



The Sustainable Source™

Technology and Ingredients to power the
Materials Transition at scale

Christophe Schilling

Chief Executive Officer

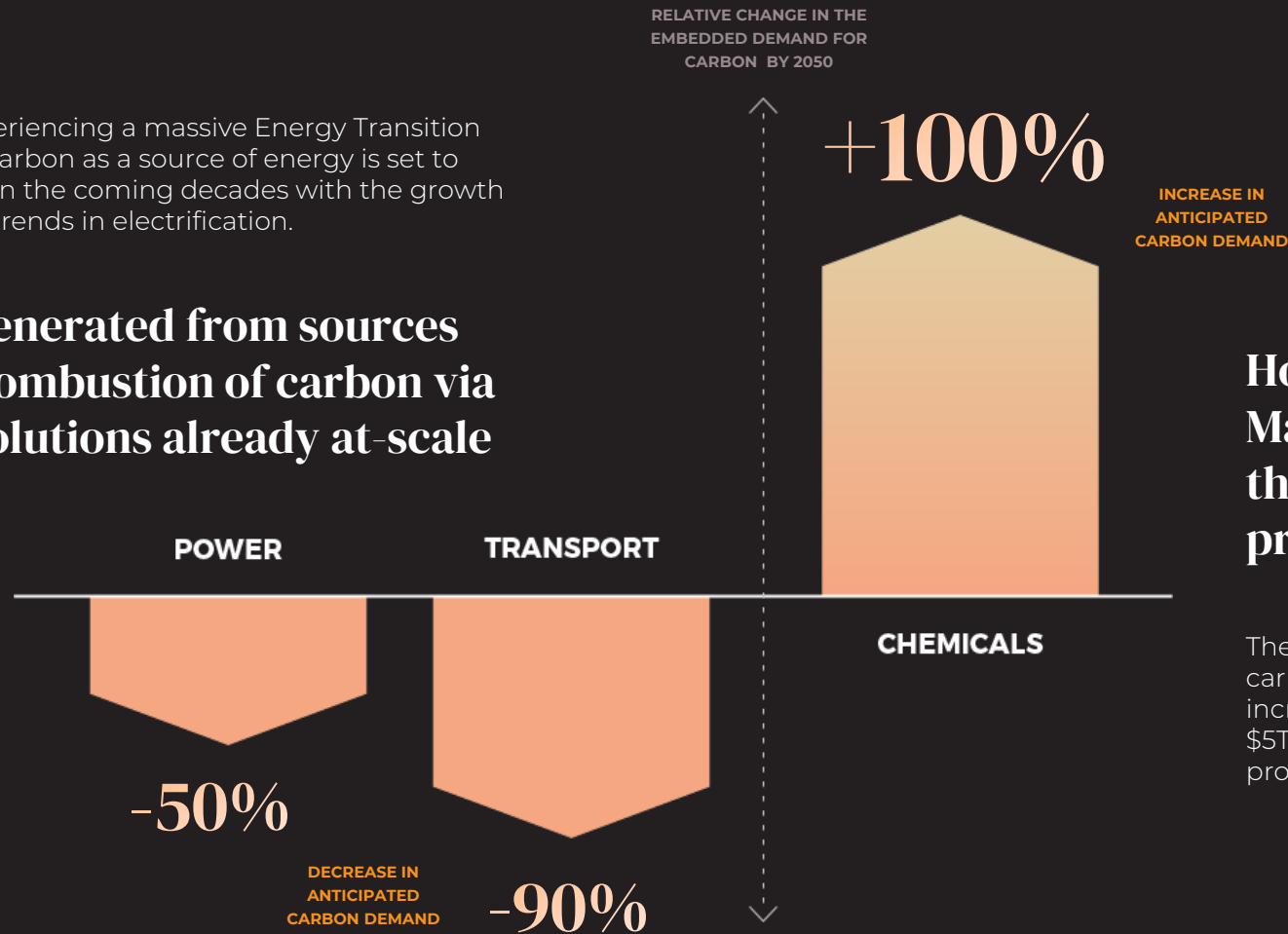
DOE Clean Fuels & Products Shot Summit
April 9, 2024



“Decarbonization” and Lowering Intensity of Chemicals & Materials \$5T Materials Transition Opportunity.

The world is currently experiencing a massive Energy Transition wherein the demand for carbon as a source of energy is set to come down substantially in the coming decades with the growth in renewable energy and trends in electrification.

Energy can be generated from sources other than the combustion of carbon via industry-wide solutions already at-scale



However, the Chemical and Materials industries will need 2X the amount of carbon to hit 2050 projections for market demand

The search is on for more sustainable sources of carbon and the enabling conversion technologies to increasingly displace conventional hydrocarbons in a \$5T global materials industry, across 100s to 1000s of products.

Enabling “Clean Products” with Higher Sustainability Impact

Targeting the identical molecules (“drop-ins”) vs. building new markets



Renewable Sources of Carbon



Same Exact Materials



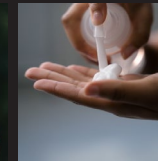
APPAREL

HOME CARE

Direct Addressable Markets



NUTRITION



BEAUTY



PACKAGING

Lower Carbon Intensity

- Carbon Emissions Reduction
- Renewable Carbon Content

Competitive Economics

Equal Performance

Carbon Savings

×

Scale

×

Speed

=

Impact

Tons CO2 per ton product

Tons product per plant

Number of plants

Tons CO2 Avoided

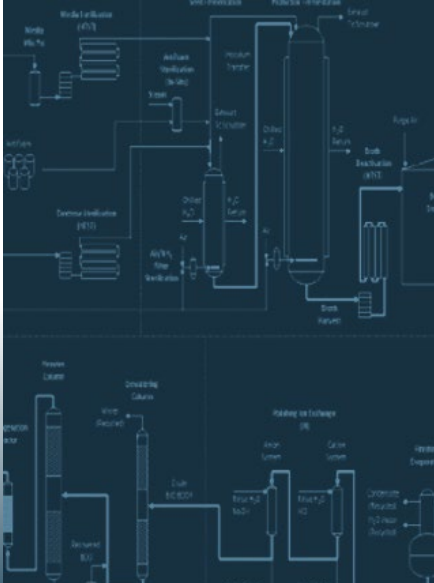
Biomanufacturing & Fermentation-Based Conversion Technologies

Geno integrates the power of synthetic biology and chemical process engineering to deliver carbon-efficient conversion technologies going from ideation to commercial realization – enabling others to produce



Geno engineered microbe

Geno develops microorganisms...



Geno process design

...and a “how-to” for manufacturing...



...to use alternative renewable feedstocks...



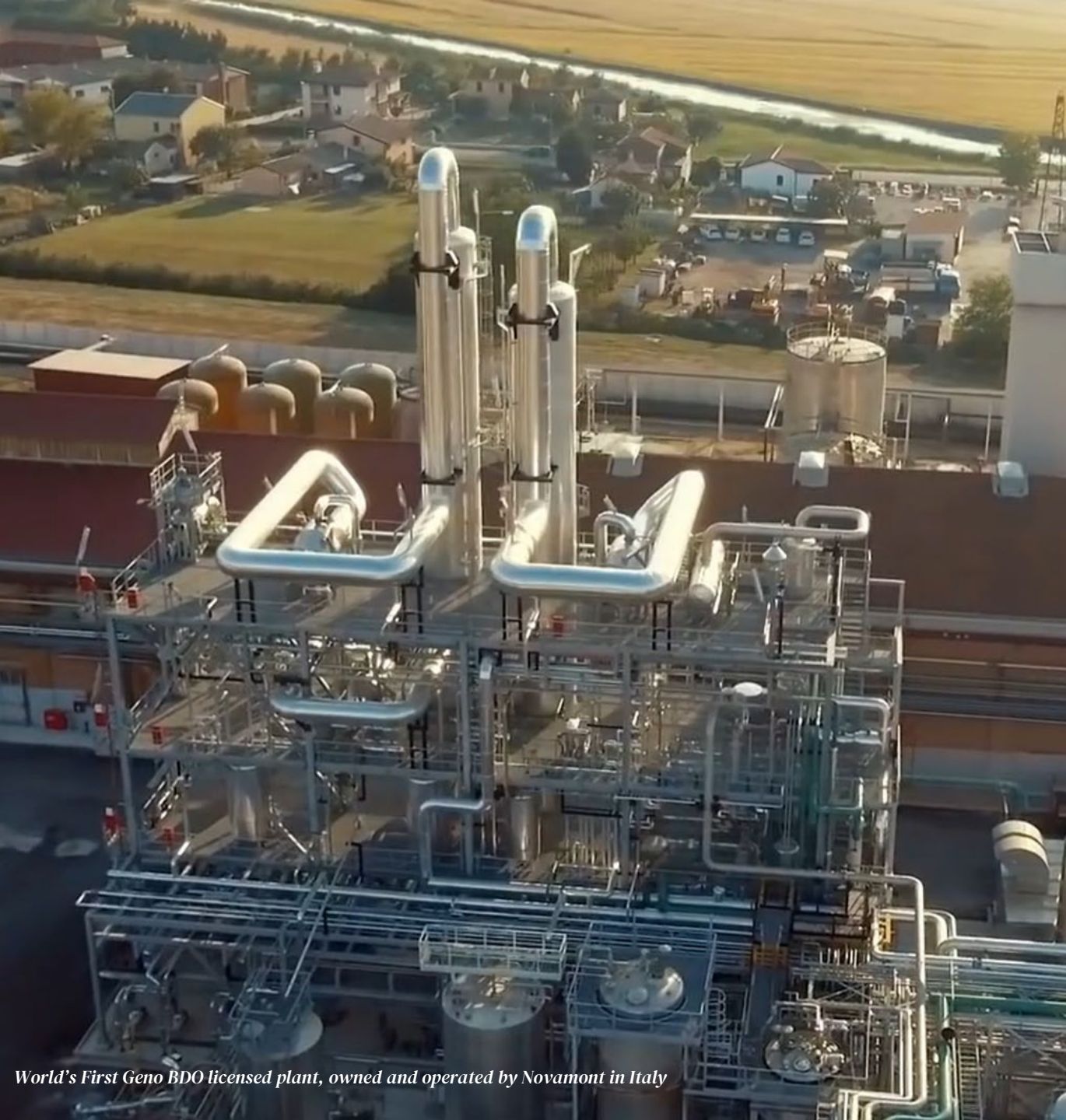
Geno powered 30kt plant

...to make widely-used molecules at scale...



Geno enabled products

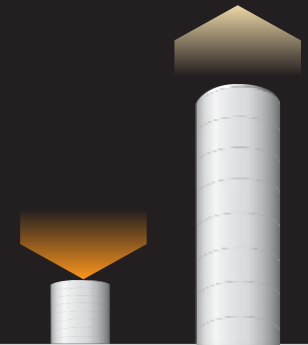
...making their way into everyday products



GENO BDO[®] Technology Scalable with High Impact

- **BDO (1,4-Butanediol) is a \$5B established market** with dozens of fossil-based plants making over 3 million tons per year
- GENO BDO technology produces same exact **BDO with ~90% reduction in carbon intensity**
- **First commercial-scale demonstration in 2013** validating technology (+500K liter reactors)
- First commercial plant using Geno technology started **production in 2017 with a 30,000 ton per year** with fermentation reactors at a **3-fold scale-down**.
- Routinely **scaling up and scaling down at 100,000-fold** from our innovation center to licensed commercial plants

100,000x
scale down/up



Next Generation GENO BDO® Plants under Engineering and Construction set to bring combined capacities to 150K tons per year

QORE

Cargill and HELM partner to build \$300M commercial-scale, renewable BDO facility, first in the US, to meet growing customer demand

June 2021

- 65,000 tons per year in USA (Iowa)
- 2024 completion (in later stage construction)
- plans to expand future plants to 200,000 tons
- Selling to global markets

 **HYOSUNG**

Hyosung TNC Invests \$1 Billion in Future “Bio” Business

April 2024

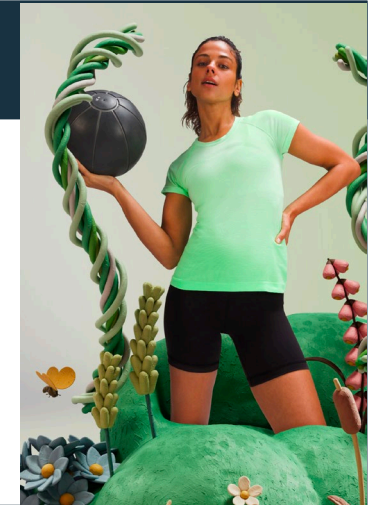
- 50,000 ton factory in Vietnam
- 2026 completion (in engineering)
- plans to expand future plants to 200,000 tons
- Fully integrated from BDO to Spandex

Pipeline of technologies expanding addressable markets by 5X, now scaling with advancing technology readiness and brand owners



Reimagining Nylon

100% plant-based nylon to displace fossil-based production +\$10B market



Palm Alternatives

Displacing deforestation-linked palm oil derived ingredients for home and personal care



Kao

L'ORÉAL



Thank You!

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