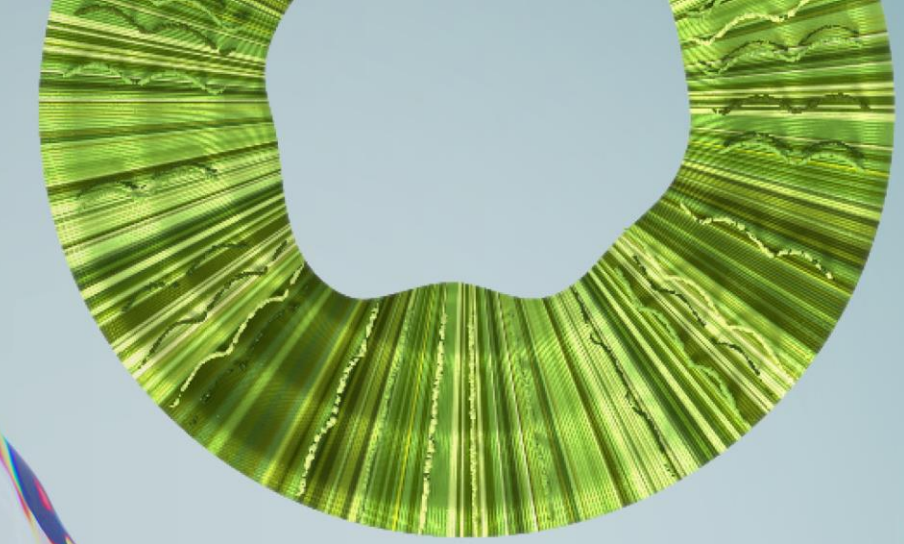
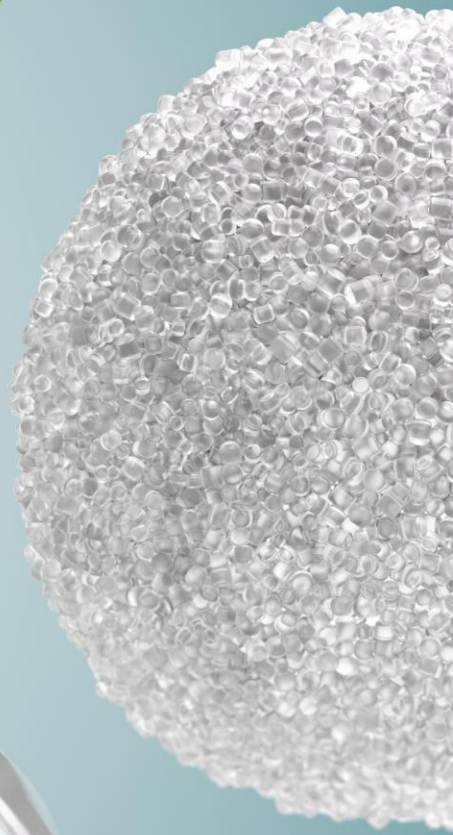
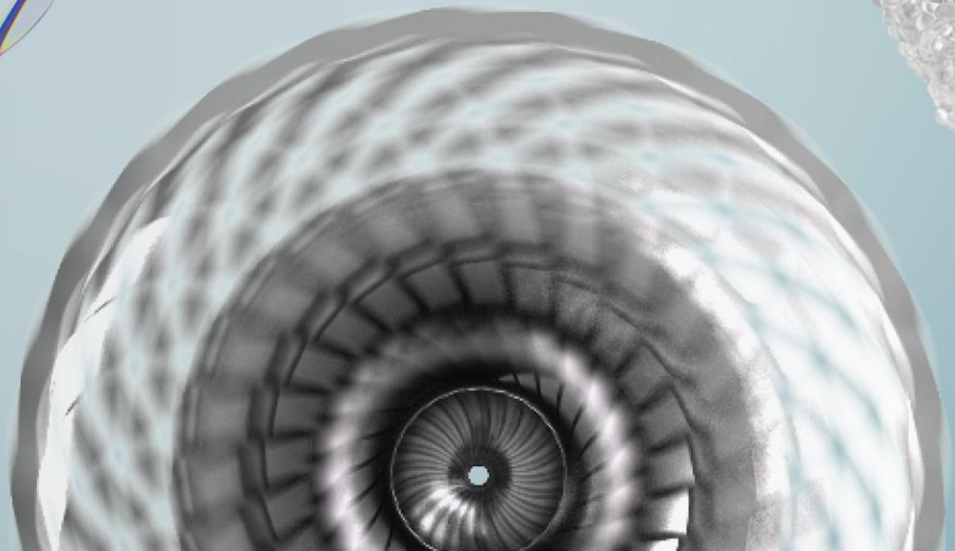
Ara

INDUSTRIAL DECARBONIZATION REPORT 2023

Built to Decarbonize.™







www.arapartners.com

Letter from our Managing Partners and Chief Decarbonization Officer

The alignment between decarbonizing the industrial economy and delivering strong returns is at the core of our firm.

Charles Cherington
Managing Partner

Troy Thacker
Managing Partner

Irina Markina
Managing Director, Chief Decarbonization Officer

As the rapid evolution of private equity and infrastructure investing continues, Ara Partners is focused on accelerating the growth of future-fit businesses that can provide the products, services and infrastructure we all rely on with less waste and lower emissions.

This report caps a pivotal year for the firm with the closing of Ara Fund III at $2.8BN in new capital commitments.

We see several investment themes tied to industrial decarbonization that provide long-term attractive tailwinds in the chemicals and materials, energy efficiency and green fuels, industrial and manufacturing, and food and agriculture sectors.

Ara Partners' built-to-decarbonize investment strategy centers on an owner-operator model and active engagement with portfolio companies throughout the investment life cycle.

We focus on delivering meaningful, quantifiable, and comparable results that inform strategic business management decisions, commercial scale-up, and demonstrate industrial decarbonization today. We have structured and scaled the firm commensurate with the growth of our portfolio.

The Ara Advantage leverages our investment and, decarbonization management expertise, portfolio capital project delivery and strategic policy engagement to help unlock investment alpha.

In 2023, Ara Partners' efforts have focused on portfolio value creation through the execution of annual portfolio company performance plans and decarbonization strategy development.

"This report caps a pivotal year for the firm with the closing of Ara Fund III at $2.8BN in new capital commitments."

ARA AT A GLANCE

Ara is a global private equity firm that is decarbonizing the industrial economy

We specialize in buyout, growth equity and infrastructure investments, targeting sectors that are difficult to decarbonize and often overlooked.

We invest in proven technologies, back businesses that help these to grow, and build decarbonization infrastructure on the ground.

We bring specialist investing, technical, and operational expertise to accelerate the growth and value of businesses that can deliver meaningful decarbonization results today.

SIZE

6.2BN

assets under management[1]

PEOPLE

70

global team members with specialist expertise[2]

PORTFOLIO

28

companies[2]

TARGET

60%

reduction in GHG emissions at the product, service or asset level compared to the market incumbent[3]

RESULTS: EMISSIONS

10.8M

metric tonnes of CO_2e reduced in 2023

RESULTS: WASTE

424.4K

metric tonnes of waste reduced in 2023

[1] AUM as of December 31, 2023. [2] As of April 2024. [3] For illustrative purposes only. Reductions include amounts directly resulting from Ara portfolio company operations, in addition to reductions realized by third parties as a result of services provided by portfolio companies. There can be no assurance that these targets will be met, and actual reduction of CO_2e emissions will vary substantially depending on a number of factors.

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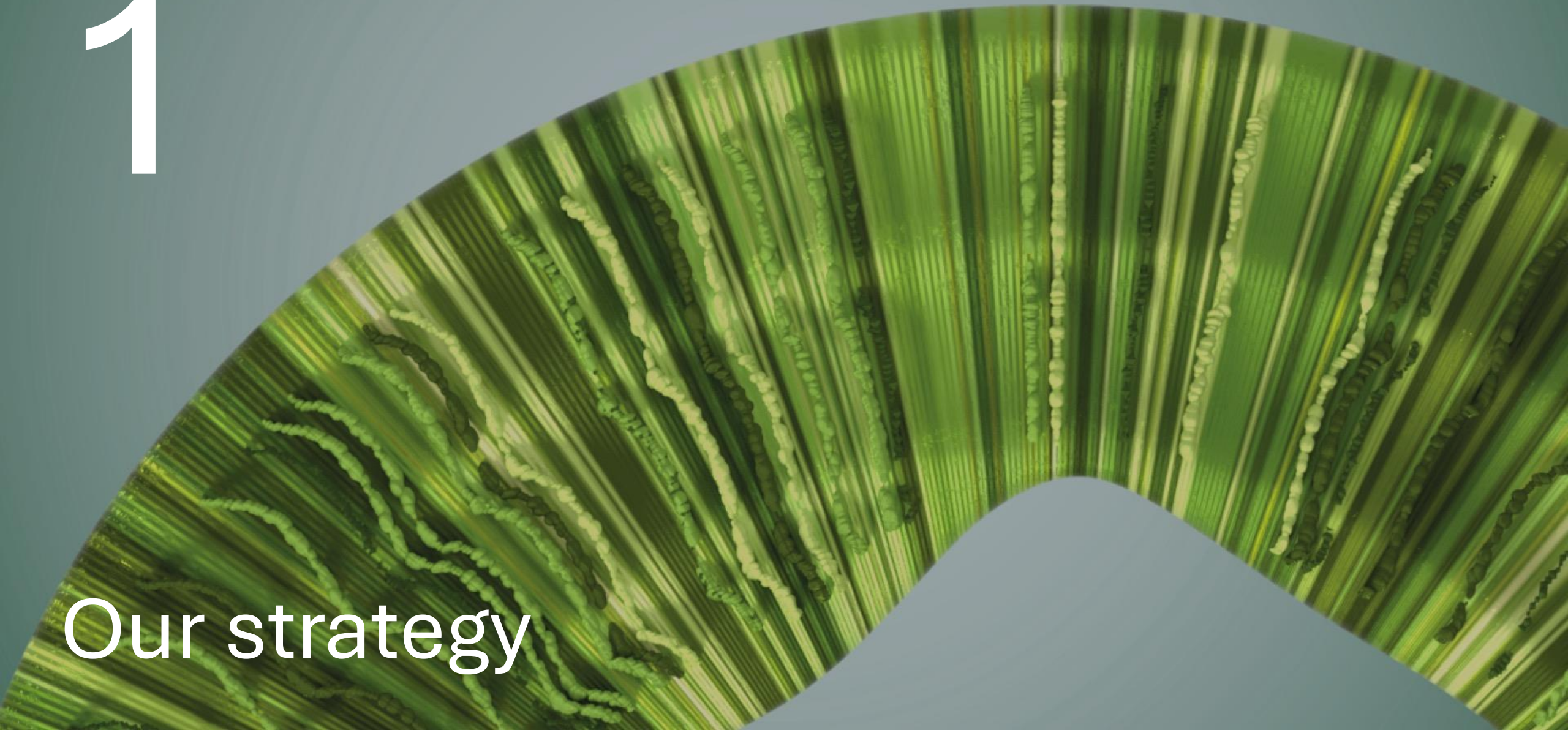


Our strategy

OUR STRATEGY

Targeting a generational investment opportunity

Our strategies commercialize and scale companies that are critical to the transition to net-zero.

Global GHG emissions must fall by nearly half before the end of this decade for the world to stay on its 2050 decarbonization pathway.

To date, decarbonization efforts have largely focused on the 27% of global GHG emissions coming from power generation[1], with an overwhelming amount of climate-focused capital investment directed towards wind, solar, battery storage, and electric vehicles (EVs).

A huge increase in decarbonization investment – in the right places – is required to meet climate targets. In addition to the power sector, capital must be mobilized towards 'the world of made things', targeting high-impact industrial sectors, including manufacturing, chemicals and materials, food and agriculture, and supply chain businesses.

Our two investment strategies focus on the high-polluting areas of the industrial economy, helping to provide the products and services we all rely on with less waste and lower emissions.

Private Equity

We invest in proven technologies that are displacing existing, polluting industrial processes, as well as the businesses that provide products and services to decarbonization platforms.

Infrastructure

We build new infrastructure and repurpose high-quality existing assets that are required to underpin a lower-carbon economy.

60%

Global CO_2 emissions are generated by power and industrial sectors[2]

35%

Energy-transition capital investment directed towards renewable energy[3]

9.2TN

Annual spending required to reach net-zero by 2050[2]

Sources: [1] WEF, Net-Zero Industry Tracker, 2023 Edition; [2] McKinsey & Co. "The net-zero transition: what it would cost, what it would bring", 2022; [3] BNEF, "Energy Transition Investment Trends 2024", 2024.

We provide:

DIFFERENTIATED CAPITAL

Investing in companies in North America and Europe that decarbonize via fossil fuel displacement, increased efficiency, affordability, infrastructure development, and circular solutions.

SPECIALIST EXPERTISE

Scaling businesses and infrastructure, and advancing best-in-class processes to maximize the decarbonization potential of our portfolio.

NETWORK AMPLIFICATION

Leveraging customer and industry connections and strategic partnerships to drive commercial outcomes and unlock new markets.

OPERATIONAL RISK MITIGATION

Optimizing operational practices and minimizing risk by improving operational performance and decarbonization measurement and management.

OUR STRATEGY

Private Equity

We provide the capital and expertise required to bridge the gap between IP and real assets.

Targeting the ‘missing middle’

While there has been an increase in climate-focused investment, the majority of capital is being deployed at two opposing ends of the energy transition market – venture financing and infrastructure. The result of this is the creation of the ‘missing middle’ – a gap in the funding and skills needed to support companies that have matured out of the venture stage but yet to have de-risked or scaled their operations enough to access mature-stage capital.

The lack of this kind of investment means that critical early-stage technologies that are needed to meet global climate targets will struggle to achieve full-scale deployment.

Our Private Equity strategy addresses this challenge, commercializing proven technologies and backing the businesses that help them grow.

Process Technology Rollouts (PTRs)

We support companies that have developed proven process technologies to become full industrial enterprises. We help these businesses scale and build new plants, guiding them through planning and execution at all stages of the process while identifying new opportunities to improve their decarbonization potential.

Decarbonization Enablers

These businesses are the catalysts for delivering industrial decarbonization, providing essential products and services to the wider decarbonization ecosystem. We partner with companies as their first institutional owner, strengthening the fundamentals of their business and driving growth.

OUR STRATEGY

Infrastructure

We see a growing opportunity in the mid-market, building new infrastructure and repurposing high-quality existing assets.

This dual approach represents the fastest and most economical path to net-zero. Even though the transition to net-zero will rely on new technologies and infrastructure to replace carbon-intensive assets, much of our future infrastructure is already built or in the pipeline.

50%

of all in-ground infrastructure in 2050 is either already built, under construction, or planned[1]

Capitalizing on a growing opportunity

The industrial space is highly fragmented. New technology advancements, distributed models, and growth orientation within industrial decarbonization have shifted the opportunity set towards smaller transaction sizes, with multiple levers for value creation. The growth of the infrastructure asset class over the last decade also means that many players who would have originally competed for these opportunities now need to target larger transactions to deploy their capital.

Our focus on the mid-market puts us in a strong position to capitalize on these attractive smaller projects where we have a far greater degree of control over asset risk related to construction and development.

We are also able to see attractive infrastructure opportunities ahead of the market with a front row seat to identify the assets growing out from private equity funding, and we are an early mover in this space. The overlap between our strategies means that we are operating across a broad spectrum of the decarbonization life cycle and from a wide network of sourcing opportunities.

We focus on developing new and repurposing existing mid-market infrastructure to serve the low-carbon economy.

Low-carbon molecules: The production, storage and distribution of low-carbon fuels (i.e., biofuels, renewable natural gas, H_2/ammonia).

Waste management: Landfill/incineration avoidance and resource recovery (i.e., waste processing, recycling, waste transformation).

Decarbonization solutions: Enabling decarbonization across the full infrastructure value chain (i.e., refueling infrastructure, grid solutions, energy efficiency).

Sources: [1] Global Infrastructure Hub: "What is the path to net-zero infrastructure?" 2021.

OUR STRATEGY

Infrastructure

$3.5TN

annual new funding required in low-emissions assets and enabling infrastructure by 2050[1]

Infrastructure assets unlock attractive investment opportunities within the evolving and highly fragmented industrial sector.

Secular shifts are driving corporates and governments alike to embrace decarbonization solutions. These solutions require new and repurposed infrastructure to scale. However, a steep funding gap persists. Coupled with attractive returns via long-term contracted cashflows and de-risked operations, low-carbon infrastructure assets confer a generational investment opportunity.

Leveraging investment opportunities

Ara Infrastructure is focused on the mid-market, targeting investments of c. $50-$200M. This approach allows us to unlock attractive investment opportunities within the industrial sector which is often highly fragmented and decentralized.

Ara focuses on proven, commercial-scale technologies – the infrastructure developed will be simple in nature and fully proven on a commercial scale. This ensures minimal regulatory, construction and operating risk, while simultaneously yielding stable gross returns.

We leverage our owner, builder, and operator expertise along with our robust strategic network to scale new assets and redevelop legacy projects to further enhance financial growth prospects. Alongside strong commercial pipelines, our assets are strategically placed to achieve meaningful value-add returns.

We build assets with attractive risk-adjusted returns

Upside potential: Provide meaningful upside via additional growth opportunities, expansion potential, and crystallization of pipeline value.

Base case value-add returns: Enable strong base case returns through well-delineated near-term growth opportunities bolstered by milestone-based funding.

Downside protection: Expected to achieve “core” infrastructure returns by targeting commercially established, credit worthy assets with near-term yield and long-term contracts.

[1] McKinsey & Co, The net-zero transition, what it would cost, what it could bring, 2022.

OUR STRATEGY

The Ara Advantage

Our approach to value creation is designed to maximize decarbonization results while accelerating the growth of our portfolio companies.

Our firm brings together a strong roster of industry veterans with technical, operational, private equity and infrastructure expertise that is needed to decarbonize the industrial economy today, while creating high-value sustainable business models in the long-term.

OUR STRATEGY

Decarbonization value creation framework

Each portfolio company is guided through a four-step value creation framework post-investment, leveraging strategic enablers to maximize portfolio impact.

Baseline

- Performance benchmarking: KPI comparison against private and public markets benchmarks.
- Operating and carbon data collection: Onboarding and collection of material non-financial data, including Scope 1-3 GHG emissions.
- Impact accounting: Impact investment thesis alignment and calculation of realized and projected ERP and/or WRP.

Plan

- Short-term action plans: Action items identified in due diligence for first 100-Day plans, including policy checklist and execution.
- Long-term action plans: Annual operational performance assessment, including key risks and risk mitigation activities.
- Carbon accounting: LCA management, ERP/WRP model development and refinement and climate risk assessment, including scenario analysis.

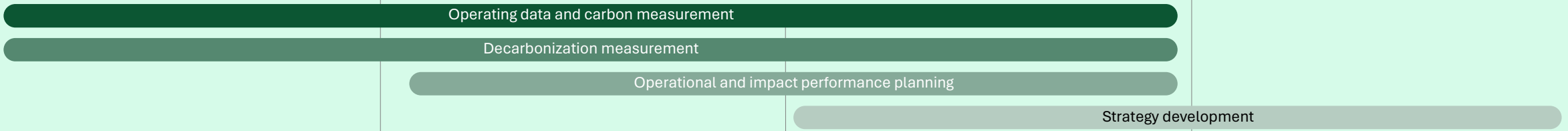
Manage performance

- Short-term operating strategy: Operational performance improvement policies and programs with corporate oversight.
- Long-term operating strategy: Annual performance Plan execution and development, time-bound targets and measures.
- Decarbonization strategy: Decarbonization roadmaps, including carbon and impact accounting and program development.

Lock-in value

- Impact-oriented operating model: Decarbonization and operational excellence embedded across:
  - Operating & governance model.
  - Corporate & commercial strategy, and customer positioning.
  - Value chain management.

Carbon Operating Model



OUR STRATEGY

Decarbonization results

Our investments continue to deliver immediate decarbonization while driving a shift to the circular economy.

RESULTS: EMISSIONS

10.8M

metric tonnes of CO_2e reduced in 2023

EQUIVALENT TO AVOIDING

2.6M

passenger vehicles driven for one year

RESULTS: WASTE

424.4K

metric tonnes of waste reduced in 2023

EQUIVALENT TO

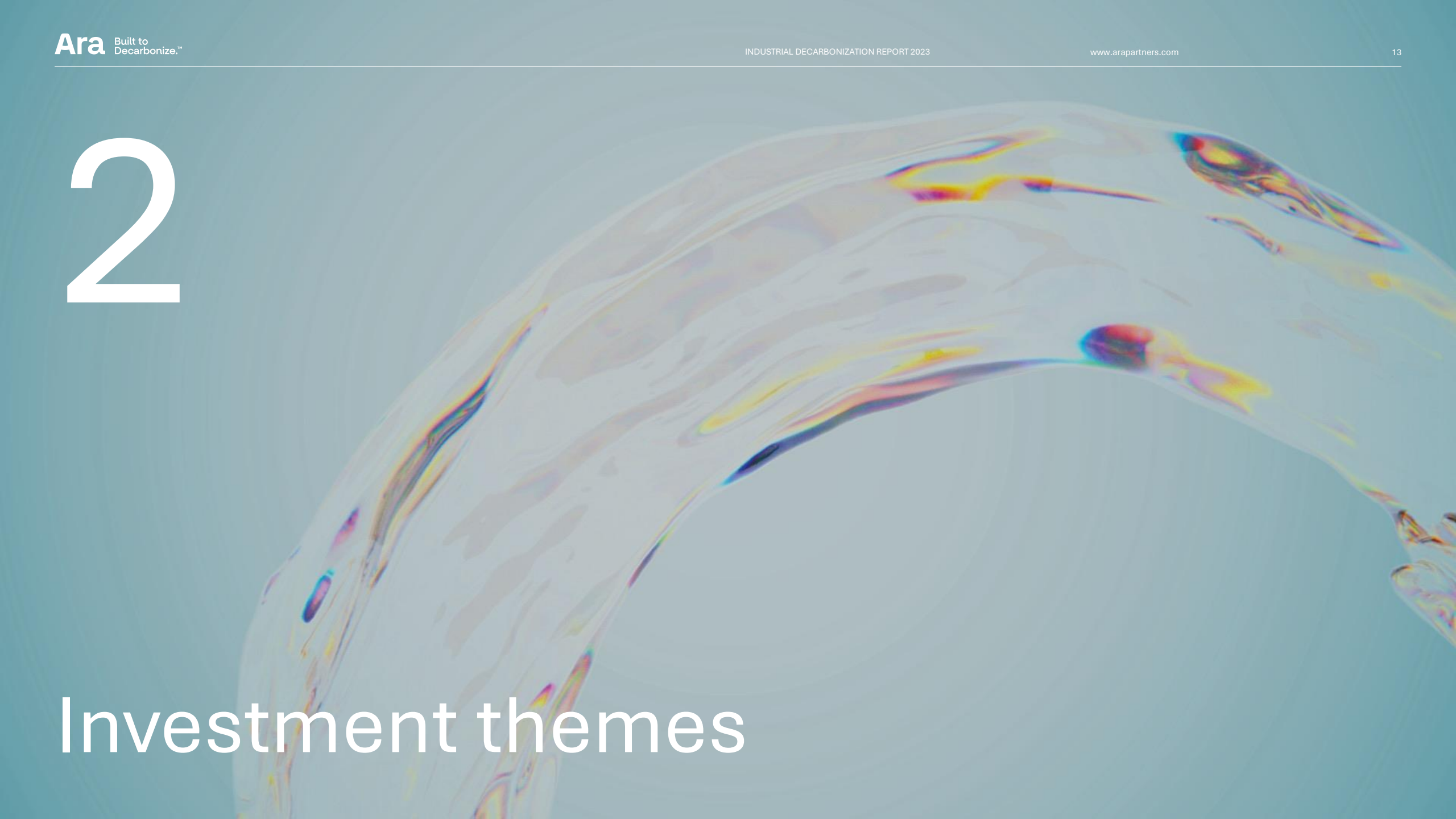
60.6K

garbage trucks

Given the time value of carbon, climate mitigation in the next decade is critical. We target investments that directly contribute to the reduction of GHG emissions, with the potential to deliver 60% GHG emissions reduction at the product, service or asset level compared to the market incumbent.[1]

We invest in businesses that contribute to the circular economy by using new technologies and building infrastructure to produce nature-benign and circular materials that reduce and recycle non-biodegradable waste. This transition represents a long-term shift in local and global supply chains, presenting a key market for material-efficient industrial solutions.

[1] For illustrative purposes only. Reductions include amounts directly resulting from Ara portfolio company operations, in addition to reductions realized by third parties as a result of services provided by portfolio companies. There can be no assurance that these targets will be met, and actual reduction of CO2e emissions will vary substantially depending on a number of factors.



2

Investment themes

INVESTMENT THEMES – OUR EXPERTISE

Our expertise

We invest in the long-term macro trends reshaping industries toward a lower-carbon economy.

We draw on the insights and experience of our seasoned deal team to identify exciting, high-performing investment opportunities.

Charles Cherington
Managing Partner

25+ years in industrial, energy, and chemical sub-sectors

Troy Thacker
Managing Partner

25+ years in environmental, industrial, software, energy, and insurance industries

Chris Picotte
Partner

25+ years in industrial, energy efficiency, and digital transformation

Cory Steffek
Partner

18+ years in advanced materials and energy

Tuan Tran
Partner

20+ years in environmental and industrial services, and energy technology

Teresa O'Flynn
Partner, Infrastructure

20+ years in sustainable investing

Churchill George Yong
Partner, Infrastructure

15+ years in infrastructure investing

INVESTMENT THEMES - CHEMICALS AND MATERIALS

Chemicals and materials

We target businesses that can decarbonize the chemicals and materials industry while continuing to offer products at attractive prices.

Several mega-trends tied to decarbonization provide long-term attractive tailwinds for investment in “green” chemicals and materials.

- Market shifts and regulatory stimuli are propelling electric vehicle (EV) adoption, with a commensurate increase in critical component parts and commodities required for vehicle manufacturing.
- To support the rapid rise in EV adoption and electrification, batteries, especially lithium-ion batteries, will need to be recycled and repurposed through a more advanced battery collection and sorting infrastructure.
- Green hydrogen and plastics recycling will be driven by emerging regulatory incentives, technological advancements increasing production efficiencies, and planned infrastructure buildouts ensuring effective transition and capacity extensions.
- Geopolitical insecurity, market fragmentation, and increasing digital dependence are fueling massive government funding to reinvigorate North-American-made semiconductors, with opportunities for “green” production methods.

Additional supply of critical materials needed to meet growing EV adoption

The number of EVs is expected to increase substantially over the next decade. Automotive Original Equipment Manufacturers (OEMs) are spending vast sums of money to expand EV production, driven by a range of factors – from changing consumer preferences to government legislation.

EV PENETRATION (% OF TOTAL NEW CARS)[1]

	US	Europe
2024	~7%	~15%
2030-35	50%	65%

A growing number of battery giga-factories are being built across Europe and North America to keep pace with this demand.

>600GWh/year

estimated size of US battery capacity by 2030[2]

Anti-China provisions are also placing a premium on domestically-produced critical materials and battery components, including lithium, cobalt, nickel, copper, and manganese.

Demand is particularly high for rare earths needed in the production of magnets that allow EV motors to convert electric energy into kinetic energy.

~90%

of rare earth processing capacity currently based in China[3]

OUR PORTFOLIO

VAC® VACUUMSCHMELZE

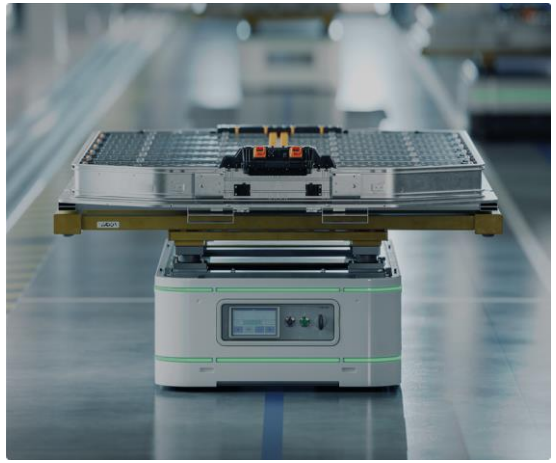
Fund III

Vacuumschmelze ("VAC") is the only scaled Western producer of high-grade permanent magnets. Its products enable better sensors, electromagnetic interference, circuit breakers, e-motors, and other industrial applications that play a critical role in electrification.

VAC is uniquely positioned to supply key commercial and government stakeholders in Western markets looking to onshore their supply chain, or simply relocate it outside of China.

[1] IEA, "Prospects for electric vehicle deployment", 2021; [2] BNEF, "1H 2023 US Clean Energy Market Outlook", 2023; [3] IEA, "The Role of Critical Minerals in Clean Energy Transitions", 2021.

INVESTMENT THEMES - CHEMICALS AND MATERIALS



Growing need for Lithium-ion Battery (LiB) collection & sorting infrastructure, and secondary reuse and recycling capacity

Material requirements for critical minerals will only grow, with long-term supply/demand imbalances expected for copper, nickel, lithium, and rare earths. In response, EV OEMs and battery producers are working closely with LiB recyclers to build out black mass and hydrometallurgical processing capacity across North America, Europe, and Asia to recycle production scrap from new gigafactories as well as end-of-life batteries from aging EV fleets. Recycling critical materials and wider 'urban mining' initiatives can help to address sourcing challenges while reducing the GHG emissions footprint associated with their production.

Significant investments in collections infrastructure and recycling capacity will also be required, with annual battery retirements set to surge post 2030. Currently, there is not enough LiB recycling infrastructure across Europe and North America to meet this demand.

3.7M

metric tonnes of end-of-life batteries likely available for recycling by 2035[1], enough to supply...

10-18%

key input materials needed for battery manufacturing in the same year[1]

Government policies across Asia, Europe, and North America are making investments in EV battery recycling increasingly attractive too, including requirements for collection networks and lifetime battery traceability requirements to manage end-of-life processing and tax credits.

There are also a growing number of opportunities for the secondary reuse of LiBs, where the market is expected to grow significantly within the next 10-15 years.

15x growth

market for second life batteries[2]

OUR PORTFOLIO

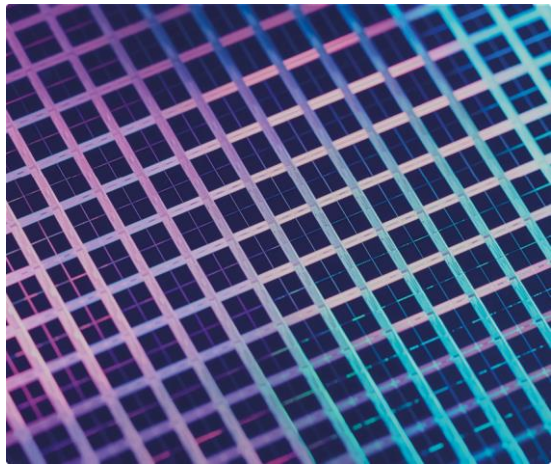
BLUE WHALE MATERIALS

Fund II

Blue Whale Materials is a recycler of LiBs that will benefit from the growing demand for EV battery recycling capacity, given its focus on black mass production. Its first facility in Bartlesville, OK will process up to 20 thousand tonnes per annum (KTPA) of feedstock and can produce over 7 KTPA of black mass. The company is ranked by TIME Magazine and Statista as one of America's Top GreenTech Companies of 2024.

[1] BNEF: "Lithium-Ion Battery Recycling Market Outlook 2024", 2024.

● INVESTMENT THEMES - CHEMICALS AND MATERIALS



Semiconductors materials, the CHIPS Act and the North American semiconductor corridor

The US government is looking to build a strong domestic semiconductor industry, having lost significant global market share of production to Asia. Canada is focusing on its domestic semiconductor industry to boost R&D and manufacturing.

75%

of overall CO_2 emissions are created during the semiconductor manufacturing phase[1]

~$250BN

in government funding provided by the CHIPS Act in the US[2]

<12%

of global semiconductor chips are manufactured in the US (down from 37% in the 1990s)[3]

Decarbonization trends in the semiconductor space revolve around several key themes:

- Use of renewable energy sources.
- Lower-carbon materials such as greener forms of silicon carbide and high purity alumina.
- Adoption of green chemicals.
- Reclamation of scrap materials for productive uses (e.g., testing and R&D initiatives).

OUR PORTFOLIO

polar performance MATERIALS

Fund II

High Purity Alumina (HPA) is used in the production of insulating layers, interconnects, and gate dielectrics, as it has excellent electrical and thermal properties. Polar Performance Materials' proprietary chemical HPA production method achieves a >90% reduction[4] in carbon intensity vs. conventional HPA sourced from China. It is the only North American supplier of ultra-pure HPA.[5]

[1] Harvard University, Chasing Carbon: The Elusive Environmental Footprint of Computing" 2020; [2] Mckinsey & Co, "The CHIPS and Science Act: Here's what's in it", 2022; [3] Scientific American, "A Global Computer Chip Shortage Shows Danger of U.S. Production Trends", 2021; [4] NSF, Polar Sapphire Environmental Screening, 2020; [5] See Appendix on Impact Measurement Methodology for addition detail.

INVESTMENT THEMES – ENERGY EFFICIENCY AND GREEN FUELS

Energy efficiency and green fuels

We invest heavily in the areas of energy efficiency and green fuels with attractive economics and relatively high regulatory certainty.

Energy efficiency is a fast and affordable way to decarbonize the global economy. Integration of smart, automated grid assets is accelerating the transition to an increasingly decarbonized grid. We invest in energy-efficient technologies and solutions that provide more reliable, differentiated and, sustainable energy to commercial and industrial customers – from electric and solar power generation to green fuels.

Transitioning to green fuels, particularly in the transportation and industrial sectors, has strong political and long-term policy momentum throughout Europe and in select regions across North America.

Our investments are focusing on the green fuels that are growing the fastest and have the lowest barriers to adoption. These fuels:

> Are a direct molecular substitution for the fossil-derived molecule currently being used in any process (combustion, transportation, or industrial).

> Do not require significant new logistics and distribution infrastructure or new capital investment by the end user.

Other areas such as sustainable aviation fuel (SAF) are also receiving a lot of attention from industry, end users, and policy makers. However, the high sensitivity to fuel cost and the enormous quantity that would need to be produced to have a meaningful effect on the market are all significant challenges in the near-term.

[1] IEA Energy Efficiency 2023; [2] Ara Infra Whitepaper.

INVESTMENT THEMES – ENERGY EFFICIENCY AND GREEN FUELS

Fund II / Fund III

CycleØ

Capitalizing on favorable market trends in biomethane pricing and regulatory movements across Europe.

CycleØ designs, manufactures, owns, and operates modular treatment, liquefaction, and compression processing equipment for small-and medium-scale biogas producers. The company's mission is to deploy an end-to-end approach to biomethane production and to empower agri-food producers. CycleØ is actively supporting global targets to reduce GHG emissions and displace conventional natural gas consumption with renewable fuels.

The business is well positioned to benefit from favorable market trends in biomethane pricing, as well as regulatory support across Europe.

Business model

CycleØ's unique technology has tens of thousands of potential target farms across the EU and already has a number of projects in operation or development across Spain, Italy, Ireland, and Chile.

5-7x

increase in biomethane production targeted by the EU in the medium-term[1]

It also has a highly differentiated business model in the European biomethane industry. It has a strong advantage over competitors with permanent access to low-carbon feedstock, permitting and, planning permissions through favorable logistics, and a negative product carbon intensity.

Optimizing operations

CycleØ has engineered a proprietary equipment package which works more efficiently and with favorable logistics for the typical-sized European farm. Its skid-mounted equipment package is instaled at the individual farm, effectively capturing the feedstock indefinitely and also meaning that it only moves a very small number of gas tankers through the area, (when it is not doing direct grid injection) rather than a very large number of manure trucks.

It is investing in digestate processing to extract useful fertilizer from the liquid product that remains after the anaerobic digestion process has created biogas. It has recently acquired Biogasclean, a company with proven technology that is able to biologically transform the biogenic CO_2 produced during anerobic digestion into e-methane through the addition of e-hydrogen.

60%

increase in CycleØ's green methane production from the acquisition and application of Biogasclean technology

Flexible go-to-market capabilities

CycleØ can sell product as CNG by truck, LNG by tanker truck, or gaseous methane through direct pipeline injection. This gives the business the ability to achieve the maximum price for its product across all end-market options.

[1] European Commission, "Biomethane", 2024.

● INVESTMENT THEMES – ENERGY EFFICIENCY AND GREEN FUELS

Biofuels logistics

Fuel logistics infrastructure in Europe and North America must be re-tooled and repurposed to account for changing product flows, a greater number of fuel grades, and the need for infrastructure to facilitate the integration of biofuels into the broader fuels stream.

These projects constitute attractive infrastructure investment opportunities:

> Fuel logistics assets such as pipelines and terminals are well-proven and pose no technology risk.

> Projects backed by large, blue-chip energy and industrial companies that are willing to enter into long-term fee-based offtake contracts.

> Logistics assets with limited revenue exposure to commodity prices.

USD CLEAN FUELS

New portfolio addition

Ara Infrastructure invested in USD Clean Fuels, a developer and owner of logistics infrastructure for the efficient staging and delivery of renewable feedstocks and advanced biofuels.

USD Clean Fuels' assets enable immediate and cost-effective decarbonization by providing an essential delivery channel for feedstocks and biofuels that reduce emissions.

USD offers a uniquely positioned platform through a network of strategic locations in key Western US and Canadian markets, and long-tenured commercial relationships with major North American advanced biofuels producers.

4x

biofuel production increase projection under IEA Net-Zero Scenario by 2050[1]

>80

countries with polices supporting continued demand growth[2]

Energy-efficient networks

Our everyday economy is built upon several essential networks – including transportation networks (e.g., ports, rail systems), data networks (e.g., data centers, fiber cables) and the energy network (e.g., district heating grids) – that must be decarbonized with energy-efficient infrastructure.

For example: Rail terminals can extend the last-mile of the rail network and lower the overall cost of freight while promoting the displacement of diesel truck movements.

GROWTH IN FREIGHT VOLUMES

50%

are forecast by 2050 (US), with **~65%** handled by truck[3]

TRAINS ARE UP TO

75%

more emissions-efficient than diesel-fueled trucks[4]

OUR PORTFOLIO

Lincoln

Infrastructure Fund I

Lincoln owns, operates and, develops essential infrastructure that enables the economic and emission-efficient distribution of biofuels along the US East Coast.

Its terminals directly reduce emissions by displacing diesel truck deliveries of biofuels with rail transportation given their critical additionality in last-mile fuel logistics.

Lincoln is well positioned to provide logistics solutions for biodiesel and ethanol, which rely on rail transport and are experiencing growing demand resulting from both regulatory support and corporate sustainability initiatives.

[1] IEA, Net Zero by 2050; [2] IEA, Renewable Energy Market Update - June 2023 [3] U.S. Department of Transportation's Bureau of Transportation Statistics (BTS) and Federal Highway Administration (FHWA), "Freight Activity in the U.S. Expected to Grow 50% by 2050", 2021; [4] Association of American Railroads, "Freight Rail & Preserving the Environment", 2022.

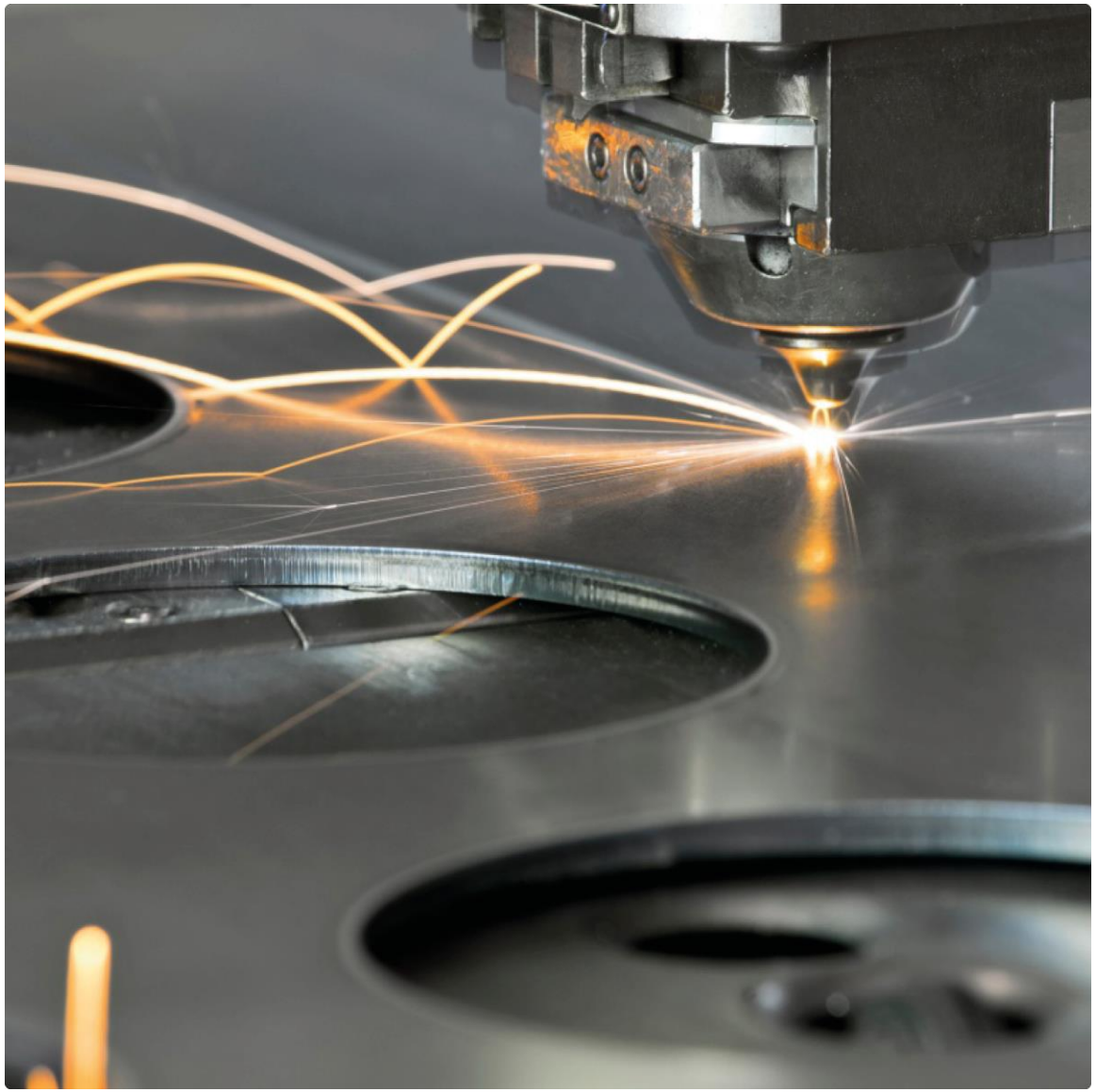
INVESTMENT THEMES – INDUSTRIAL AND MANUFACTURING

Industrial and manufacturing

Hundreds of industry subsectors must find cleaner ways to make the products the world relies on.

Our investments target structural shifts in the industrial economy – providing industrial commodities, equipment, and building materials – that eliminate emissions and waste associated with current manufacturing processes.

Ara's portfolio companies capture market share from existing competitors in the hard-to-abate manufacturing sectors by providing cost-competitive products with next-generation clean technologies.



Lower-carbon industrial metals – steel production

Decarbonizing the steel industry is essential to meet climate goals and address the rising demand for green steel from industries such as transportation. Steelmakers are using breakthrough technologies such as green hydrogen, electrification, and carbon capture, utilization, and storage (CCUS) to reduce carbon emissions. These processes include:

> Technologies using electricity to transform iron ore into molten iron, with oxygen as a product.

> Replacing coal in blast furnaces with green hydrogen.

> Storing or repurposing carbon produced during steelmaking to create new products.

> Using less carbon-intensive fuels such as natural gas and biomass.

OUR PORTFOLIO

UTILITY

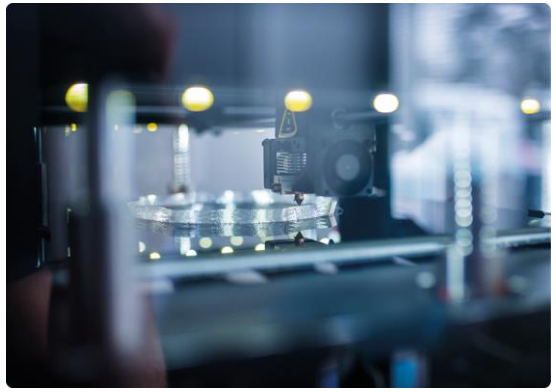
Fund I

Utility Global offers a cheaper and more scalable pathway to produce high-purity hydrogen and a concentrated CO_2 stream for carbon capture, utilization and storage (CCUS).

Rather than using electrolysis, Utility produces hydrogen from waste gases that would have otherwise been vented into the atmosphere. The cost is considerably lower than electrolysis and the process does not need renewable power to produce hydrogen.

Lower-carbon steel is produced by converting industrial gas byproducts (flue gas) from steel production to hydrogen, which in turn can be used as a fuel source.

We have been instrumental in helping the business refine its strategy, prioritizing the markets where it has the clearest advantage and differentiation, as well as working to optimize and validate its GHG emissions reduction model.



Additive Manufacturing (AM) and 3D printing

Additive manufacturing and 3D printing are revolutionizing the development and production of components across the industrial, automotive, aerospace and energy sectors, reducing GHG emissions through increased manufacturing efficiencies and precision part production. Printed parts have higher efficiency, use recycled materials, consume less energy for the same output, and consequently produce fewer emissions.

OUR PORTFOLIO

continuum

Fund II

Continuum recycles scrap metal into high-quality metal powders with a variety of uses. Its technology has a smaller GHG emissions footprint than traditional processes and contributes to the circular economy of metals.

Continuum is decarbonizing advanced manufacturing by upcycling scrap metals (e.g., Inconel, nickel superalloys, stainless steel, titanium, etc.) into 3D printing powders, enabling a circular “upcycling” solution for industrial scrap metals.

The business secured contracts for future sourcing of renewable electricity from hydropower and certified green argon gas made using 99.8% renewable energy, which are anticipated to cover 100% of Continuum's growing demand and significantly reduce the carbon intensity of its operation and products.

Green building materials and low-carbon cement

Natural or recycled materials that can be used to create eco-friendly buildings with lower energy consumption are growing in adoption across Europe and North America. The HOMES Rebate Program in North America, providing rebates to homeowners for upgrades that improve efficiency by at least 20%, is an example of how government policies are looking to shift consumer behavior and back businesses providing these services.

> The energy used in buildings could increase up to around 70% in 2050 without targeted policy actions.[1]

The US is currently the country with the highest emissions per ton of cement. The Inflation Reduction Act (IRA) is looking to address this by incentivizing the supply and demand for low-emissions concrete through federal procurement. This includes incentives for federal agencies to purchase low-carbon materials for their projects.

$4.5BN

has been allocated to incentivize the supply and demand for low-emissions concrete through the IRA [1]

Low-carbon cement typically contains lower clinker factors than traditional cement (the decomposition of limestone into lime and CO_2 during the production process). Lower clinker factors yield the dual benefits of reduced energy consumption and emissions and lower quantities of environmentally-detrimental industrial byproducts. Clinker factors could go as low as 35% as innovation progresses, compared to 95% for traditional Portland cement and 70-80% for the current world average.[2]

The US is also in the process of changing its building codes to facilitate adoption of low-carbon cement. Currently, 44 states allow low-carbon cement in building codes via their local Departments of Transportation. However, in practice, project engineers are still designing buildings and infrastructure with the traditional cement specifications. Increasing uniformity in codes across the engineering and construction community will help drive the adoption of green building materials.

Landfill avoidance infrastructure

The diversion of waste streams from landfills to alternative uses can have a disproportionate decarbonization impact through the compounding effect of avoided landfill methane emissions and the incremental carbon savings stemming from alternative use case. These processes are helping to accelerate the shift towards the circular economy, while helping businesses meet regulatory requirements and internal sustainability targets.

For example: Engineered fuel facilities can divert industrial waste streams to create alternative fuels for difficult-to-abate segments of industry, such as cement and lime manufacturing, which accounts for ~6% of global emissions.[3]

[1] EIA: "The energy efficiency policy package" 2023; [2] IRS: "Inflation Reduction Act of 2022" 2022; [3] WEF, Net-Zero Industry Tracker, 2023 Edition.
[2] BNEF, "Energy Transition Investment Trends 2024", 2024

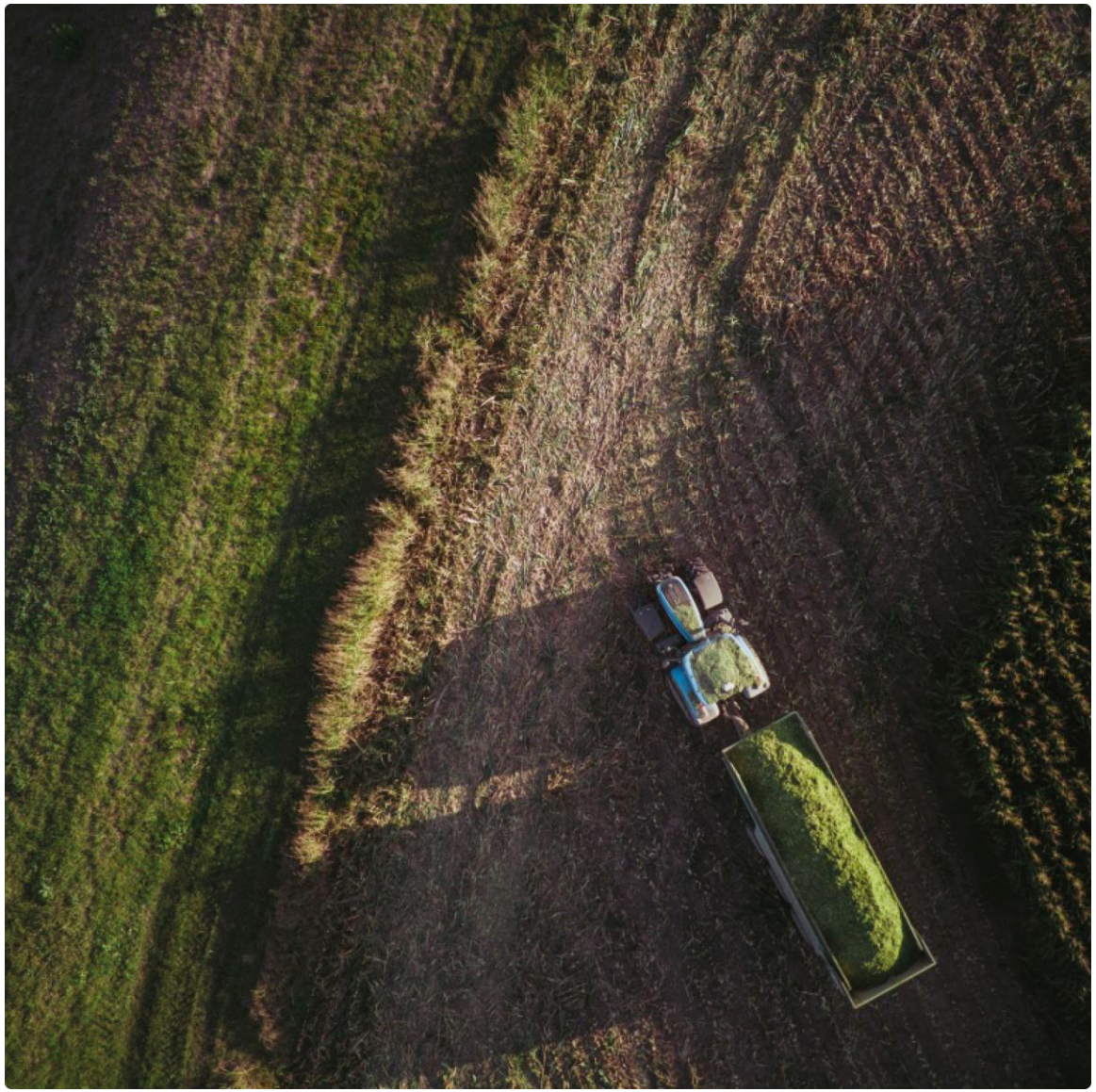
INVESTMENT THEMES – FOOD AND AGRICULTURE

Food and agriculture

Government legislation, changing consumer attitudes and, investor interest are clearing the way for a new wave of technologies bolstering efficient and sustainable food systems.

The world is producing more food than ever before as well as more GHG emissions throughout the associated supply chain. We are investing in the products and services that offer near-term carbon reductions through more efficient food processes and transport, increased land productivity, and diversion of food waste.

Robotics (hardware), automation and precision agriculture have the potential to transform the industry by reducing pesticide use, accelerating operational efficiencies, and boosting crop yield. Across supply chains, solutions leveraging the Internet of Things (IoT) and artificial intelligence (AI) are poised to revolutionize food processing safety and quality control, while streamlining logistics via demand forecasting, inventory management, and enhanced end-to-end tracking across complex networks.



INVESTMENT THEMES – FOOD AND AGRICULTURE

Fund II / Fund III

GENERA

Regulations limiting single-use plastic packaging are encouraging the development of biomass-based packaging solutions.

Genera produces non-wood agricultural pulp and molded fiber products and packaging which are biodegradable and compostable, directly impacting several societal dilemmas including greenhouse gas emission reduction, plastic pollution, and sustainable agricultural production. Genera's process uses perennial grasses as its feedstock, including miscanthus and switchgrass, that can grow on less productive land, are planted once instead of annually, and sequester carbon.

Capitalizing on macro trends

Genera is well positioned to capitalize on shifts within the macro environment as customers and brands look for alternatives to plastic packaging across consumer packaged goods, food and food service categories. Its plants have strong underlying unit economics, making the business easier to scale and presenting an attractive investment opportunity.

It Is the only fully integrated packaging supplier in the world, growing and harvesting its own feedstock in partnership with local farmers and producing its products on-site at leased or owned facilities in Tennessee.

"We're developing new products in the food processing markets to help producers address legislative change. Take meat products, for example, these are often sold on polystyrene trays, but producers are now having to look for more sustainable solutions."

Ben Mascarello, CEO
Genera

INVESTMENT THEMES – FOOD AND AGRICULTURE

Fund II

divert

Pioneering the first national network of processing facilities diverting food waste from landfills.

Divert partners with food retailers across the US to prevent food waste. It uses data analytics and proprietary liquefaction and anaerobic digestion technology to collect and convert unsold food into renewable electricity, renewable natural gas (RNG), and nutrients for fertilizer.

Divert is one of the largest anaerobic digestion processors in the United States and is pioneering the first national network of processing facilities to avoid food waste going to landfill sites. The environmental impact of wasted food is a growing concern for consumers, investors and policymakers, and changes to the regulatory landscape make the business an attractive investment opportunity.

Capitalizing on macro trends

The U.S. EPA recently released two reports (replacing the agency's food recovery hierarchy and adding nuance to its view of anaerobic digestion) that reinforce Divert's approach to waste management. The business is incorporating the EPA's most preferred pathways and focuses on standalone anaerobic digestion, as well as having its own digestion facilities. This is hugely beneficial, capitalizing on the byproduct of renewable fuel, while also making a rich digestate that can be added to compost to enhance its value.

The business is also continuing to expand its customer base. Major grocers backhaul their food waste to distribution centers for Divert to analyze what is being thrown away. Its proprietary equipment will measure when the waste was created, at which store, and specifically what food was disposed of, giving these businesses valuable insights.

The market opportunity is large and continues to grow, as the US EPA targets a 50% reduction of food waste per capita by 2030, siting infrastructure and hauling services as lacking and critical for reaching their target.[1]

[1] FDA, Draft National Strategy for Reducing Food Loss and Waste and Recycling Organics, December 2023

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Connect with one of our industry experts

We’re building companies that are decarbonizing the economy in immediate and tangible ways.

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