for specific materials such as steel, cast iron, plastic, and tires — the most common in its machines — to maximize the impact of this effort.

As far as recyclable content, steel and cast iron represent the most significant materials, based on weight. But both already are nearly 100 percent recyclable. Conversely, plastic, rubber, and electronics are high in opportunity but low in weight, meaning the company's goal will be challenging. But not impossible.

Supply management and product design teams will play essential roles in sourcing and designing for increased incorporation of sustainable materials and recyclable content.



65%
Product content comprised of sustainable material by 2030
2022 baseline estimated at 40% sustainable product content



The above represents a bill of material breakdown of a S-Series tractor.



95%
Recyclable product content by 2030
2022 baseline estimated at 90% recyclable product content



SUSTAINABLE CONCEPT GATOR

The world of sustainability is often driven by change while the world of innovation is often driven by the introduction of something new. Now imagine what happens when those two intersect and are applied to a signature product with a 30-year history.

"John Deere's Sustainable Concept Gator turns some of that imagining into reality. This Gator shows how innovative thinking and innovative partnerships can provide invaluable insight into how we can apply sustainable material use in the future," said Jill Sanchez, John Deere director of sustainability.

Many of the utility vehicle's traditional parts were replaced with recycled and recyclable materials, including options taken right from a farmer's field. The joint venture project with Ford Motor Company includes materials made from soybeans, flax fiber, sugar cane, hemp fiber, plastic bottles from the Mississippi River, ground coconut, and even fishing nets taken from the Indian Ocean.

The Sustainable Concept Gator demonstrates and reinforces John Deere's commitment to achieving its 2030 product circularity goals, such as ensuring 65 percent of product content comes from sustainable materials.

REDUCING OPERATIONAL GREENHOUSE GAS EMISSIONS

As John Deere closes out its 2022 sustainability goals, it adds another impressive year of operational greenhouse gas (GHG) emissions reductions, increased renewable energy use, and environmental stewardship.

In 2021, Deere exceeded its 15 percent absolute Scope 1 and 2 GHG reduction goal one year early, achieving nearly 20 percent reduction. As the company closes out its 2022 goals, it achieved a total reduction in operational GHG emissions of nearly 29 percent between 2017 and 2022.

Deere also surpassed its 2022 renewable electricity goal by achieving nearly 59 percent renewable electricity as of the end of 2022. Deere's participation in the Mesquite Sky Wind project was a major contributor to both of these goals. As with its other goals, despite these successes, the company has challenged itself yet again to do better.

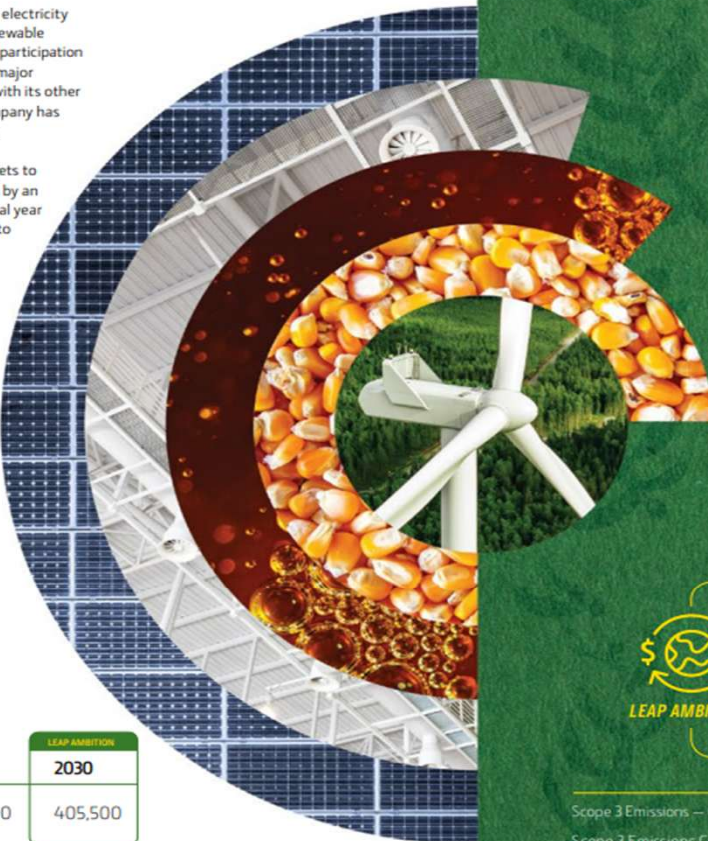
Deere has validated Science Based Targets to reduce its Scope 1 and 2 GHG emissions by an additional 50 percent by 2030, with fiscal year 2021 serving as the baseline. We'll aim to accomplish this through efficiency gains in operations and facilities processes, and by leveraging renewable electricity and fuels.

HIGHLIGHTS

- John Deere-Saran implemented an updated strategy in production test cells to reduce GHG emissions from diesel fuels by 8.5% in 2022. We expect the broader deployment of this technology will enable a reduction of 40% by the end of 2024 and 45% by 2026.
- John Deere-Horizontina improved its paint process to reduce outside interferences and heat loss, reducing liquified petroleum gas consumption. This reduced GHG emissions by 43.2% in 2022 compared to 2021.
- Deere's 2015 global LED lighting and control initiative is now mature and implemented at most sites, saving a cumulative 250-million kWh through 2020.
- Deere has secured many long-term agreements through 2030 for projects to harness wind and solar energy. These projects will achieve more than 50% global renewable electricity including in the U.S., Germany, Spain, the Netherlands, India, Mexico, and Brazil.
- In the U.S., Mesquite Sky Wind project, the largest renewable energy project in John Deere history, represents a major long-term piece of our renewable energy strategy. It is equivalent to more than 20% of our global electricity footprint.

	2021	2022	2030
Scope 1 and 2 Emissions ¹ (metric tons CO ₂ e)	811,000	716,700	405,500

¹Apex Companies, LLC has verified greenhouse gas (GHG) emissions data in accordance with the ISO 14064-3: Greenhouse gases — Part 3: Specification with guidance for the validation and verification of GHG statements assurance standard. Data associated with the operations of Unimil is not included in 2021 metric.



REDUCING UPSTREAM EMISSIONS

Engaging our supply base is crucial to our success in reducing upstream greenhouse gas (GHG) emissions. From strategically analyzing product materials and supplier data, John Deere has identified the opportunities where partnering with our supply chain can have the most significant impact on GHG emissions. Many of these priority areas have a significant overlap with the materials that will be critical to achieving Deere's Leap Ambitions around product circularity. For fiscal years 2022 and 2023, we're focusing on collaborating with energy-intensive suppliers in the following industries: steel, castings, rubber, glass, packaging, data centers, batteries, and power systems.

Aligned with our new Leap Ambitions, Deere updated its strategic sourcing approach, considering sustainability a key action area, balanced with ongoing expectations for quality, cost, and delivery. In fiscal year 2022, Deere communicated its supplier sustainability strategy to all suppliers in the John Deere Supplier Network (JDSN) platform. This strategy guides our search for supplier opportunities that further our 2030 goals, including emissions reduction and increased usage of sustainable and recyclable materials.

To encourage and recognize supplier excellence in sustainability and innovation, John Deere expanded its Supplier Achieving Excellence program. This year-round company program measures, recognizes, and rewards exceptional supplier performance. With changes implemented in 2022, a supplier can no longer reach the highest level of recognition without incorporating sustainability initiatives into their business, including criteria such as EcoVadis participation, setting goals for reductions in GHG emissions, reporting GHG emissions, and improving workforce diversity. Expanding the value creation portion of this program to include sustainability initiatives and expectations is a critical early step in unlocking the collaborative potential between John Deere and our supply chain partners to achieve the Leap Ambitions outcomes.

Some of Deere's supply chain partners are leading the way in sustainability innovation. In fiscal year 2022, SSAB (a global steel company) received a Supplier Sustainability Award from Deere & Company for its sustainability initiatives. SSAB's facility in Iowa uses 88.5 percent renewable energy to power its facilities as certified by the utility provider and produces steel using 97 percent recycled scrap content.

30%
Reduction in upstream and downstream CO₂e emissions (Scope 3) by 2030

To see more on Deere's Downstream Scope 3 Category 11 Emissions see the [Product Emission Reduction Strategy](#) on page 35.

	2021	2022	2030
Scope 3 Emissions — Category 1 and Category 11 (metric tons CO ₂ e) ^{2,3}	100,456,000	97,353,000	70,319,000
Scope 3 Emissions Category 1 (metric tons CO ₂ e) ²	7,336,000	7,451,000	

²Apex Companies, LLC has verified greenhouse gas (GHG) emissions data in accordance with the ISO 14064-3: Greenhouse gases — Part 3: Specification with guidance for the validation and verification of GHG statements assurance standard.

³Scope 3 Category 11 (Purchased Goods and Services) data does not account for any Deere acquisitions.

⁴Scope 3 Category 11 (Use of Sold Products) methodology was updated to drive consistency across the enterprise in the way product line data is reported. 2021 data is restated from previous reporting in accordance with the updated methodology. Reduction in Scope 3 Category 11 greenhouse gas emissions from fiscal year 2021 to fiscal year 2022 was volume driven.

Current Enterprise Results

Unit	Large Tractor	Mid Tractor	India Tractor	Harvester	C&F Loader	T&CU	Enterprise
	Waterloo	Mannheim	Pune & Dewas	Moline	Davenport	Horicon, Greenville	
Enterprise Weightage	9%	15%	17%	7%	3%	3%	54%
Recycled Content	57.6%	30.4%	30.5%	48.5%	51.2%	42%	39%
Recyclability	96.8%	84%	84%	95.5%	96.8%	94%	91%



JDSN: John Deere Supply Network

The screenshot displays the John Deere Supply Network (JDSN) web application. At the top left is the John Deere logo. The top right corner shows the text "Supply Network" and a user greeting "Hi, Kenneth" with a dropdown arrow. Below this is a navigation bar with links: "Control Tower", "Spend Management", "Applications", "Standards" (with a dropdown arrow), "Return to Old View", and "Help". The main header features a large image of a John Deere machine with the brand name "JOHN DEERE" prominently displayed. Below the header is a dark navigation bar with icons and labels for various sections: "Design", "Quality", "Cost", "Planning", "Orders", "Delivery", "Payment", and "Supplier". The main content area consists of four light gray boxes, each with a title and a brief description:

- Supplier Quality Manual**
Implement and maintain a quality system to produce and deliver globally competitive products and services.
- Purchasing Terms & Conditions**
Available for multiple regions are the John Deere Terms and Conditions for the purchase of goods and/or services.
- Supplier Code of Conduct**
Updated March 8, 2022
John Deere's commitment to integrity & social responsibility extends to its diverse and worldwide supply base.
- Supply Chain Sustainability**
John Deere Supply Chain Sustainability focus areas in support of Leap Ambition goals and supplier expectations.

JDSN: John Deere Supply Network

 **JOHN DEERE**

Supply Network
Hi, [Kenneth](#) ▾

[Home](#) [Control Tower](#) [Spend Management](#) [Applications](#) [Standards ▾](#) [Return to Old View](#) [Help](#)

Supplier Sustainability Leap

Let's make sustainable leaps together by understanding opportunities to reduce manufacturing emissions and reuse materials cradle to cradle across our value chain.

GHG Scopes & Emissions Across the Value Chain

● measured/estimated and reported by Deere
▲ 2030 goal, or reported



Greenhouse Gas

We look forward to working with you on telling your manufacturing sustainability story by measuring, reporting publicly, and setting targets to reduce emissions.

Deere's 2030 targets from a 2021 baseline are to reduce absolute scope 1 and 2 greenhouse gas (GHG) emissions 50% and reduce absolute scope 3 GHG emissions from purchased goods and services and use of sold products by 30%.

[Measuring Emissions](#) [Report Publicly](#) [Set Targets](#)

JDSN: John Deere Supply Network



Greenhouse Gas

We look forward to working with you on telling your manufacturing sustainability story by measuring, reporting publicly, and setting targets to reduce emissions.

Deere's 2030 targets from a 2021 baseline are to reduce absolute scope 1 and 2 greenhouse gas (GHG) emissions 50% and reduce absolute scope 3 GHG emissions from purchased goods and services and use of sold products by 30%.

Measuring Emissions

Report Publicly

Set Targets

Measuring Emissions

John Deere requires all suppliers to measure and report publicly their scope 1 and 2 operations emissions. Supplier upstream value chain emissions are measured in scope 3 category 1.

The [Greenhouse Gas Protocol](#) provides [product, corporate and value chain standards](#), [scope guidance](#), and [calculation tools](#) for businesses to measure emissions.

The [US EPA](#) has resources for [GHG inventory development](#), [emissions factor data](#), and [supply chain guidance](#).

Report Publicly

As the world takes steps towards building a climate safe future, ambitious corporate action is more crucial than ever. [CDP for Climate Change](#) is a comprehensive database for companies globally to disclose their emissions.

[Why report?](#) [How to get started?](#) [Guidance for reporting.](#)

Set Targets

[John Deere emissions reduction targets have been validated](#) by the [Science Based Targets](#) initiative (SBTi). [How it works](#), [Set a Target](#), [Sector Guidance](#), [Resources](#)

SBTi determined that Deere's 2030 targets are consistent with what's required to keep global warming to 1.5°C, which is needed to prevent the most damaging effects of climate change.

JDSN: John Deere Supply Network



Efficiency & Clean Energy

Efficiency and electrification of equipment are important considerations in your operations. Outside the factory walls, one of the biggest levers in decarbonizing manufacturing is clean energy. How can we help clean energy as a group? There are paths to renewable and clean electricity at scale that are low cost.

Why are renewables important?

Renewables, including solar, wind, hydropower, biofuels and others, are at the center of the transition to less carbon-intensive and more sustainable energy systems. Generation capacity has grown rapidly in recent years, driven by policy support and sharp cost reductions for solar photovoltaics and wind power in particular.

Solar PV

Power Purchase Agreements for Renewable Energy

Efficiency & Electrification



Efficiency & Electrification

Industrial decarbonization can be accomplished through efficiency, electrification, and material sourcing decisions, especially in iron and steel.

Check out the US Department of Energy Industrial Efficiency and Decarbonization to learn more.

John Deere Foundry uses electric induction melt to provide iron casting parts for our large tractors.

You can use GHG Protocol Scope 3 Guidance to calculate how recycled materials reduce "Cradle to Gate" CO2e emissions in your supply base.



Power Purchase Agreements for Renewable Energy

Deere achieved 59% renewable electricity globally in 2022. The electricity supplied by Mesquite Sky Wind is equivalent to more than 20% of our global electricity footprint. Deere has secured other long-term agreements for projects globally to harness wind and solar energy, achieving more than 50% renewable electricity in the US, India, and Mexico through 2030. Join us by investing in new, long term renewable electricity assets at scale.

The International Renewable Energy Agency (IRENA) is a platform for international energy transition data and analyses on technology, innovation, policy, finance and investment.



Solar PV

Solar PV dominates global corporate renewables contracting, with a share of almost 70% in 2022.

Check out US renewable electricity incentives.

Agrivoltaics represent an exciting new field of farming alongside Solar PV. Check out a US Department of Energy project exploring the environmental compatibility and mutual benefits of solar development with agriculture and native landscapes.

JDSN: John Deere Supply Network



Product Circularity

Consider ways to incorporate and verify recycled and sustainable content in your commodity procurement and product design.

Learn more about how John Deere is addressing product circularity with our sustainable procurement and remanufacturing goals.

Recycled and Recyclable

Remanufactured Parts & Components

Design for Environment



Design for Environment

Circularity Verifications

Tier 1 through Tier “n” sourcing decisions can be used to increase recycled content and other sustainable materials. Using Life Cycle Assessments to learn more about mills, foundries and feedstocks in your supply chain can help create opportunities to lower resource intensity and ensure recyclability of products and materials.

[ISCC PLUS certification](#) allows for the verification of circular attributes of chemicals, plastics, packaging, textiles and feedstocks.

[CRU's Emissions Analysis Tool](#) allows you to compare recycled content and emissions of steel mills globally to inform sourcing decisions.



Recycled and Recyclable

Our John Deere [Product Circularity Goals](#) are 65% sustainable material and 95% recyclable content by 2030.

65% product sustainable material content – Materials that provide environmental, social and economic benefits over the material's whole life cycle. This equates to recycled content and renewable content used in producing a component.

- [ISO 14021](#) – Environmental labels and declarations
- Recycled content – Material that has been reprocessed from recovered material by means of a manufacturing process and made into a component or final product. Includes only pre-consumer (post-industrial) and post-consumer materials.
- Renewable Content – Material that is composed of biomass from a living source and that can be continually replenished.

95% recyclable product content – Ability of a component or material that can be diverted from an end-of-life stream to be recycled.

- [ISO 16714](#) – Earthmoving Machinery Recyclability and Recoverability Rates.
- Recyclability rates depend on the design and material properties of new machines and on the consideration of proven technologies – those technologies which have been successfully tested, at least on a laboratory scale.
- The calculation method cannot in detail reflect the real process that will be applied to the machine at end-of-life



- ISCC Principles
- GHG Emissions Calculations
- Circularity

ISCC's vision is a carbon-neutral world and a true circular economy in which waste is no longer produced, but instead reused and recycled to create circular products and regenerate nature. Sustainable agriculture that increases biodiversity and creates healthy ecosystems is part of this vision as well as a resilient economic system which ends the consumption of finite resources.

***Therefore ISCC certification is based on the six ISCC Principles, which must be met and are consistent with many of the Sustainable Development Goals, set by the United Nations.** This way, ISCC supports companies to act more responsibly. With specific guidance for audits and their preparation, ISCC facilitates the correct implementation of its sustainability requirements and allows sustainable production of various feedstocks across continents.*

To move towards a carbon-neutral world, we furthermore need to incentivize the use of products and practices that contribute to the reduction of greenhouse gas emissions. Through consistent greenhouse gas calculations across product life cycles including their robust auditing and verification, ISCC ensures that GHG information is credible. This, in turn, leads to investment in practices that reduce emissions.

JDSN: John Deere Supply Network



Show us your Sustainability Story

Communication of good ideas is always our best way forward, and we're looking forward to the conversation with you.

Whether you want to share your company history: [Deere.com/history](https://www.deere.com/history), work to achieve a more just society: [Deere.com/leap](https://www.deere.com/leap), work on sustainability: [Deere.com/sustainability](https://www.deere.com/sustainability), or discussion of future products: [Deere.com/electric](https://www.deere.com/electric), we want to know your story.

Supplier Sustainability Award

Achieving Excellence

JD Crop



Supplier Sustainability Award

Please share your sustainability success stories with us by submitting your sustainability projects in our Annual John Deere Supplier Self-Nominating Awards for Innovation, Diversity, and Sustainability.

[Previous Sustainability Award Winners](#)

For more information write to: SCSustainability@JohnDeere.com



JD Crop

[JD CROP](#), the John Deere Cost Reduction Opportunities Process, is one of several criteria under the Value Creation Category of the Achieving Excellence Process. JD CROP was designed with supplier input to engage, capture, and communicate supplier efforts.

John Deere believes that being an efficient and profitable business goes hand in hand with being a good steward of the environment. If a supplier submits an [environmental suggestion](#), we will give the supplier a .25% credit toward their 3% goal.

Contact Us: JDCROPCoordinator@JohnDeere.com



Achieving Excellence

[Achieving Excellence](#) is a dynamic supply management tool that provides a framework for John Deere and suppliers to follow and ensures a shared vision and commitment.

Capture your supplier sustainability initiatives in our [AE Behavior Matrix](#).

JDSN: John Deere Supply Network



EcoVadis

John Deere began utilizing [EcoVadis](#) in 2020 to engage our supply base in corporate social responsibility and sustainability ratings and to assess the sustainability performance of our key suppliers. Suppliers that complete the sustainability assessment will gain a deeper understanding of sustainable practices in environmental, labor and human rights, ethics, and sustainable procurement. John Deere utilizes supplier sustainability scores as part of our procurement processes, our supplier evaluation processes in Achieving Excellence, and providing supplier awards and recognition for sustainability projects and improvement.

The EcoVadis sustainability assessment provides suppliers an excellent understanding and baseline knowledge to also participate in critical sustainability initiatives around CO₂e emission (Green House Gas) reductions and reporting, waste management and reduction, and product circularity improvement (recyclability and sustainable material usage). With the John Deere Leap Ambitions to complete significant improvements in each of the above areas for our operations and our supply chain by 2030, we are expecting our suppliers to be able to measure and report on these critical environmental elements.

[Registration and Help Resources](#)[EcoVadis Value and Process](#)[Accelerate Initiative](#)

STRENGTHS & IMPROVEMENTS

[Contact Your SBM](#)

JDSN: John Deere Supply Network



Packaging and Waste

John Deere looks to minimize packaging and handling waste with reusable containers, pallets and void fill.

[Reusable Containers](#)[Circular Pallets](#)[Recycled Void Fill](#)

Sustainability @ John Deere

We're running for a world where people and planet prosper.

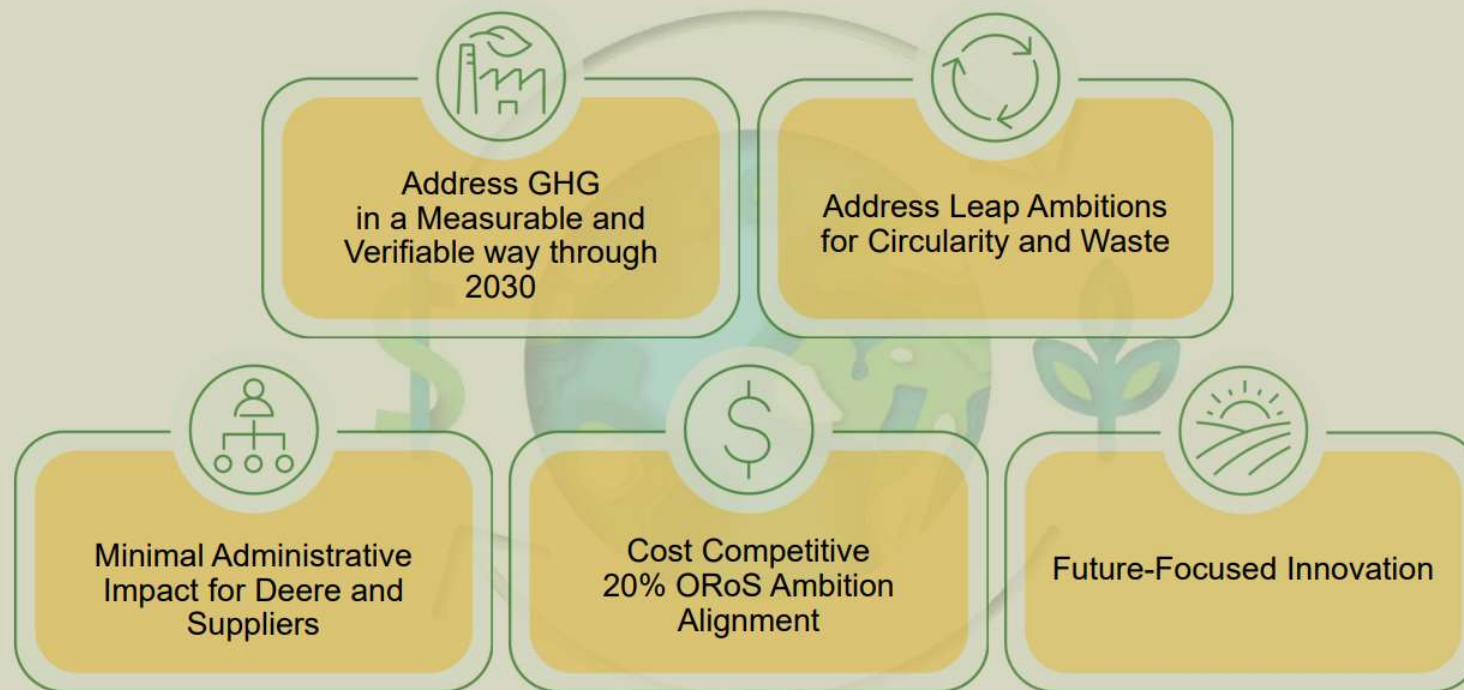
Check out our sustainability reports and LEAP ambitions for supplier sustainability.

[John Deere Sustainability
Reports](#)[LEAP
Ambitions](#)[Link to previous John Deere Supplier Sustainability
page](#)

SUPPLIER SUSTAINABILITY

Guiding Principles

Purpose: To Educate, Harness Engagement, Provide Focus, Gain Alignment, Determine Priorities



Recycle and Bio-mass content need to be Certified to meet FTC 260 requirements. (UNESCO, ISO/EN/China/India/CARB/EPA, Etc.)

260.12 recyclable claims - A product or package should not be marketed as recyclable unless it can be collected, separated, or otherwise recovered from the waste stream through an established recycling program for reuse or use in manufacturing or assembling another item.

260.13 recycled content claims - Materials that were recovered or otherwise diverted from the waste stream, either during the manufacturing process (pre-consumer) or after consumer use (post-consumer)

260.16 renewable materials claims - Marketers should clearly and prominently qualify their renewable materials claims

Key Supply Chain Sustainability Links

For more information write to: SCSustainability@JohnDeere.com

Leap Ambitions and Supply Chain Sustainability

- [John Deere Sustainability Report](#)
- [Leap Ambitions Strategy](#)
- [Supply Chain Sustainability Video](#)
- [Supply Chain Sustainability Strategy](#)
- [John Deere and Supplier Sustainability FAQ](#)
- [Supply Chain Sustainability Guiding Principles](#)

EcoVadis Sustainability Program

John Deere utilizes EcoVadis for supplier sustainability ratings. Critical (AE) suppliers are expected to complete the EcoVadis sustainability assessment and all suppliers are encouraged to complete it.

- [About John Deere EcoVadis Sustainability Program](#)
- [EcoVadis Log-in link](#)
- [EcoVadis Assessment Program Registration](#)
- [EcoVadis Help Desk / Center](#)

Achieving Excellence & Sustainability Reporting

[and AE Sustainability and Diversity Ratings](#)

[G Reporting FY24 Baseline \(FY23 EOY\)](#)

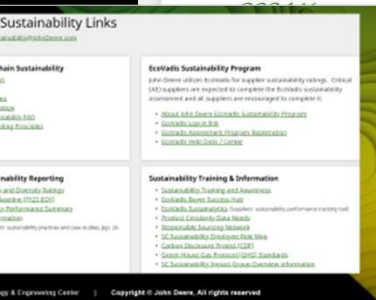
[er Env. Sustainability Performance Summary](#)

[nability Award Information](#)

[tal JD CROP](#) (Suppliers' sustainability practices and case studies, pgs. 20-

Sustainability Training & Information

- [Sustainability Training and Awareness](#)
- [EcoVadis Buyer Success Hub](#)
- [EcoVadis Sustainability](#) (Suppliers' sustainability performance tracking tool)
- [Product Circularity Data Needs](#)
- [Responsible Sourcing Network](#)
- [SC Sustainability Employee Role Map](#)
- [Carbon Disclosure Project \(CDP\)](#)
- [Green House Gas Protocol \(GHG\) Standards](#)
- [SC Sustainability Impact Group Overview information](#)



Our Supplier (Molders/Processors) “Some Material Suppliers”

- . Baseline Data Points (EcoVardis) (2022 -2024)**
- . Training (John Deere Goals and Expectations) (2023-2025)**
 - . John Deere Rating System (2023 - Forward)**
- . Metrics Scorecard (Now and the Future) (2023 -2030)**
 - . Recycled Content and Greenhouse Reductions**
- . Timelines (This will vary by country and region) – (2022 -2032)**
- . Traceability (CO2 Footprint & LCA will be required) (2025) ISCC + CBAM**
- . Design Forward (2025 -2030)**
- .COST !!!!!!!!!!!!! (Neutral)**

ISO 14000 Series Today: JD Quality Expectations

List of ISO 14000 series standards [\[edit \]](#)

- **ISO 14001** Environmental management systems - Requirements with guidance for use
- **ISO 14004** Environmental management systems - General guidelines on implementation
- **ISO 14005** Environmental management systems - Guidelines for a flexible approach to phased implementation
- **ISO 14006** Environmental management systems - Guidelines for incorporating ecodesign
- **ISO 14015** Environmental management - Environmental assessment of sites and organizations (EASO)
- **ISO 14020 to 14025** Environmental labels and declarations
- **ISO/NP 14030** Green bonds -- Environmental performance of nominated projects and assets; discusses post-production environmental assessment
- **ISO 14031** Environmental management - Environmental performance evaluation - Guidelines
- **ISO 14040 to 14049** Environmental management - [Life cycle assessment](#); discusses pre-production planning and environment goal setting
- **ISO 14050** Environmental management - Vocabulary; terms and definitions
- **ISO/TR 14062** Environmental management - Integrating environmental aspects into product design and development
- **ISO 14063** Environmental management - Environmental communication - Guidelines and examples
- **ISO 14064** Greenhouse gases; measuring, quantifying, and reducing [greenhouse gas emissions](#)
- **ISO 14090** Adaptation to climate change — Principles, requirements and guidelines

ISO 20400: Sustainable procurement

ISO 14044 LCA

ISO 14064
CO2 Measuring

Polymers : Four Classification to Sustainability for Polymers

PIR Mechanical Recycled Materials

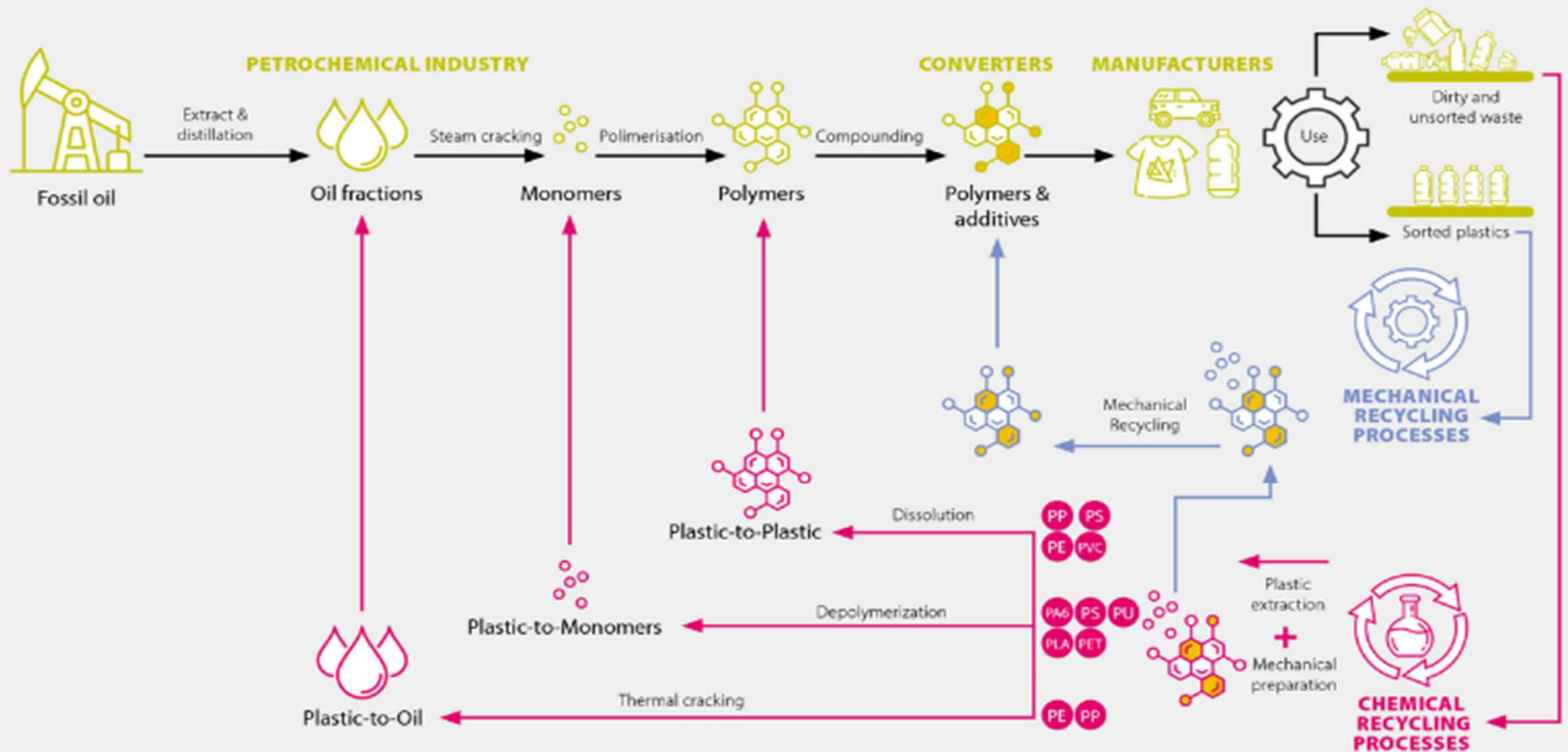
PCR Mechanical Recycled Materials

Advance-Chemical Recycled Materials

Bio-Based Materials (Not Fillers – EPR)

LCA = Greenhouse Emissions (2025) and Reach, PFAs free, etc

PRODUCTION OF VIRGIN AND RECYCLED PLASTICS



Source: Veolia

Post Consumer Resin (PCR)

Post consumer resin (PCR) is defined as plastic that served its intended purpose for consumers, is collected, cleaned and repelletized for use in future plastic goods.

- Examples: Water bottles, food containers, shipping materials, car seats, toothbrushes, etc...



Post Industrial Resin (PIR)

Post industrial resin (PIR), is defined as plastic that has been converted into a product that is out of specification or not saleable and thus never made it to the consumer., aka “pre-consumer” waste. Ex: Labels, Carpet, non saleable plastic.

ISO 14022

- 1) Pre-consumer material:: Material diverted from the waste stream during a manufacturing process. Excluded is reutilization of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it.





Post-consumer (PCR)

Reclaimed material from homes and businesses.



Post-industrial (PIR) aka pre-consumer

Imperfect bits and scraps recovered from a factory.

PIR is often considered related to “production efficiency” rather than sustainability or circularity because it is recovered material waste or excess product from a company’s manufacturing processes. ***(Still open issues on definitions)***

PCR vs. PIR

PCR is **the primary** focus when it comes to sustainability and circularity and will be the focus.

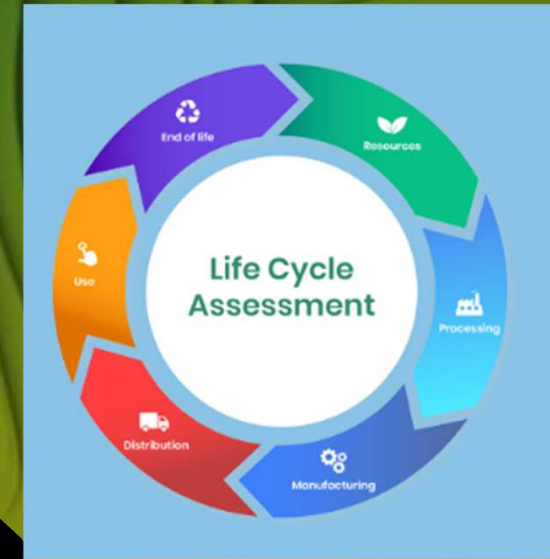
- **It will/is Legislation driven!!**

Understand how some LCA's Mass balance can be a Variable

Each Material “Must” have an LCA in order to be utilized by John Deere to be counted towards the sustainability score.

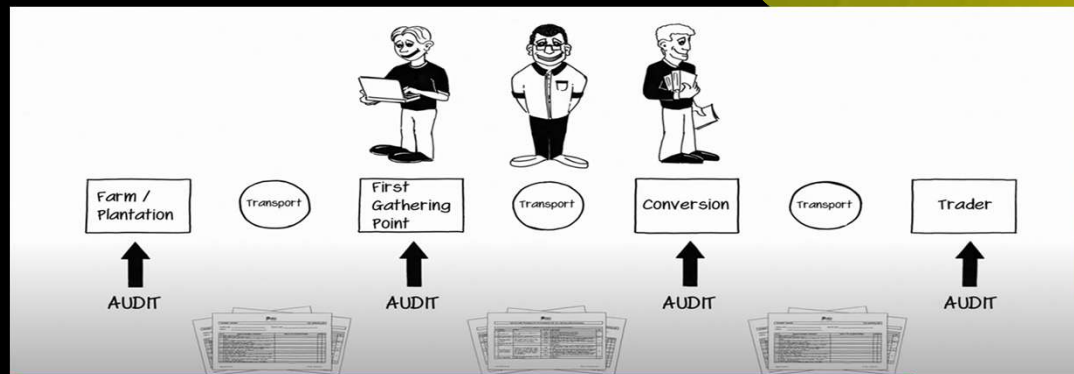
LCA-Polymers/Elastomer
LCI-Steel
LCIA-Hybrids

Lifecycle analysis (LCA) has proven a favorable environmental impact. LCA's compare the difference in carbon dioxide (CO2) emissions and water and energy consumption to that of virgin materials and it will also provide data on the PCR, PIR, and Bio aspects of the materials .



Note: Standards will vary Globally.

ISO 22905 ISO 14044
EN15343
UL 2809



Mass balance approach according to International Sustainability and Carbon Certification (ISCC)



Mass balance

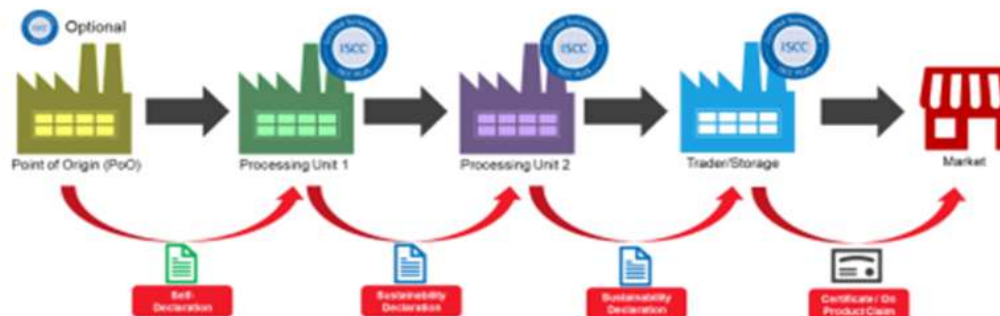
- Increasing circular feedstock
- Processing with existing equipment
- Constant production quality and efficiency



Certification by ISCC



- Multi-stakeholder initiative (incl. NGOs ...)
- Traceability of materials along the supply chain
- Emerging standard in chemical industry



RENEWABLE OPTION: ELCRIN™ SLX2271TB EXAMPLE ISCC+ CERTIFICATE (MASS BALANCE APPROACH)



Certified Renewable Polycarbonate Sustainability Declaration according to ISCC PLUS

Supplier: **Example customized ISCC certificate based on renewable content grade**

Customer name: **xxxxxx**
 Customer Address 1: **xxxxxx**
 Customer Address 2: **xxxxxx**
 Customer Address 3: **xxxxxx**

Customer Purch. Ord: **xxxxxx**
 Sales Order: **xxxxxx**
 Delivery No.: **xxxxxx**
 Delivery Date: **28.11.2019**
 Manufacturing Plant: **Shanghai**
 Manufacturing Date: **22.11.2019**

Certification system: **ISCC PLUS**
 Certificate No.: **ISCC-PLUS-0450000**

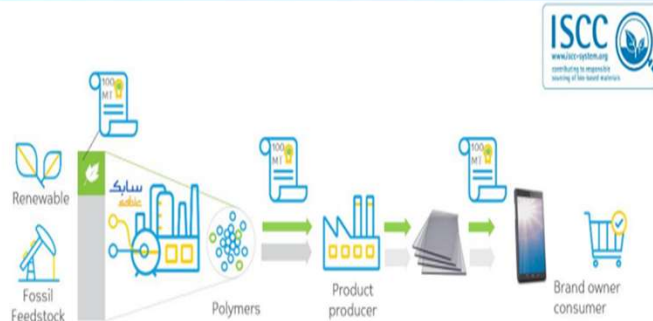
Product related information:

Product Description: **SLX2271TB-0103094-94G-00-00-00**
 Product Batch No.: **001020000**
 Delivered city (kg): **1200**

For every 100kg of this Polycarbonate Product, 32 kg of oil-based materials have been replaced by renewable materials. **
 Renewable material is fuel produced from biomass waste (oil oil with country of origin: Finland). The raw material complies with the sustainability criteria according to Art. 17 (3), (4) and (5) RED.
 Hereby we confirm that our supplier has been certified under the ISCC Framework as the producer of receipt of the certified renewable feedstock.
 The entire supply chain is ISCC compliant.

Date of issuance: **28.11.2019**

* Product Batch No. represents the unique number of Sustainability Declaration
 ** Based on Mass Balance approach



Bio-based resins based on cracker feedstock:

- Mass balance approach. Bio content certified by ISCC+

RENEWABLE COMPOUNDS BENEFITS

Same product, same properties:
Drop in solution with no tooling changes

Better carbon/energy footprint

Equivalent color space

Requalification not required

LCA impact:
23% reduction or
1.3 kg CO₂ eq./kg
carbon footprint reduction
compared to virgin grade

Estimated renewable content*
Renewable SLX2271TB 32%

The majority of resin supplier today are ready for this transition.

Alternates for PPC1GF3UV-Black

- 30% Glass Fiber PP Impact Copolymer (B66620)
- Currently no recycle content, GWP = 1.708 kg CO₂-eq/kg
- Highest recycle content grade PPR55GF3.0MFUV-Black V1
 - 88% recycle content, GWP₁₀₀ = 0.848 kg CO₂-eq/kg
- Lowest cost option PPR55GF3.0MFUV-Black V2
 - 58% recycle content, GWP₁₀₀ = 0.860 kg CO₂-eq/kg

Proprietary & Confidential Property of Audia International, Inc.



Turning off the Tap

How the world can end plastic pollution and create a circular economy

Market transformation to circularity through
3 MARKET SHIFTS

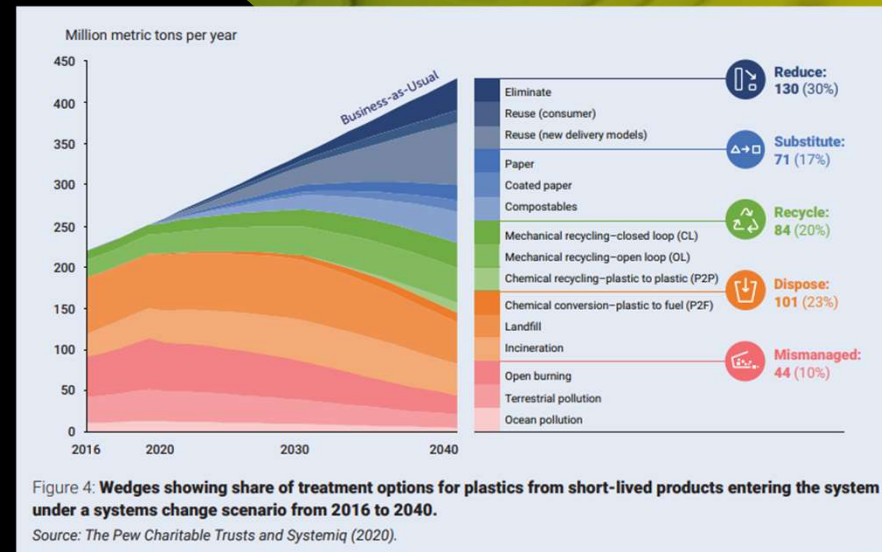
REDUCE
the size
of the
problem



Deal
with the
LEGACY

Policies and Regulatory Framework

treaty could put requirements on how the plastics industry operates, including material and additive restrictions, minimum recycled-content requirements, and EPR or other fees to finance recycling.



M1. Mandate the implementation of Extended Producer Responsibility schemes	EPR schemes are applied to 100% of new plastic products and packaging by 2030	High legislative requirement	 better design + financing opex/capex of circular processes
M2. Binding common design standards for reuse and recycling	Common design rules and standards for reuse and recycling in place by 2030	High legislative requirement	

D3. Public investment in plastic waste collection	100% collection of plastic waste by 2030	Medium fiscal policy	 ensuring safe and fair recycling in practice and at scale
D4. Mandate to strengthen the alignment between the informal and formal plastics waste sector	100% plastic collection by the informal waste sector is aligned with mainstream solid waste management	High legislative requirement	 ensuring safe and fair recycling in practice and at scale
D5. Establish ambitious recycling targets per material / application	Over 50% of plastics are recycled by 2035	High legislative requirement	 boosting demand for secondary plastics / de-risking investment in recycling capacity

U1. An incremental rising tax/fee on the purchase of virgin plastic products by manufacturers of plastic packaging and plastic-containing products	An incremental rising virgin plastic tax/fee is in place by 2025; rising from 15% (2025) to 50% (2040) of the externality cost	High legislative requirement	 by bringing price of virgin plastic closer to its real cost
U2. A prohibition of products containing problematic or unnecessary plastic	No new unnecessary polymers or products containing problematic or unnecessary plastics are made, distributed or sold after 2025	High legislative ban	 by simplifying recycling processes
U3. Control measures on chemicals of concern	Control measures to prevent chemicals of concern put on the market after 2025 and their use in plastic products	High legislative controls	
U4. Obligation to replace plastics if safe and more sustainable alternatives exist	Substitution rate of 100% where more sustainable alternatives exist by 2030	High legislative requirement	
U5. Fiscal policy incentives for companies shifting their operations to circular plastics	Definition of criteria for sustainable circular plastic operations by 2025 to see acceleration of investments by 2030	Medium fiscal policy	
M1. Mandate the implementation of Extended Producer Responsibility schemes	EPR schemes are applied to 100% of new plastic products and packaging by 2030	High legislative requirement	 better design + financing opex/capex of circular processes
M2. Binding common design standards for reuse and recycling	Common design rules and standards for reuse and recycling in place by 2030	High legislative requirement	

The tax rates are €450 (~\$465) per ton of taxable plastic in Spain and Italy, and £200 (~\$250) per ton in the UK. The expected (net) government revenue from the Italian plastic tax was estimated to be almost €470 million (~\$484 million) for the first year, and from the Spanish plastic tax, €724 million (\$745) million. The expected revenue of the British plastic packaging tax is £240 million (~\$300 million) for the first year. In the subsequent years the revenues are expected to decrease as consumers should switch to more reusable, recycled and non-plastic alternatives. In all countries the tax revenues go to the general budget. Environmental benefits are realised through the choice of tax base and eco-modulation of tax rates.

USA / CARB: Plastics manufacturers must pay \$5 billion into a fund over the next 10 years that would mitigate the effects of plastic pollution on the environment and human health, primarily in low-income communities.

Senate Environment & Public Works Legislation

- [S. 3743](#) – the Recycling and Composting Accountability Act (RCAA)
- [S. 3742](#) - the Recycling Infrastructure and Accessibility Act (RIAA)

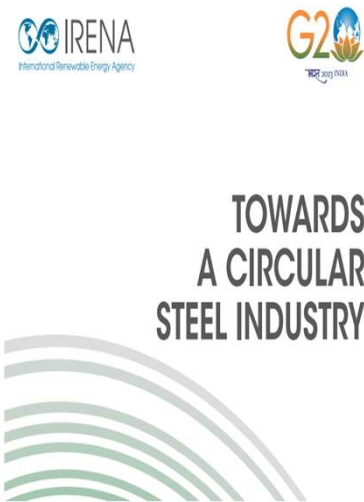
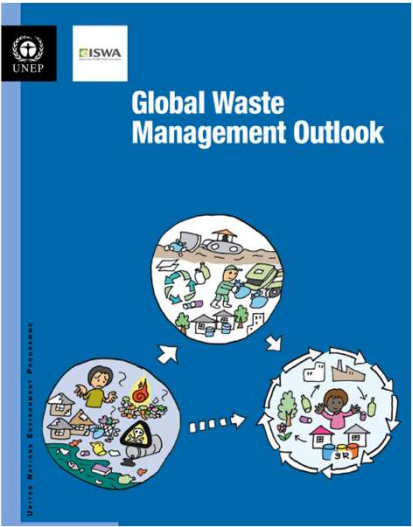
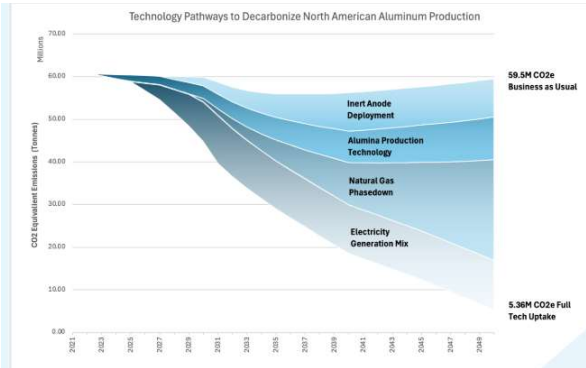
Plastic Waste Reduction and Recycling Innovation Act (H.R. 2821)

EPA's National Recycling Strategy & New RFI related to recycling infrastructure investment.

Global Plastics Treaty

Potential EPR Legislation to be introduced in the House by Reps Schrier & Curtis

It is more than Plastics



Biomass Strategy

WRA welcomes Biomass Strategy

Aug 10, 2023

The Wood Recyclers' Association has today (August 10) welcomed the launch of the government's much-anticipated Biomass Strategy.

[read more](#)

Sustainability Driven:

Accelerating Impact with the Tire Sector
SDG Roadmap

Global Rubber Recycling Market 2023-2027

Industry Report - January 2023

BRIDGESTONE TIRES MADE WITH 75% RECYCLED AND RENEWABLE MATERIALS

- 1. Natural Rubber (Primary and Secondary)
- 2. Recycled Steel and Wire
- 3. Bio-based Black from the Asphalt
- 4. Recycled Steel
- 5. Sustainable Synthetic Rubber
- 6. Sustainable Carbon Black produced from plant-based oil and coal-to-olefin (the products of bio-ethanol conversion)
- 7. Recycled Carbon Black
- 8. Recycled Rubber Chemicals

BRIDGESTONE
Solutions for your journey

Plastics World Plans



Confederation of India Industry

CI-ITC Centre of Excellence for Sustainable Development

WWF

Developed by

wrap

Supported by

United States Environmental Protection Agency

Search EPA.gov

Environmental Topics ▾ Laws & Regulations ▾ Report a Violation ▾ About EPA ▾

CONTACT US



Circular Economy



Target 1		Responsibility Key:			Target by:		
Design for reusability and recyclability							
		L Leads S Supports					
Outcomes	Key activities				End 2021	End 2023	End 2025
Publish criteria that leads to the elimination of agreed list of problematic and unnecessary items by Pact members	Define criteria for prioritising the problematic and unnecessary items Define the problematic and unnecessary items list to eliminate in phase 1 Define the problematic and unnecessary items list to eliminate in phase 2						
Problematic additives identified and phased out from plastic packaging	Develop and implement communications campaign for citizens to refuse to use problematic and unnecessary items Research and produce a list of positive and negative additives Investigate additives used against design intentions Produce guidelines to identify what additives help or hinder recycling Define and communicate the implications for black pigments on recycling Develop consistent tagging to provide information on what's inside Develop a phase-out/replacement proposal of problematic additives for European policymakers						
Increase in recyclability and reusability through improvement in material choice	Produce guidance on material choice in design for reuse vs. design for recycling Communicate distinctions between recyclable materials and non-recyclable materials (e.g. biodegradable) Identify food vs. non-food implications for material choice Develop guidance on material choice for bottles, pots/tubs/trays and films/flexibles Investigate and communicate smarter lid solutions to improve recyclability of the whole packaging						
Pan-European on-pack recycling labelling review for consistency	Analyse validation of claims made by Pact members Collaborate to achieve pan-European consistency on icons and information for on-pack recycling labels Develop guidance for labelling in e-commerce/online shopping						
Technical innovation developed for more efficient labelling	Linking artwork with advanced sorting Develop a landscape review of current technological solutions and future scan Citizen information campaign to accompany the changes in labelling and technology Investigate potential export incentives for technical innovation in labelling Explore opportunities of digitalisation of labelling to expand level of information available						

1. WMC: Waste Management Company
2. This is indicated as to when the activity should be completed. When more than one year is coloured it means that this activity has a separate output for each timeframe.
3. Design for recycling includes both mechanical and non-mechanical recycling.

3 John Deere | Document Title | Date

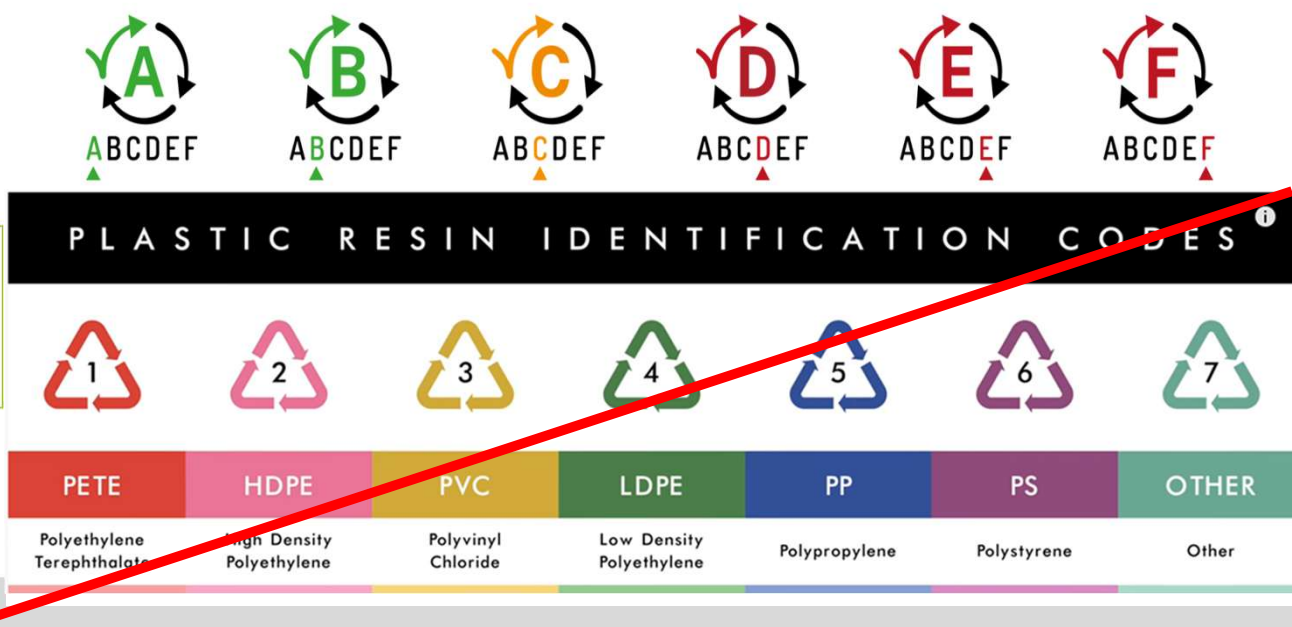
Company Use

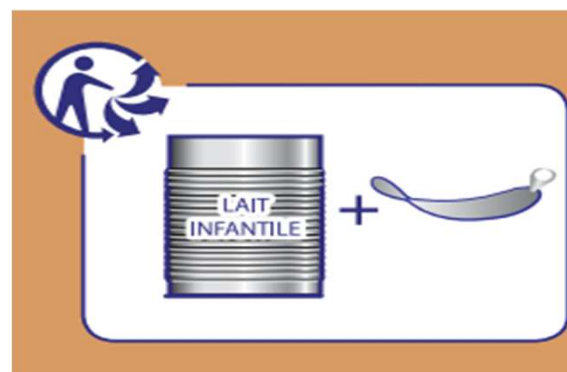
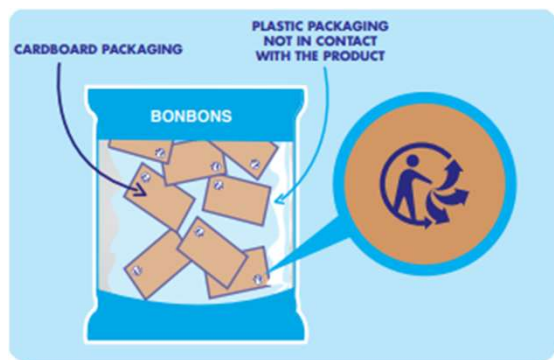
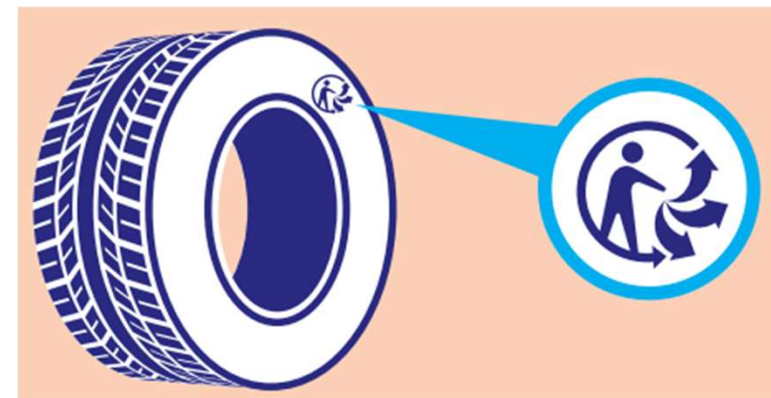
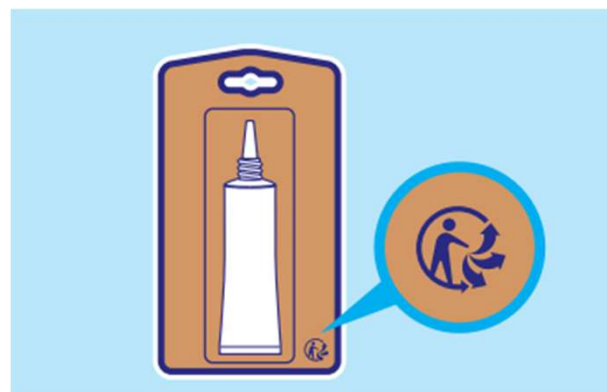
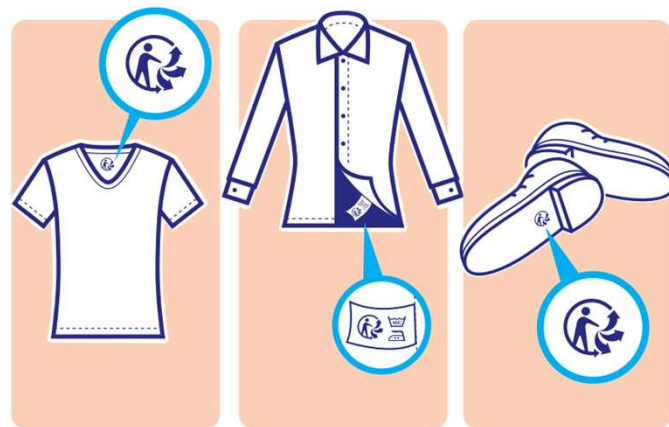


Labeling : A Moving Target

Lawmakers enacted **SB 343**, which prohibits use of the chasing arrows or any other indicator of recyclability on products and packaging unless certain criteria are met.

Increasing recycling in California first requires accurate labels on recyclables. As California moves toward a circular economy that designs all products and packaging to get recycled into new products, this law will ensure recycling labels help consumers recycle correctly.

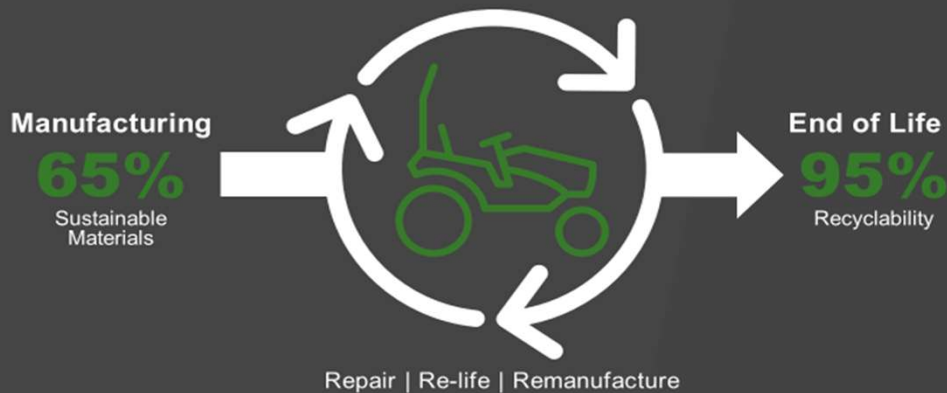




EPR End Producers Responsibility

Extended Producer Responsibility (EPR) is a globally used legislative tool that makes producers responsible for the entire lifecycle of their products. While EPR laws can apply to any product placed on the market, the packaging and packaging waste, electronic or electrical waste, and battery categories have been identified by global legislators as crucial waste streams due to their volume and toxicity.

Product Circularity Background



CIRCULAR ECONOMY

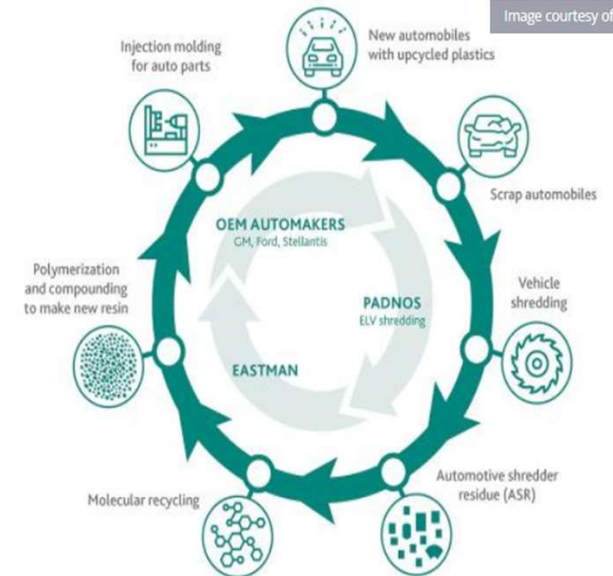


Image courtesy of Eastman

ELV:

On 13 July 2023 the Commission proposed a new Regulation on end-of-life vehicles, following a review.

In line with the European Green Deal and with the Circular Economy Action Plan, the proposal for an ELV Regulation builds on and replaces two existing Directives: Directive 2000/53/EC on end-of-life vehicles and Directive 2005/64/EC on the type-approval of motor vehicles with regard to their reusability, recyclability and recoverability. The proposed new rules cover all aspects of a vehicle from its design and placement on the market until its final treatment at the end-of-life:

- improve circular design of vehicles to facilitate removal of materials, parts and components for reuse and recycling
 - + ensure that at least 25% of plastic used to build a vehicle comes from recycling (of which 25% from recycled ELVs)
- recover more and better-quality raw materials, including CRMs, plastics, steel and aluminium
- ensure that producers are made financially responsible for vehicles when they become waste, to ensure proper financing for mandatory ELV treatment operations and incentivise recyclers to improve quality
- put a stop to vehicles going “missing”, through more inspections, interoperability of national vehicle registration systems, improved distinction of used vehicles from end-of-life vehicles and a ban on exporting used vehicles that aren’t roadworthy
- cover more vehicles, and gradually expand EU rules to include new categories such as motorcycles, lorries, and buses, ensuring a proper end of life treatment.

New

CBAM

REGULATION (EU) 2023/956 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL **Steel, Iron, Aluminum, Fertilizer, Concrete, Hydrogen, and Electricity**

Deere is reporting on these today.

The EU's Carbon Border Adjustment Mechanism (CBAM) is the EU's tool to put a **fair price on the carbon emitted** during the production of carbon intensive goods that are entering the EU, and to encourage cleaner industrial production in non-EU countries.

By confirming that a price has been paid for the embedded carbon emissions generated in the production of certain goods imported into the EU, the CBAM will ensure the carbon price of imports is equivalent to the carbon price of domestic production, and that the EU's climate objectives are not undermined. The CBAM is designed to be compatible with WTO-rules.

CBAM will apply in its definitive regime from 2026, while the current transitional phase lasts between 2023 and 2025. This gradual introduction of the CBAM is aligned with the phase-out of the allocation of free allowances under the EU Emissions Trading System (ETS) to support the decarbonization of EU industry.

Design for Environment

.Training on Materials Classification: Material Engineers (2024/5)

.Training 1st Qtr 2025 John Deere Design Engineers (Europe First)

Regulation (EU) 2024/1781 of the European Parliament and of the Council of 13 June 2024 establishing a framework for the setting of ecodesign requirements for sustainable products, amending Directive (EU) 2020/1828 and Regulation (EU) 2023/1542 and repealing Directive 2009/125/EC

Design for Environment (DfE) is “the systematic consideration of design performance with respect to environmental, health, and safety objectives over the full product and process life cycle.”² DfE, like other concurrent engineering techniques, seeks to address product life-cycle concerns early in the design phase. Thus, it is similar to design for manufacturing (DFM), design for assembly (DFA), and design for production (DFP).⁶ DfE combines several design-related topics: disassembly, recovery, recycling, disposal, regulatory compliance, human health and safety impact, and hazardous material minimization.

DESIGN FOR ENVIRONMENT

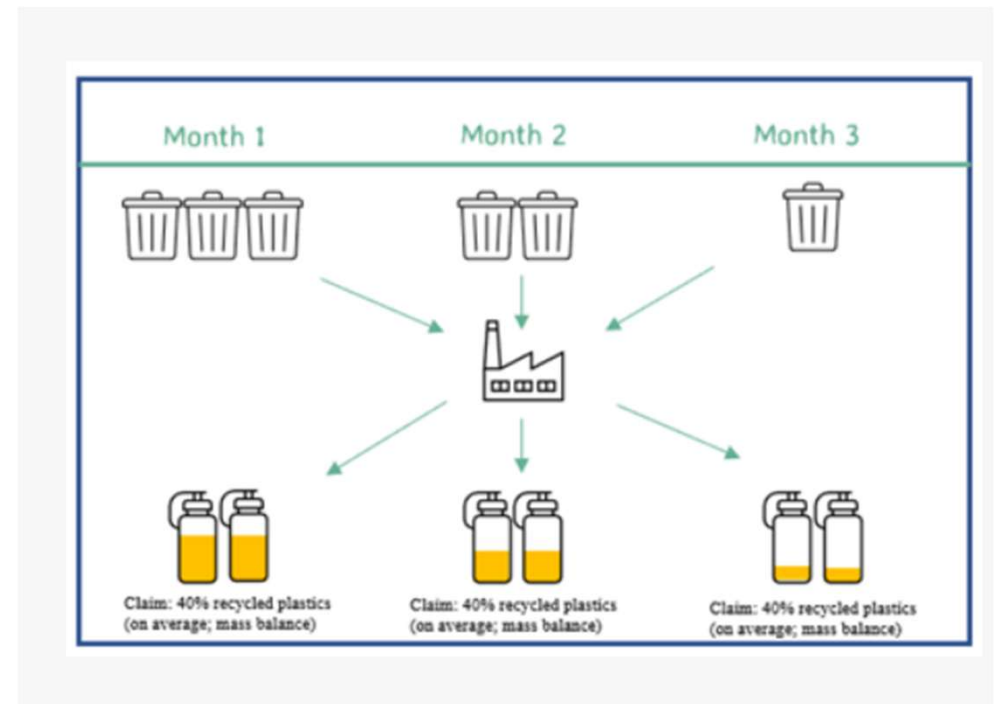
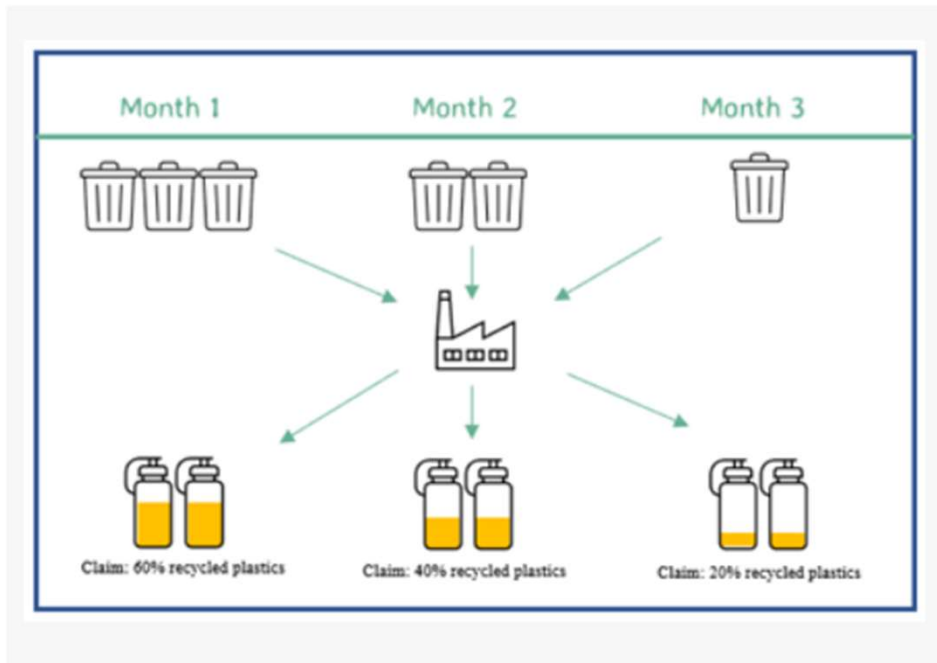
1. Materials, and extraction
2. Production
3. Transport, distribution and packaging
4. Use
5. End of life, Design For Disassembly and Design For Recycling



JOHN DEERE

Mass Balance Method versus Blending Method

Note:



Chemical composition			Amount (%)				
			B10	B20a	B30a	B30b	B40
Carbon number range							
Alkane	C ₁ -C ₁₀		0.39	6.82	3.49	11.28	10.2
	C ₁₁ -C ₂₀		43.72	31.99	53.66	22.17	43.8
	C ₂₁ -C ₃₀		4.30	3.05	6.79	2.88	8.43
	C ₃₁ -C ₄₀		2.32	6.69	2.82	1.04	1.48
Alkene	C ₁ -C ₁₀		0.29	1.80	2.99	4.06	2.98
	C ₁₁ -C ₂₀		–	–	0.58	4.01	2.51
Benzene			4.94	11.99	7.78	7.37	8.90
Naphthalene			4.03	10.60	10.92	6.53	8.6
Fatty acid ME	Common name	Structure					
	Lauric acid ME	C12:0 ME	–	0.43	0.40	0.36	0.40
	Myristic Acid ME	C14:0 ME	0.80	0.62	1.17	0.53	0.56
	Palmitic acid ME	C16:0 ME	2.09	–	0.81	2.13	2.22
	Heptadecanoic acid ME	C17:0 ME	–	1.61	1.53	–	0.82
	Oleic acid ME	C18:1 ME	–	1.11	1.94	0.96	0.48
	Arachidic acid ME	C20:0 ME	0.43	0.48	–	0.56	0.65
	Total saturated fatty acid ME		3.32	3.14	3.91	3.58	4.65
	Total unsaturated fatty acid ME		–	1.11	1.94	0.96	0.48

Chemical composition of binary fuels (B10 and B30a) and quaternary fuels (B20a, B30b and B40).