

THE FUTURE IS ZERO



Scaling Up a Decarbonized World, now.

Coins without a Country



Meetings without the Room





The Onyx Digital Genome Engineering Instrument automates all aspects of large-scale, massively parallel genome engineering experiments — including the cell transformation, CRISPR-based genome engineering, cell growth, and cell recovery — all at your benchtop, all push-button easy. The instrument automatically reads the consumables' barcodes and downloads the corresponding protocol ensuring every instrument run is set up for success. Single benchtop system performs every step of the engineering process while providing real-time monitoring. It supports a CRISPR-edited cell library with thousands of programmed edits generated in 2–4 days.

Stores without the Check-out

amazon go



Rides without the Taxi



TV without the Cord

NETFLIX



Sweetener without the Sugar

Stevia



Cars without the Driver





MADE FROM
ALGAE!





MADE FROM
SPIDER SILK!





MADE FROM
PLANTS!





*MILK WITHOUT
THE COW!*





LEATHER
WITHOUT
THE COW!



Sushi without the Fish



Honey without the bees



Synthetic biology company MeliBio has held a private tasting event for what it claims to be the world's first bee-free honey.

The Berkeley-based company produces honey molecularly identical to the yummy vomit generated by bees. Green Queen's Alessandra Franco, who was among the lucky few to score a sample, said MeliBio's product "tastes, drips and spreads 100% like honey made from bees."

Melibio was founded in 2020 and aims to begin shipping by the end of year. It is currently welcoming foodservice orders. Investors include Big Idea Ventures, Joyance and Sustainable Food Ventures.

"Honey is an ingredient found in every product category, from food to beverage and personal care products for which MeliBio is now providing a plant-based option," says co-founder and CEO Darko Mandich. "By bringing delicious, nutritious, and real honey made without bees to the market, we are shaping our present and future in a way that is better for bees and for humans."



what's
going on
MARVIN GAYE

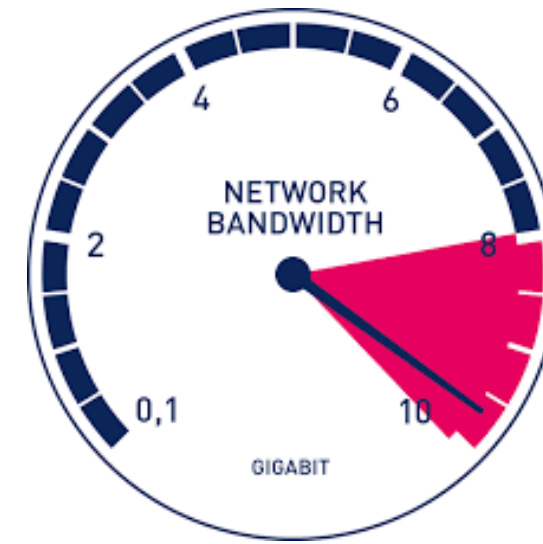
5 REVOLUTIONS CONVERGING



Genetics



Robotics



Bandwidth



Intelligence



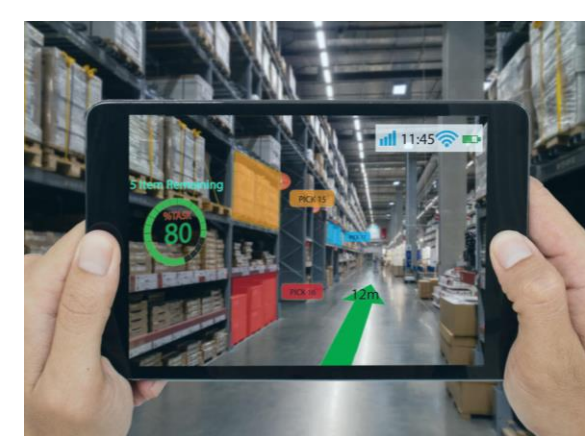
Storage



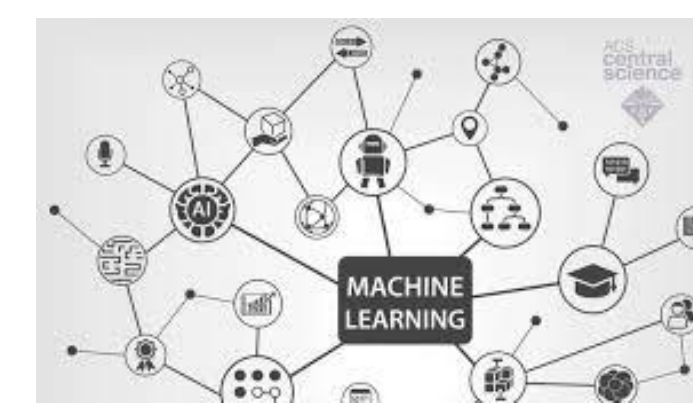
mRNA vaccine gene edits



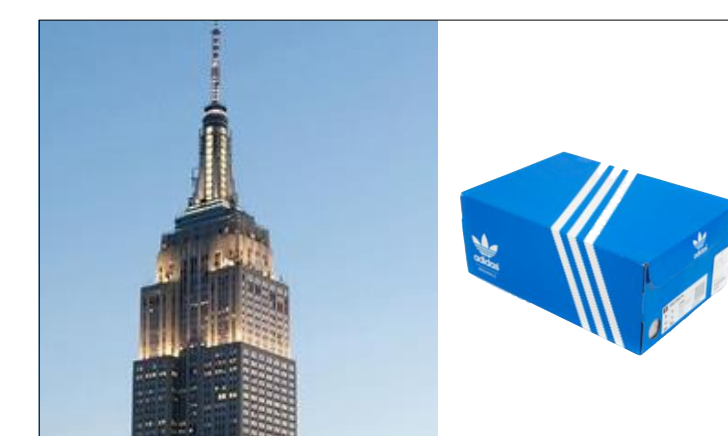
Advanced Warehousing



Augmented Reality



Machine learning



DNA data storage

A dizzying array of companies and institutes



\$20 trillion in ESG funds



BMW without the metals

Luxury automaker BMW has said renewable materials will play a large role in its plans to cut its carbon footprint by 2030.



BMW is working with startup Adriano di Marti S.A. de C.V. on cactus-based material Deserttex, which is comprised of pulverized cactus fibers with a biobased polyurethane matrix. BMW has also made an equity investment in the plant-based material startup Natural Fiber Welding.

The company says it will focus R&D on “environmentally-compatible raw materials” and will work with both startups and established suppliers to develop “pioneering” materials.

“We are setting new standards for sustainable premium quality – by rethinking materials and focusing more than ever on resource-efficient alternatives and renewable materials with strong dismantling capability,” says Stefan Floeck, head of Development Body, Exterior, Interior.

The company already uses renewable raw materials like cellulose, hemp, wood and bamboo, but plans to evaluate wood foams to replace acoustic foams as well as alternative leathers.

Chanel without the Plastics

Iconic fragrance brand Chanel has launched plant-based, biodegradable caps for its perfume bottles.



Finding a material capable of meeting such specific performance criteria is “a message to other industries that sustainable plastic alternatives can meet the most rigorous standards,” Suvi Haimi, CEO of Sulapac, tells Global Cosmetics News. “The big revolution is that you no longer need to use plastic.”

Following two years of research and nearly 50 prototypes, Chanel settled on material made by Sulapac, a Finnish producer of plant-based plastic. Criteria included sound when cap is fastened, and the “depth of the satiny matte finish on the iconic double C engraving.”

The caps are 91% biobased. Chanel will use the material on all of its 125 mL Les Eaux de Chanel fragrances.

Crocs without the Carbon



90,000 PAIRS OF CROCS SAVED FROM LANDFILLS IN 2020

45% OF ALL CROSLITE™ PRODUCTION SCRAP IS RECYCLED

100% VEGAN BRAND BY END OF 2021

85% OF ALL PRODUCTS SOLD WITHOUT SHOE BOXES IN 2020

860K SHOES The Free Pair for Healthcare program donated another 860,000 pairs of shoes to frontline healthcare workers in 2020.

Old Navy without the Rubber

The ubiquitous, no-frills Old Navy summer flip-flop is getting a renewable makeover thanks to EVA foam made from sugarcane.



On sale now for \$4.99-\$8.99, the flops are available in four styles—classic, T-strap, Jelly Criss-Cross and Jelly Slide. All feature an EVA outsole that is 51% sugarcane-based.



The new offering from Old Navy is just the latest in a line of new products based on renewable materials that span all price points. Walmart recently launched bras made from sugarcane-based materials, while high-end brands Gucci and Alexander McQueen are working with Bolt Threads on luxury goods made from mushrooms.

In April, Old Navy announced the elimination of plastic shopping bags in the U.S. and Canada stores by 2023, alongside other plastic reduction commitments aimed at creating a greener, cleaner future for the next generation. The brand will also invest in a new wave of earth-minded changemakers in honor of the 51st anniversary of Earth Day. In partnership with 11-year-old Next Gen leader Ryan Hickman of Ryan's Recycling Company, Old Navy will fund 51 GoFundMe fundraisers from young advocates leading environmental progress in their communities.

“These flip-flops are partially made from renewable sugarcane, which helps cut down on our consumption of fossil fuels,” Old Navy says. “It looks and feels just like your favorite flip-flops, while helping reduce our carbon footprint.”

Adidas without the Crude Oil

THE BRANDSTAND

This Stan Smith FOREVER branded shoe featuring a PRIMAGREEN upper made with 80 percent recycled material.

“Plastic is a design failure disguised as an incredible material. It is cheap and strong, and it can be turned into a thousand different forms,” says the company. “These characteristics are what make plastic so attractive to manufacturers and consumers alike. They are also what make plastic one of the most ubiquitous pollutants on our planet.”

Primeblue is a high-performance recycled material made in part with Parley Ocean Plastic—upcycled plastic waste intercepted from remote islands, beaches, coastal communities, and shorelines, preventing it from polluting our oceans.

Parley For The Oceans was formed to bring together people, organizations, and brands to find new answers to today’s major ocean threats, like plastic pollution. Adidas was a founding member of the organization.

Recycling? Plastic waste is collected and baled by Parley’s global cleanup network. The plastic is cleaned, stripped, and manually sorted, then flaked via crushing, washing, and dehydrating. The flakes are heated, screened, cleaned, and dried before being extruded, cooled, and chopped into resin pellets. The pellets are melted into a filament that can be spun into Ocean Plastic, a high-performance polyester yarn with all the qualities you’d get from virgin plastic.

The ADIDAS RUN FOR THE OCEANS event aims to clean up to 500,000 pounds of plastic waste to prevent it from entering our oceans. “We came a long way and we won’t stop here,” the company avers.

Adidas sez: “As we continue to address our overall carbon footprint, we’re shifting to use 100% recycled polyester in our products by 2024. This is bigger than sport, this is for our future.”





Airbus aims to develop the world's first zero-emission commercial aircraft by 2035. Hydrogen propulsion will help deliver on this ambition, they say.

The ZEROe concept aircraft seen here, enables the exploration of a variety of configurations and hydrogen technologies that will shape the development of future zero-emission aircraft.

Buildings without the Steel

SKYSCRAPER USING SALT, SUNFLOWERS, AND ALGAE BY FRANK GEHRY

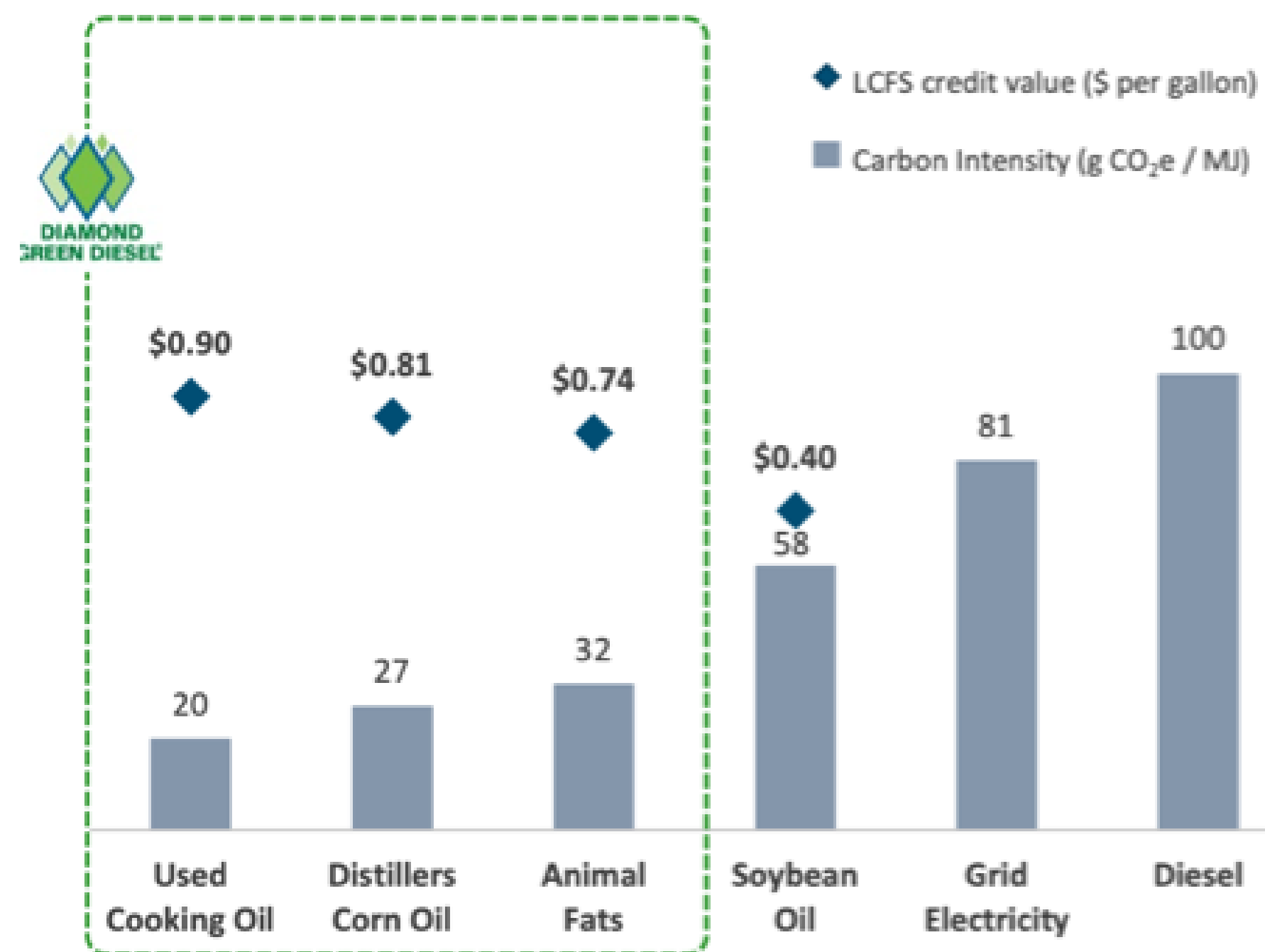
In Arles, France, a tower designed by famed architect Frank Gehry features elements made from salt, sunflowers, and algae to lower its carbon footprint. Both the salt and algae are sourced from the nearby Rhône river. Salt crystals were grown on metal mesh in an energy-less process to form panels. Leftover algae was used to make 30,000 injection-molded tiles in 20 colors, and a ground floor bar uses sunflower waste in acoustic panels.

THE PROFIT DRIVER



Diamond Green Diesel (DGD) Feedstock and Margin Indicator

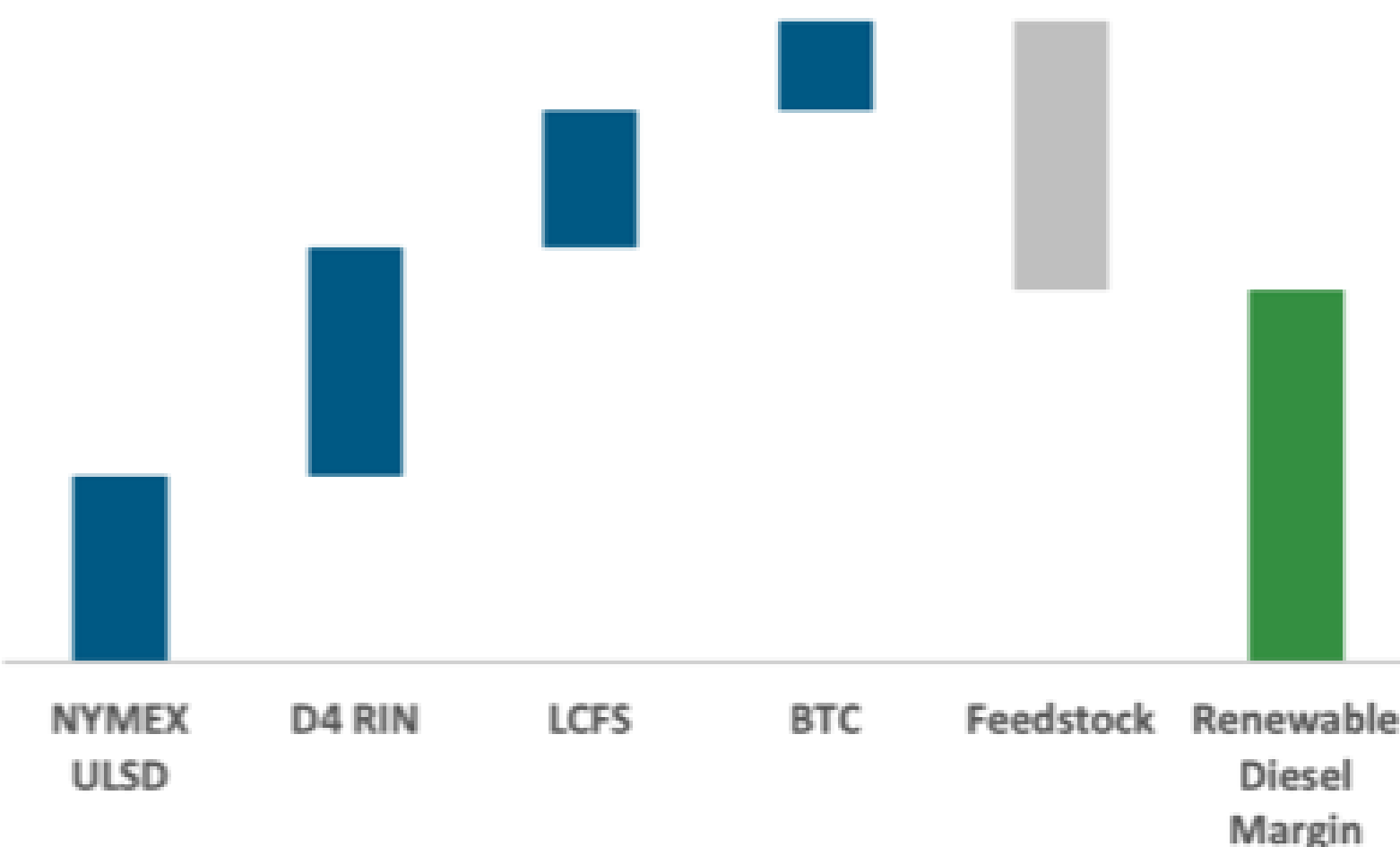
DGD Feedstock Carbon Intensity and Product Value



DGD Margin Indicator*

\$ per gallon

New York Ultra Low Sulfur Diesel (ULSD) price (\$ per gallon)
 + 1.7 * Renewable Identification Number (D4 RIN, \$ per RIN)
 + 0.007 * Low Carbon Fuel Standard (LCFS) credit (\$ per metric ton)
 + BTC (\$/gal)
 - 8.5 * Chicago Soybean Oil price (\$ per pound)



Source: California Low Carbon Fuel Standard (LCFS) 2023 values, assuming \$100 per metric ton carbon price.

* Illustrative pricing

RD/ SAF PLANNED CAPACITY

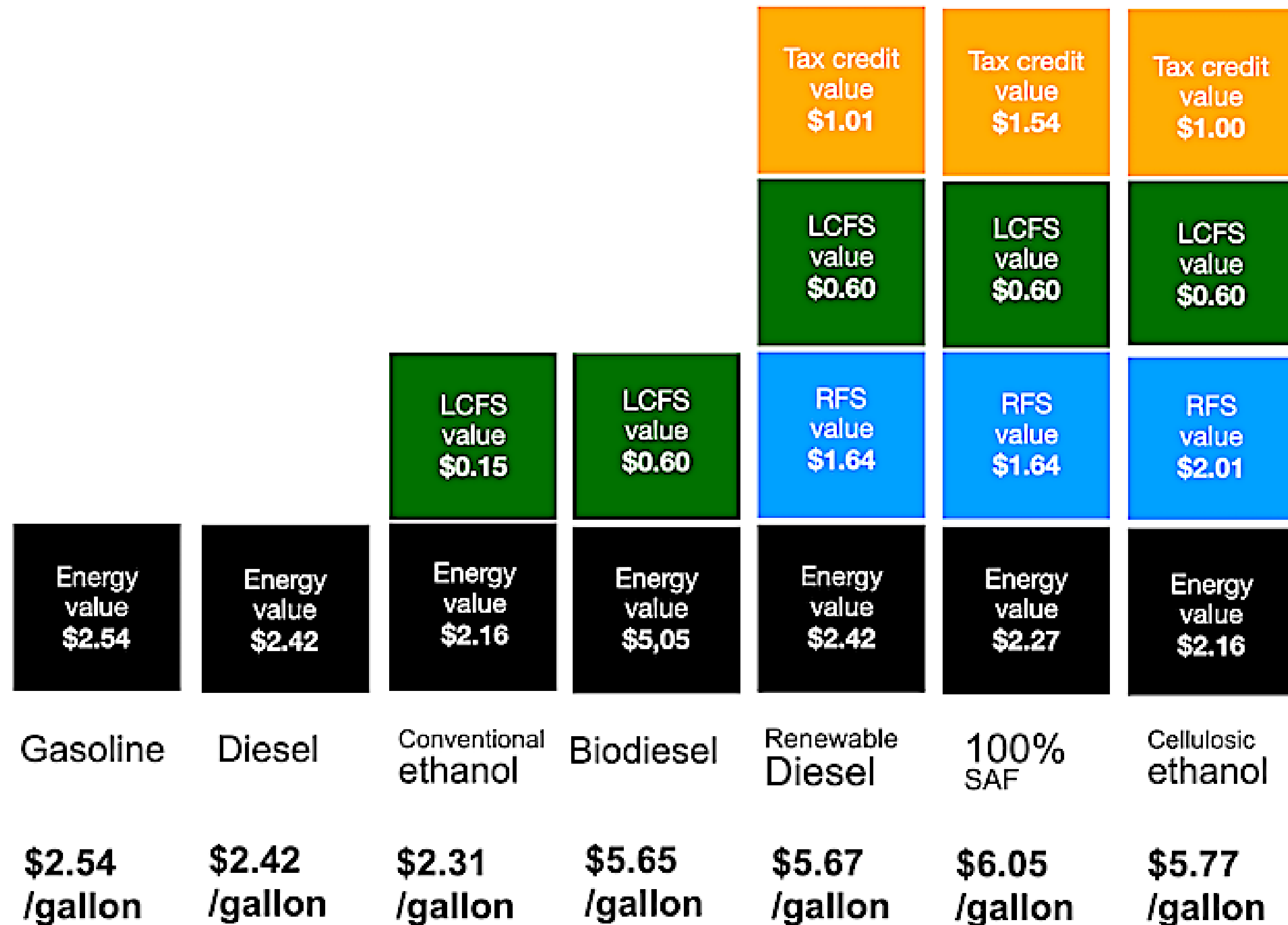
More than **30.5B gallons** of heavy duty renewable fuels capacity is in place/under construction/in planning around the world. At today's RD prices, that's a \$200B+ market, and a **1.3% increase** since our **State of SAF update on 6/29/23**.

Project	US	ROW	Gevo			Oceania		
Aemetis	90.0	0.0	Global Bioenergies	65.0	0.0	Omega Green	300.0	0.0
Acenel Brazil		260.0	Global Clean Energy	230.0	0.0	Pan Oleo India		0.5
Afanar		26.0	Grön Fuels	996.0		Parkland	0.0	100.0
Alder	150.0	0.0	Heartwell	75.0	0.0	PBF	300.0	0.0
Azure Renewable Fuels		378.0	HIF Global	168.6		Preem	0.0	100.0
Bangchak		90.0	HOBO	120.0	0.0	Prince George	0.0	37.0
BBF Manaus Brazil		143.0	HollyFrontier	200.0	0.0	Raven SR	60	
Bio-D Colombia		50.0	HySKies		27.0	RETI Calgary		100
BioTJet		33.0	Imperial	0.0	300.0	Seaboard	85.0	0.0
Bolivia	0.0	120.0	Indaba	100.0		SG Preston	0.0	2600.0
BP (Cherry Point, Kwinana)	109.0	153.0	Infinium eFuels	7.2		Shell	300.0	265.0
Braya Renewable Fuels		214.0	Indian Oil		26.4	Sherdar		150.0
Chevron REG	340.0	0.0	JetZero		26.0	Sinclair	115.0	0.0
Cielo	0.0	50.0	Kosan Gas		0.5	SkyNRG	27.0	15.0
Covenant	0.0	100.0	LanzaJet	10.0	0.0	Strategic Biofuels	100.0	
CVR Coffeyville, Wynnewood	200.0	0.0	LanzaTech (Dragon)		26.4	Swedish Biofuels/COWI		120.0
DG Fuels	302.0		Marathon	1605.0	0.0	Texas Renewable Fuels	100.0	0.0
Diamond Green Diesel	1200.0	0.0	Marquis Energy	120.0		Total LaMede		150.0
Dimeta rDME		90.0	MOL Group	0.0	20.0	UPM	0.0	194.0
Emerald	100.0	0.0	Montana RF	150.0	0.0	Vandelay Malaysia		75
Energy Absoluta Thailand		14.2	Nacero Texas	1073	0	Velocys	20.0	20.0
ENG	200.0	100.0	Neste	0.0	2040.0	Vertex	200.0	0.0
ENI		345.0	New Rise Renewables	44		Viking	43.0	0.0
Fulcrum	40.0	25.1	Next	766.5	0.0	World Energy	1000.0	0.0
Future Energy Australia		4.6	NWABF	64.0	0.0		11175.3	8692.2
FutureFuels ANZ	0.0	3.0				Conventional BD	2588.2	8511.8
Geo Biogas Brazil		0.5				TOTAL Heavy-duty	13763.5	17204.0

Total Global RD/SAF/DME: 19.867B

Total Global Heavy-Duty Fuels: 30.967B

PRICE DRIVERS: THE VALUE STACK



Sources. EIA, EPA.gov, IATA, USDA, CARB. Data updated 7/05/23.

Notes. These values are for delivery into a US market with a clean fuels standard. Since ethanol and biodiesel are traded commodities and those commodity prices include the assumed value of federal credits/RINs. For the others, quoted energy prices are for the equivalent fossil molecule, so we've added in all the available carbon prices for a full comparison. Also note that conventional ethanol is modeled at a Carbon Intensity of 70, RD, SAF and CellEth at a CI of 20. Individual companies/processes may have better or worse CI scores that are used to calculate LCFS credits. **Sources.** We use quoted prices at CBOT for ethanol, USDA's weekly report for B100 biodiesel, and the EIA's daily energy prices for gasoline, diesel, IATA for jet fuel prices. LCFS credit prices are from the California Air Resources Board. Tax credits are as provide by the US Congress. RIN prices are as provided by the US Environmental Protection Agency.

EMERGING DOWNSTREAM PLAYERS

RAVEN



—twelve

ALDER
FUELS



nacero



VISOLIS



DG FUELS



The Biggest Thing Anywhere Ever?



The story behind the Global Biofuels Alliance



**WANTED: 5 Billion Tonnes of
Sustainable, Affordable, Reliable, Available Feedstock**



**BOLD GOALS, BOLD
ACTIONS FOR
DEPLOYING A GLOBAL
BIOECONOMY:
THE BOLD GOALS
ACTION GROUP**

BOLD ACTIONS FOR BIOMASS PRODUCERS

Adding sustainable, affordable, and reliable, biomass production capacity is essential for price stability, and social license.

1. We will work to expand the availability of biomass by increasing yields with sustainable and restorative agricultural practices, while expanding arable land and water, and improving soil health to bring degraded land back to production.
2. We will expand capacity by the development and deployment of sustainable cash cover crops that improve soil productivity and work to remove non-price barriers that constrain cover and crops that offer sustainable rotation alternatives to fallow seasons.
3. We will drive down the cost, and work to remove non-price barriers, in the aggregation of biomass residues.

BOLD ACTIONS FOR SUPPLY-CHAIN DEVELOPERS & OWNERS

Long distance transport of biomass feedstocks is inefficient. We will work to improve biomass supply chain management by increasing the pre-processing of feedstock near to where they are grown and harvested.

1. Feedstock pre-processing facilities will be deployed widely to simplify delivery of bio-crudes and condensed biomass to bio-refineries.
2. We will develop more reliable feedstock pre-processing and work towards a Uniform Transportable Feedstock Standard.
3. We will develop more effective and affordable use of infrastructure to transport solid, liquid and gaseous feedstocks and by-products.
4. We will work to extend the electrical grid to support a more diversified bio-refinery system and to support the development of power purchase agreements that support independently-owned power-generation facilities to distribute power to refineries on a direct basis.

BOLD ACTIONS FOR PROJECT & PROCESS DEVELOPERS

We will work to re-structure molecular industries by improving the processes by which biomass is converted into the fuels, chemicals, and materials needed by society.

1. Bio-based products will be valued not only for their utility but also for their carbon intensity and societal benefits
2. We will focus in the near-term on those markets and products that offer the greatest opportunities to reduce carbon intensity, with a long-term goal of replacing all products for all markets that are made from fossil resources today.
3. We will utilize all existing programs that support development in disadvantaged communities to diversify and spread the growth of bio-based production and jobs.
4. We will support permitting reform that permits what will protect, instead of the current approach which protects that is already permitted, and we will engage those communities, counties, provinces, states and countries that harmonize, speed, and create a reliable, predictable, one-stop permitting process.

BOLD ACTIONS FOR FINANCE

Accelerating deployments requires more and better financial tools deployed by motivated public and private finance. For example, it is necessary to harmonize, accelerate and reduce the cost of due diligence. To enable better and faster project preparation we will

1. Develop a project risk rating system to facilitate due diligence by those offering debt and equity.
2. Grow of a Development Capital Industry to address the financing of technologies between pilot scale and commercial deployment.

BOLD ACTIONS FOR GOVERNMENT

Strong collaboration between government and industry is needed to enable de-fossilization of fuels, chemicals, and materials. In the spirit of collaboration, we recommend that national and sub-national governments:

1. Create and sustain investment tax credits that are harmonized across all regions, to create a level playing field with fossil carbon, that lasts as long as it takes to pay off the cost of a given facility, begin at the commencement of production, and are payable directly to project developer.
2. Work with international agencies to develop and deploy transparent, aggressive, science-based, harmonized low-carbon fuels and materials standards.
3. Encourage fossil alternatives that support and meet domestic demand for food and energy, and in cases where there is sustainable capacity beyond domestic needs, to develop export markets to support de-fossilization goals for those areas who lack domestic capacity.
4. Adopt a harmonized all-of-government approach when supporting the development of fossil alternatives — including but not limited to departments of energy, agriculture, defense, science, environment, with a focus on developing transparent, speedy, technology-neutral and efficient programs, and reliable, speedy, and consistent regulatory support.
5. Create and expand programs that support the capital costs of converting fossil refineries, or mothballed biobased refineries, to 100% sustainable bio-based feedstocks.
6. Reform permitting to reduce the time and cost of project development and fossil-alternative deployment.
7. Develop less prescriptive crop insurance to speed the development of bio-capacity.
8. Harmonize regulations that protect land access and resources and ensure that they be feedstock-neutral, science-based, harmonized, predictable, and reliable.
9. Support the growth of a Development Capital Industry to address the financing of technologies between pilot scale and commercial deployment.
10. Expand, simplify and speed the availability of Loan Guarantees to support deployment of commercial-scale projects that offer the highest carbon reduction values and account for carbon intensity in the design of loan program support.
11. Recognize across all branches, ministries, and departments that carbon credits are an asset class that can be utilized to collateralize project and company debt.

BOLD ACTIONS FOR INTERNATIONAL AGENCIES AND GLOBAL LEADERSHIP

Recognizing the catalytic role that international bodies and processes can play accelerating the Energy Transition, we recommend that

1. International agencies enable standards, regulations and development programs that are transparent, consistent, harmonized, reliable, and science-based.
2. International agencies encourage countries to prepare and enforce of transparent, harmonized, and science-based carbon intensity, water use efficiency, and land-use standards.

BOLD ACTIONS FOR TRADE & INDUSTRY GROUPS

1. We recommend that trade & industry group develop data standards and databases that support the development and deployment of biomass resources, including but not limited to biomass-ready regions and aggregators, risk ratings, technology providers, project developers, financial resources, government programs and relevant regulations.
2. We recommend that trade & industry groups prioritize speed of development and deployment, the communication of success stories, in addition to their work on new market development and regulatory relief.
3. We recommend that trade, industry and economic development groups collect and advise on economic development programs that support conversion of existing refining assets those that can use use increasing amounts of sustainable biobased feedstocks.

BOLD ACTIONS FOR RESEARCHERS

We recommend a focus on developing new feedstocks and cover crops, uniform feedstock conditioning, improvement in yields from water electrolysis, and supporting partnerships for the improvement of processing technologies and for new product development.

BOLD ACTIONS FOR THE BOLD GOALS ACTION GROUP

We will create and support, for the long-term, a working group to oversee the implementation of these Bold Actions and to continue to serve for all organizations that seek independent, science-based, technology-neutral feedback and guidance from our "coalition of the willing" of project developers, scientists, financiers, end-users, and economic development officials.

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