

Investment Insights

Quarterly Investment Insights, Q2 2023

Notes on coverage

- In this quarter, our **Enabling Technologies** section will explore Environmental Predictive Analytics.
- We may make small adjustments in previous quarter numbers when our analysts uncover an older deal or obtain additional information as part of the ongoing research.



**AGRICULTURE
& FOOD**



**ENERGY
& POWER**



**MATERIALS
& CHEMICALS**



**RESOURCES &
ENVIRONMENT**



**TRANSPORTATION
& LOGISTICS**

← Enabling Technologies, Business Models and Themes →

Cleantech Quarterly Investment Update Webinar (July 20th)

Q2 2023 saw a slight improvement on venture investments in cleantech versus Q1, underpinned by a landmark quarter in water technology and continued enthusiasm in built environment optimization and electric vehicles.

We noted last quarter that investment amounts were beginning to “land” on the other side of the pandemic funding craze. However, if these past few quarters are any indication, the new normal for cleantech funding, per quarter, still stands at roughly double the amount it did in Q2 2020.

Undoubtedly, dominant models are being established, as we start to see a clear venture financing-to-IPO pipeline stay intact in areas such as distributed energy resources and buildings optimization. As such, we should expect to see potential winners slowly emerge over these next few quarters.

We hope you will join us for our Quarterly Investment Update Webinar on Q2 2023, to unpack these trends and more, on **July 20th at 11am Eastern (5PM CET)**.

Subscribers can register here:
<https://cleantech.swoogo.com/QII2023>



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Q3 Research Schedule



Resources & Environment

- Spotlight: Waste Collection & Behavior Change
- Spotlight: Biodiversity & Natural Capital: Monitoring, Protection & Restoration



Materials & Chemicals

- Spotlight: Ammonia Cracking
- Spotlight: Direct Air Capture



Agriculture & Food

- Spotlight: Farm Robotics
- Spotlight: Cultivated Meat
- Spotlight: Plant-Based Proteins



Energy & Power

- Insight: Hydrogen
- Spotlight: Electrolyzers (Hydrogen)
- Insight: Hydropower & Marine Energy



Transportation & Logistics

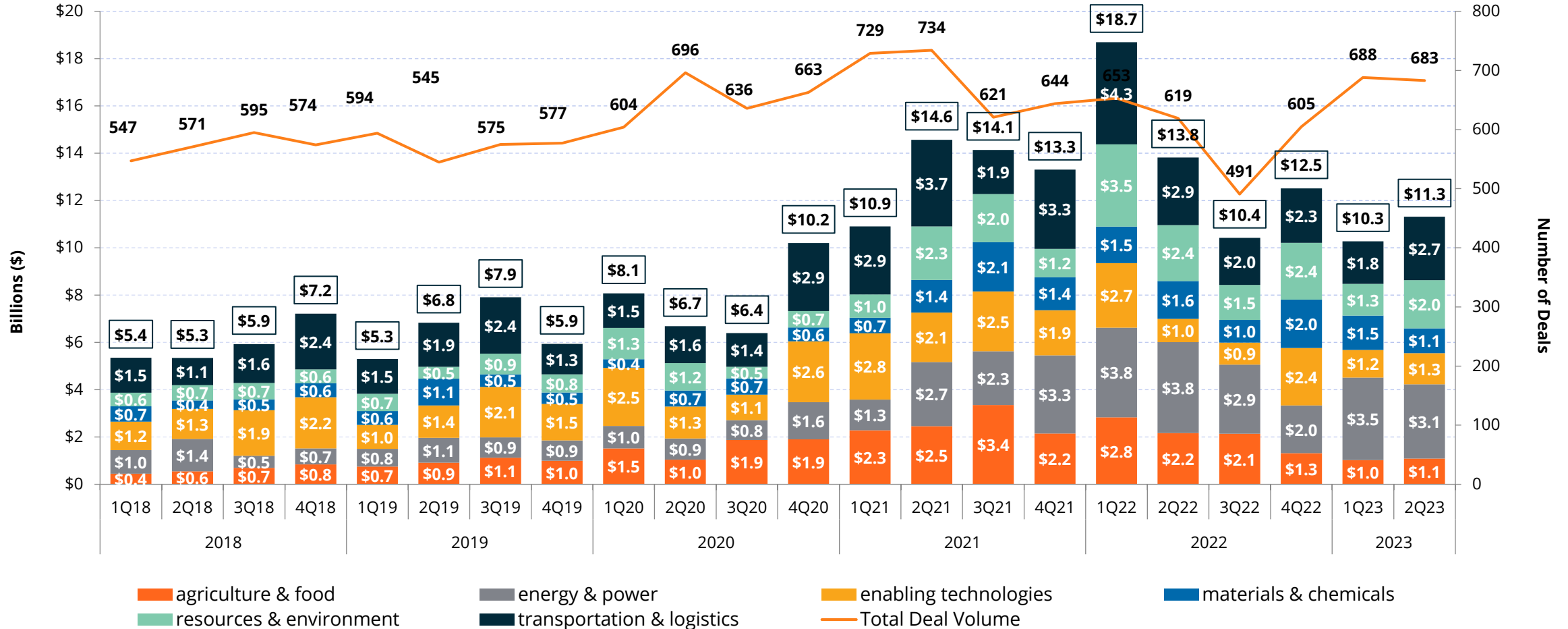
- Spotlight: Hydrogen for Long Distance Transport

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a. <u>Europe & Israel</u>	
b. <u>Asia Pacific</u>	

Deal amount and volume: 2Q23

2Q 2023 capped at \$11.3 billion, invested across 683 deals. Energy & power continues to be the leading sector in 2023, followed by transportation & logistics and resources & environment.

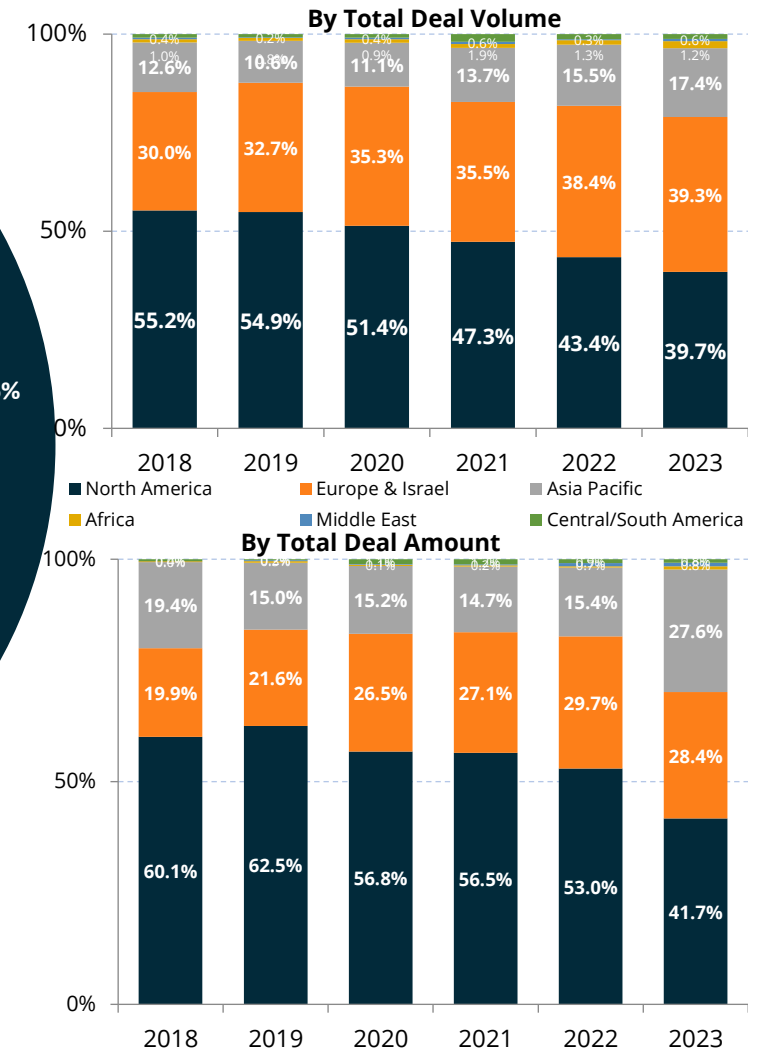
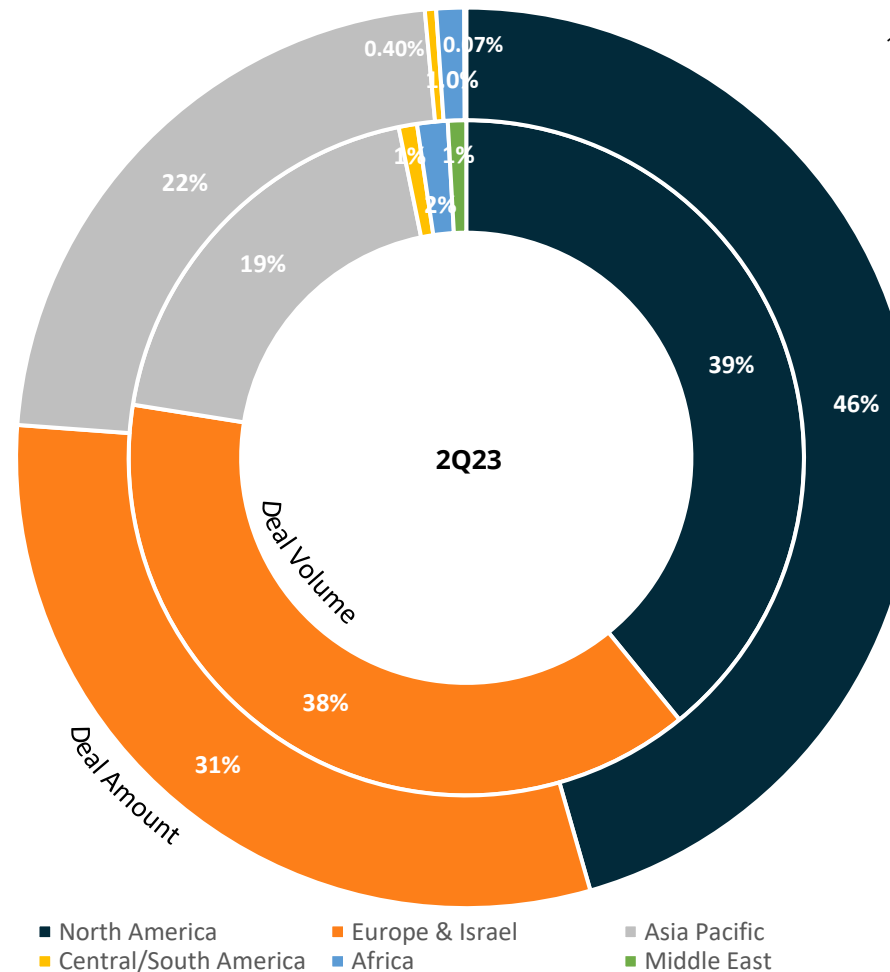
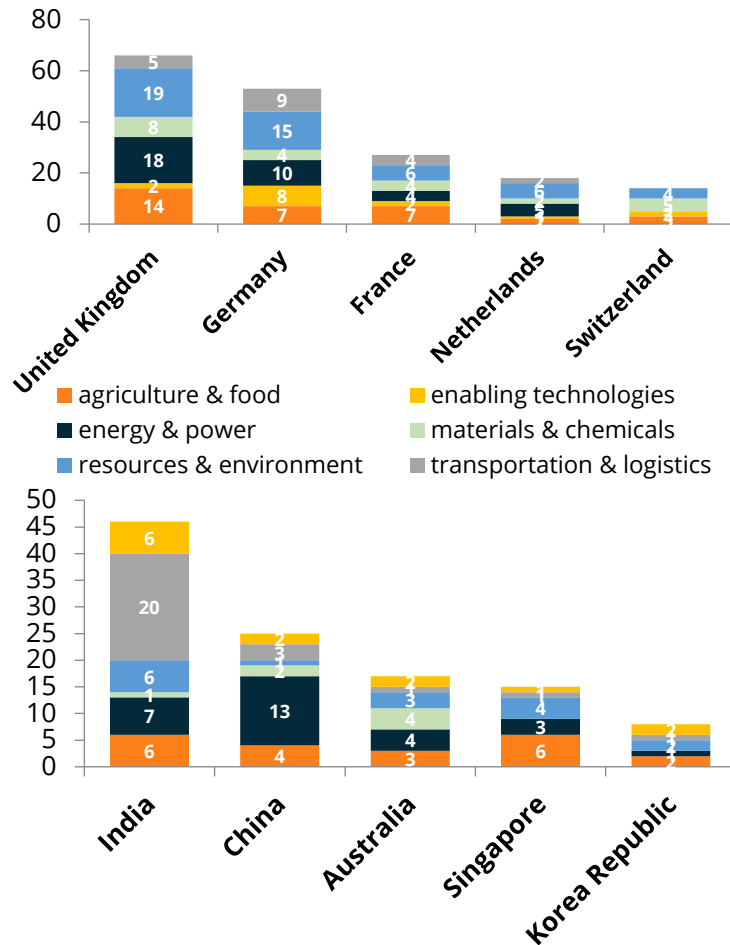


* Excludes deals above \$350M

**Dollars (left) and volume (right) of global cleantech venture capital deal activity

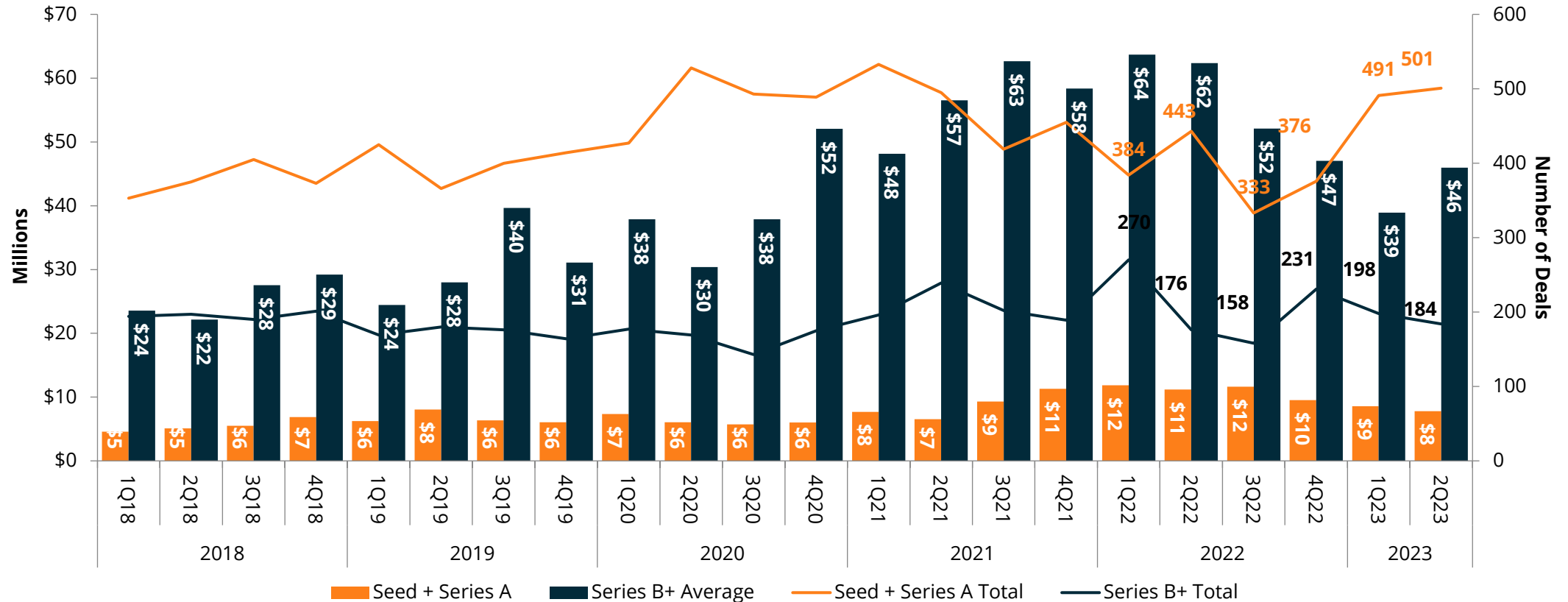
Cleantech deal volume by geography: 2Q23

Europe & Israel is leveling up with North America in terms of share of deal volume, though the latter retains a significant lead with a 46% share of deal amount. United Kingdom and Germany lead in Europe & Israel, with resources & environment the largest sector in both. Transportation & logistics leads by deal volume in India, while energy & power takes dominance in China.



Cleantech deals by stage: 2Q23

Share of early-stage deals increased to 73% of total deal volume, with average deal size at \$8 million. Average late-stage deal size increased by \$7 million, to \$46 million.



**Dollars (left) and volume (right) of global cleantech venture capital deal activity
 *Excludes outlier deals above \$350M

Special Purpose Acquisition Company activity: 2Q23 announced

7 new SPACs announced in 2Q23, with 4 in energy & power.

Agriculture & Food

Energy & Power

Transport & Resources & Environment
Logistics



Company	Description	Date	SPAC	Valuation
ABOVE FOOD™	Operator of a vertically-integrated plant-based specialty ingredients and food business	01/05/2023	Bite Acquisition Corporation	\$319 million
SUNERGY	Residential solar and energy storage installer	19/04/2023	ESGEN Acquisition Corporation	\$475 million
Montana Technologies	HVAC technology for energy efficient dehumidification and water harvesting	06/05/2023	Power & Digital Infrastructure Acquisition II Corporation	\$500 million
global hydrogen energy	Hydrogen distributor	15/05/2023	Dune Acquisition Corporation	\$112 million
Suntuity RENEWABLES	Solar and wind solutions, manufacturing and installation services	19/05/2023	Beard Energy Transition Acquisition Corporation	\$249 million
JEPLAN	Recycling technology for chemical clothing, and manager of recycling facilities	20/06/2023	AP Acquisition Corporation	\$480 million
VINFAST	Automotive manufacturer	12/05/2023	Black Spade Acquisition	\$23 billion

Section 2: Industry Groups

Investment Summary & Activities

Agriculture & Food

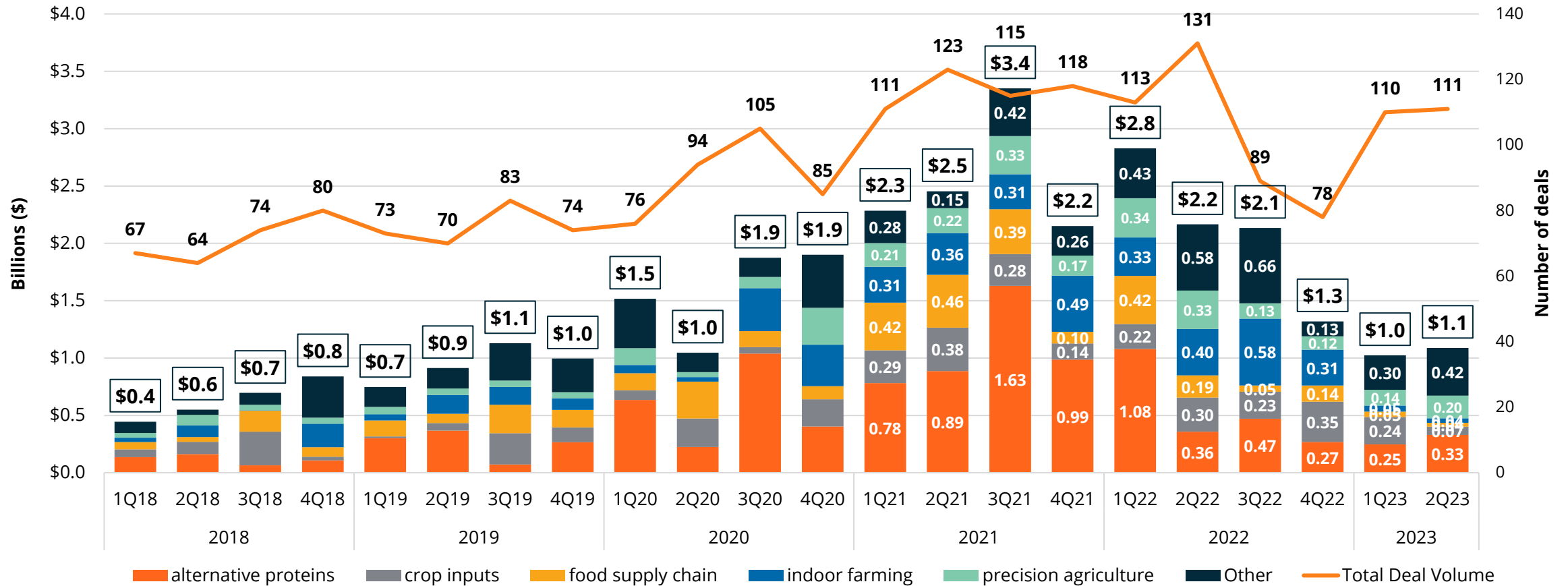
Energy & Power

Materials & Chemicals

Resources & Environment

Transportation & Logistics

Agriculture & Food: 2Q23 investment summary



* Excludes deals above \$350M
 **Dollars (left) and volume (right) of global cleantech venture capital deal activity

- Agriculture & Food venture funding saw a slight uptick compared to 1Q23, but the \$1.1 billion total raised still made it the second-smallest quarter since early 2020. A fifth of 2Q deals involved a corporate investor; Europe was the leading geography, hosting 42% of deals.
- *Animals* - which covers technologies aimed at making livestock production more sustainable - was the leading subsector by dollars invested, closely followed by *alternative proteins*, which seeks to source protein from non-conventional sources such as plants, fungi, and cell cultures. Between them, these two subsectors accounted for two-thirds of the industry group's total - signifying the importance investors are placing on global protein supply.

Agriculture & Food: 2Q23 activities

Corporates, Investors, Ecosystem

Corporates:

- **ADM** partnered with Air Protein to scale the latter's CO2-to-protein technology alongside a strategic investment in the start-up; it also partnered with Believer Meats to accelerate R&D around the Israeli innovator's cultivated meat tech.
- **Bel Group** will use Climax Foods' AI capabilities to develop plant-based versions of its Laughing Cow, Boursin, and Babybel product lines.
- **Lotte Group** signed a collaboration deal with Ÿnsect to explore human food applications for edible insects.

Investors:

- **Emmertech** and **Better Bite Ventures** were the most active Agriculture & Food venture investors in 2Q, with four deals each.
- **S2G Ventures** closed a \$300 million Special Opportunities Fund to provide flexible financing for capital-intensive, asset-oriented businesses in agriculture, energy, and oceans.
- **Omnivore**, an Indian agrifoodtech VC, made a \$150 million first close for its third fund.

Entrepreneurial support organizations:

- **EIT Food**, an EU agency, announced the latest cohort of 63 agrifood start-ups for its EIT Food Accelerator Network and RisingFoodStar programs.
- **UK Research & Innovation**, a UK government agency, earmarked \$406 million for a new plant and microbe research hub to be completed by 2030.

Policy:

- The **US Department of Agriculture** gave its first-ever approvals for cultivated meat to be sold in the US. The approved products are made by innovators Eat Just and Upside Foods.
- The **European Parliament** formally adopted a law which stops deforestation-linked agrifood products from being sold, imported, or exported in the EU.

Innovators

Animals: technologies aimed at making livestock production more ecologically sustainable, secured \$373 million in 2Q, just over a third of all Agriculture & Food funding, driven primarily by the following start-ups:

- **Ÿnsect** (France) raised \$175 million from undisclosed investors as it pivots from farming insects for livestock feed to target higher-value pet food and ingredients.
- **eFishery** (Indonesia) which develops technologies for sustainable fish and shrimp farming, netted \$128 million for its ongoing Series D round from 42X Fund, SoftBank Vision Fund, Northstar Group, and UAE sovereign fund ADQ.
- **Victory Farms** (Kenya), operator of a vertically-integrated tilapia farming platform, scored \$35 million in a Credev-led Series B round as it seeks to expand across Africa.
- **Vytelle** (USA) raised \$20 million in Series B funding from Grosvenor Food & Agtech, Forage Capital Partners, Fulcrum Global Capital, and others to take its livestock genetics technology global.

Alternative proteins: technologies to reduce the environmental impact of animal agriculture by sourcing protein from alternative sources, raised \$330 million in total:

- **Air Protein** (USA) scored the sector's biggest deal of 2Q, banking \$75 million in Series B funding from Ford Family Foundation, Barclays, Google's GV, and ADM Ventures for its tech that converts captured CO2 into edible protein.
- **Omeat** (USA) emerged from stealth with \$40 million funding to begin scaling its sustainable cultivated meat growth factor which is derived from living cows. Investors included Cavallo Ventures, Tyson Ventures, S2G Ventures, and GV.
- **Uncommon** (UK), a developer of cultivated pork products previously known as Higher Steaks, raised \$30 million for its Series A round co-led by Balderton Capital and Lowercarbon Capital.
- **VFC** (UK), an animal-free chicken alternative, acquired compatriot **Meatless Farm's** brand assets and inventory for an undisclosed sum.

Agriculture & Food Sector Research

Cleantech Group tracks the startups, scale-ups, investors, and multinationals from across the region and the world shaping the future of the climatetech industry



Recent Published Research

- **Spotlight:** Carbon Fixing Soil Inputs (Q3 2023)
- **Spotlight:** Soil Carbon Measurement, Reporting & Verification (Q2 2023)
- **Sector Insight:** Carbon Farming (Q1 2023)
- **Analyst Insight:** Agri-FoodTech Can Have Critical Impact. Here's How (Q4 2022)
- **Spotlight:** Recirculating Aquaculture Systems (Q2 2022)
- **Spotlight:** Seaweed (Q2 2022)
- **Sector Insight:** Aquaculture (Q2 2022)
- **Sector Insight:** Food Waste (Q1 2022)

Upcoming Topics

- **Spotlight:** Farm Robotics (Q3 2023)
- **Spotlight:** Plant-Based Proteins (Q3 2023)
- **Spotlight:** Cultivated Meat (Q3 2023)

Upcoming Events

- **Cleantech Forum Europe** – Easy access to startups, scale-ups, investors & multinationals from across the region – Tallinn, Estonia – November 14-16, 2023
- **Cleantech Forum North America** – Meet the top innovators, investors & incumbents driving cleantech in North America – San Diego, CA – January 22-24, 2024

Lead Analyst – Jack Ellis

- Senior Associate leading Agriculture & Food research at Cleantech Group, based in Singapore.
- Jack's professional background is in journalism, marketing, and venture capital. Prior to joining Cleantech Group, he was Research Lead at agrifoodtech investor AgFunder, and Deputy Editor of industry news site *AFN*.
- Jack earned a bachelor's degree in Philosophy from the University of Sheffield.

Section 2: Industry Groups

Investment Summary & Activities

Agriculture & Food

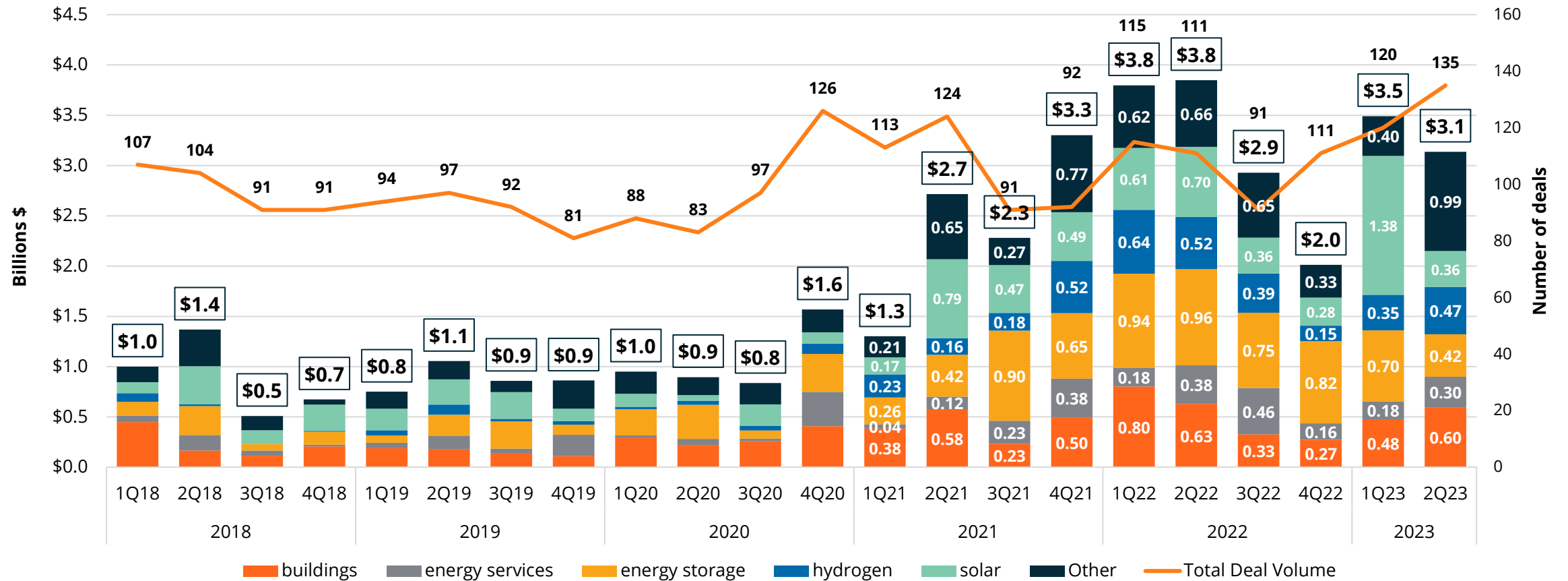
 **Energy & Power**

Materials & Chemicals

Resources & Environment

Transportation & Logistics

Energy & Power: 2Q23 investment summary



* Excludes deals above \$350M

**Dollars (left) and volume (right) of global cleantech venture capital deal activity

- The overall amount invested in Q2 2023 declined slightly quarter-on-quarter and year-on-year from \$3.5 billion and \$3.8 billion respectively to \$3.1 billion, however the number of deals has increased to record level of 135 deals per quarter.
- The investments into *solar PV* sector, which last quarter was boosted by several high value deals in China, and *energy storage* declined sharply q-o-q from \$1.4 billion to \$0.4billion and \$0.7billion to \$0.4billion, respectively, while the share of investments into *buildings* and *other technologies* increased.
- Vast majority of deals were Series B rounds averaging at \$46 million per round, up from \$39 million per round in the previous quarter, meanwhile Series A and seed round investments both declined compared to last quarter, reflecting the shift towards more mature less CAPEX heavy investment.

Energy & Power: 2Q23 activities

Corporates, Investors, Ecosystem

Corporates:

- Japanese corporates **Mitsubishi**, **Inpex**, **Mitsui** and **Itochu** were by far the most active in the market in 2Q, with some of the key investment themes including nuclear fusion, electric vehicles and hydrogen.
- **Iberdrola** partnered with thermal storage developer Kyoto to develop its industrial process heat development.
- **Microsoft** signed a power purchase agreement (PPA) with nuclear fusion developer Helion Energy for deliveries from 2028.
- **Aldi** agreed to trial EV energy storage technologies from Voltfang.
- **NextEra Energy** and BlackRock agreed to develop EV and hydrogen charging network for medium and heavy-duty vehicles with Daimler Truck.
- **Okayama Gas Corporation** and **Mitsubishi** have partnered with Aakel Technologies to support EV charging infrastructure.

Investors:

- **New Energy Capital** became a development partner to Granite Source Power to fund further renewable and battery storage development.
- **Generate Capital** entered a partnership with green hydrogen developer Ambient Fuels to support its development project with commitment to fund \$250 million of green hydrogen infrastructure.
- **TDK Ventures** launched a \$150 million fund EX1 targeting cleantech investments in electrification in Europe and North America.

Policy:

- Portugal aims to generate 85% of its annual electricity from renewable sources by 2030, up from 60% in 2022 under new proposed targets.
- Sweden adopted new energy targets, that could pave the way for building new nuclear generation.

Innovators

Nuclear fusion continued to attract investment, following last year's breakthrough of net energy gain and record high temperatures, which has invigorated the sector with \$352 million invested in 2Q and \$428 million since the start of the year - all the largest deals this quarter were recorded in Asia.

- China's **Neo Fusion** raised \$142 million in growth equity round
- Magnetic confinement reactor developer **Energy Singularity** (China) raised \$57.8 million in Series A round.
- Japan's magnetic confinement reactor developer **Kyoto Fusion** raised \$79 million in growth equity.

Energy networks and buildings: Digital solutions continue to attract investment amid strong demand from end users to reduce their energy bills and to improve the energy efficiency of their housing stock.

- German **1Komma5**, distributed solar PV aggregator raised \$468M in Series B round from investors, such as Eurazeo and Porsche Ventures.
- China's energy storage and software provider **Xi'an Singularity Technology** raised \$99.8 million in series B round in May.
- US smart home control panel manufacturer **Span** raised \$96.5 million in series B round, while British smart building control platform for real estate managers **Infogrid** raised \$90 million in series B round.

Energy storage: Overall investments into energy storage has tapered off as investors realign on more asset light digital solutions over CAPEX heavy hardware technology, but interest particularly from China persists as the country recorded 72% (\$324M) of all storage deals.

- Vanadium redox flow battery (VRFB) developer **Dalian Rongke** raised \$145 million in Series B round.
- Compressed air energy storage developer **Zhongchu Guoneng Technology** raised \$141million in Series A round.

Energy & Power sector research

Cleantech Group tracks the start-ups, scale-ups, investors and multinationals from across the region and the world shaping the future of the Energy & Power industry



Recent Published Research

- **Sector Insight:** Nuclear fusion (Q1 2023)
- **Sector Spotlight:** Stationary Thermal energy storage (Q2 2023)
- **Sector Insight:** Long Duration Energy Storage energy storage (Q2 2023)
- **Sector Spotlight:** Vanadium redox flow batteries (VRFB's) (Q2 2023)

Upcoming Topics

- **Spotlight:** Electrolyzers (Q3 2023)
- **Insight:** Hydrogen (Q3 2023)
- **Insight:** Offshore marine power (Q3 2023)

Upcoming Events

- **Cleantech Forum Europe** – Easy access to startups, scale-ups, investors & multinationals from across the region – Tallinn, Estonia – November 14-16, 2023
- **Cleantech Forum North America** – Meet the top innovators, investors & incumbents driving cleantech in North America – San Diego, CA – January 22-24, 2024

Lead Analyst – Selene Law

- Senior Associate leading Energy & Power research at Cleantech Group, based in the UK.
- Selene has over ten years of experience working in the energy sector in analytical and journalistic capacity, covering the entire value chain from upstream oil to power and renewables. Prior to Cleantech Group, Selene worked in S&P Global, Wood Mackenzie and Fitch Research.
- She has a degree in journalism from Falmouth University in Cornwall, UK and a postgraduate degree in international relations from the University of Bristol.

Section 2: Industry Groups

Investment Summary & Activities

Agriculture & Food

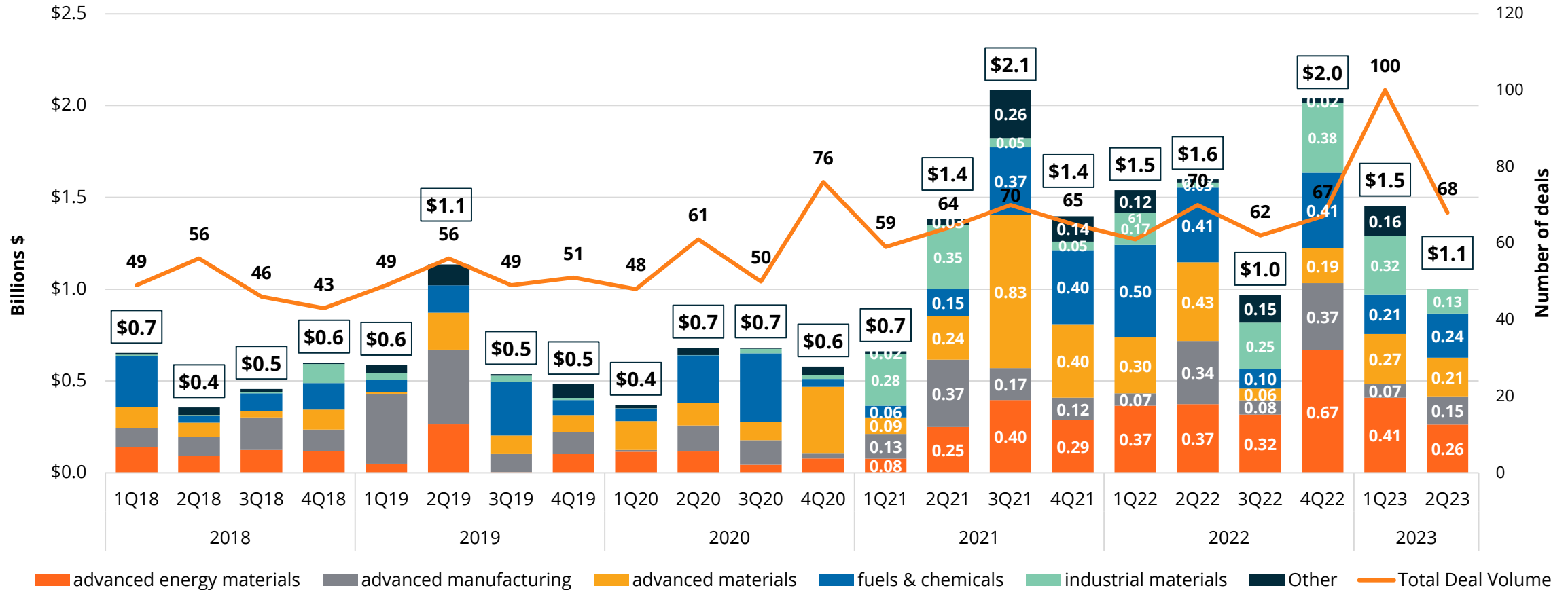
Energy & Power

 **Materials & Chemicals**

Resources & Environment

Transportation & Logistics

Materials & Chemicals: 2Q23 investment summary



* Excludes deals above \$350M
 **Dollars (left) and volume (right) of global cleantech venture capital deal activity

- Total venture investment fell away again in 2Q with \$1.1 billion raised over 68 deals. Funding rounds for **Anhul Advanced Semiconductor** (\$535 million) and **Libode New Material** (\$375 million) are excluded from the numbers.
- Corporate participation bounced back with 28% of deals featuring a corporate or corporate venture in 2Q23, up from 21% in 1Q23.
- *Advanced energy materials* and *fuels and chemicals* were the strongest themes this quarter, attracting around a third of all investments in the sector, \$390 million - the largest funding rounds were in *advanced energy materials* (**Semi-Tech, Forge Nano**) and *fuels and chemicals* (**Next Renewable Fuels**).

Materials & Chemicals: 2Q23 activities

Corporates, Investors, Ecosystem

Corporates:

- **Asahi Kasei** allocated \$100 million to invest in early-stage startups focused on hydrogen, energy storage, carbon management, and bio-based chemicals.
- **Lockheed Martin Ventures** invested in several materials innovators: AyarLabs, 3D Glass Solutions and Fortify.

Investors:

- **Matterwave Ventures** announced a first close of \$80 million for its Industrial Technologies II fund for 'deeptech' start-ups.
- **Energy Impact Partners** completed fundraising of \$120 million for its Elevate Future fund for investing in the energy transition. LPs include **Amazon, Microsoft, General Electric, Fortsis** and **Southern Company**.

Entrepreneurial Support Organizations:

- **H&M Foundation** awarded grants to textiles innovators: Algreen, ALT TES, KBCols Sciences, Nanoloom, Phycolabs, and Rethread Africa.
- **Carbon to Value Initiative** announced year 3 startups including Capro-X, Capture6, Carbon to Stone, Dioxcyle, enaDyne, Global Algae Innovations and TerraFixing.
- **Plug and Play Tech Centre's** new cohort included several materials innovators including Motor Skins, Treetop Biopack, Titan Bioplastics, Keanos, Mussel Polymers.

Innovators

Cathodes: the most expensive and energy intensive component of a battery - new manufacturing technologies produce less waste, reduce energy usage and lower costs. Additives and coatings enable improved energy density and safety, these innovations improve the properties or lower the cost of battery manufacturing.

- **Libode** raised \$375 million in Series B, pre-IPO funding to manufacture cathode materials.
- **Forge Nano** raised \$50 million in a growth equity round to develop a battery production line to satisfy full-scale, premium battery contracts.
- **6K** raised funds from Stellantis Ventures. 6K's Unimelt process is used to produce sustainable critical materials including cathodes.

Sustainable Aviation Fuel (SAF): Recent pushback against poor quality carbon offsets has heightened interest in alternative propulsion methods. Battery and hydrogen powered planes may address emissions of short haul flights, SAFs enable reduction in emissions in the near term, and are still required for long haul flights.

- **Cleanjoule** raised \$50 million in a seed round for further development of technology to produce SAF from agricultural residues and other waste biomass
- **Next Renewable Fuels** raised \$75 million according to a regulatory filing. Next produces renewable diesel, jet fuel and naphtha.
- **OXCCU** raised \$23 million in Series A funding to commercialize cost-effective SAF production using hydrogen and carbon dioxide.
- **Universal Fuel Technologies** raised seed funding to deploy flexiform technology for production of SAF and renewable gasoline.

Materials & Chemicals sector research

Cleantech Group tracks the start-ups, scale-ups, investors and multinationals from across the region and the world shaping the future of the Materials & Chemicals industry



Recent Published Research

- **Spotlight:** Sustainable Aviation Fuels: eJet (Q2 2023)
- **Spotlight:** Silicon anodes (Q2 2023)
- **Spotlight:** Decarbonizing cement & concrete (Q4 2022)
- **Spotlight:** Anaerobic digestion (Q3 2022)
- **Green ammonia** (Q2 2022)
- **Sector Insight:** Carbon capture and utilization (Q1 2022)

Upcoming Topics

- Cathode manufacturing (Q3 2023)
- Ammonia processing (Q3 2023)
- Direct air capture (Q3 2023)

Upcoming Events

- **Cleantech Forum Europe** – Easy access to startups, scale-ups, investors & multinationals from across the region – Tallinn, Estonia – November 14-16, 2023
- **Cleantech Forum North America** – Meet the top innovators, investors & incumbents driving cleantech in North America – San Diego, CA – January 22-24, 2024

Lead Analyst – Ian Hayton

- Materials & Chemical analyst, engineering and business professional with a passion for technology, innovation and the environment. Experienced in strategy, marketing, business support and R&D activities
- Prior to joining Cleantech, Ian held several roles at Exergy, including business process improvement manager, chemical process engineer, and a chemical research engineer.
- Ian earned an MSc degree in Chemical Engineering from the University of Manchester

Section 2: Industry Groups

Investment Summary & Activities

Agriculture & Food

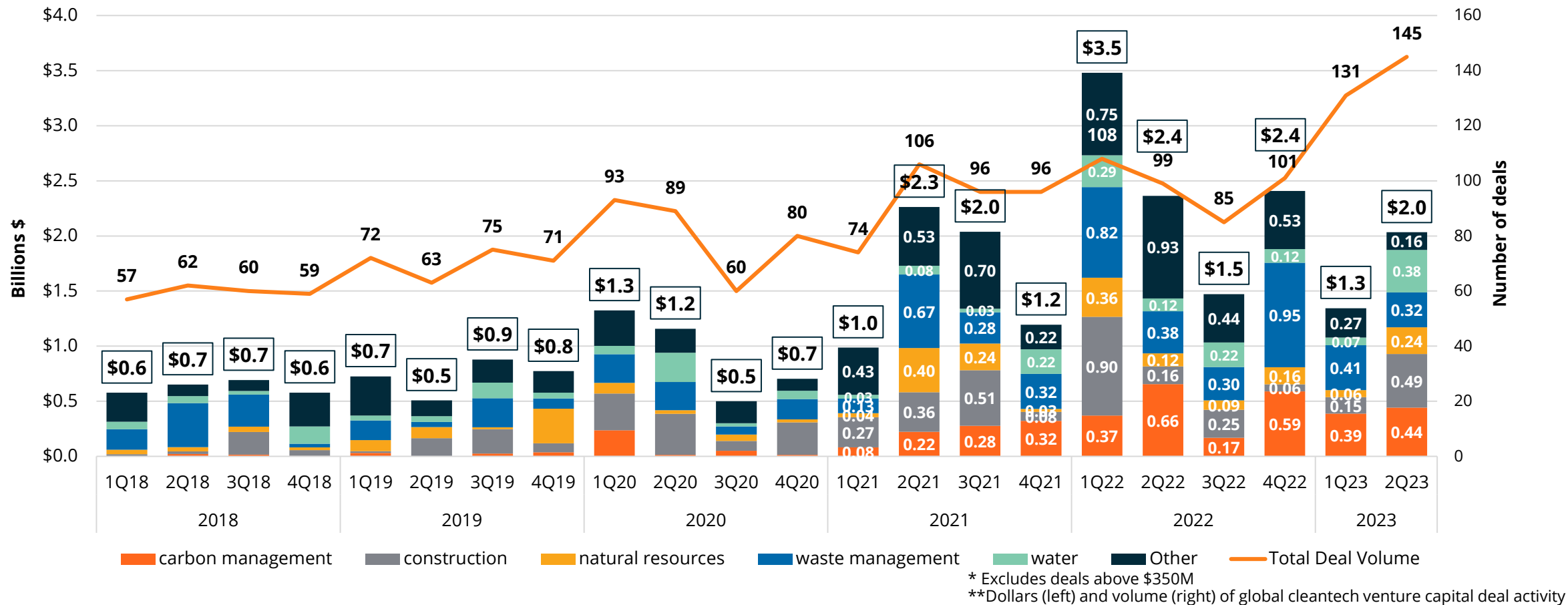
Energy & Power

Materials & Chemicals

 **Resources & Environment**

Transportation & Logistics

Resources & Environment: 2Q23 investment summary



- Strong investment themes this quarter included *construction* (\$490M) with notable rounds from **Equipment Share** (\$290M), **TopHat** (\$87M) & **Mighty Buildings** (\$50M); and *carbon management* (\$440M) across 59 deals including \$93M for **Measurabl**.
- *Water* technologies saw a record investment, at \$380 million, however **Gradiant** raising \$225M as part of its IPO made up the majority of this number.

Resources & Environment: 2Q23 activities

Corporates, Investors, Ecosystem

Corporates:

- Battery Recycler, **Cirba Solutions** & **Honda** partner to recycle critical battery materials for Honda's future EV products
- Emissions monitoring provider, **Watershed** will partner and enable **Aledade, Boom Supersonic, Canva, SKIMS, Wise, and Zendesk** to purchase carbon removal projects

Investors:

- **Morgan Stanley Investment Management** raised \$500M for the first close of **1GT Climate Private Equity Strategy**, for equity capital commitments with circular economy, food and mobility themes, aiming to avoid or remove 1GT of Carbon by 2050
- **Temasek**-backed investment management firm **LeapFrog** is raising \$600-700 million for new fund, in part focused on climate adaptation

Entrepreneurial Support Organizations:

- **Cycle Capital** and **Demeter** launch the **Circular Innovation Fund** and Accelerator program with target sectors in Upcycling and Plastic
- The **Cleantech Open Program** announced its 2023 cohort which included several water, carbon offset and circular economy innovators including wastewater-to-fertilizer developer, **HyeYield**

Policy:

- The EU Parliament approves new battery market regulations including rules for design, manufacture and recycling of batteries sold in the EU
- This will include mandatory carbon footprint labelling via a life-cycle assessment, which may drive more sustainable upstream mining

Innovators

Climate Risk: Software, sensors and satellite data to understand the impact of climate change on business and government, e.g., increasing losses from physical climate risks flooding & fire in 2023:

- Key deals: **ClimateAI** raised \$22 million in a Series B round to expand into India, Japan and other countries in the Global South, worst affected by climate risk

Emissions Monitoring: SaaS monitoring present and modelling future impact, increasing specialization in key industries e.g., real estate:

- **Measurabl**, emissions monitoring for Real Estate raised \$93 million
- **TeamClimate** was acquired by **ClimateTrade** to offer subscription-based carbon offsetting to global consumers

Water: Technologies which improve water use, efficiency and wastewater treatment - awareness of problem pollutants, regulation and water scarcity's impact on industry is driving investment into water technologies:

- PFAS treatment provider **Aguagga** raised \$1 million in grant funding
- Scale-up **Gradiant** raised \$225 million, becoming one of water technologies first unicorns

Reuse: Software and services to coordinate and facilitate reuse and reduce waste:

- **EquipmentShare**, in the construction sector, raised \$290M in growth equity
- Spirit bottle reuse system, **EcoSpirits** raised \$12 million including investor **Pernod Ricard**

Recycling in Critical Materials: Recycling of materials key for the energy transition and supply chain risks for critical materials are driving investments which onshore value of materials, and provide an alternative and somewhat stable supply:

- Magnet recycler **Noveron**, raised \$75 million in a Series B round
- Recycler of critical metals from e-waste **Nth Cycle** raised \$20 million in a growth equity round

Resources & Environment: Sector research



Cleantech Group tracks the start-ups, scale-ups, investors & multinationals from across the region & the world shaping the future of the Resources & Environment industry

Recent Published Research

- **Spotlight Insight:** Direct Lithium Extraction (Q3)
- **Sector Insight:** Critical Metals for the Energy Transition (Q2)
- **Spotlight Insight:** Flood Resilience (Q1)
- **Spotlight Insight:** Digital Water (Q1)
- **Sector Insight:** Carbon Offsets & Markets (Q4)
- **Sector Insight:** Corporate Sustainability Monitoring (Q3)
- **Sector Insight:** Water & Cleantech (Q2 2022)
- **Spotlight Insight:** Climate Risk Analytics (Q2 2022)
- **Spotlight Insight:** Methane Monitoring in the Oil & Gas Industry (Q1 2022)

Upcoming Topics

- **Spotlight Insight:** Biodiversity & Natural Capital (Q3)
- **Spotlight Insight:** Waste Collection & Behavior Change (Q3)
- **Spotlight Insight:** Insurance & Climate Risk (Q4)

Upcoming Events

- **Cleantech Forum Europe** – Easy access to start-ups, scale-ups, investors & multinationals from across the region – Tallinn, Estonia – November 14-16, 2023
- **Cleantech Forum North America** – Meet the top innovators, investors and incumbents driving cleantech in North America – Palm Springs, California – January 23-25, 2023

Lead Analyst – Holly Stower

- Focused on emerging innovation & trends across the resources & environment sectors, including water, waste, circular economy, natural resources & corporate sustainability.
- Prior to joining Cleantech, Holly was a Public Affairs & Communications Executive with the Solar Trade Association & the Association of British Insurers. Before this, Holly worked in advocacy for climate & wildlife charities.
- Holly earned an Undergraduate & Masters degree in Environmental Science from the University of East Anglia.

Section 2: Industry Groups

Investment Summary & Activities

Agriculture & Food

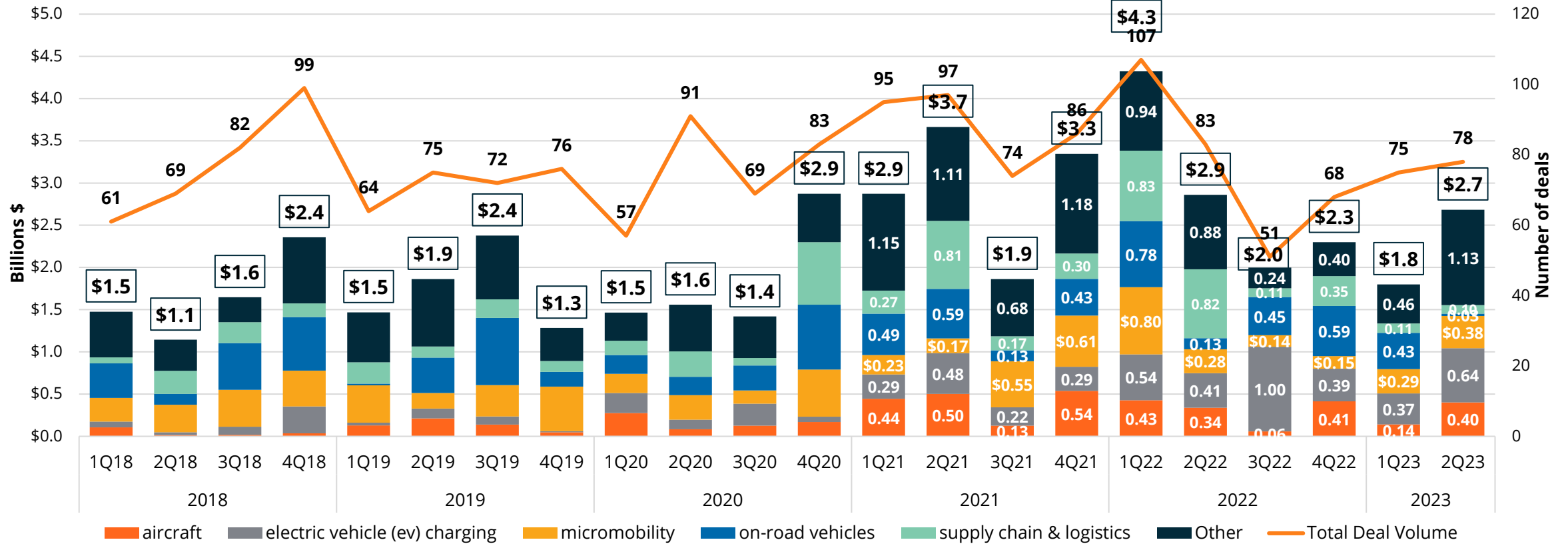
Energy & Power

Materials & Chemicals

Resources & Environment

 **Transportation & Logistics**

Transportation & Logistics: 2Q23 investment summary



**Dollars (left) and volume (right) of global cleantech venture capital deal activity

- Investment returned to mid-2022 levels this quarter with a total of \$2.7 billion invested - a \$900 million increase from Q1, driven by a significant increase in the average size of late-stage deals, nearly doubling the Q1 average (\$46 million) to reach record high of \$90 million.
- Key themes this quarter were *EV charging*, taking nearly a quarter of transport & logistics investment, followed by *vehicle components* with 21% and *aircraft* and *micromobility*, with 15% and 14% respectively.
- EV charging* returned as the highest-funded subsector after several quarters behind *micromobility* and *on-road vehicles* which received 19% and 21% of transport and logistics investment in Q1 compared to *EV charging's* 17%. *Vehicle components* investment shot up this quarter - not only did its share of investment more than double since Q1 2023 (9%), since 2018 the subsector has never accounted for more than 6% of transport & logistics funding.
- 2Q 2023 saw no outlier venture investments above \$350 million in transport & logistics.

Transportation & Logistics: 2Q23 activities

Corporates, Investors, Ecosystem

Corporates:

- **Volkswagen** announce EV R&D procurement center in China, along with plans to invest \$14.8 billion in a battery gigafactory in Ontario in partnership with the Canadian government
- **Hyundai Motor** and **LG Energy Solution** partner to establish an EV battery plant
- **BlackRock** and Daimler Truck form a joint venture with NextEra Energy for public EV charging and hydrogen fueling for heavy duty vehicles across the US
- **General Motors** and Samsung SDI will construct an EV battery production facility in Indiana
- **Honda** and Cirba Solutions partner to establish critical battery materials recycling capacity

Investors:

- Aviation OEMs and venture capital investors funding novel low-emissions aircraft technologies (e.g., **Airbus Ventures** investment in hypersonic aircraft innovator Venus Aerospace, **Y Combinator** investment in Radical Aero, developer of wireless services for solar aircrafts, and Stralis, hydrogen aircraft developer)
- Public sector investors were active in fleet management and EV charging (**European Investment Bank** invested in truck optimization innovator Trucksters, **Enterprise Estonia** and **Innovate UK** in micromobility and accessible EV charging)

Entrepreneurial Support Organizations:

- **Cleantech Open Northeast** accelerator program supported companies across the EV charging, vehicle components, and fleet management subsectors (e.g., Matcha, Elyte Energy, InceptEV)



Innovators

EV Charging: As EV adoption steadily increases and more EVs hit the roads, charging infrastructure is racing to keep up - innovators are developing residential and public charging solutions including turnkey solutions for electric fleets, multi-tenant housing, and fast-chargers for urban areas

- **DRIVECO** \$272 million growth equity; for EV charging network across Europe
- **Virta** \$71 million growth equity; funding for expansion across Europe and Asia
- **Weev** \$62 million growth equity; to support rollout of charging network in Ireland

Vehicle Components : As more EV models reach the market, there is an increasing demand to optimize vehicle components, particularly electric motors, powertrains, power electronics, and retrofit systems to conventional ICE vehicles to electric or hydrogen-powered vehicles

- **UVEye** \$100 million growth equity; funding to produce vehicle inspection systems in North America
- **Leekr Technology** \$58 million Series B; funding will support scaling and commercialization
- **Whisper Aero** \$32 million Series A; for product development and commercialization

Aircraft: Aircraft incumbents and corporates engaging with innovators to develop electric and low-emissions aircraft technologies including batteries, electric engines, and eVTOLs

- **Lilium** \$100 million late-stage private equity, for first manned eVTOL flight in 2024
- **Ascendance Flight Technologies** \$22 million Series A; for prototype development

Micromobility: innovators in two- and three-wheeled electric vehicles and sharing platforms continue to attract large investments- electrification solutions including battery swapping and charging networks as well as retrofitting solutions gain traction

- **Ola Electric Mobility** \$300 million growth equity; for battery production facility
- **River** \$15 million Series B; for manufacturing and operations scaling

Transportation & Logistics sector research

Cleantech Group tracks the start-ups, scale-ups, investors & multinationals from across the region & the world shaping the future of the transportation & logistics industry



Recent Published Research

- **Sector Insight:** Electric Mobility Services (Q2 2022)
- **Spotlight:** Residential EV Charging (Q2 2022)
- **Sector Insight:** Zero- and low-emission Off-road Commercial Vehicles (Q1 2022)
- **Sector Insight:** Advanced Air Mobility Infrastructure (Q4 2021)
- **Analyst Insight:** Scaling Advanced Air Mobility - Beyond Flying Cars and Drones (Q4 2021)
- **Spotlight:** Vehicle Grid Integration (Q2 2021)

Upcoming Topics

- **Spotlight:** Hydrogen for heavy transport (Q3 2023)
- **Spotlight:** Electric aviation (Q4 2023)

Upcoming Events

- **Cleantech Europe**– Meet the top innovators, investors and incumbents driving cleantech in Europe– Tallinn, Estonia– November 14-16, 2023
- **Cleantech North America**– Meet the top innovators, investors and incumbents driving cleantech in North America– San Diego, CA– January 22-24, 2024

Transport & Logistics Associate– Nicole Cerulli

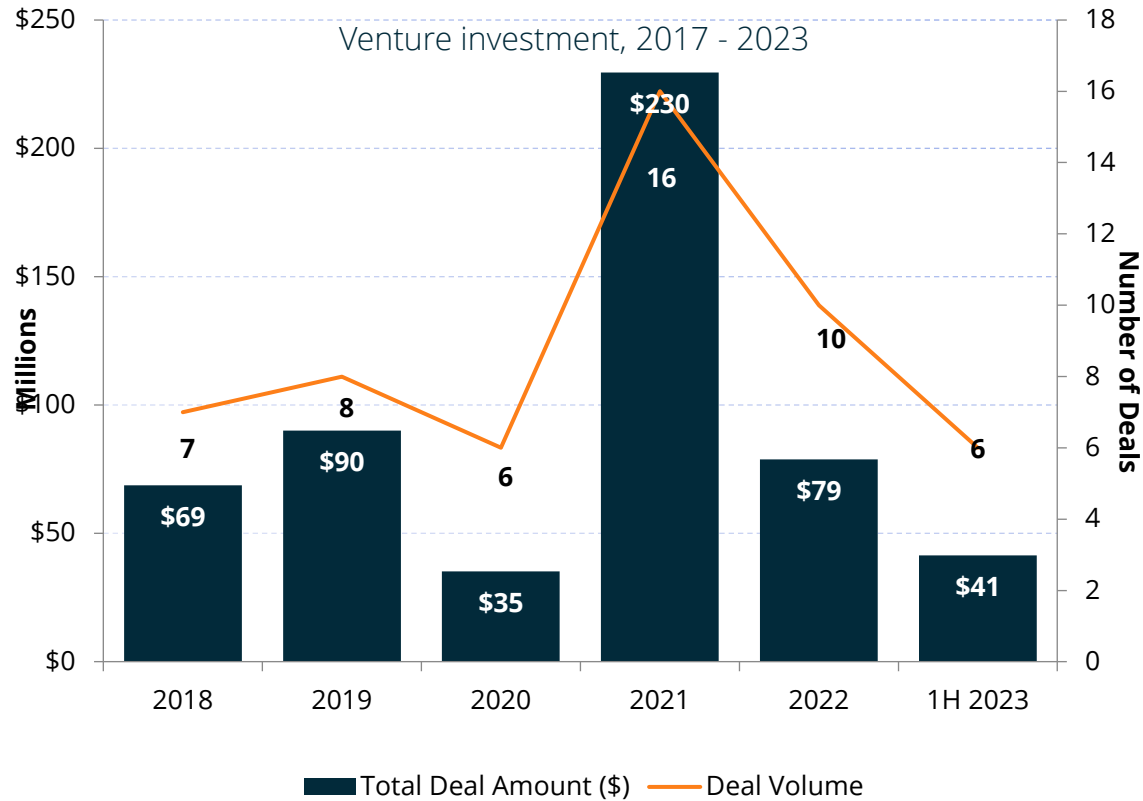
- Focused on emerging innovation and trends in transportation & logistics
- Nicole earned an undergraduate degree in Urban Studies and Sustainable Development from Barnard College and a Masters in Urban Resilience Design and Management from Universitat Internacional de Catalunya.

Section 3: Enabling Technologies

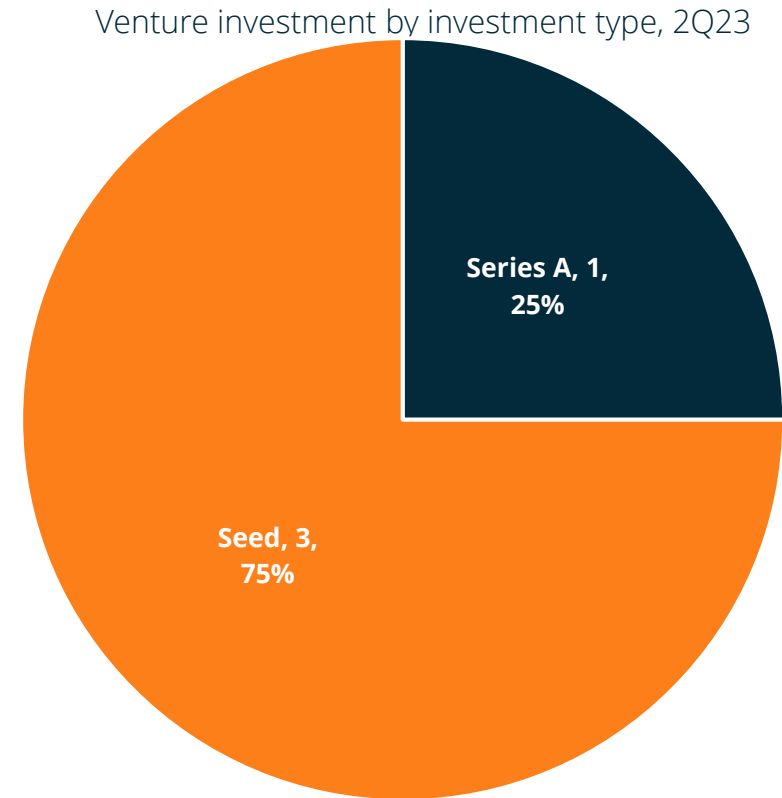
Investment Summary & Activities

Environmental Hazard and Disaster Prevention

Enabling Technologies: Environmental Hazard and Disaster Prevention



*Excludes outlier deals above \$350M



- Natural disasters and weather hazards are known for devastating impacted communities. As climate change continues to accelerate the frequency of these disasters, it is essential to develop preventative methods to mitigate the risks effecting vulnerable communities.
- *Environmental predictive analytics* works to leverage technologies including weather monitoring sensors, satellite data, radar technology, computing simulations and 5D mapping software among others, to support communities in anticipating the risk, severity and scope of a disaster, allowing for strategic and efficient responses to meet these challenges.
- This sector is still at the early stage of its development with 75% of investments being at seed-stage last quarter. This reflects the tendency over the last decade in this sector, with seed and Series A funding being dominant over the period.

Enabling Technologies: predictive analytics for environmental disaster and hazard prevention

Corporates, Investors, Ecosystem

Corporates:

- **Amazon Web Services** accepted several companies into its incubator program:
 - **Little Place Labs**, provider of machine learning space analytics including wildfire prediction.
 - **GRASP**, developer of satellite instruments and products that provide a complete picture of the Earth's atmosphere and surface, offering predictive capability for air pollution hazards, among other uses.
- Satellite company **Spire** and the **Canadian Space Agency** partnered with **OroraTech** to begin preparatory work for a wildlife monitoring satellite, thermal infrared cameras and AI-algorithms to detect wildfires. Spire and OroraTech are also partnering to put a constellation of eight satellites into orbit by mid-2024.
- **KorrAI**, processor of remote sensing solutions to generate complex data, joined Zurich Insurance Group's accelerator program and received a \$100 thousand grant.

Entrepreneurial support organizations:

- **EIC Rose Rock** accepted Salient predictions into its incubator program with a \$100 thousand grant to help build its presence in Tulsa, Oklahoma.

Innovators

- **Hydrosat**, provider of satellite imagery analytics services, raised \$15 million in Series A funding with an additional \$5 million in non-dilutive funding to put its first two thermal infrared satellites into orbit.
- **Reask**, developer of a climate risk data platform with analytics and machine learning software for global catastrophe modelling, weather risk modelling and trend forecasting, raised \$4.6 million in seed funding. The funding will be used to add more hazard coverage and grow its team internationally.
- **Salient predictions**, provider of weather forecasting services using machine learning and ocean data, raised \$3 million in seed funding to improve its long-range weather forecasting accuracy.
- **Hohonu**, developer of a water level monitoring device to predict episodic and seasonal flooding occurrences, raised \$1.8 million in seed funding to provide actionable data and insights to mitigate coastal flooding both nationally and internationally.

Grants:

- **3DEO 5D**, developer of a 5D mapping platform for applications including environmental mapping such as air quality, water pollution, flooding, and land contamination, raised \$2.7 million from backers in grant funding.

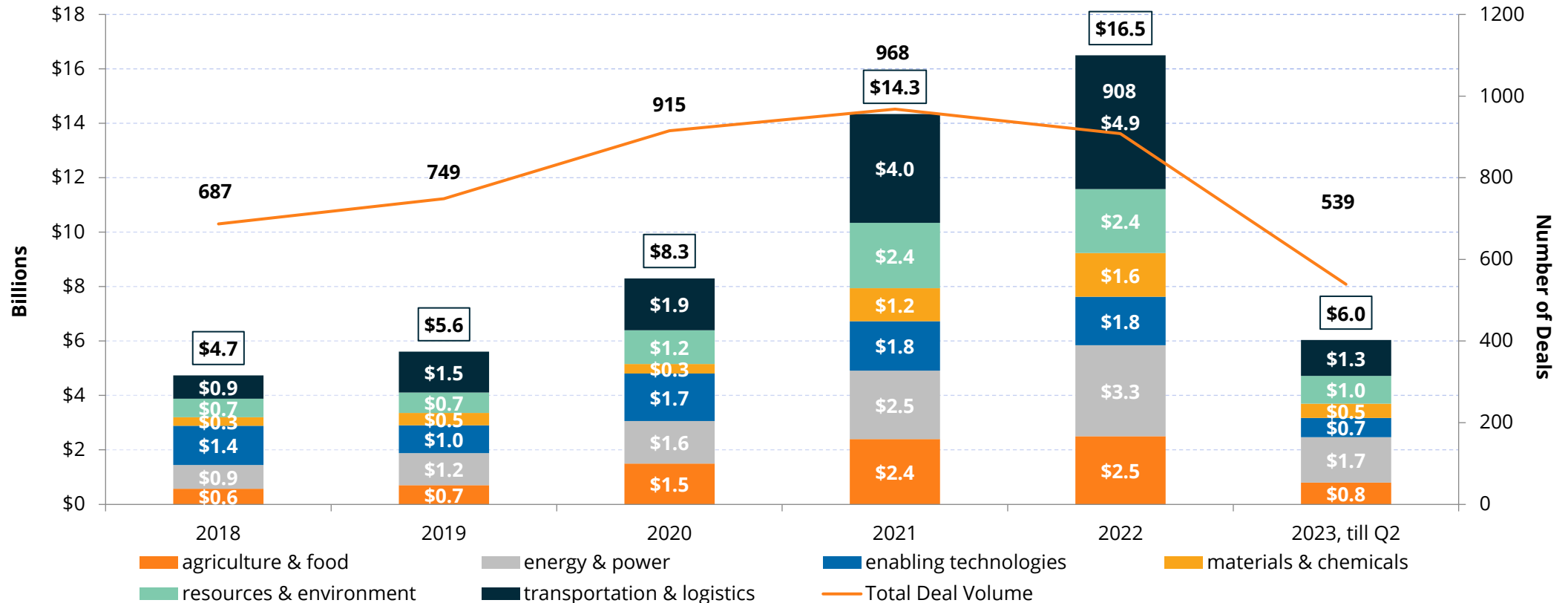
Section 4: Geographic Breakdown

Investment Summary & Activities

Europe & Israel

Deal amount and volume: 2Q23 Europe & Israel

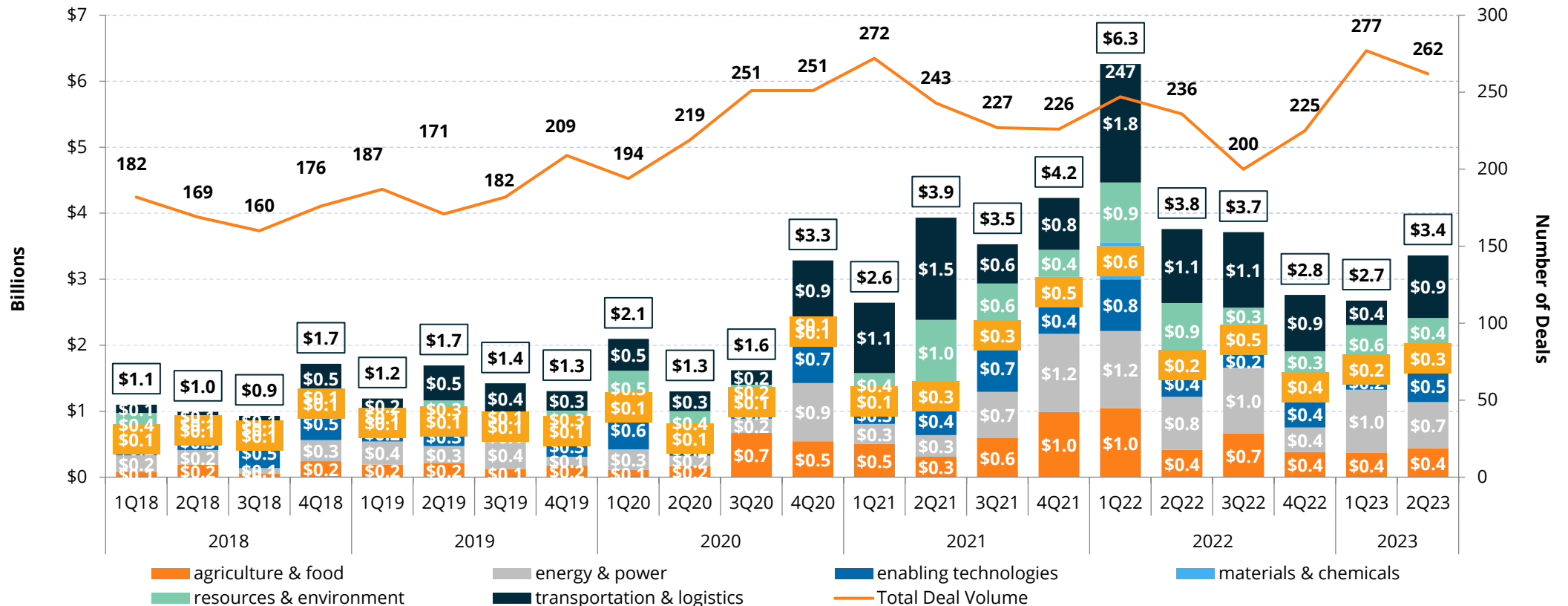
Electric vehicle (ev) charging, buildings, IT infrastructure, and energy services have dominated Q2 by investment amount. Carbon management secured the highest deal volume with 27 deals dominated by seed and Series A stage rounds. Waste management and alternative proteins followed behind.



*Excludes outlier deals above \$350M

Deal amount and volume: 2Q23 Europe & Israel

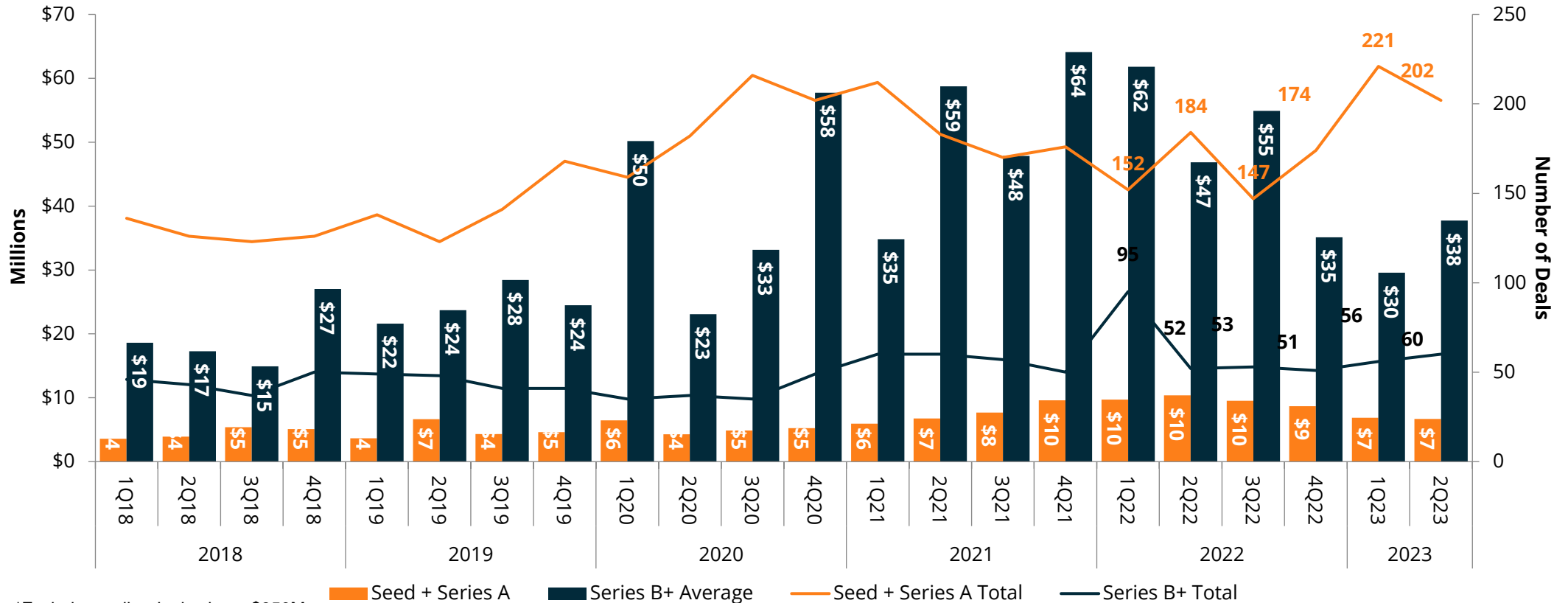
Q2 for Europe & Israel has seen \$3.4 billion invested across 262 deals. The slight dip in deal volume in Q2 has been met with a substantial increase in deal amount.



*Excludes outlier deals above \$350M

Cleantech deals by stage: 2Q23 Europe & Israel

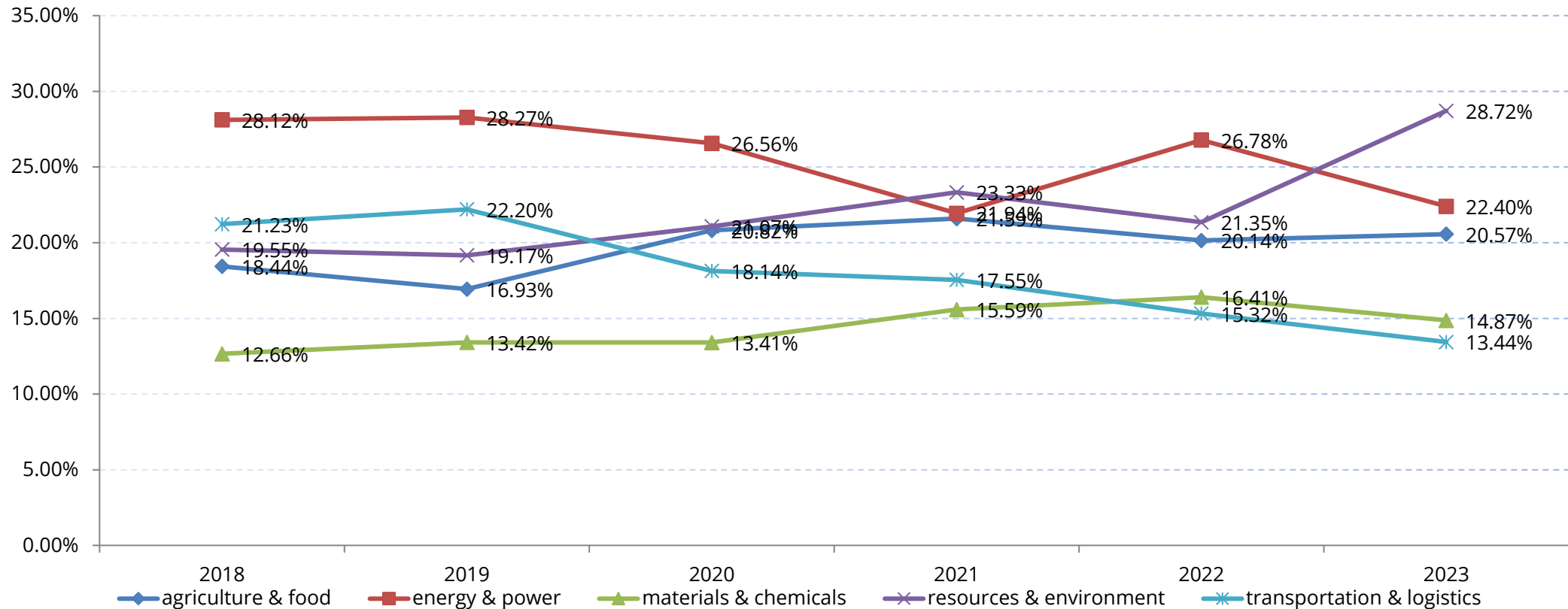
The deal amount trend in Q2 has continued to be dominated by early-stage rounds with lower investment amounts. Series B + continues to experience lower deal volume with higher average investment amounts.



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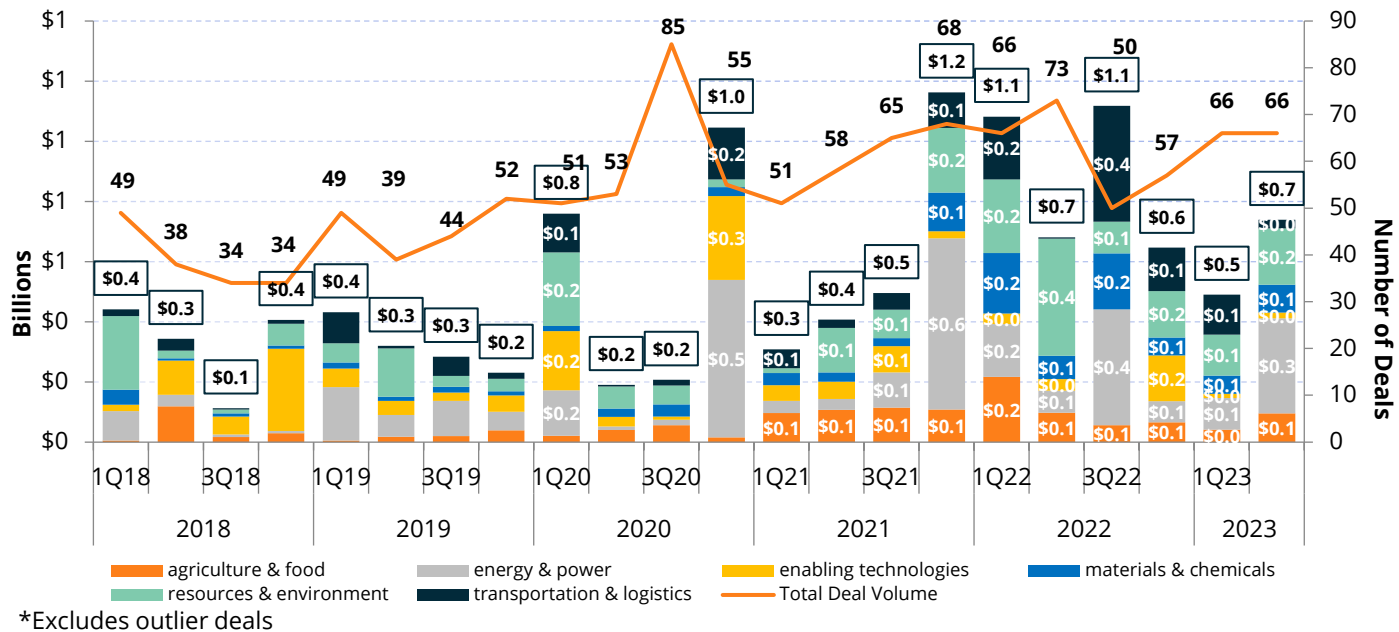
Industry sector shares by deal volume: 2Q23 Europe & Israel

The distribution of sector shares has remained relatively intact since Q1, with resources & environment still holding the lead in both quarters.



Excludes outlier deals above \$350M

United Kingdom



Top investments

- **Infogrid**, supporting smart buildings with end-to-end connected sensor solutions, has raised \$90 million in Series B funding. The round was led by Northzone Ventures, with participation from The Venture Collective, SoftBank Vision Fund, Pictet Private Equity Investors, Original Capital, JLL Spark, and Committed Capital.
- **TopHat**, designing technology-enabled prefabricated housing, has secured \$87 million in Series B funding from Aviva Investors and Persimmon.
- **Hometree**, residential energy services provider, pulled \$46 million in Series B funding led by 2150 and Energy Impact Partners, with participation from Legal & General Capital, Inven Capital, FJ Labs, Oxford Capital Partners, CEZ Group, AENU, and Frank Strauss.

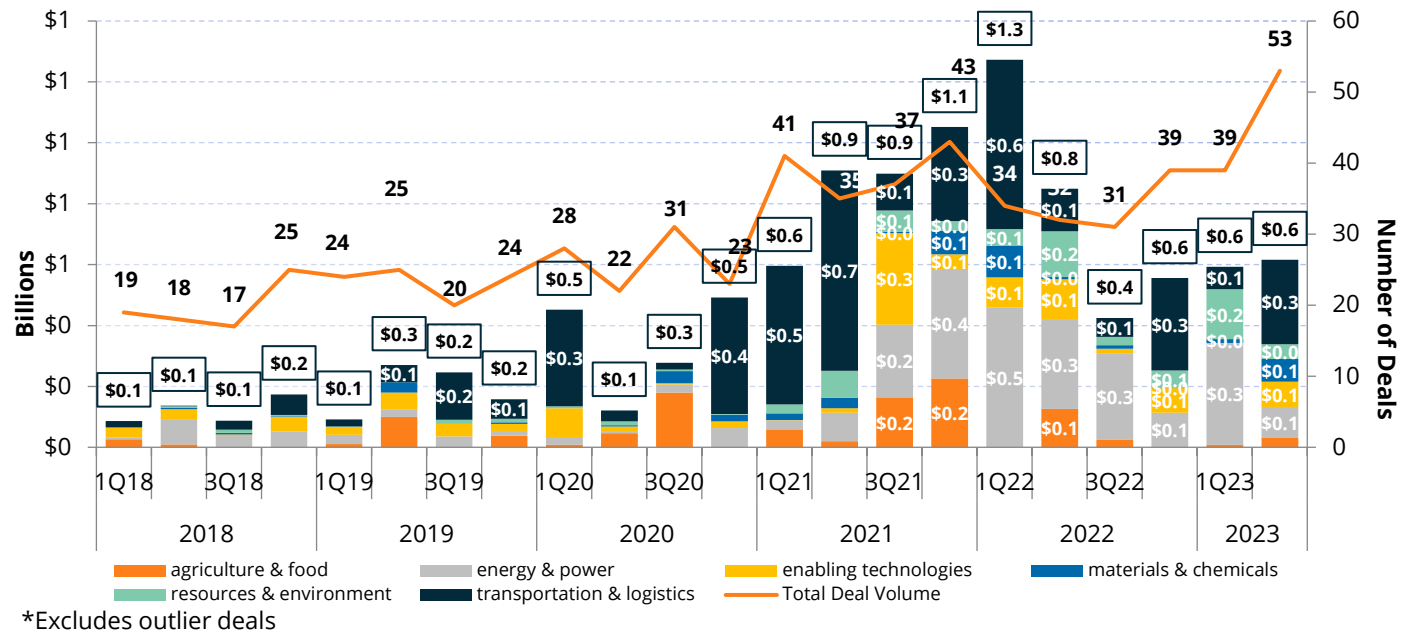
Top investors

- **Advanced Propulsion Centre (APC) UK** invested in Anaphite, Global Nano Network, OXLiD, Hypermotive, Beacon Battery Design, and Fuuse
- **Innovate UK** invested in HexisLab, Infleqtion, Energy Local, Lightricity, Duku and Ivy Tech
- **Amadeus Capital Partners** invested in Unisieve, Tenzo, and ATMOS Space Cargo (ATMOS)
- **A/O PropTech** invested in Enter, Span, and Satellite Vu
- **Clean Growth Fund** invested in HydRegen, Futraheat, and Arda Biomaterials
- **2150** invested in Hometree, Kelvin, and Ampd Energy
- **BGF** invested in Forefront RF, Gaussion and It's Fresh

Acquisitions & IPOs

- **VFC**, a meatless chicken alternative, has acquired Meatless Farm's brand assets and inventory, transaction does not include staff or Lovingly Made Ingredients business.
- **Paragraf**, producing 'two-dimensional' materials and of electronic devices based on these materials, has acquired Cardea Bio for an undisclosed sum.
- **Abatable**, carbon procurement platform that helps organizations offset their emissions, has acquired Ecosphere+.

Germany



Top investors

- **AENU** invested in Pivotal Future, HomeTree, VoltFang, UNDO, and Ocell
- **High-Tech Gründerfonds Management** invested in Sunvigo, Proxima Fusion, talpasolutions, and ATMOS Space Cargo (ATMOS)
- **UVC Partners (Entrepreneurship Venture Capital)** invested in Tanso, Proxima Fusion, and Reverion
- **UVC Partners (Entrepreneurship Venture Capital)** invested in Tanso, Proxima Fusion, and Reverion
- **Atlantic Labs** invested in Zero44, Exazyme, and Vyoma

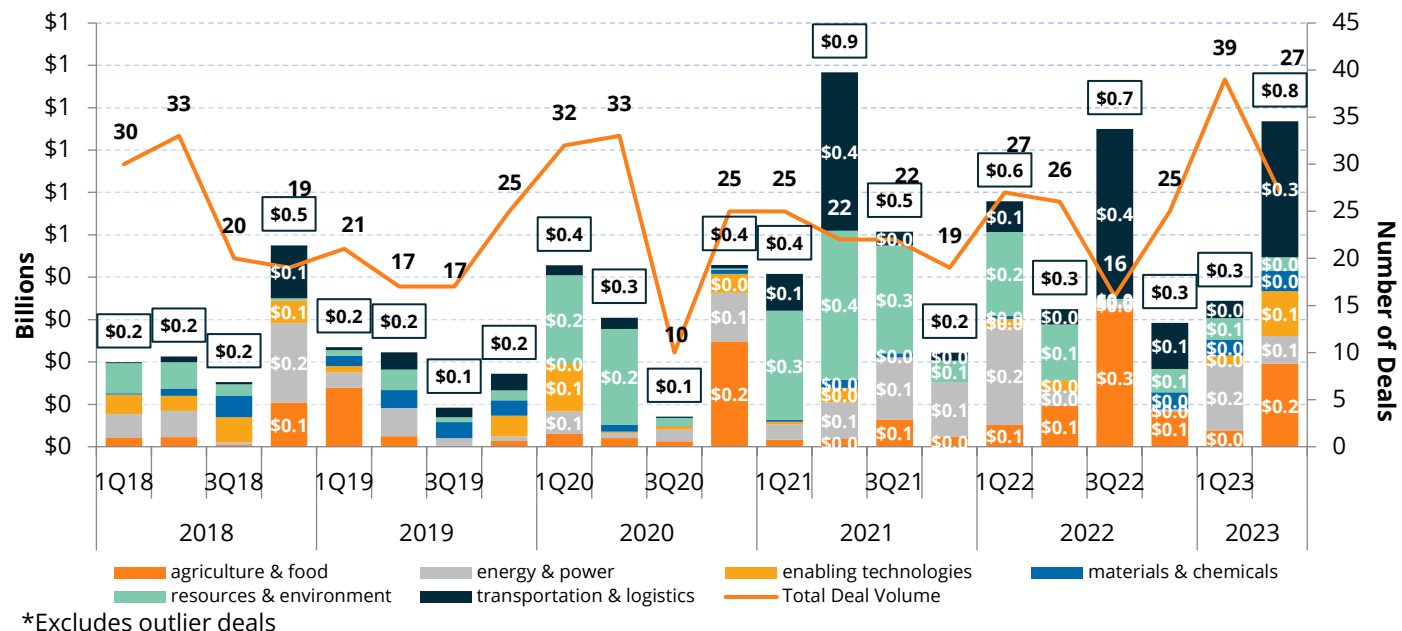
Top investments

- **1Komma5**, a software-enabled DER installation and deployment services company, has been launched into the unicorn space with its \$467 million Series B round led by G2VP, with participation from Porsche Ventures, Norrsken VC, Haniel, EURAZEO, eCAPITAL Entrepreneurial Partners, Blue Elephant Capital, and b2venture.
- **NexWafe**, supplying high quality wafers to solar cell producers, has secured \$32 million in Growth Equity funding from Reliance New Energy Limited, Athos Capital, Malcolm Turnbull and Aramco Ventures.
- **Fernride**, a platform for autonomous electric trucking, has announced \$31 million in Series A funding from 10x Founders, Promus Ventures, Fly Ventures, Speedinvest, Push Ventures, DB Schenker, and HHLA Next.

Acquisitions & IPOs

- **1Komma5**, providing software-enabled DER installation and deployment services, has acquired Viasol alongside its recent Series B round. The aim with this purchase is to secure a prominent market position in Denmark, and introduces its intelligent Energy IoT solution, Heartbeat.
- **Litchblick**, a green energy retailer, has acquired Installion for an undisclosed sum.

France



Top investors

- **France2030** invested in Carbios, SiPearl, and Look Up Space
- **Demeter IM** invested in Aptimiz, ICTYOS, and BeFC
- **EURAZEO** invested in Swapp, UrbanChain, and 1Komma5
- **BNP Paribas** invested in BeFC, Agriodor, and Expliseat
- **360 Capital Partners** invested in Energy Dome and NEWTWEN
- **ENGIE New Ventures** invested in TablePointer and TreaTech












Top investments

- **Ynsect**, offering bioconversion solutions using insects to produce feed, organic fertilizers and bioenergy, has secured \$175 million in Series D funding from undisclosed investors.
- **SiPearl**, an energy-efficient microprocessor for AI and quantum intelligence sectors, raised \$98.3 million in Series A funding from France 2030, European Investment Bank, and Atos. The round includes \$27.3 million in convertible debt.
- **Lynxter**, manufacturing modular industrial 3D printing machines compatible with elastomers, thermoplastics, composites and more, raised \$43 million in Series A funding from Etchart Group, National Angel Capital Organization (NACO), Pyrénées Gascogne Développement, and Herrikoa.


Acquisitions & IPOs

- **Engie**, distributor of traditional and renewable energy, acquired BTE Renewables including its South African portfolio, in a deal valued at \$1 billion.
- **Hiphen**, image analytics for crop monitoring, has acquired SlantRange for an undisclosed sum. The combined company will operate globally under the Hiphen brand.
- **Deepki**, using software and statistics for energy-efficiency in buildings, has acquired Nooco for an undisclosed amount.
- **Volta Enterprises**, a solar farm developer, has acquired Sunbooster.

Largest EU & Israel deals – Seed & Series A


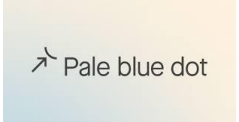


Company and Country	Description	Round Size	Investors
 SIPEARL France	Solving the carbon footprint of super-computing with an energy-efficient Microprocessor for AI and Quantum tech	\$ 98,330,000	France 2030, European Investment Bank, Atos
 Lynxter France	Modular industrial 3D printing machines that are compatible with elastomers, thermoplastics, composites and more	\$43,850,760	Etchart Group, National Angel Capital Organization (NACO), Pyrénées Gascogne Développement, Herrikoa
 WOOD France	Bionic wood technology for wood that overcomes all standard wood limits for its application in the building industry	\$31,000,000	One Creation, Lowercarbon Capital, Purple Ventures
 FERNRISE Germany	Autonomous electric trucking platform	\$31,000,000	10x Founders, Promus Ventures, Fly Ventures, Speedinvest, Push Ventures, DB Schenker, HHLA Next
 uncommon United Kingdom	Cell-based cultivated meat technology	\$30,000,000	Balderton Capital, Lowercarbon Capital, Redalpine, East Alpha, Sam Altman, Max Altman, Miray Zaki, Sebastiano Castiglioni
 AXELERA ARTIFICIAL INTELLIGENCE Netherlands	Software and hardware platform leveraging AI to minimize computing power consumption in edge applications	\$23,000,000	CDP Venture Capital, Verve Ventures, Fractionelera, Innovation Industries
 OXCCU United Kingdom	Offering sustainable fuels, chemicals and biodegradable plastic products generated from carbon captured from air	\$22,700,000	Clean Energy Ventures, Eni Next, United Airlines Ventures, Braavos Capital, Kiko Ventures, Trafigura, TechEnergy Ventures, Aramco Ventures, Doral Energy-Tech Ventures
 exazyme Germany	AI-based support services to accelerate protein engineering for green biotech (enzymes for CO2 absorption), industrial biotech and pharmaceutical industries	\$21,800,000	AIX Ventures, Atlantic Labs
 Citron. France	Software-as-a-Service for energy management systems for energy and technical building management	\$21,399,800	Eiffel Investment Group, Entrepreneur Invest, BPIFrance
 enter Germany	A digital home efficiency assessment software	\$21,300,000	Target Global, Coatue, Fundamental, Partech Ventures, A/O PropTech
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Largest EU & Israel deals – Series B & Growth Equity

Company and Country	Description	Round Size	Investors
 1KOMMA5° Germany	Software-enabled DER installation and deployment services	\$ 467,883,000	G2VP, Porsche Ventures, Norrsken VC, Haniel, EURAZEO, eCAPITAL Entrepreneurial Partners, Blue Elephant Capital, b2venture
 Ynsect France	Bioconversion solutions using insects to produce feed, organic fertilizers and bioenergy	\$175,000,000	Undisclosed investors.
 INFOGRID United Kingdom	Connect end-to-end sensor solutions to make buildings smarter	\$90,000,000	Northzone Ventures, The Venture Collective, SoftBank Vision Fund, Pictet Private Equity Investors, Original Capital, JLL Spark, Committed Capital
 TopHat United Kingdom	Designing technology-enabled prefabricated housing	\$87,330,803	Aviva Investors, Persimmon
 CORO Israel	An all-in-one security platform helping businesses be resilient against cyber threats, protecting against malware, ransomware, phishing, and bots across devices	\$75,000,000	Energy Impact Partners, Balderton Capital, Jerusalem Venture Partners (JVP)
 VIRTA Finland	Electric vehicle charging network	\$71,630,000	Jolt Capital, Future Energy Ventures
 PERCEPTO Israel	Autonomous drone technology for enterprise solutions	\$67,000,000	Koch Disruptive Technologies (KDT), Zimmer Partners, U.S. Venture Partners, Delek US Holdings, Atento Capital, Spider Capital, Arkin Holdings
 weev™ Ireland	EV chargepoint operator alongside end-to-end charging solutions	\$62,000,000	Octopus Ventures
 ecorobotix Switzerland	Designer, developer and vendor of autonomous agriculture robots for weeding fields	\$52,000,000	AQTON, Cibus Capital, Swisscanto Invest, Yara Growth Ventures, Flexstone Partners, Swisscom Ventures, BASF Venture Capital, Verve Ventures, 4FOX Ventures, Swiss Technology Fund
 AMbotics Switzerland	Manufacturer of four-legged industrial robots	\$50,000,000	Walden Catalyst, NGP Capital, Bessemer Venture Partners, Swisscom Ventures, Swisscanto, Aramco Ventures

Select 2Q23 EU fund news



Manager	Fund & Amount	Focus & Geography
	United Kingdom LeapFrog Climate Fund– Private Equity \$600 million (Raising)	The fund will focus on climate tech companies and those supporting lower income groups to adapt and mitigate climate related challenges.
	Sweden Pale Blue Dot Climate Tech Fund II – Venture Capital \$101 million (Interim Close)	The fund will focus on climate tech companies and those supporting lower income groups to adapt and mitigate climate related challenges. The regional focus is on Europe & Israel and North America
	Spain ENION I Energy Fund – Venture Capital \$26 million (Interim Close)	The fund will focus on projects related to sustainable mobility, circular economy, sustainable energy sources, green hydrogen, digitization of the energy system, energy storage and distributed and flexible energy generation.
	Switzerland SNGLR XTF Fund– Venture Capital (Interim Close)	The fund amount has not been disclosed. The focus is on early-stage startups within smart mobility and smart city focus areas which are enabled by technologies such as artificial intelligence, data analytics, Internet of Things, application programming interface, 5G, robotics. blockchain and other related sectors.

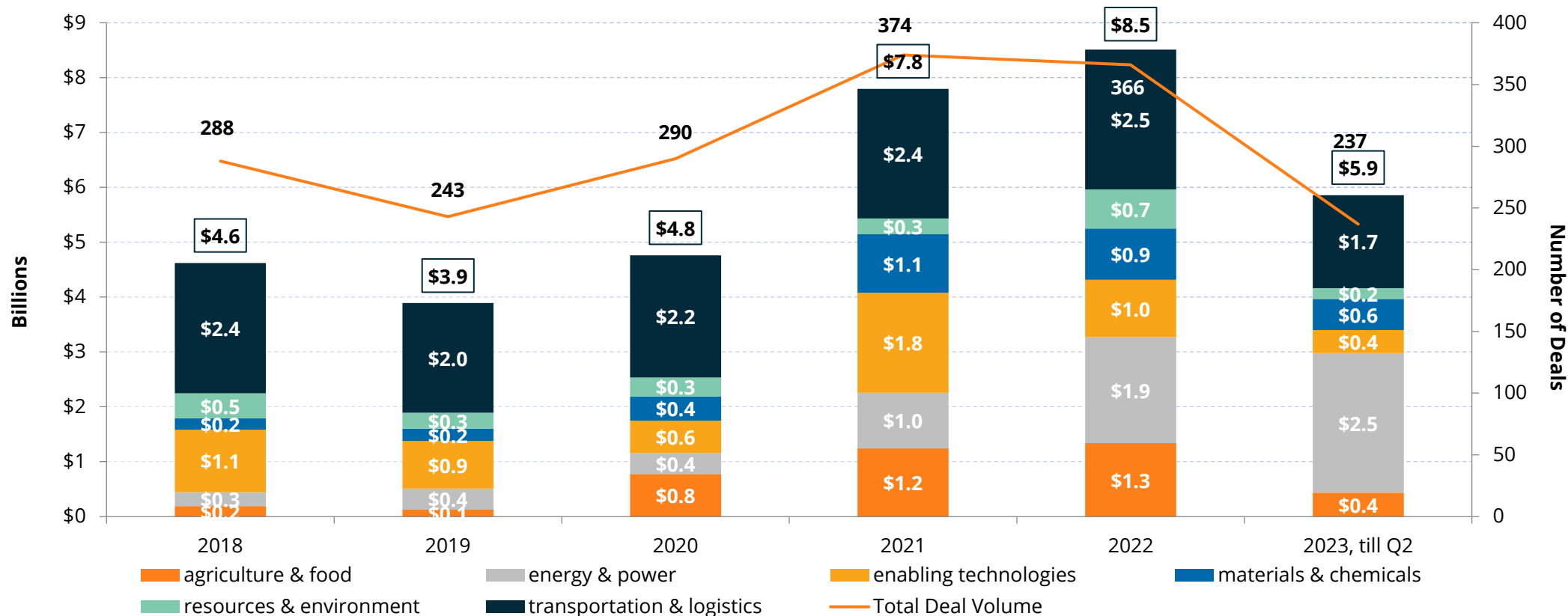
Section 4: Geographic Breakdown

Investment Summary & Activities

 Asia Pacific

Deal amount and volume: 2Q23 APAC

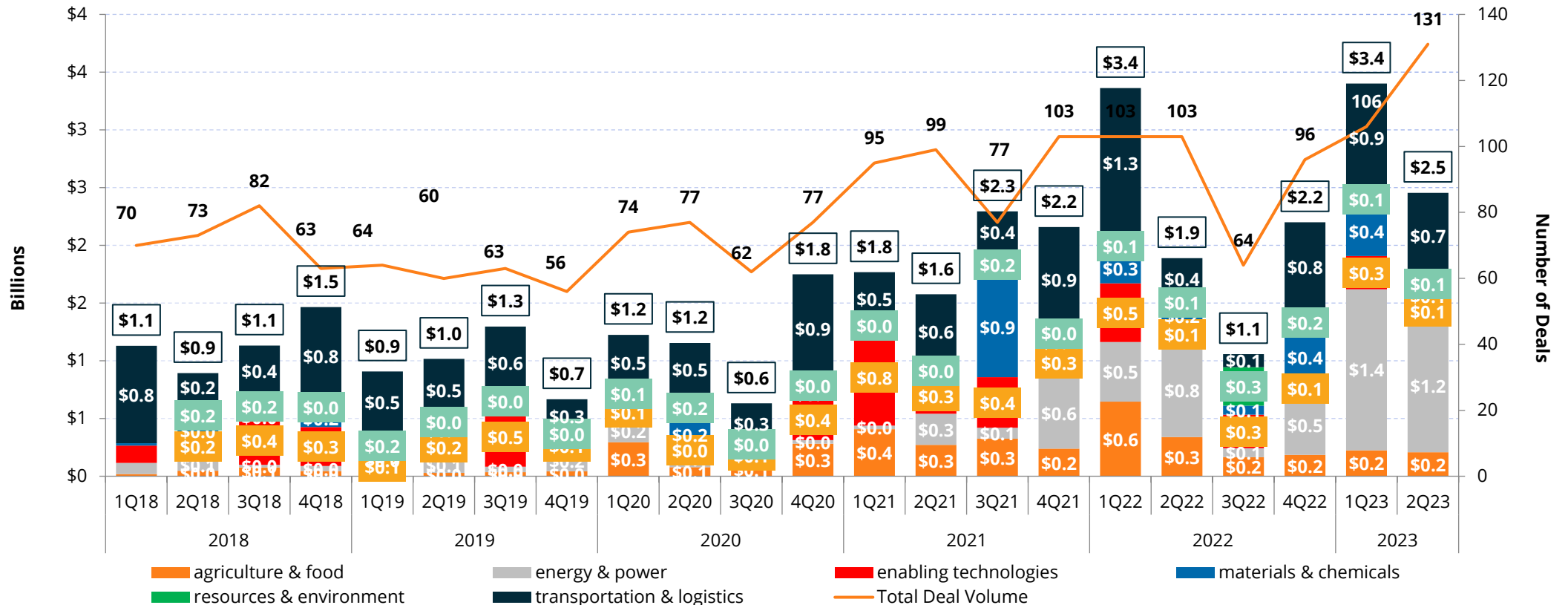
Micromobility, energy storage, vehicle components, solar and nuclear fusion have led Q2 with significant investments. Alternative proteins held the largest deal volume, with all 13 deals being early stage at seed and Series A.



*Excludes outlier deals above \$350M

Deal amount and volume: 2Q23 APAC

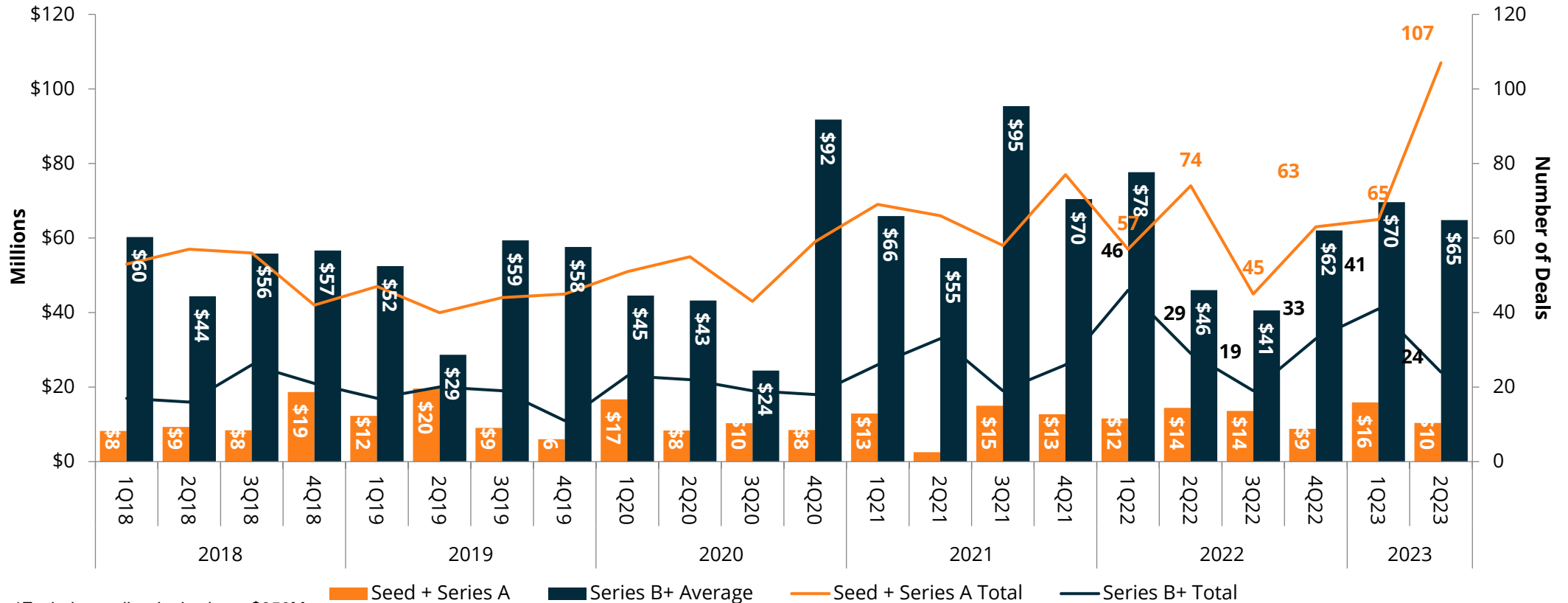
The substantial start to 2023 has been met in Q2 with an increase in deal volume, sitting at 131 deals dominated by Energy & power at 33 deals. Total deal amount experienced a decline compared to Q1, with Q2 closing at \$2.5 billion.



*Excludes outlier deals above \$350M

Cleantech deals by stage: 2Q23 APAC

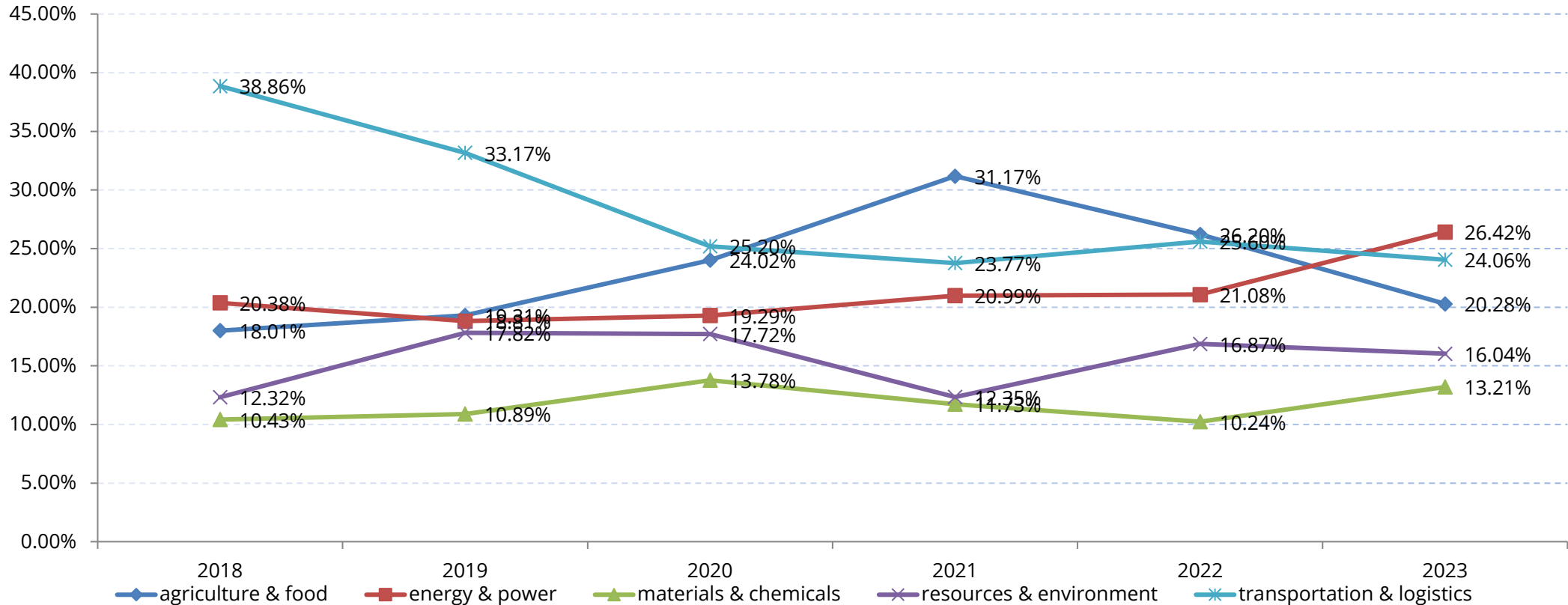
Early-stage deals have doubled in the APAC region, compared to the minor growth in early-stage deals at a global scale. However, deal volume for Series B+ has declined in step with global trends. Across all investment stages, deal amount is down this quarter compared to 1Q23.



*Excludes outlier deals above \$350M

Industry sector shares by deal volume: 2Q23 APAC

Following the figures observed in 1Q23, energy & power has maintained its sector share while materials & chemicals has dropped. Agriculture & food has kept on a downward trend each quarter since its peak in 2021. Resource & environment and transport & logistics took a dip in Q1 but are coming back up in Q2.



Excludes outlier deals above \$350M

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