SEPTEMBER I, 2021

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AIRBUS AND THE HYDROGEN PLANE IT'S PAMPLONA TIME IN FAST EV CHARGING, THE BULLS ARE RUNNING BUT WHERE ARE THEY HEADED, WHICH TECHNOLOGIES MIGHT BE TRAMPLED? MATT DAMON AND WATER.ORG THE HYBRID ELECTRIC FLEX FUEL VEHICLE AMYRIS, JONATHAN VAN NESS VENTURE INTO ECO-FRIENDLY HAIR BIG OIL AIMS FOR BIG RNG



LET'S WORK TOGETHER 1

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TOPPERS

5 CIRCULAR BREAKTHROUGHS OF THE WEEK

By Rebecca Coons

Nike is working with Newlight Technologies to explore the possibility of producing sneakers and apparel that actually sequester carbon instead of releasing it. The partnership will look at using Newlight's AirCarbon material, which is a biomaterial made from methane that escapes from defunct coal mines. According to Newlight, for every 1 kilogram of AirCarbon produced, 88 kilograms of carbon dioxide equivalent are diverted from the atmosphere.



A biobased succinic acid built that went offline in 2018 is getting new life thanks to a new, more efficient process from LCY Biosciences. The company has more than doubled the 8,000 metric tons per year of annual capacity achieved by BioAmber. LCY Biosciences has reached 18,000 metric tons of annual capacity and aims to bring this output up to 30,000 metric tons by 2023.



Swiss specialty chemical Clariant has bought out the 70% of shares it did not already own in Beraca, a manufacturer of natural ingredients for the personal care industry, from company's founders. Beraca produces natural ingredients for the personal care sector, including inter alia fats, oils and botanicals.





Cultivated meat startup Shiok Meats recently held a tasting event for what it claims is the world's first cell-based crab meat. Samples were available for crab cakes and chili crab, with crab meat grown in a lab from cells extracted from crustacean shells. The dishes were conceived by chef José Luis Del Amo of TheTasteLab. Shiok hopes to have its first product in the market by 2023.



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www.biofuelsdigest.com/ablc

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MATT DAMON AND WATER.ORG

Water.org is a global nonprofit organization working to bring water and sanitation to the world. "We want to make it safe, accessible, and cost-effective<' the group says. "We help people get access to safe water and sanitation through affordable financing, such as small loans. We give our everything every day to empower people in need with these life-changing resources – giving women hope, children health and families a bright future. Among the co-founders going back some 10 years now? Matt Damon.

Water.org offers a portfolio of smart solutions that break down the financial barriers between people living in poverty and access to safe water and sanitation. We work with and through partners to increase access to financing for those who need it most. This will help achieve safe water and sanitation for all.

THE RIGHT STUFF

PRODUCT OF THE WEEK: PANGAIA FRUTFIBER AND PLNTFIBER FABRICS

Sustainability-focused clothing brand Pangaia has added two new biobased fabrics to its collection. Made entirely from agricultural waste, PlntFiber and FrutFiber will help the company replace both synthetic fabrics based on petroleum as well as traditional, but water-intensive, plant-based materials like cotton. Sixty percent of FrutFiber is bamboo, while the balance is comprised of leaf waste from pineapple and banana cultivation. PlntFiber is also 60% bamboo, with the rest of the fabric made of fibers from nettles, eucalyptus and seaweed.



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THE BRANDSTAND

OLD NAVY'S SUGARCANE FLIP-FLOPS

DLDXA

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

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."

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% sugarcanebased. An innovative platform of high-performance yeast and enzymes united for greater value, efficiency, productivity and profitability.

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DEATH OF WASTE

WOOD MADE FROM KOMBUCHA WASTE



Design student Gabe Tavas has been awarded the prestigious James Dyson award for developing a process to convert kombucha waste into an alternative for wood, including exotic and endangered species. Dubbed Pyrus, the material is made from a sheet of bacterial cellulose that is a byproduct of kombucha production.

Tavas created the first batches in his dorm room while a student at University of Illinois at Urbana-Champaign. He tells *Fast Company* he was inspired by work converting the same waste material into life jackets. His startup Symmetry is already selling guitar picks and jewelry from the material. He is targeting exotic woods that are endangered or are found in areas where logging causes environmental damage.

THE LAUNCH



Amyris and Jonathan Va Ness, the hair stylist and Emmy-nominated television personality, are launching JVN, featuring four accessibly priced, best performing in category product families that are silicone-free, color-safe, sulfate-free, cruelty-free, and vegan: Nurture, for hair that deserves extra moisture; Undamage, for hair that is stressed or overtreated, Embody, for fine hair with big dreams; and Complete, for hair that is ready to style. JVN formulas are built around Amyris invented Hemisqualane. This Amyris molecule penetrates the hair shaft, providing weightless nourishment that makes hair more manageable while reducing frizz and preserving color. It is an effective, clean, superior product to silicone in haircare that adds softness, slip, shine, and bounce to hair without compromising long-term hair health: a real revolution in caring for your hair without harm to our planet.

Sign-up information on the launch as well as a giveaway of the entire collection and more is now live on JVNhair.com. JVN is available at JVNhair.com and Sephora.com beginning on August 31, 2021, and in select Sephora stores on September 17, 2021.



Led by a Visionary leader Dr. Pramod Chaudhari widely acclaimed as Ethanol Man in Industry circles



George Washington Carver Award 2020 was presented to Dr. Pramod Chaudhari during the BIO IMPACT Digital Ag & Environment Conference on September 22, 2020.



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RCM- made from carbohydrates feedstock RCM- green & sustainable alternatives for commodity products made from hydrocarbon RCM help reduce GHG emissions and conserve environment

ITS PANPLONATIME FOR FAST EV CHARGING

THE BULLS ARE RUNNING. WHERE ARE THEY HEADED, WHICH TECHNOLOGIES MIGHT BE TRAMPLED?

THE WEEKLY CIRCULAR 23



TODAY IT'S POSSIBLE







Decarbonize by recycling: today it's possible thanks to the **Green Circular District**, developed by NextChem, the Maire Tecnimont's company for energy transition.

The Green Circular District allows to produce recycled polymers, chemical products, hydrogen and low carbon fuels, through plastic recycling and recovering of non-recyclable waste.

The **model** is based on the integration of green chemistry technologies, as **Upcycling**, **chemical recycling** and the production of circular hydrogen and green hydrogen via **electrolysis**.

The **Green Circular District** brings benefits to the environment, economy and society, through decarbonization, recycling and recovery, production, employment and local economic development. "The world has changed completely, and the cheapest energy is renewable — the cost to build is now less than the cost to operate coal fired plants. Now, it is about what kind of businesses can you build?" So informs the imposing Energy Transition Ventures co-founder Craig Lawrence, to CIRCULAR this week.

We listen to Craig closely, he's one of the few that out ran the bulls that last time they ran through the Pamplona of energy investing, betting that all the sector's daunting troubles would be solved by thinfilm technology, or concentrating solar, that sort of thing. Lot of smarties jumped on those bandwagons, a lot of Ivy League MBAs ran around energy circles in those days, articulate, confident, persuasive. Craig and his associates went contrarian that time, betting that a breakthrough in residential solar needed more of a push on financing structure than shiny-new tech, and he did OK.

"Thin film, concentrating solar and so on," Lawrence mused when we caught up this past week. "Most of them failed, or really, all of them ultimately failed in a way, because what happened is that the basic panels and turbines got better, cheaper, more efficient. The cost of panels, wind turbines, and lithium batteries came down, way faster than any of those bets anticipated."

And, yes, the bulls are roaring this year on renewables, for those very reasons. Capital is pouring in. Early-stage, latestage venture, growth, corporate, public. So, what's next?

For one, power electronics for EV charging,

"Think DC fast charging for vehicles," Lawrence told me. "We believe that EVs are going to transform fleets as well as passenger vehicles and charging infrastructure is crucial, as is better power conversion. That's not science risk, but there's work needed in engineering, design, manufacturing."

COLUMNS

So, we'll put that on the table, and keep a look out. But, perhaps we'll take even a stranger and more exciting step, also. What about wireless fast charging?

"Highly efficient wireless charging is a breakthrough technology that can alleviate EV range anxiety and facilitate the U.S. effort to decarbonize the transportation sector," said Xin Sun, associate laboratory director for energy science and technology at Oak Ridge National Laboratory. Yes, imagine sidestepping all the travails of slow-charging and infrastructure development of the charging-point, in one fell swoop.

So, interesting news this week that Oak Ridge National Laboratory has licensed technology to Brooklyn-based HEVO that could one day enable electric vehicles to be charged as they are driven at highway speeds.

The Oak Ridge breakthrough

The license covers ORNL's unique polyphase electromagnetic coil that delivers 1.5 megawatts per square meter - eight to 10 times higher than currently available technology. This surface power density supports higher power levels in a thinner, lighter coil, resolving the issue of adding range-sapping weight to electric vehicles. The ORNL technology enables very fast hands-free charging and even in-motion charging so vehicles could be reenergized as they're driven at interstate speeds over specially equipped roadways.



HEVO intends to work with ORNL to continue development of this critical technology to increase power levels and efficiency of existing charging techniques.

"We are excited to see another one of our technologies move into the private sector where it can create new green jobs and support the nation's clean energy goals," says Sun.

Advances in pointsource charging, too

In Israel, StoreDot has filed a patent for technology that will rapidly increase the crucial 'miles per minute' of charging ratio that is currently a major barrier to electric vehicle adoption. The technology allows batteries in electric vehicles to accept higher currents, charging them faster, safely, and can also be used to improve the charging rates in existing electric infrastructure. Enabling enabling a 50% reduction in charging time at equivalent cost.

The new breakthrough technology covered by the patent will be accessible to the entire market, marking a first for an advanced automotive battery company.

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Making sustainable mobility a reality with SUNLIQUID[®] – CELLULOSIC ETHANOL FROM AGRICULTURAL RESIDUES

StoreDot is making the technology available to other organizations to help expand current charging infrastructure, speed up the global adoption of electric vehicles and create a zero-emissions world in the future.

The patent pending technology incorporates hardware and software advances that create a "booster" feature, allowing the battery to analyze the capability of the charging station in real time and to adjust the battery's ability to carry high current rates. This communication between a vehicle's XFC battery and charging system means that cells can be charged faster, safely accepting a higher current without overheating.

It also has the ability to immediately boost existing infrastructure systems, enabling faster charging, and thus optimizing future fast-charge technologies without the need to upgrade to newer equipment in the near future.

So, it's an efficiency story, and that's a trend that's emerging in the circular world of renewable electricity. Now that science and cost breakthroughs have been achieved, scrutiny has shifted to operations.

COLUMNS

As Craig Lawrence observes, "It's been more about building, now they have to be operated efficiently, and in the end its an electromechanical system. But that's not to say that we wouldn't invest in technology. For example, Dronebase has built built a very impressive business around aerial inspections of critical infrastructure buildings, and also for construction. It's a really good solution for solar and wind asset owners, because as the investor returns drop, there's more scrutiny on operation efficiency. Dronebase has an incredible service. This type of inspection has been around forever, but here's a new way of doing it.

The stakes are high and it's still early days

Last week, the Southern Alliance for Clean Energy (SACE) released the first of two reports, "Retained Transportation Fuel Spending in the Southeast: Electric vs. Internal Combustion Vehicles." The report found that \$64 billion of the region's economy is lost each year for fueling transportation, and \$47 billion in transportation fuel spending could be retained annually in the Southeast by electrifying transportation.



When the future is at stake, **promises are not enough**

For over 80 years, Haldor Topsoe has been at the forefront of energy-efficient technologies, and now we are setting our sights on becoming the world leader in carbon-reduction technology by 2024.

As the world's need for renewables increases, we are working with producers who share our vision for green energy – and our understanding of how to realize it. From proven solutions to emerging technologies, our goal is always the same: progress for our customers, their customers, and the planet.

After all, progress is all that counts on the path to a sustainable future.

Learn more at www.topsoe.com

The Top Metro Areas That Drive the Electric Vehicle Trend in the US



Source: STOKAGECate analysis of AFDC, DOE, EIA, FHWA, FTA, EPA, U.S. Census E Yardi Matrix, FuelEconomy.gov, Atlas EV Hub and other state-level sources for EV registrations.

STORAGECafé®

The report is pretty far out there, because it assumes a scenario in which all on-road gas and dieselpowered cars, trucks, and buses are replaced with vehicles that drive entirely on electricity.

So, let's keep the enthusiasm and billions in perspective, because in the short term, those electric vehicles aren't all being manufactured in Knoxville and the suburbs of Atlanta, just sayin'. <u>But</u> <u>here it is.</u>

And. we're quite a ways from having the solutions ready for fleetscale EV transition — most attention to date has been on passenger-scale. Key to making the transition, Lawrence said, may well be rooftop solar. "NREL did a study and found that we could get 40 percent of our power from rooftop solar, the barriers at one time were financing, and those are pretty much now solved,"Lawrence noted. "The biggest barrier in places where it's an incredible opportunity is customer education and acquisition, so we're looking at technologies and companies that have better ways to acquire customers.

COLUMNS

Orange EV trucks, says the company, meet the most rigorous duty cycles and 24×7 shift schedules while eliminating diesel fuel and emissions. Building both new and re-powered terminal trucks, Orange EV was the first manufacturer offering 100% electric Class 8 vehicles to be commercially deployed and re-ordered into trailer and container handling operations.

The numbers are small but the trend is of interest.

The Bottom Line

At the end of the day, what's clear is that the narrative has shifted. Back when, it was passenger vehicles only, now the narrative for the United States is "electrify everything" Back when, it was greening the grid, not it's 'what do we do with the excess power?" Back when, it was about transforming the technology of solar and wind. Now, it's a narrative about the efficiency of existing tech, and getting operationally focused.



"Part of that is making it more attractive and energy storage is a key. Most people get pretty disappointed when they find that rooftop solar doesn't automatically provide backup power when the grid goes down, even if the sun is shining. So, we'll need and we're seeing novel solutions and more integration. For instance, Ford has announced an electric F-150 truck that can provide backup power for the home.

As Lawrence said of the electric-side venture world of the late 2000, "Back then, solar wind, batteries were the expensive pathways to energy and they were factors more expensive then fossils, so the main thrust was reducing cost and the idea at venture firms was to develop new technology and defeat the incumbent solar technology —

Now, we think less about "whether?" an energy transition will take place, and more perhaps about "where?" In that light you might enjoy this report on the best-equipped metro areas for electric vehicles. It focuses on the

demographics of metros where EV charging is available and a high number of EV's are already registered. As our technologists and venture capitalists have mentioned in this report, all that may shortly change.

Speaking on EV trucks, news from Orange EV

Out of Georgia and Missouri comes news that Orange EV, inked multi-year agreement with Georgia-based Lazer Spot, Inc. to manufacture and deliver more than 25 EV trucks in 2021 and 2022. Lazer Spot, the largest yard management firm in the U.S., sought a mature EV partner that could deliver a fleet of zero emission EV yard trucks that could be immediately put to work.

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INTERNET AND INTERNET AND INCOME.

o MERIC





"I say boy, oil companies are going to do what? They're going to get rich picking up my what? Is that a joke, son? Are you making a joke?"

PIVOTING FROM PETROLEUM, CHEVRON, BP DIVE INTO POULTRY POOP AND DAIRY DOODOO FOR RNG

By Helena Tavares Kennedy A double doozy came in the news with Chevron expanding their JV partnership with Brightmark on their dairy biomethane renewable natural gas work together, and then bp and Clean Bay Renewables' new 15-year agreement where bp will buy RNG processed from poultry litter and sell it as fuel for the U.S. transportation sector.

In today's Digest, all about the poultry poop and dairy doodoo plans, what CleanBay Renewables, bp, Chevron, Brightmark, had to say about it, ExxonMobil's take, what this all means, and more.

Poultry Poop Power

Let's start with the bp, CleanBay Renewables RNG news since that's a brand-new agreement and with more than 14 million tons of chicken litter produced each year in the United States alone, the feedstock is aplenty.

bp and CleanBay Renewables announced a 15-year agreement where bp will purchase renewable natural gas processed from poultry litter – a mixture of manure, feathers and bedding – and sell it as fuel for the US transportation sector.

CleanBay manages this process by mixing poultry litter with water in an anaerobic digester. One of the end products is biogas, which includes methane. The biogas can be processed into RNG and used to fuel vehicles.

CleanBay's approach builds on the sustainability efforts of the agriculture community by re-purposing poultry litter into RNG and a controlled-release fertilizer designed for optimized nutrient management. Each of their plants can recycle more than 150 thousand tons of chicken litter annually.

Through this agreement, <u>bp's trading and shipping team will sell</u> the fuel to its customers, initially in California. There is strong demand for RNG fuel in the state due to incentives from its Low Carbon Fuel Standard. RNG-fueled vehicles are estimated to result in up to 95 percent lower greenhouse gas (GHG) emissions than those fueled by gasoline or diesel on a lifecycle basis, <u>according to a US Department of Energy study</u>.

The Poultry Plans

CleanBay is an environmental technology company focused on the production of sustainable RNG and engineered organic fertilizers. <u>This agreement with bp directly supports the financing</u> for its first active bio-conversion facility, planned in eastern <u>Maryland</u>.

CleanBay is actively exploring sites for future facilities in the Mid-Atlantic, Southeast and California. Its goal is to establish a portfolio of RNG and power facilities that reduce local emissions and provide farmers with an alternative use for their poultry litter and a fertilizer to increase their food production.Dairy Doodoo.



Each of the 30 proposed CleanBay facilities is expected to generate enough sustainable energy to power 9,200 cars per year by recycling more than 150,000 tons of poultry litter annually.

CleanBay has incorporated measures to further reduce its carbon footprint, including co-located solar power fields to meet the onsite power needs and the production of alternative products like green hydrogen.

Reactions from the stakeholders

Michael Thomas, vice president biogas origination, bp said, "Working with innovative companies like CleanBay will be key for bp to reach our net zero ambition. As one of the largest suppliers of RNG to the US transportation sector, this agreement will help us continue delivering competitive, reliable energy solutions." Thomas Spangler, executive chairman, CleanBay Renewables said, "By collaborating with bp, we continue taking steps to positively impact our environment. Not only will our process improve the air, soil and water quality around our agricultural facilities, but our RNG is a sustainable, environmentally-friendly way to help reduce GHG emissions."

Donal Buckley, CEO, CleanBay Renewables said, "RNG is a necessary energy transition approach in the nearterm, but green hydrogen and the use of RNG to power electric vehicle charging stations will be the backbone of a fast transition to a net zero future."

RECYCLE MORE THAN 150,000 TONS OF LITTER

CHICKEN LITTER

Ok, let's take a look at the Chevron, Brightmark news about their second expansion of their previously announced joint venture, Brightmark RNG Holdings LLC, to own projects across the United States to produce and market dairy biomethane, a renewable natural gas.

Brightmark RNG Holdings LLC's subsidiaries currently own RNG projects in New York, Michigan, Florida, South Dakota and Arizona. <u>Additional equity</u> investments by each company in the joint venture will fund construction of infrastructure and commercial operation of 10 dairy biomethane projects, including new sites in Iowa and Wisconsin and additional sites in Michigan and South Dakota. Chevron will purchase RNG produced from these projects and market the volumes for use in vehicles operating on compressed natural gas.

Reactions from the stakeholders

"This latest expansion with Brightmark advances our strategy of higher returns and lower carbon," said Andy Walz, president of Chevron's Americas Fuels & Lubricants. "Opportunities like these not only reaffirm our commitment to investing in ways that are good for the environment, our consumers and our stockholders, they also bolster our previously announced objective to increase RNG volumes tenfold by 2025 over 2020 volumes."

"Brightmark's expanded partnership with Chevron is another positive step forward in the decarbonization of the farming industry," said Bob Powell, founder and chief executive officer of Brightmark. "Our carbon-negative projects are successfully reimagining waste and delivering significant environmental benefits while improving economics for our dairy farm partners. We look forward to executing on these new RNG projects with Chevron and partnering with dairy farmers to expand our RNG footprint across the country."

Bottom Line

No matter how you look at it, big oil companies are teaming up with biobased companies like Brightmark and CleanBay to support more sustainable fuels. Sure, we'd like to see more action and more money from the big guys, but something is better than nothing. Tackling both the huge animal waste issue that the U.S. has from all those chickens and cows, while getting some RNG and renewable fuel out of it is a move in the right direction. We hope to see many more projects like this in the future being backed up by those that have the means and money to do so, like the bp's, Chevron's, and ExxonMobil's of the world.

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AIRBUS

THE AIRBUS ZEROE CONCEPT AIRCRAFT

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Henergy

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

ZERO emission aircraft

RBUS

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.

Introducing Airbus ZERCE





What is Power-to-Liquid or PtL?

PtL is a synthetically produced liquid hydrocarbon. Renewable electricity is the key energy source, and water and carbon dioxide (CO₂) are the main resources used in PtL production, which consists of three main steps:

- Renewable energy powers electrolysers to produce green hydrogen.
- Climate-neutral CO₂ captured via, for example, Direct Air Carbon Capture is converted into carbon feedstock.
- Carbon feedstocks are synthesized with green hydrogen via processes such as Fischer-Tropsch to generate liquid hydrocarbons. They are then converted to produce a synthetic equivalent to kerosene

Power-to-Liquids for aviation

PtL is a type of sustainable aviation fuel (SAF) that is composed of synthetically produced liquid hydrocarbons.



Hydrogen Hub at Airports by Airbus

This concept involves collaborating with airports to develop a stepped approach to decarbonise airport facilities, ground operations and transportation using hydrogen



The green hydrogen ecosystem for aviation



AIRBUS

The road to zero: aviation's energy roadmap

ple energy pathways m hieve significant emissi ands on their availability	ons reduction. Their success affordability and scalability.	Hydrogen production for aircraft	
2 Hydrogen	Hydrogen economy and infrastructure	deployment	Del \
	Usage	Synthetic erdel (PIL)
Direct Air Ca	rbon Capture Storage		
Low-carbon	power		
Biomass-bas	ed fuel*		
•		۲	
2020 Deployment	2024 Ramp-up	2030+ Acceleration of cost-efficient energy transition	2050 Start of climate-neutra aviation

"A type of Sustainable Aviation Fuel (SAF) made of renewable feedstock (Le. used cooking oil, waste, residue, etc.)

Q. Airbus has laid bare its hydrogen ambition. Does this mean hydrogen is the answer to aviation's carbon problem? At Airbus, we've been clear from the beginning: there's no "silver bullet" solution to decarbonizing aviation. The aviation industry has set itself some ambitious targets to reduce its CO, emissions. But these targets don't go far enough, particularly in the context of a growing aviation market. A mix of new energy pathways and fuels, including hydrogen, will be vital to achieving the disruptive CO, reductions the industry is targeting over the medium to long terms. This is why Airbus' climate strategy involves accelerating several pathways simultaneously while fostering the development of a new energy ecosystem.

Q. Can you describe these energy pathways? For one, there's today's sustainable aviation fuel, otherwise known as SAF, which is a biomassbased fuel (used cooking oil, waste, residue, etc.). All Airbus aircraft are certified to operate on up to a 50% SAF blend. In March, we launched a 100% SAF project that will help support SAF's future certification for blends that exceed today's maximum of 50%. In addition to biomass-based fuel, there are other alternative fuels that represent a major opportunity to reduce aviation's CO, emissions, such as Power-to-Liquid (PtL) synthetic e-fuel made of renewable hydrogen and CO, captured from Direct Air Carbon Capture. We at Airbus see PtL as having huge potential, not only in terms of climate impact, but also in cost and scalability. And, of course, there's hydrogen, a fuel we're learning more about from the automotive and space industries. Hydrogen is likely to be a solution for several industries to meet their climate targets, and we believe aviation will be no exception.

Q. What are some of the challenges to scaling up this new energy ecosystem?

For SAF, there's still a lot of work to do to encourage its uptake, which accounts for less than 1% of today's flights. Incentives and longterm policies that encourage SAF use will be essential in this respect. Similarly, the global hydrogen economy is still in its infancy. The availability of green hydrogen – made using renewable energy – to fuel future aircraft is undoubtedly a key challenge, but we've been carefully observing the hydrogen ecosystem and are excited by the incredible progress. We expect all of this rapid development to help drive down the costs of hydrogen for aviation, while boosting its availability in the years to come. "Decarbonizing aviation is a team sport, and we're in it to win it."

Glenn Llewellyn, Airbus VP of Zero-Emission Aircraft

zero emission

Hydrogen



Electric Vehicle Charging Infrastructure Trends from the Alternative Fueling Station Locator: Second Quarter 2020

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Figure 5. Quarterly growth of public EVSE by charging level.



Figure 6. Quarterly growth of public DC fast EVSE by power output.

There are currently three types of connectors that are available for DC fast chargers: CHAdeMO, CCS, and Tesla. Of the 16,670 DC fast connectors in the Station Locator as of Q2, Tesla connectors made up the largest proportion, followed by CCS and CHAdeMO connectors (Figure 7). However, CHAdeMO connectors grew the most in Q2 (12.4%) (Figure 7).



Figure 7. Quarterly growth of public DC fast connectors by type.



Figure 8. Breakdown of public EVSE by network and charging level in Q2.



Figure 12. Quarterly growth of private EVSE by charging level.



Figure 13. Quarterly growth of private workplace EVSE by charging level.



Figure 14. Quarterly growth of private MUD EVSE by charging level.

THE ROAD AHEAD

HEFF: THE HYBRID ELECTRIC FLEX FUEL FORD FUSION



Meet **HEFF**: Ron Lamberty of the American Coalition for Ethanol recently unveiled HEFF, a Ford Fusion hybrid adapted for E85 fuels. That's about a low carbon as you can go. Here's how it works. The eFlexFuel conversion unit plugs into the vehicle's computer and fuel injectors and integrates a fuel-line sensor to monitor the actual ethanol content of fuel going to the cylinders and adjusts the combustion for maximum efficiency. The system includes a smartphone app that reports the percentage of ethanol in real time. ACE will document the vehicle data over the next three years to demonstrate real-world performance of the hybrid electric vehicle fueled with E85, as well as estimated GHG reduction using the CI scores of various ethanol producers. The front-wheel-drive midsize sedan starts up on electricity and is powered by a 2.0-liter, four-cylinder engine capable of using up to E85 matched to an electric motor for a combined 188 horsepower. Thank you for reading this issue of CIRCULAR ECONOMY • MATERIALS • ENERGY • FOOD • HEALTH • THE DEATH OF WASTE

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