

# **Company Overview**

The world's leading carbon negative materials company

March 7, 2023

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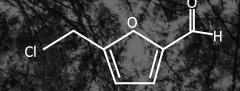
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#### Origin Materials - At a Glance

The world's leading carbon negative materials company



Disruptive Materials
Technology Company



Origin produces low and negative carbon materials

Decarbonizing Platform Technology



Enables customers' netzero commitments **Enormous TAM** 

~\$1+ Trillion

\$390Bn near-term focus in polyesters; \$750Bn across broad range of materials Cost advantaged



Timber feedstocks are competitive with oil and ~10x cheaper than bio alternatives

Global Fortune 500 Customers & Investors<sup>1</sup>







Strong Customer Demand<sup>2</sup>

\$9.3Bn<sup>3</sup> and growing

from a diverse mix of industries

Protected & Validated Technology

23 Patent Families<sup>3</sup>

Core technology protected in key countries

Cash on hand<sup>4</sup>

\$324 Mn

Origin expected to be fully financed until EBITDA positive with anticipated financing, grants, and potentially strategic partnerships

<sup>1.</sup> Denotes ownership by PepsiCo, Danone and Nestle prior to business combination with Artius Acquisition, Inc.

<sup>2.</sup> Figures assume maximum offtake amounts and exercise of full capacity reservations. Refer to slide 33 for additional detail.

<sup>3.</sup> As previously reported in the Q4 2022 Earnings Presentation of Origin Materials, Inc. dated February 23, 2023.

<sup>4.</sup> As of December 31, 2022. Represents cash, cash equivalents, restricted cash, and marketable securities. Refer to slide 50 for additional detail. As previously reported on Origin's Form 8-K filed on August 12, 2021, except where otherwise noted.

## Leading institutions are committing to a net zero future

The global industrial complex is committed to decarbonization

2030

patagonia

Patagonia

Carbon neutral by 2025



**Proctor & Gamble** 

Net zero between 2020 – 2030



Siemens

Net zero by 2030



LG

Carbon neutral by 2030



IKEA

Carbon negative by 2030



Microsoft

Carbon negative by 2030



Jnilever

Carbon neutral before 2030

2030-2040



AT&T

Net zero by 2035



Walmart

Net zero by 2040



PepsiCo

Net zero by 2040



Amazon

Net zero by 2040



Mercedes Benz

Net zero by 2040



**Best Buy** 

Net zero by 2040



**General Motors** 

Carbon neutral by 2040

2040 - 2050



Michelin

Net zero by 2050



BF

Net zero by 2050



Danone

Net zero by 2050



Ford

Net zero by 2050



Nestlé

Net zero by 2050



Nike

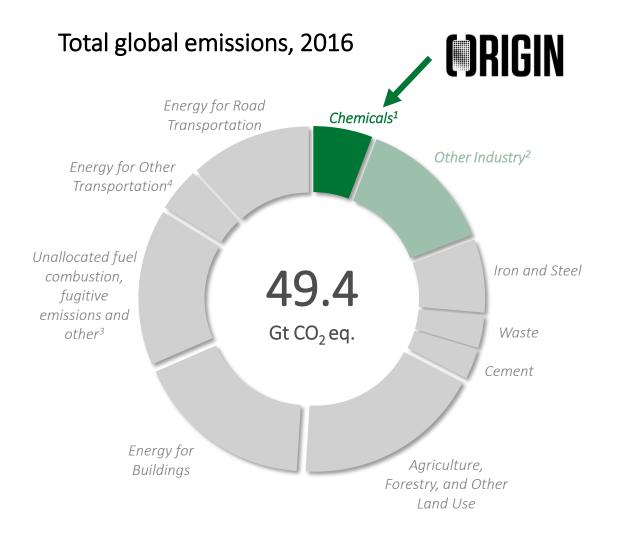
Net zero by 2050



Shell

Net zero by 2050

# Nearly half of all global emissions come from making products



# Origin's mission is to enable the world's transition to sustainable materials

Fossil-based



10.6Mn

Daily barrels of oil consumed by the chemicals market

Sustainable-based



<1%

Of annually available 900Mn tons of forest residue and wood waste



Emitting



2.78kg

Carbon emissions per ka of fossil-based PET produced

Avoiding



>100%

Carbon reduction for Origin's PET vs. fossil-based PET

The Origin platform can replace oil as the foundational feedstock for the materials economy



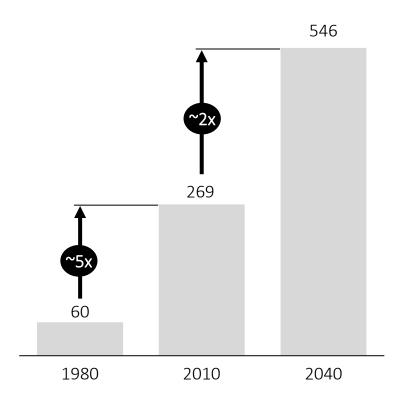
## Ubiquitous plastics are a prime target to begin reducing carbon emissions

#### Plastics enable modern life...



#### ... but we need better, scalable solutions

Million tons





#### Drop-in ready – change only happens at scale

Transforming the materials economy won't happen in niche markets. Plastics permeate every sector and Origin's products are supply-chain ready alternatives for fossil-based feedstocks



#### Negative-to-low carbon

Sustainably harvested, renewable feedstocks (e.g., forest waste / residues) can convert naturally captured carbon into useable end products



#### Sustainable, end of life solutions (recycle first)

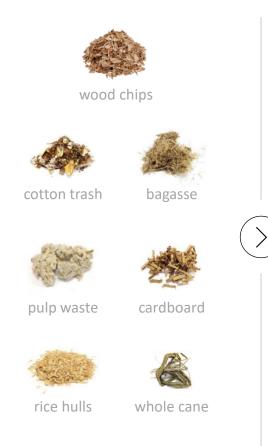
Responsible plastics use goes from 'cradle to grave'. Enabling the circular economy through high rates of recycling is a must for any solution

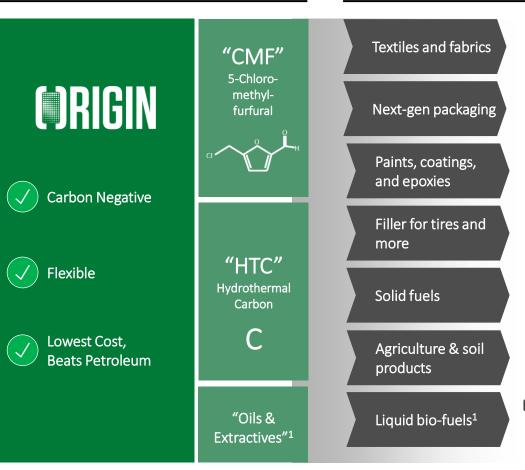
# The Origin platform: 'Once in a planet' shift from fossil to decarbonized materials

Abundant, low-cost, bio-feedstocks

**Origin Core Technology** 

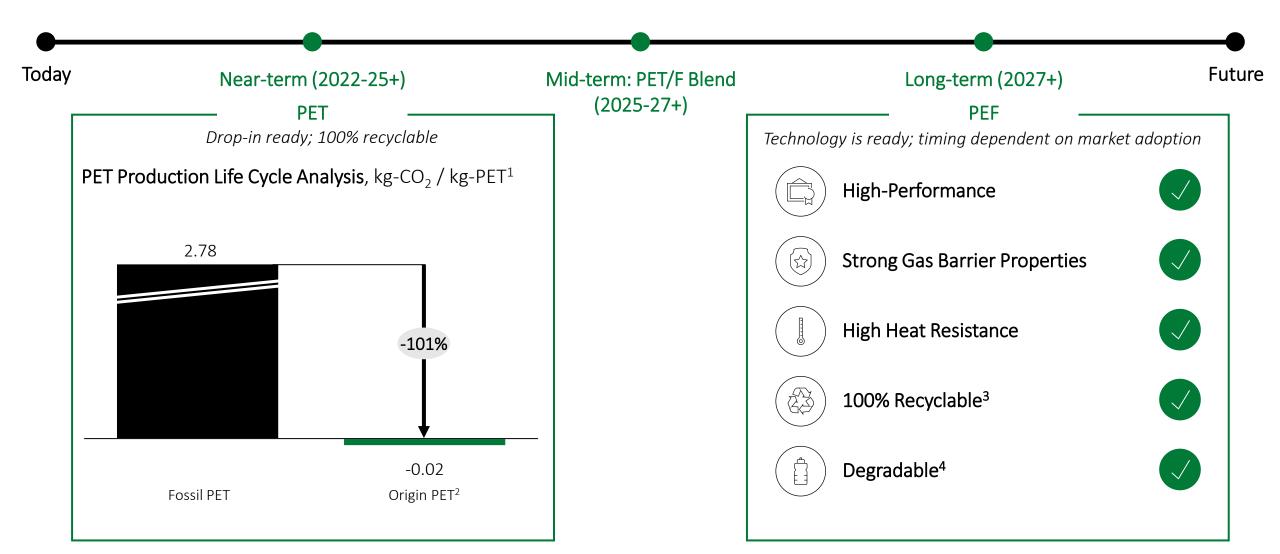
Countless products can be manufactured using Origin's carbon negative materials...







## Origin's CMF is a carbon negative solution for recyclability and degradability



<sup>1.</sup> Process step carbon impacts are derived from Deloitte ISO compliant LCA report. Deviations from supply chain described in LCA report may affect carbon impacts. 2. Southern Pine based bio-PET. 3. PEF can be recycled by the same mechanical methods used for PET. Currently there are no independent PEF recycling stream or U.S. guidelines for blending PEF and PET streams. 4. PEF degradation time in industrial composting conditions (58 °C) range from 7 to 13 months to 90% degradation, depending on conditions, according to "First Results Accelerated Tests Biodegradation of PEF," Organic Waste Systems (OWS), Gent, Belgium.

Source: Origin Materials. As previously reported on a Rule 425 filing of Artius Acquisition, Inc. dated April 19, 2021.



### Origin's HTC is a diverse, high-potential carbon negative platform material

Near-term (2022-25+) Today Fuel pellets/Activated Carbon (~\$20Bn) A drop-in ready, energy dense, fuel alternative Net o Carbon footprint Annual growth rate of fuel pellet market A carbon negative solution for food and water treatment ~500 m<sup>2</sup>/g – Ultra high surface area 3,000 Annual growth rate of activated carbon market

Mid-term (2025-27+)
Carbon Black (~\$20Bn)

Long-term (2027+)
Agriculture (~\$40Bn)

Future



A next-generation agriculture additive to improve farming efficiency

#### **Key Properties**

(R)

Porous, High Surface Area



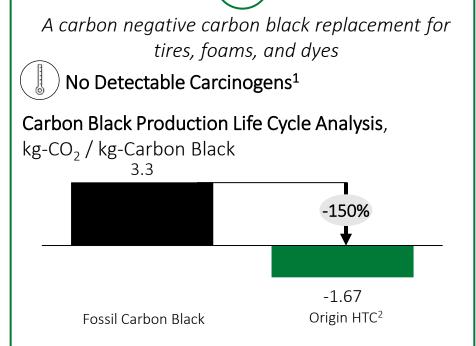
**Available Water Capacity** 



High Cation Exchange

#### **Applications**

 Biochar, slow-release fertilizer, microbials / biologics, soil amendment



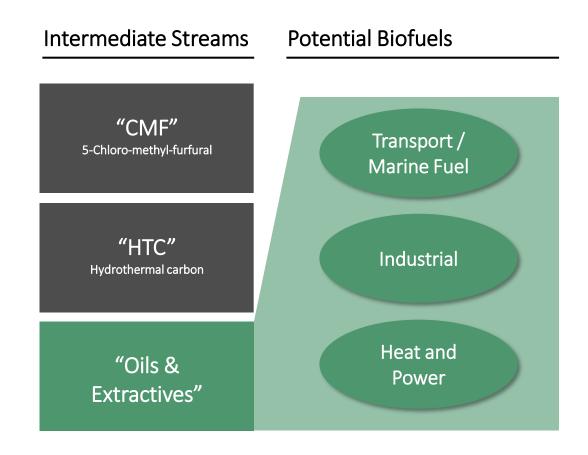
 $<sup>1.\</sup> Origin\ carbon\ black\ does\ not\ contain\ any\ PAH,\ or\ polyaromatic\ hydrocarbons,\ which\ are\ carcinogens\ found\ in\ fossil\ carbon\ black.$ 

<sup>2.</sup> Derived from Deloitte ISO compliant LCA report. Deviations from supply chain described in LCA report may affect carbon impacts. Source: Origin Materials, PBL Netherlands Environmental Assessment Agency.

# Origin is exploring biofuel production from an "oils and extractives" stream co-produced with CMF and HTC and not included in previous plans

Cellulose-derived biofuel for aviation, renewable diesel, and marine fuel

- Biofuels market is \$110 billion to \$130 billion, estimated to grow to \$200 billion by 2030<sup>1</sup>
- Today biofuels are made mostly from food or foodderived sources (soy, used cooking oil, tallow, etc.)
- Cellulosic biofuels or bio-intermediates made from wood waste are highly sought after and represent the future of biofuels. Unlike food-derived biofuels, cellulose-derived biofuels do not compete with land for growing food and "let food be food"
- Origin is uniquely positioned to deliver these renewable fuels using a third intermediate stream, "oils and extractives," which is co-produced alongside CMF and HTC and which has not been included in previous plans
- Potential applications include transport/marine fuel, industrial, and heat and power
- Preliminary discussions with multiple potential strategic partners



# Origin and Avantium to accelerate mass production of FDCA and PEF for advanced chemicals and plastics

Complementary technologies represent potential breakthrough in the commercialization of next-generation materials

- Origin's existing patented carbon-negative technology platform would convert wood residues into the building block chemical CMF and its derivatives. Avantium's process technology can be used to convert derivatives of Origin's CMF into FDCA, the chemical building block for the polymer PEF
- The produced PEF is expected to be a performance-advantaged alternative to PET, 100% plant-based, fully recyclable<sup>1</sup>, have attractive unit economics, and to offer a significantly reduced carbon footprint, improved degradability<sup>2</sup>, and superior strength, thermal properties, and barrier properties
- PEF could replace glass and aluminum, offering superior break protection and inexpensive light-weighting for shipping, making it well-suited for oxygen-sensitive products like carbonated soft drinks, protein shakes, and teas
- FDCA applications include a wide range of polyesters, polyamides, polyurethanes, coating resins, and plasticizers
- To accelerate commercialization, partnership includes a licensing agreement providing Origin with access to Avantium's process technology for producing FDCA and a conditional offtake agreement under which Avantium will supply Origin with FDCA and PEF
- Materials are expected to be sold to future customers while Origin incorporates Avantium's process technology into the supply chain. This allows Origin to start market development for PEF during its plant construction phase



Complementary technologies aim to accelerate the mass production of FDCA and PEF



<sup>2.</sup> PEF degradation time in industrial composting conditions (58 °C) range from 7 to 13 months to 90% degradation, depending on conditions, according to "First Results Accelerated Tests Biodegradation of PEF," Organic Waste Systems (OWS), Gent, Belgium. 3. Derivatives such as MF, or methyl furfural, and others.

### Origin's platform technology decarbonization impact

By 2030, Origin's operating plants are expected to annually avoid ~8.3MMT¹CO2 equivalent to approximately...







## Estimated total addressable market for Origin products is more than \$1Trn

Origin addresses a growing market with broad applications HTC market CMF market **Market Size** Markets Cumulative TAM = >\$1Trn Near term focus pre-2030 **PET Fiber** | ~\$175Bn >\$390Bn market Apparel Carpet **PET Resin** | ~\$145Bn Food and beverage packaging ~\$70Bn Carbon \$390Bn Tires Activated Carbon \$750B Near-term focus TAM is expected to grow by ~\$15Bn annually

## Estimated total addressable market for Origin products is more than \$1Trn

Origin addresses a growing market with broad applications HTC market CMF market Select Markets Market Size Cumulative TAM = >\$1Trn Long term focus post-2030 Paints & Coatings | ~\$30Bn >\$750Bn market Colorants Soil Additives | ~\$40Bn Soil Nutrients PEF | ~\$225Bn Apparel Apparel PET Applications Packaging **Epoxies** | ~\$15Bn Adhesives

Coatings Coatings

**Plasticizers** 

PVC Piping

| ~\$18Bn

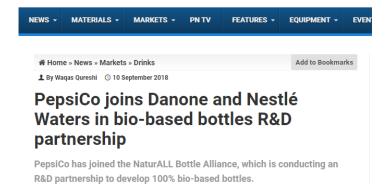


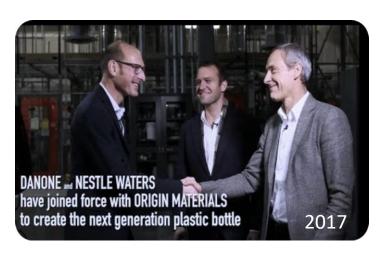
\$390Bn

\$750B

### Origin is supported by Global Fortune 500 companies

#### **Packaging News**







We believe total estimated plastics demand from these three customers represents...

4.75Mn
Tons

Commercial facilities required to meet PET demand<sup>1</sup>

### Origin has earned prestigious awards and certifications for innovation









Origin Materials Wins EPA
Green Chemistry Challenge
Award for 2022 in
Partnership with University
of California, Davis

Origin Materials Earns
USDA Certified Biobased
Product Label for Carbon
Negative Materials, 2021
and 2022

Origin Materials
Recognized by Chemical
Week for Best Sustainable
Product by an Emerging
Company 2021

Origin Materials Named to Fast Company's Annual List of the World's Most Innovative Companies for 2022 in Manufacturing

#### **AECI SANS Technical Fibers Partnership**



"Origin Materials and AECI SANS Technical Fibers to Develop Carbon-Negative Materials for Apparel and Automotive Applications" – April 5, 2021

- AECI SANS Technical Fibers is a leader in engineered thread for high-performance apparel and automotive applications
- Expands existing joint development agreement in order to develop high-performance fibers for diverse thread applications serving the apparel, footwear and automotive industries
- AECI SANS Technical Fibers signed a capacity reservation agreement for carbon-negative PET and next-generation polymers produced using the Origin platform





### **AECI Much Asphalt Partnership**



# "Origin Materials and AECI Much Asphalt to Develop Low-Carbon Asphalt" – April 6, 2021

- AECI Much Asphalt is the largest commercial asphalt producer in southern Africa
- Region's leading manufacturer and supplier
  of hot and cold mix asphalt products, and a
  manufacturer, supplier and applicator of
  bituminous road binders, emulsions, primes,
  pre-coats and modified binders
- The collaboration is expected to create substantial value in the developing African market, where AECI Much Asphalt is currently active





## **Packaging Matters Partnership**



"Origin Materials and Packaging Matters Launch Partnership to Develop Advanced Carbon-Negative Packaging Solutions, Building on Existing 10-Year Supply Agreement" – April 12, 2021

- Packaging Matters is a leader in packaging innovation with several Fortune 100 food companies as customers
- Development work to produce advanced packaging materials, including PEF
- Packaging Matters will transition its virgin petroleumbased PET purchases to sustainable carbon-negative PET from Origin Materials.
- As the companies make progress on developing PEF applications, some or potentially all of the supply is expected to transition to PEF
- 40+ years PET experience
- 3 manufacturing facilities in the United States









#### **PrimaLoft Partnership**



"Origin Materials and PrimaLoft Form Strategic Alliance to Develop Carbon-Negative Insulating Fiber for Outdoor Gear, Bedding, and Apparel" – April 19, 2021

- PrimaLoft is advanced material technology company and a world leader in the development of high-performance insulations and fabrics
- Launched strategic alliance to develop high-performance, carbon-negative insulating fibers for diverse apparel applications, including for leading outdoor, fashion, and lifestyle brands, plus home goods applications such as hypoallergenic insulated bedding
- Signed capacity reservation agreement for carbon-negative
   PET produced using the Origin Materials technology platform
- Fibers to address demand for sustainable, high-performance materials from over 900 global brand partners
- PrimaLoft iconic brand partners include Patagonia, Stone Island, L.L. Bean, Lululemon, adidas and Nike







### **Solvay Partnership**



#### Solvay and Origin Materials to Develop Advanced Carbon-Negative Materials for Automotive Industry – April 19, 2021

- Solvay, founded 1863, is a global leader in chemicals and materials with more than 23,000 employees in 64 countries, and net sales of €9 billion in 2020
- Collaboration to develop advanced materials for the automotive industry, including a drop-in ready specialty polyamide, a polymer for internal combustion engine technology as well as e-mobility systems like e-motors and power electronics that can provide resistance to heat, toughness, corrosion, and operate at high voltages
- The companies believe these materials will be critical to decarbonize supply chains in the automotive industry and achieve the zero-carbon car
- "The cooperation with Origin Materials is a new important element in our continuous commitment to sustainability which, together with our customers, is at the heart of our operations and growth strategy," said Mike Finelli, President of Solvay Specialty Polymers. "Today carbon negative-materials can be added to the evolution of our sustainability roadmap, which already includes different actions from the integrated use of renewables to generate electricity in our plants to pursuing more sustainable products with biosourced monomers or recycled content."







#### Ford Partnership



# "Origin Materials Launches Net Zero Automotive Program With Ford Motor Company" – June 10, 2021

- Launched Net Zero Automotive Program, a sustainable automotive supply chain initiative focused on industrializing new materials to drive decarbonization in the automotive industry
- Partnership will pursue drop-in applications for carbon negative PET plastic (polyethylene terephthalate) produced from sustainable wood residues with Origin technology
- Ford and Origin will also work together to develop sustainable pigments and fillers for automotive applications throughout the interior and exterior of the vehicle, including bumpers, paint pigment, door panels, tire filler, underbonnet foam sheet, black plastic, head rests, seat cushions, and arm rests





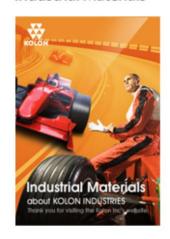
#### **Kolon Industries Partnership**



#### "Origin Materials and Kolon Form Strategic Partnership to Industrialize Advanced Carbon-Negative Chemicals and Materials" – November 8, 2021

- Kolon Industries, a global leader in chemicals and materials, signed a multi-year capacity reservation agreement to purchase sustainable carbon-negative materials from Origin Materials
- Materials include novel polymers and drop-in solutions for select applications, with an initial focus on automotive applications
- The partnership includes development work aimed at commercializing polyethylene furanoate ("PEF"), a polymer with an attractive combination of performance characteristics for packaging and other applications, including enhanced barrier properties when compared with polyethylene terephthalate ("PET"), degradability, and other qualities.
- Origin Materials' technology platform is expected to produce costcompetitive, sustainable carbon-negative furandicarboxylic acid ("FDCA"), the primary precursor to PEF. Kolon has deep expertise in novel FDCA-based polymers, including PEF.

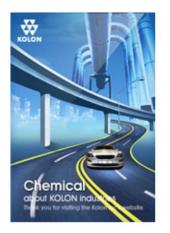
#### Industrial Materials



#### Film/EM



#### Chemicals



Kolon Industries areas of business<sup>1</sup>

#### Fashion



### Mitsui Partnership



#### "Origin Materials and Mitsui Form Strategic Partnership to Industrialize Advanced Carbon-Negative Chemicals and Materials"

- January 10, 2022
- Mitsui & Co., Ltd., a global leader in energy, machinery, chemicals, food, textile, logistics, finance, and more, signed a multi-year capacity reservation agreement to purchase sustainable carbon-negative materials from Origin Materials
- This strategic partnership aims to rapidly develop and industrialize new sustainable carbon-negative products for the automotive, chemicals, electronics, packaging, textiles, construction, and personal care industries based on Origin Materials' patented technology platform
- The partnership will leverage Mitsui's global supply chain strength, access to Japanese and international markets, and leadership in business innovation
- Mitsui is a global trading and investment company with a diversified business portfolio that spans approximately 63 countries in Asia, Europe, North, Central & South America, the Middle East, Africa and Oceania













Mitsui & Co., Ltd areas of business include mineral & metal resources, energy, machinery & infrastructure, chemicals, iron and steel products, lifestyle, and innovation & corporate development.<sup>1</sup>



#### **Minafin Partnership**



- Belgium headquartered Minafin Group is a leading developer and manufacturer of fine chemicals with three main areas of expertise: health chemistry, green chemistry, and challenging chemistry
- Origin + Green Chemistry Division of the Minafin Group collaboration aims to bring cost-competitive biobased products to the market, with applications in the pharmaceutical, agricultural, cosmetics and personal care, and automotive industries
- This partnership demonstrates Origin's expanded product offerings apart from CMF- and HTC-derived materials, for applications in specialty and fine chemicals
- Minafin affiliate Pennakem aims to develop new technologies with
   Origin to further expand the market for Pennakem's biobased products
- Minafin business unit EcoXtract® is in discussions with Origin to commercialize its revolutionary biobased extraction process using sustainable carbon-negative materials produced by Origin. The EcoXtract® process efficiently extracts useful plant oils for food, cosmetics, and other applications









## LVMH Moët Hennessy Louis Vuitton Partnership (1 of 2)

### LVMH

"Origin Materials and LVMH Moët Hennessy Louis Vuitton Form Strategic Partnership to Bring Carbon Negative Materials to Perfumes and Cosmetics Industry"

- April 19, 2022

- Strategic partnership with LVMH Beauty, a division of LVMH, the global leader in luxury products
- LVMH has signed a multi-year capacity reservation agreement to purchase sustainable, carbon-negative polyethylene terephthalate ("PET") for use in packaging for perfumes and cosmetics
- New category expansion and Origin's first partnership with luxury brand
- Family of renowned LVMH Beauty brands includes Parfums Christian Dior, Parfums Givenchy, Guerlain, and others









LVMH Beauty brands shown: Parfums Christian Dior, Parfums Givenchy, Guerlain

### LVMH Moët Hennessy Louis Vuitton Partnership (2 of 2)

#### LVMH

"At LVMH, with our Life 360 program, we made the decision that our packaging will contain zero plastic from virgin fossil resources in a near future. Origin's bioplastic technologies are playing a crucial role in helping LVMH achieve our sustainability targets without any compromise on quality. LVMH Beauty is happy to collaborate with Origin, supporting innovative technologies."

- Claude Martinez, Executive President & Managing Director LVMH Beauty









LVMH Beauty brands shown: Parfums Christian Dior, Parfums Givenchy, Guerlain

### Mitsubishi Chemical Group Partnership



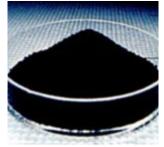
"Origin Materials and Mitsubishi Chemical Group Partner to Develop Advanced Carbon-Negative Materials for Tires"

- April 28, 2022

- Strategic partnership with Mitsubishi Chemical Group ("MCG"), Japan's leading diversified chemicals and advanced materials producer
- MCG will convert HTC produced by Origin into highperformance analogs of specialty carbon black materials
- Represents Origin's first announced carbon black partnership
- Carbon black applications include paint, printing inks, colored resin, toner, tires, and rubber products







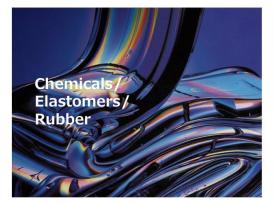
#### **Kuraray Partnership**

#### **kura**ray

#### "Origin Materials and Kuraray Announce Carbon Negative Materials Partnership"

- June 16, 2022

- Kuraray, a global Japanese specialty chemicals company and one of the largest suppliers of industrial polymers and synthetic microfibers, signed a multi-year capacity reservation agreement to purchase sustainable carbon negative materials from Origin
- Strategic partnership to commercialize advanced carbon negative materials for diverse polymer applications
- The sustainable, carbon negative intermediate chemicals produced by Origin can be used in the largescale synthesis of many polymers, including purified terephthalic acid ("PTA"), PET, and polyamide











**Revion Initiative** 

#### "Origin Materials and Revlon Announce Initiative to Develop Next-Generation Sustainable Packaging for Cosmetics"

– July 20, 2022

- Revlon, a leading global authority and beauty trendsetter in the world of color cosmetics and hair care, signed a memorandum of understanding to reserve commercial volumes of Origin PET
- Joint initiative to develop advanced carbon negative materials for next generation cosmetics packaging



Revlon is among the leading global beauty companies, with some of the world's most iconic and desired brands and product offerings in color cosmetics, skin care, hair color, hair care and fragrances under brands such as Revlon, Revlon Professional, Elizabeth Arden, Almay, Mitchum, CND, American Crew, Creme of Nature, Cutex, Juicy Couture, Elizabeth Taylor, Britney Spears, Curve, John Varvatos, Christina Aguilera and AllSaints. Source: Revlon.com

#### **Intertex Partnership**



"Origin Materials and Intertex Announce Partnership to Produce 100% Bio-Content Carbon Black for Rubber Compounding"

– July 25, 2022

- Intertex World Resources, a leading value-added distributor of synthetic rubber, signed an offtake agreement to purchase sustainable carbon negative carbon black from Origin
- Origin carbon black, made from Origin's hydrothermal carbon ("HTC"), is a versatile 100% bio-content filler and pigment
- Carbon black can be used in a wide range of applications including belts and hoses, mechanical rubber goods, tires, plastic masterbatch, and toners
- Partnership aims to produce carbon black for tires including N660, N550, and N762 specifications, as well as for belts, hoses, rubber seals, plastic extrusion, and other mechanical rubber goods markets









### **ATC Plastics Partnership**



"Origin Materials and ATC Plastics Announce Partnership to Bring 100% Bio-Content Carbon Black to the Plastics Industry" – July 27, 2022

- ATC Plastics, a leading global manufacturer of black color concentrates, agreed to purchase sustainable carbon-negative carbon black from Origin Materials
- The global market for carbon black is projected to reach \$26
  billion by 2025, expanding at 6% CAGR. Plastics is anticipated to be
  the fastest-growing application for carbon black from 2019 to
  2025 resulting from its use in the production of high-performance
  products
- Application targets include plastic masterbatch for corrugated pipe and plastic manufacturing processes such as blow molding, injection molding, pipe extrusion, compounding, plastic film and sheet, and rotational molding







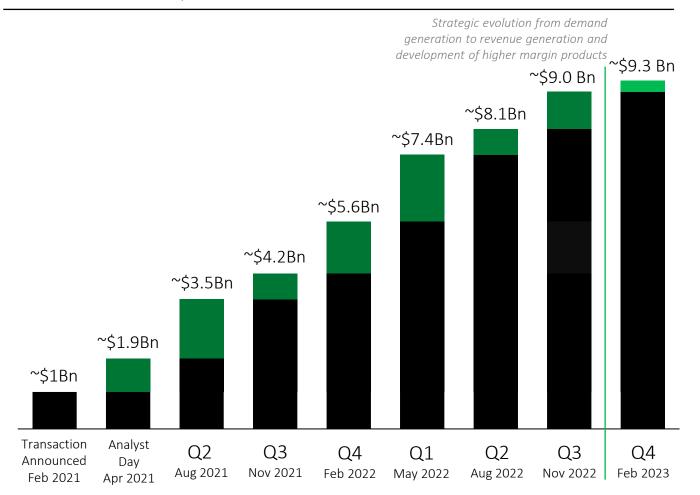
Source: atcplastics.com



# Origin customer demand has increased more than ninefold to \$9.3Bn since February 2021 announcement to go public

Total demand is \$9.3Bn in either offtake agreements or capacity reservations<sup>1</sup>

Customer Demand, \$Bn cumulative<sup>2</sup>



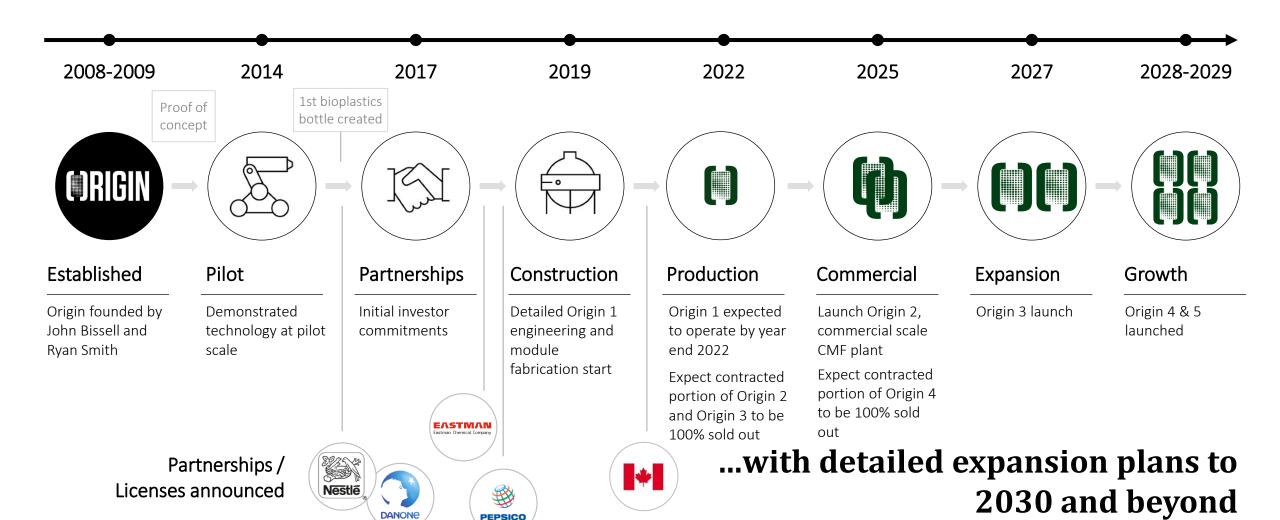
#### **Select Origin Customers & Partners**



<sup>1.</sup> Figures assume maximum offtake amounts and exercise of full capacity reservations.

<sup>2.</sup> In the chart, green color denotes the incremental increase in customer demand for a given quarter. Source: Origin Materials

## Origin is building on a strong foundation toward rapid growth...



#### **Origin 1 mechanically complete**

Commissioning underway, with completion of commissioning and start-up expected in Q2 2023

- Commercial-scale plant expected to enable customers to qualify products and applications beyond PET and HTC fuel pellets; higher value products ultimately be produced and sold at world scale from Origin 2, Origin 3, and beyond
- Origin 1 nameplate capacity approximately
   50 million pounds of biomass input annually
- In addition to para-xylene and bio-PET, Origin is exploring or qualifying FDCA, epoxies and resins, surfactants, sustainable carbon black, bio-asphalt, fuel pellets, as well as biofuel and bio-solvents from an "oils and extractives" stream co-produced with CMF and HTC and which has not been included in previous plans
- Origin 1 will be operated to optimally fulfill customers demand around qualification and sampling



### **Origin 1 platform development**

Origin's first plant will play a key application development role including exploring additional high-value products

Products being explored or qualified (JDAs, sample production) Strategic asset Intermediate streams Para-xylene **Epoxies and** "CMF" **FDCA** Surfactants and Bio-PET Resins 5-Chloro-methyl-furfural "HTC" Sustainable Fuel Pellets Bio-asphalt Carbon Black Hydrothermal carbon "Oils & Biofuel **Bio-Solvents** Extractives"1

### **Construction – Origin 2 (1 of 3)**

"Origin Materials Announces Geismar, Louisiana as Location for Second Manufacturing Plant, Origin 2" — February 16, 2022

- The company has selected a site in Geismar, Louisiana, for the construction of its first world-scale manufacturing facility, Origin 2, subject to finalization of economic incentives from the State of Louisiana
- The plant is expected to convert an estimated 1 million dry metric tons of sustainable wood residues each year into carbon-negative materials used to make PET and HTC for a wide variety of end markets
- The site offers access to plentiful sustainable wood residues, including "residuals" or waste wood from local large-scale pulp mills. The Geismar wood basin is estimated to consist of approximately 650 million green short tons<sup>1</sup> of inventory<sup>2</sup>
- Pending state and local incentives are estimated to be worth more than \$100 million, and the State of Louisiana has preliminarily awarded Origin a Private Activity Bond volume cap allocation in the amount of \$400 million
- Construction expected to start by mid-2023 and the plant is expected to be operational mid-2025

(Continued on next page)

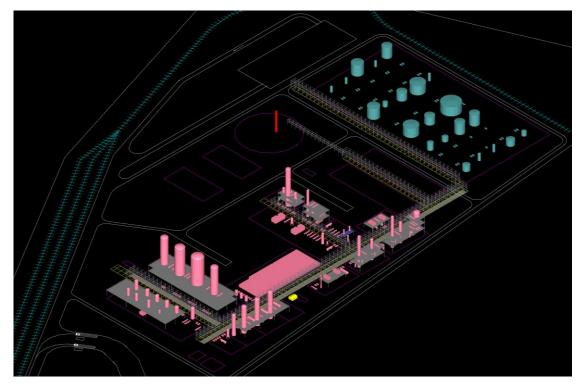


The Geismar wood basin, shown in green, offers plentiful sustainable wood residues, including "residuals" or waste wood from local large-scale pulp mills<sup>1</sup>

### **Construction – Origin 2 (2 of 3)**

"Origin Materials Announces Geismar, Louisiana as Location for Second Manufacturing Plant, Origin 2" — February 16, 2022

- The local industrial cluster offers access to reliable utilities, including hydrogen pipelines, ethylene pipelines, valuable inorganic species, water, and wastewater treatment
- Opportunities to place Origin products in the local industrial ecosystem and to participate as a customer in that ecosystem as well
- The site offers exceptional logistics via rail and water, located along the Mississippi River with easy barge access to the Gulf Coast, which is valuable for the distribution of chemical intermediates
- The site is nearby other chemical company potential partners, with approximately 15 chemical companies and refineries in the nearby Geismar area
- Baton Rouge and New Orleans have extremely skilled labor pools across refining, pulp and paper, forestry and agronomy, feedstock logistics, and chemicals
- The 150-acre facility would create an estimated 500 construction jobs, 200 local full-time positions, and between 500 and 1,000 indirect local jobs



Preliminary rendering of Origin 2 at Geismar site

## Construction – Origin 2 (3 of 3)

Origin has selected Hunt, Guillot & Associates as its owner's engineer for Origin 2



- The owner's engineer will provide full-service engineering to support and augment Origin in all phases of the project, from early design to construction, logistics, planning, detailed scheduling, cost forecasts, progress tracking and reporting, and work stream integration
- As a multi-disciplined project management and engineering services company, HGA has provided professional services to an extensive portfolio of customers throughout numerous industries for 25 years.
   HGA has ten locations throughout Louisiana, Texas, Arkansas, and Alabama and has provided full-service offerings in over 30 states, Puerto Rico, Canada, China, and Mexico
- HGA is located close to many tier 1 engineering companies, the Origin 2 site in Geismar, Louisiana, and much of the Origin design team
- HGA owner's engineer experts have conducted multiple billion-dollar projects
- HGA has extensive wood handling and forest products experience







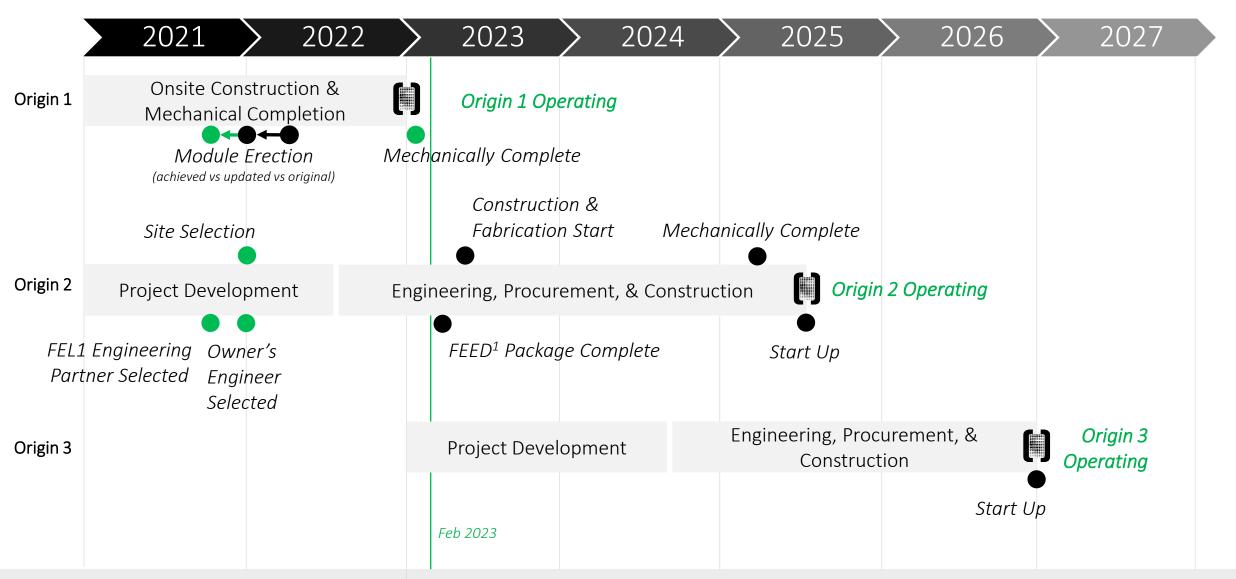


**HGA** projects



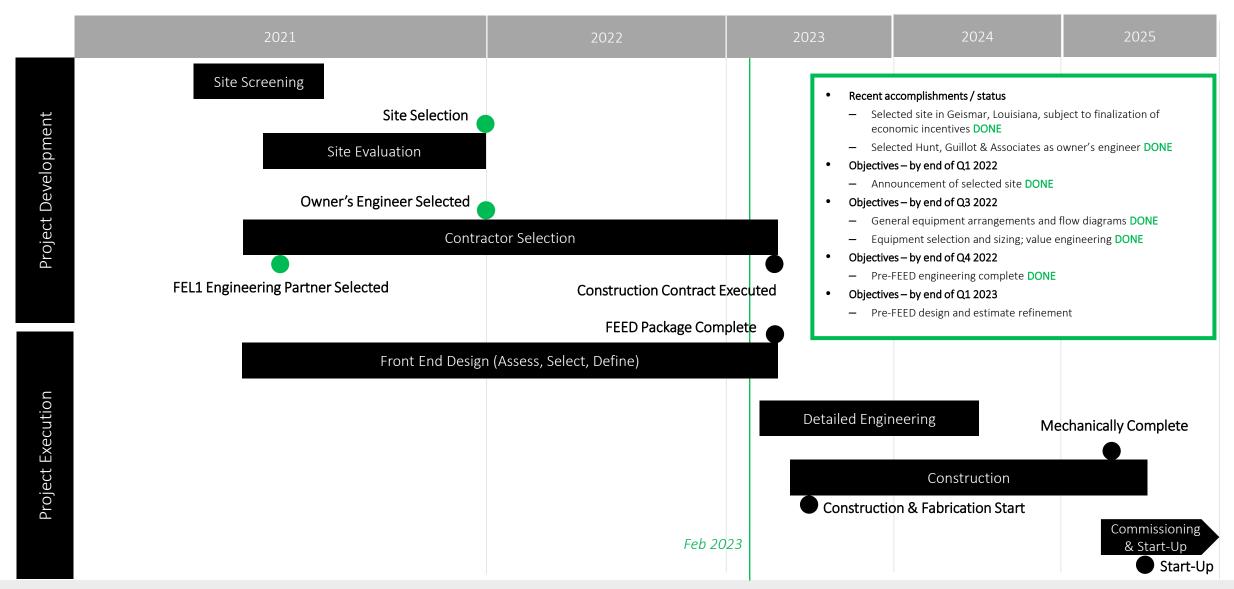
## **Construction schedule – Origin 1, Origin 2, and Origin 3**

Company expects to provide an update on new product offerings and construction plans for the Origin 2 plant in mid-2023

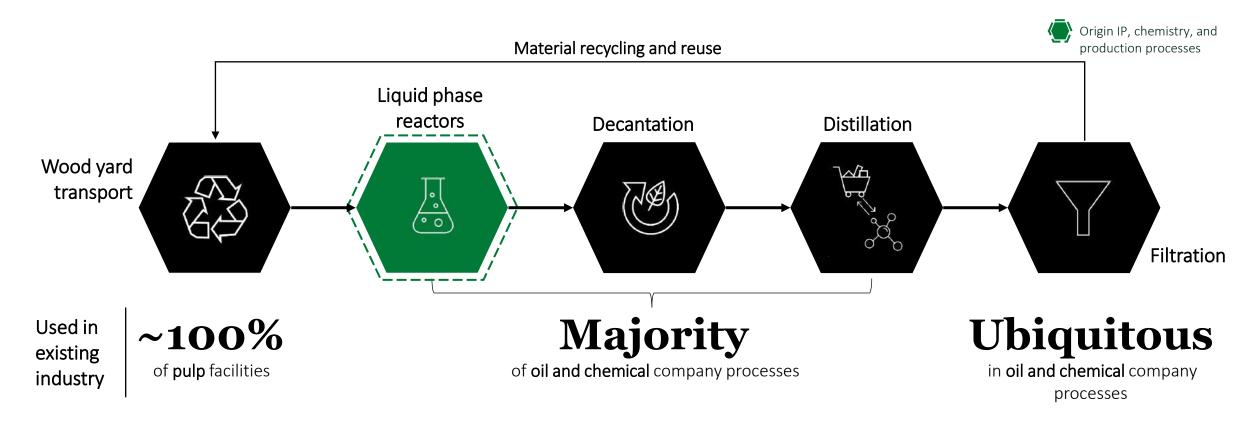


### **Construction schedule – Origin 2**

Company expects to provide an update on new product offerings and construction plans in mid-2023



## Origin is delivering transformational chemistry through mature, industrystandard equipment, materials, and technical processes



Patent families protect unique CMF and HTC production processes<sup>1</sup>

Zero

untested mechanical processes required for operations / scale-up<sup>2</sup>

<sup>1.</sup> As previously reported in the Q4 2022 Earnings Presentation of Origin Materials, Inc. dated February 23, 2023.

<sup>2.</sup> Origin does not rely on any novel mechanical processes in its plants. All of Origin's mechanical processes are standard mechanical processes utilized in the chemicals and refining industry.

## Origin's technology uses conventional chemical processing, which is inherently well suited to scale-up

Moreover, Origin technology offers additional technical and economic advantages for process scale-up

Origin technology scale-up advantages

Technology comparison

#### Proven approach for scaling up bio-processes

Conventional chemical bio-processes that have scaled up include bio-diesel, Kraft process, PLA, ethanol to ethylene, and renewable diesel

#### Conventional equipment

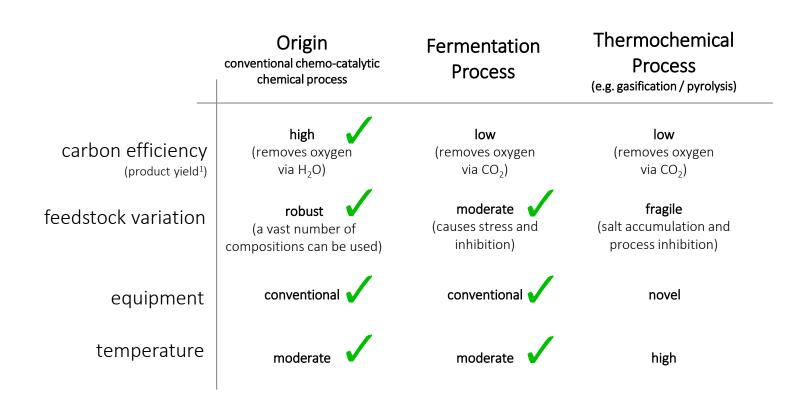
Standard equipment used in the chemical industry for centuries makes scale-up more straightforward than processes requiring new mechanical designs

#### Extensively tested at pilot scale

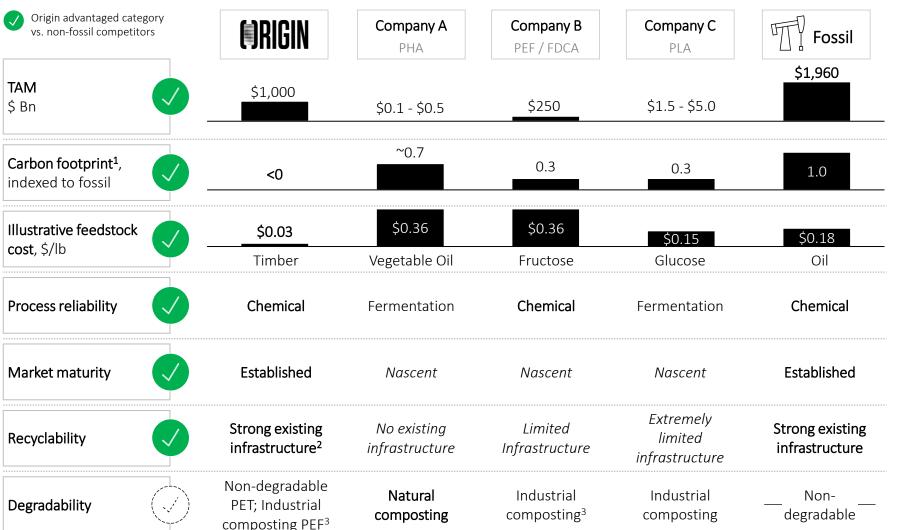
Origin's process has been extensively run and stress tested at pilot scale for over 10 years

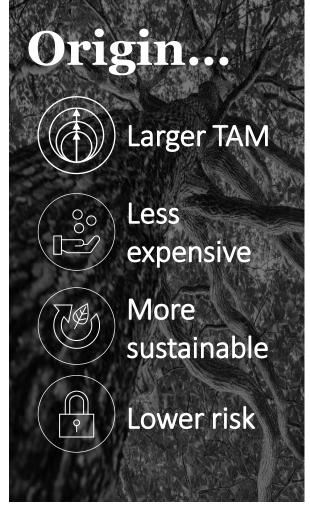
#### Powerful demand pull

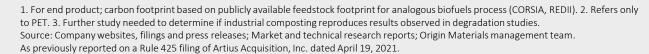
Carbon efficiency and the low cost & volatility of feedstock drive demand for Origin's products



## Origin has meaningful advantages over bioplastics companies









## Origin brings an unrivaled set of industry veterans, leaders, and visionaries



**UCDAVIS** 

John Bissell Co-Founder & Co-CEO

- Founded Origin Materials in 2008
- Featured on Forbes 30 under 30



vahoo!

**Wharton** 

 Former CEO Shazam and senior executive at Yahoo!

Rich Rilev Co-CEO

20+ years managing rapid-growth organizations



**UCDAVIS** 

#### **Nate Whaley CFO**

20 years C-Suite experience scaling complex high growth business across industries



BROADROCK

**Stephen Galowitz** CCO

 Co-founder / Chief **Development Officer** of renewables HARVARD company

• 15 years experience in

renewables space



#### Ryan Smith Co-Founder & CTO

- Founded Origin Materials in 2008
- Process Engineer at NFC Flectronics



#### Josh Lee General Counsel

- Attorney at Irell & Manella, LLP
- Sr. Analyst at Strumwasser & Woocher, LLP



**GRACE** 

#### Roman Wolff **VP** of Engineering

- Engineering leader at **TETRA Technologies**
- 30 years of experience in engineering on more than 20 projects



**Wharton** 

#### Mako Masuno, PhD **Chief Scientist**

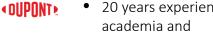
 Pathway Development & Optimization Expert



#### Tanja Gruber, PhD VP of R&D

• R&D leader at Dupont and IFF

biochemical industry



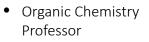


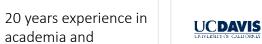
#### Chris Williams-Campbell VP of HR

• 15 years experience in biotech. pharmaceutical, and medical device industries



**UCDAVIS** 

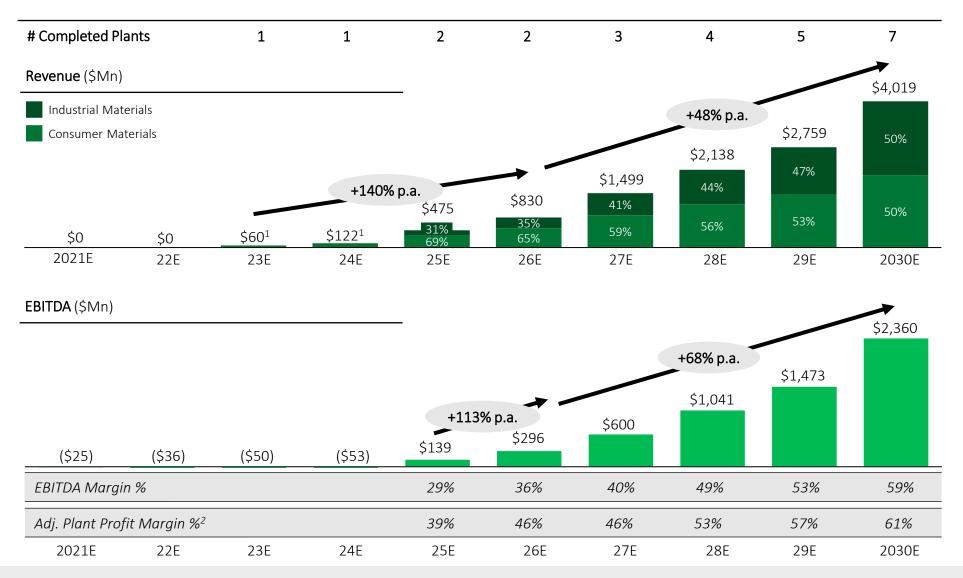








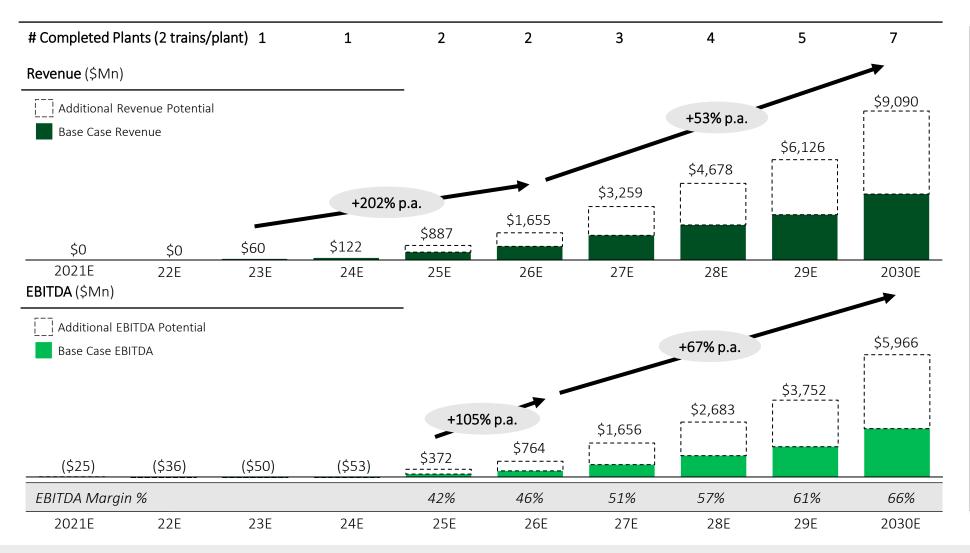
## Origin expects to deliver a superior financial profile for years to come



- Revenue and materials volume forecast / growth based on satisfying existing customer offtake contracts and expected future demand
- Pricing assumptions are based on negotiated contract pricing with existing customers
- Feedstock cost assumptions reflect historically low volatility of pine pulpwood prices
- Cost assumptions also include additional required overhead during scaling
- EBITDA margins and associated growth are expected to improve throughout the forecast period as a result of increasing economies of scale from additional plants coming online
- Includes R&D expenditures to maintain Origin as the global leader in low or negative carbon material technologies



## Origin could see significant additional revenue potential



- Assumes Origin is able to secure moderately higher prices in new customer contracts as a result of strong demand and carbon negative materials scarcity
- Concurrently, assumes Origin adds capacity at a faster rate than base business plan<sup>1</sup>, adding two trains per new plant, effectively doubling capacity of each
- Feedstock prices assumed unchanged as primary feedstock supply (forest / wood processing residues) is ample and well above Origin's needs



## Long-term target operating model

	Origin Plant 1	Origin Plant 2	Origin Plant 3-7 Average
Illustrative Run-Rate Economics			
Mn lb. biomass input	49	2,205	2,205
Mn lb. products sold	146	2,412	1,313
CapEx (\$Mn)	\$70 <sup>1</sup>	\$1,072	\$811
ROIC (Adj. plant margin/CapEx)	NM	35.9%	51.1%

	\$Mn	\$/lb. product	\$Mn	\$/lb. product	\$Mn	\$/lb. product	
Revenue	\$122	\$0.84	\$708	\$0.29	\$637	\$0.49	
Consumer materials	\$122		\$414		\$291		
Industrial materials	\$122		\$294		\$346		
Biomass feedstock	(\$7)	(\$0.05)	(\$56)	(\$0.02)	(\$56)	(\$0.04)	
Other feedstock & variable costs	(\$7)	(\$0.05)	(\$93)	(\$0.04)	(\$108)	(\$0.08)	
Tolling & downstream processing	(\$106)	(\$0.73)	(\$154)	(\$0.06)	(\$39)	(\$0.03)	
Adj. Contribution <sup>2</sup>	\$2	\$0.01	\$405	\$0.17	\$435	\$0.33	
Plant labor + other fixed costs	(\$6)	(\$0.04)	(\$20)	(\$0.01)	(\$20)	(\$0.02)	
Adj. Plant Profit	(\$4)	(\$0.03)	\$385	\$0.16	\$415	\$0.32	
Primary Products	PET/F, CMF, higher value application development samples		PET, HTC fuel		PET, PET/F, PEF <sup>3</sup> , CMF, FDCA <sup>4</sup> , carbon black, activated carbon, HTC fuel		

<sup>1.</sup> Denotes incremental capex to be spent in 2021-2022.

<sup>2.</sup> Reflected as adjusted gross profit in the base case projections included in the registration statement on Form S-4 as filed with the SEC by Artius Acquisition Inc. ("Artius") on March 9, 2021, as amended.

<sup>3.</sup> Polyethylene furanoate. 4. Furandicarboxylic acid. Source: Origin Materials management estimates.

## Anticipated fully funding of Origin 1 and Origin 2 from cash on hand and traditional project financing sources

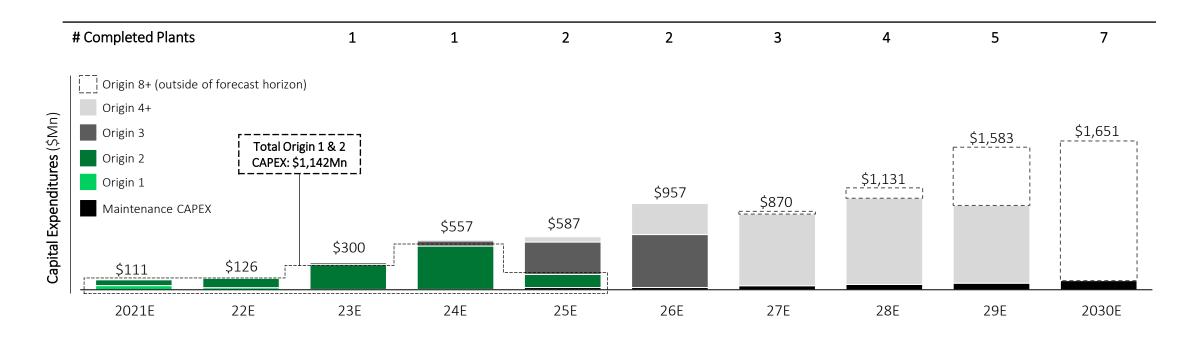
#### Cash Flow Sources & Uses from 2021E to Origin 2 Revenue in 2025E (\$Mn)

	June 2021 Forecast
Gross Proceeds	\$529
Plus: Existing cash balance	3
Less: Transaction fees and expenses (net of prepaid out of existing cash balance) <sup>1</sup>	(61)
Net Cash Balance <sup>2</sup>	\$471
Add: Project Financing <sup>4</sup>	\$804
Add: Local, State, and Federal Government Incentives / Support <sup>4</sup>	185
Less: Origin 1 Growth CAPEX <sup>5</sup>	(70)
Less: Origin 2 Growth CAPEX <sup>5</sup>	(1,072)
Less: Cash Flow from Operations '21 – '25 <sup>3</sup>	(218)
Remaining Cash to Fund Origin 3 and Beyond <sup>6</sup>	\$100

<sup>1.</sup> Transaction expenses figure excludes \$3Mn prepaid out of existing cash balance; total transaction expenses including prepaid is \$65Mn. 2. Assumes none of the Artius warrants to acquire 35.5Mn shares are exercised. 3. Cash flow from operations calculated as EBITDA + Working Capital + Maintenance CAPEX from 2021 until reaching Origin 2 revenue in 2025. 4. Project financing and government incentives / support have not yet been secured. 5. Origin has confirmed its estimates for construction cost after considering the latest input from various suppliers, construction companies and consultants specializing in chemical plant constructions. Origin has built into its capital budget for Origin 1 and Origin 2 contingencies as a reserve for any unexpected construction "overrun" that are appropriate at this stage of planning. 6. Defined as net proceeds less annual cash flow from operations less equity financed growth CAPEX for Origin 1 and 2. Source: Origin Materials management estimates. As previously reported on Origin's Form 8-K filed on August 12, 2021.



### Anticipated fully funded growth plan to profitability



- Current transaction and anticipated financing and grants are expected to be sufficient to fully finance the construction of Origin 1 and Origin 2 and achieve EBITDA profitability
- CapEx based on estimates from world-leading EPC companies that Origin will partner with to deliver holistic capital project solutions
- Capacity scaling based on current customer contract commitments / orders and anticipation of demand from global industrial complex rushing to secure "drop in" decarbonized materials to meet their carbon commitments

## **Share count as of 12/31/2022**

Class	Outstanding Shares of Common Stock		
Total Shares Outstanding <sup>1</sup>			
Shares subject to forfeiture <sup>1</sup>	4,500,000		
Total Shares Outstanding, including Shares subject to forfeiture <sup>1</sup>	143,034,225		
	Shares Reserved for Future Issuance Pursuant to Potential Earnouts, Outstanding Warrants, and Options		
Public Warrants <sup>2</sup>	24,149,960		
Private Warrants <sup>2</sup>	11,326,667		
Legacy Origin Earnout Shares <sup>3</sup>	25,000,000		
Options and RSUs <sup>4, 5</sup>	18,455,593		
Total Shares 5	221,966,445		

<sup>1. 4.5</sup> million shares held by a certain stockholder subject to forfeiture in three equal installments unless our Common Stock reaches certain trading price thresholds within certain specified time periods (10 consecutive trading day closing volume weighted average price targets of \$15, \$20, and \$25 within 3, 4 and 5 years after the closing of the business combination between Artius and legacy Origin (the "Business Combination"), respectively) 2. Warrant exercise price = \$11.50 per share. 3. 25,000,000 Earnout Shares are subject to issuance in three equal installments if our Common Stock reaches certain trading price thresholds within certain specified time periods (10 consecutive trading day closing volume weighted average price targets of \$15, \$20, and \$25 within 3, 4 and 5 years after the closing of the Business Combination, respectively). 4. Includes 4,989,537 options with a weighted average strike price of \$0.17/share and 1,481,531 performance-based options at \$0.14/share (423,294, 634,942, and 423,295 performance-based options vest if our Common Stock reaches volume weighted average price thresholds of \$15, \$25, and \$50 per share respectively for 10 consecutive trading days), 4,153,025 Restricted Stock Units, and 2,610,500 Performance Stock Units under which the maximum award can be up to 7,831,500 shares. 5. Excludes shares available for future issuance pursuant to our equity incentive plan and employee stock purchase plan.



#### Reconciliation of GAAP and Non-GAAP results

We believe that the presentation of Adjusted Earnings before Interest, Taxes, Depreciation, and Amortization (Adjusted EBITDA) is appropriate to provide additional information to investors about our operating profitability adjusted for certain non-cash items, non-routine items that we do not expect to continue at the same level in the future, as well as other items that are not core to our operations. Further, we believe Adjusted EBITDA provides a meaningful measure of operating profitability because we use it for evaluating our business performance, making budgeting decisions, and comparing our performance against that of other peer companies using similar measures.

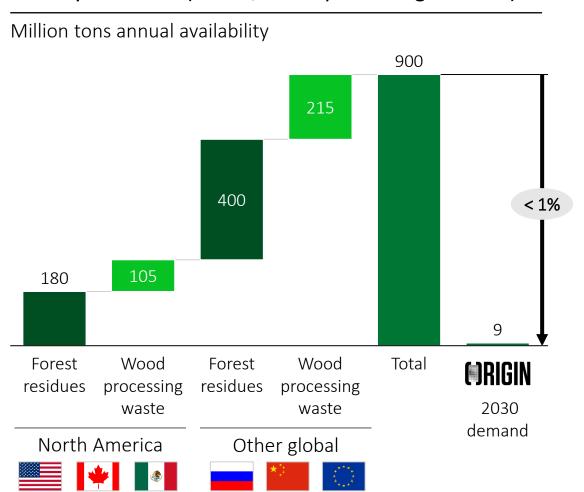
We define Adjusted EBITDA as net income or loss adjusted for (i) stock-based compensation expense, (ii) depreciation and amortization, (iii) interest income, (iv) interest expense, net of capitalized interest, (v) change in fair value of derivative liabilities, (vi) change in fair value of warrants liability, (vii) change in fair value of earnout liability, (viii) professional fees related to completed mergers, and (ix) other income, net.

	Three months ended December 31,			 Year ended December 31,			
(in thousands)		2022		2021	 2022	-	2021
Net income	\$	15,993	\$	5,237	\$ 78,569	\$	42,090
Stock based compensation		3,516		959	7,235		5,767
Depreciation and amortization		223		181	711		544
Interest income		(2,748)		(1,413)	(8,825)		(1,413)
Interest expense, net of capitalized interest		::		(1)	=		2,838
Change in fair value of derivative		2,168		(100)	443		1,326
Change in fair value of warrants liability		(6,378)		(2,838)	(21,988)		4,525
Change in fair value of earnout liability		(21,876)		(8,480)	(85,437)		(75,488)
Professional fees related to completed mergers		·—		<del></del>	_		640
Other income, net		(132)	- 2	(160)	(1,709)		(811)
Adjusted EBITDA	\$	(9,234)	\$	(6,615)	\$ (31,001)	\$	(19,982)



## Origin is not feedstock limited

#### Primary feedstock (forest / wood processing residues)



#### Additional feedstock optionality



>2X

Additional feedstock supply available above forest / wood processing residues alone

## Origin will look to value chain participants to complement its strengths

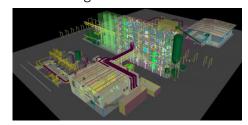




"Our proprietary bread and butter"

Proprietary technology in a league of its own

Picture: Origin 1



#### "Putting it all together"

- We will leverage an already-existing industrial base of monomer, polymer, additive, and packaging / extrusion technology
  - Beyond Origin 2 (monomers), we will license or sell that technology to a value chain participant

Illustrative potential value chain participants<sup>1</sup>:















#### "Clear market pull"

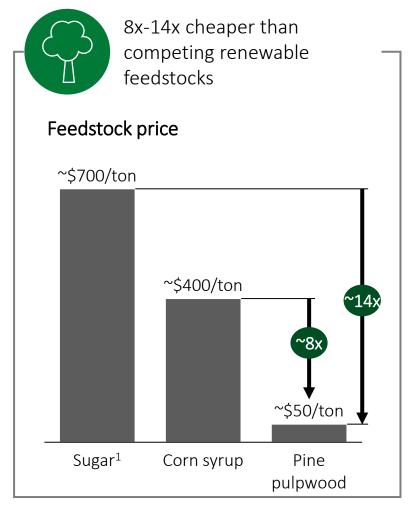
Years of experience working with the end consumer to address sustainability goals

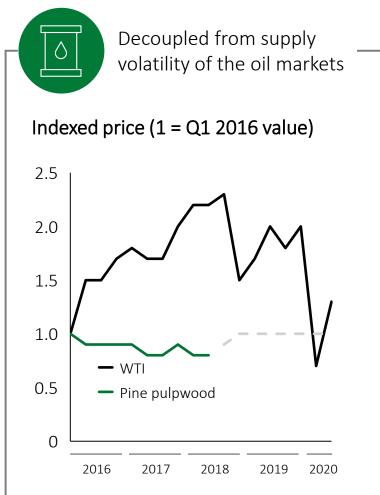


Origin is in discussions with multiple partners and is ready to scale its strategy through its next phase of growth



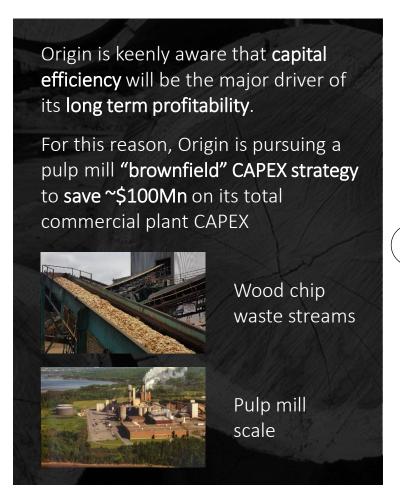
## Origin's use of timber and forest residues as feedstock is a potential game changer







## Origin is pursuing a capital efficient strategy to optimize CAPEX



Origin's strategy:

#1

Identify & purchase mill

Work with partners to identify suitable aging / defunct pulp mill

>40

Potential brownfield sites (e.g., closed pulp mills) in the US & Canada built in the last 50 years

 $\bigcirc$ 

**#2** 

Convert equipment

Leverage key components needed for its wood handling process (e.g., utilities, boiler, wood yard)

>\$100Mn

Total useable value of converted equipment, even after considering expected upgrade costs

#3

Integrate & operate

Integrate refurbished components into the rest of its necessary equipment / plant infrastructure

Up to 15%

Net savings on total plant CAPEX, or ~\$100Mn co-location benefit

Pulp mill "brownfield" strategy offers additional benefits, including the existing forest supply chain ecosystem and local gov't incentives

# Origin has added extensive technical, operational, and commercial leadership since February 2021 announcement to go public (1 of 5)



sasol 🚜

FLUOR.

Matt Perkins
Engineering Director,
Projects

- 23+ years with Fortune 500
   Owner/Operator and Engineering,
   Procurement, and Construction
   ("EPC") companies, including Sasol,
   Fluor Corporation, and Dow
   Chemical Company
- Experienced in the design, procurement and construction of industrial assets, including petrochemical technologies





**Zan Liu, PhD**Technical Manager

- 15+ years of experience in basic/applied research, process development, pilot unit design and operation, and process/reactor scale-up
- At Lummus Technology, inventor of award-winning technology C5 CDAlky (2019 Hydrocarbon Processing Award)





ON

PRAXAIR

Bill Williams, PhD
Director of Process
Development –
Carbon Black

 Process development leader with expertise in reaction engineering and catalysis
 Formerly at Dupont, Birla Carbon, Cabot Corporation, Praxair



**Bill Gong, PhD**Senior Scientist

- 25+ year career as a research scientist at Amoco Chemicals/BP
- Expertise in oxidation catalysis in PTA and diesel fuels



## James Lattner, PhD Technical Fellow

- Retired as Chief Engineer at ExxonMobil Chemical after 40+ years
- ExonMobil

 3+ years consulting and teaching Chemical Engineering classes at the University of Houston



## **Chris Stark**Commercial Director

 Served 20 years in the Marine Corps at the Department of Defense leading cross functional teams, working with and through international partners to complete projects



niagara



- 300+ science and engineering publications and almost 300 patents
- Inducted into the National Academy of Inventors

Jay Hanan, PhD

**Technical Director** 

Former Chief Scientist, Niagara Bottling; formerly with NASA Jet Propulsion Laboratory



Coca Cola

Sealed Air

## Ron Moffitt, PhD Polymer Principal Scientist

- Registered professional engineer with 38+ years of experience in polymer research, development, processing, and manufacturing of fibers, films, and containers
- Formerly at The Coca-Cola Company, Sealed Air Corporation



## Origin has added extensive technical, operational, and commercial leadership since February 2021 announcement to go public (2 of 5)



Worley

BURNS MEDONNELL.

#### Benson Ledbetter

Process Design Manager

- 19 years in engineering and construction industry spanning all EPC project phases in regions ranging from Mumbai, India to Texas and Oklahoma
- Formerly at Burns & McDonnell, WorleyParsons



**Jacobs** 



#### Robert (Bob) Nissen Project Director

- 30 years of diversified project management experience in the refining. chemical, fertilizers, liquified natural gas storage, and mining and minerals industries
- Formerly at Jacobs Solutions. BP Amoco



Worley

BURNS MEDONNELL.

#### **David Ballow Process Technology** Director

- Experience leading teams on capital projects of many sizes and stages of development including international and domestic projects
- Formerly at WorleyParsons, Process Technology Manager at Burns & McDonnell



HEXCEL

**TEREX** 

#### Mark DiGiambattista Product Stewardship and Regulatory Manager

- 15+ years of regulatory and product stewardship experience in medium to large publicly listed companies
- Former Regional Product Stewardship Manager at Hexcel Corporation; formerly at Terex Corporation, Occidental Petroleum Corporation



:::siluria

#### Wayne Schammel, PhD

Senior Scientist

- 43 years in Industrial R&D, 33 in large petrochemical companies, 10 in startups
- 50 US patents
- Formerly at Amoco Chemicals, BP Petrochemicals, Siluria **Technologies**





#### Victor Adamian, PhD Oxidation Technical Director

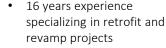
- 25+ years of academic and industrial experience in chemistry and catalysis, including 23 years with BP Petrochemicals
- Early proponent of sustainability activities at BP Petrochemicals





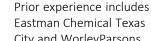
- 14+ years of chemical industry experience in various engineering and project execution roles
- Experienced leader across operations, logistics, maintenance, and project CORTEVA ( execution functions
  - Formerly at Dow Chemical Company, Corteva Agriscience





Senior Process Engineer

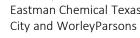
Ryan Donahe







Worley





## Origin has added extensive technical, operational, and commercial leadership since February 2021 announcement to go public (3 of 5)



Bamidele Ali Director of Product Development

 Has run several successful businesses within Fortune 100 companies



 Prior experience includes GE Healthcare, XG Sciences, DSM Functional Materials and Danaher Corporation



**Bryan Soukup** Policy and Legislative Affairs Director

- Served as VP of Government and Public Affairs for the American Society of Interior Designers
- · Led the resilience and sustainability public policy portfolio for the International Code Council



**◯** BRADY.

Sensata

Micron

Karl Stuen, PhD Materials Engineering Manager

16+ years developing products and technologies in the fields of microelectronics (Micron Technology), adhesives and coatings (Brady Corporation and NuLabel Technologies), and industrial sensors (Sensata Technologies)





Gaurav Agrawal, PhD **Chemical Process** Development Engineer

10+ years of experience in separation technologies, process development and scale-up







Sam Najjar, PhD Sr. Application Technology Manager

- 20+ years industrial experience including in the electronics and the beverage PET bottling industry in product development management, business development management, and innovation program management
- Formerly at Arlon Electronic Materials, Rogers Corporation





- Extensive career in global supply chain, logistics, distribution, and trade compliance with start-up to Fortune 250 companies to a successful consulting practice
- Formerly at Elevance Renewable Sciences, Milacron





Elevance



## Origin has added extensive technical, operational, and commercial leadership since February 2021 announcement to go public (4 of 5)



Norm Lisson Polyester Manufacturing Technical Director

- 25 years in the polyester supply chain
- Deep understanding of virgin and recycle PET producer challenges from tenures with Celanese Corporation and **DAK Americas**
- Formerly at The Coca-Cola Company, Mars



K KOCH.

**Rob Strain** Commercial Director

- Over 30 years at Koch Industries, including Flint Hills Resources
- Extensive experience executing growth capital plans and business deals resulting over \$2 billion dollars of high return investments
- VP, Business Development at Gevo



Honeywell

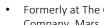
UOP

Chad Huovie Technical Director

- 25+ years refining and downstream business and project development experience
- ExonMobil Holds seven U.S. patents
  - Formerly at ExxonMobil Corporation, Honeywell UOP



Coca Cola MARS



Chemicals



FLINT HILLS





· At ExxonMobil, received Global Technology Award and named Innovator of the Year



**(O**ntinental **5** 



Himanshu Patel, PhD Dir. of Product Development -**Carbon Products** 

- 10+ years Birla Carbon, global growth and technical business development leader
- Expertise in polyester reaction engineering and rubber compounds
- Formerly at Continental AG



Darryl Huntley Director of Business Development – HTC

- Sales and marketing leader with expertise in polyethylene, polypropylene resins, engineered compounds for injection molding, blow molding and sheet applications
- Formerly at Continental Carbon Company, Formosa Plastics Corporation



Continental Carbon\*

Formosa Plastics



# Origin has added extensive technical, operational, and commercial leadership since February 2021 announcement to go public (5 of 5)



ExonMobil

#### **Colin Schumaker** Technology Economic Modeling Director

Experience working for ExxonMobil Chemicals as a Process Engineer, Business Analyst and Olefins Coordination Supervisor



U.S. DEPARTMENT OF ENERGY

#### Paul Bryan, PhD Technical Director

- R&D leader with expertise in separations technology, biomass conversion, thermodynamics, and process R&D and commercialization
- 20 years industry experience
- Formerly at Chevron
   Corporation, Union Carbide
   Corporation, United States
   Department of Energy



**COUPONTS** 

#### Henry Bryndza, PhD Consultant

- 39+ years at DuPont, most recently as Global R&D Director
- Significant experience building value through technologyenabled, sustainable growth across chemistry, materials science, and biotechnology domains



Berkeley

#### Junnan Shangguan, PhD

Research Scientist

- Chemical engineering PhD with extensive research experience in reaction kinetics, thermodynamic, and heterogeneous catalysis
- Postdoctoral researcher at UC Berkeley



**Alpen Shah** Engineering Project Manager





- Professional Engineer with 25+ years in engineering & project leadership roles in manufacturing organizations in Canada and abroad
- Formerly at Shell plc, Imperial Oil, WorleyParsons



## **Glossary**

Abbreviation	Explanation						
Carbon negative	Carbon negative activities or products go beyond achieving reduced carbon impact, or net zero carbon impact, to actually remove additional carbon dioxide from the atmosphere						
CMF	5-Chloromethylfurfural, organic compound obtained from dehydration derivatives						
FDCA	2,5-Furandicarboxylic Acid, organic compound that is a renewable resource because it can be produced from carbohydrates						
HTC	Hydrothermal Carbon, structured compounds that have been converted from organic compounds						
PET	Polyethylene Terephthalate, most common thermoplastic polyester used for packaging foods and beverages						
PEF	Polyethylene Furanoate, bio-based thermoplastic polyester also primarily used for packaging						
рХ	Paraxylene, an important chemical feedstock used in the large scale synthesis of various polymers						



