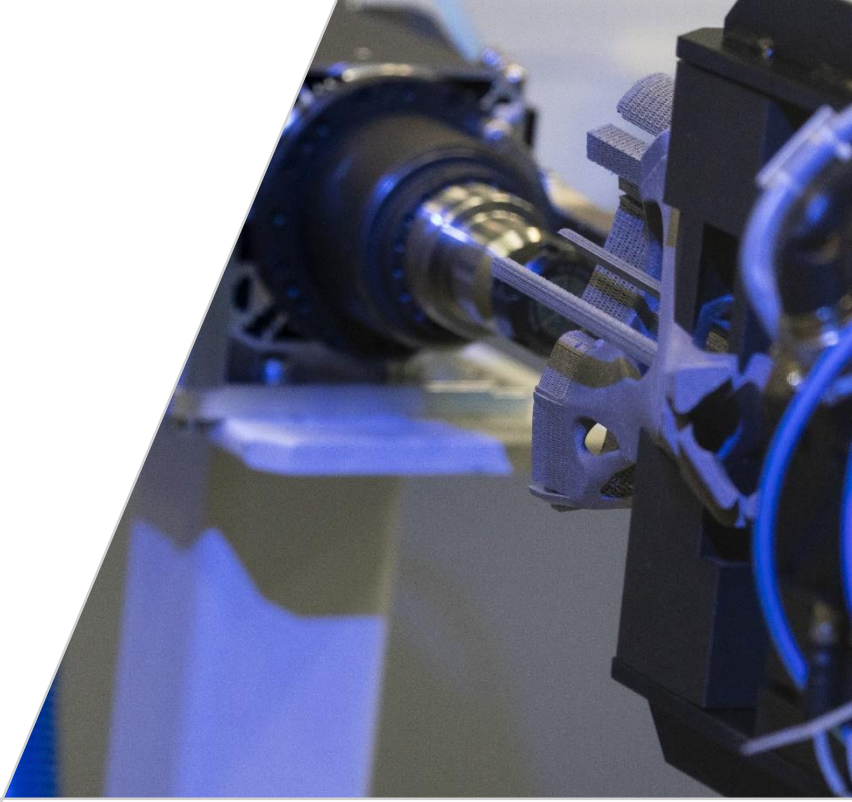


China Climate-Tech VCPE Trends: 2021

VCPE fundraising trends

Kathy Gao

February 10, 2022

BloombergNEF

Executive summary

Venture capital and private equity investors spent $15.8 billion on Chinese climate-tech startups in 2021, a twofold increase from 2020. Transport and battery companies attracted 80% of the money, and there was also strong momentum for sustainable materials and recycling startups. Climate-tech IPOs in China also grew by 50% in 2021, providing a major exit route for investors.

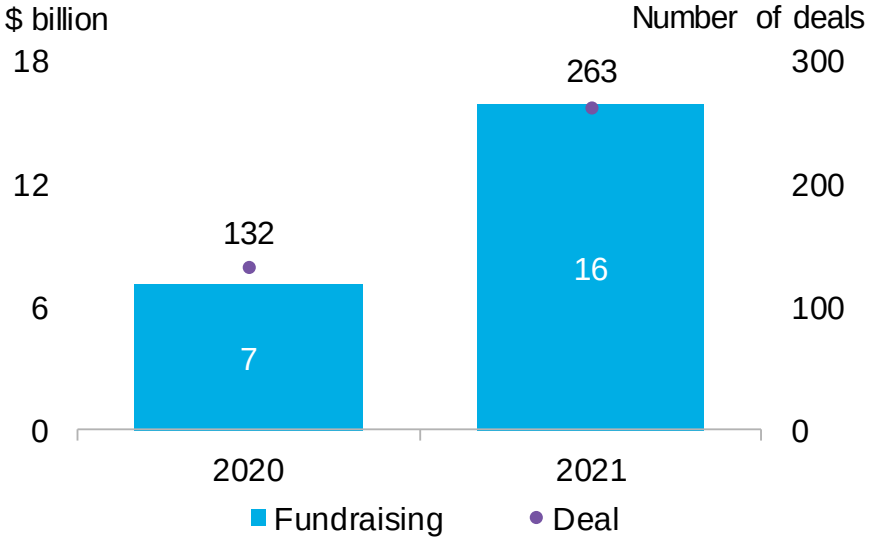
- VCPE investors in China tend to focus on larger deals (PE growth rather than seed and angel) than the rest of the global landscape. And there is a heavy tilt toward the transport and battery sectors, where some unicorns have now debuted in the public market. While agtech and food-tech now generates traction overseas, this has yet to materialize in China.
- It was not all about electric transport. Investors exiting now-public EV firms are looking for other early-stage transport opportunities. Companies in ride hailing, charging, fuel cells and low-carbon aviation raised almost $3 billion in 2021, a massive increase from 2020.
- Climate-tech companies decarbonizing industry and materials raised $814 million in 2021, a 60% increase from 2020. While the fundraising mostly went to circular economy companies, companies decarbonizing industrial processes or developing low-carbon materials raised $185 million in 2021 from VCPE investors. Most of these companies are mature, with a decade or more of operation.
- There was an uptick in the number of early-stage deals in 2021, partly driven by investor interest in less mature low-carbon technologies such as carbon capture, usage and storage (CCUS), fuel cells and perovskite solar cells. Some benefit from industry subsidies and the government's roadmap to decarbonize hard-to-abate sectors including petroleum and steel.
- In 2021, 409 investors made VCPE investments into climate-tech companies in China, a twofold increase from 2020. The most active VCPE investors are Hillhouse Capital, IDG Capital and battery manufacturer CATL. The presence of state-owned investors in less mature technology areas such as fuel cells and new materials has encouraged private capital to follow the suit.

50% Portion of funding for China's climate-tech startups in 2021 that went to the top five fundraisers

$12bn Raised by Chinese transport and battery companies from VCPE investors in 2021

409 Number of VCPE investors that participated in climate-tech deals in China in 2021

China's climate tech VCPE fundraising and deals, 2020-2021



Source: BloombergNEF. Pitchbook

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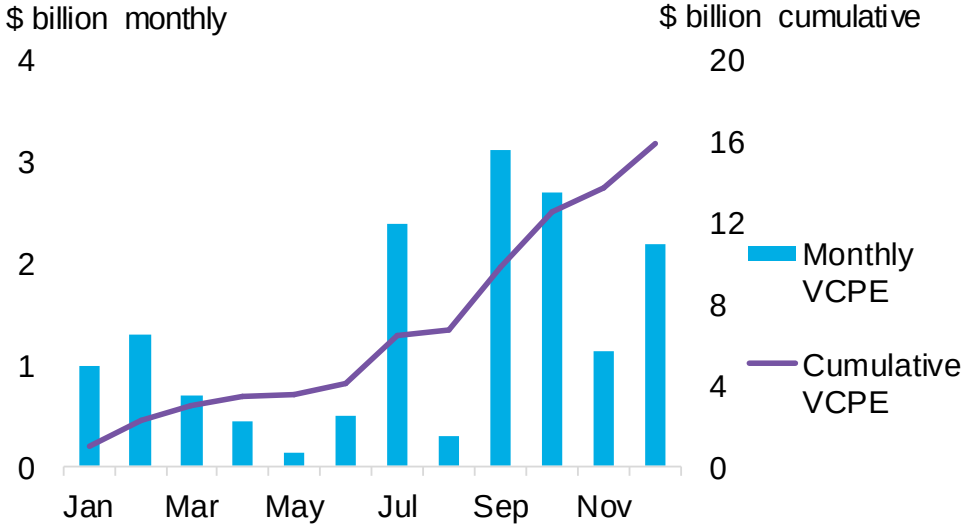
VCPE summary

Overview of startup fundraising in 2021 in China

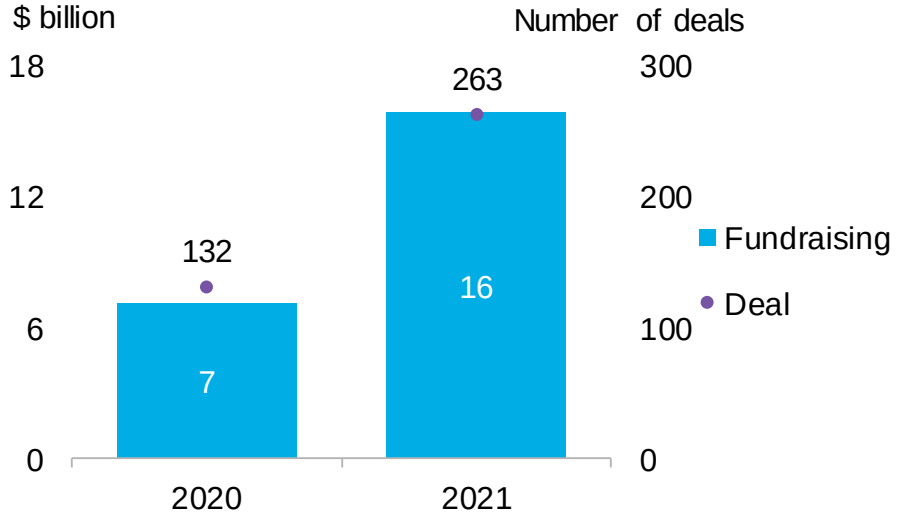
Climate-tech fundraising doubled in China in 2021

- Venture capitalists and private equity firms (VCPE) spent $15.8 billion on Chinese climate-tech startups in 2021, double the $7 billion spent in 2020. This is around 30% of the global climate tech VCPE spending, which was $53.7 billion in 2021. Here we use “startups” to refer to all private companies despite some being mature or large companies (see slide 6). After China pledged to achieve carbon neutrality at the end of 2020, there was an influx of capital to fund relevant technologies, and this investment has accelerated over the past year.
- China needs a variety of new technologies to achieve deep decarbonization. Decarbonizing the power sector requires low-carbon flexible and baseload resources, as well as smart-grid technologies to regulate power flows. In China, there is still debate about which technology options are best for decarbonizing the commercial transport sector and heavy industries. Hydrogen, alternative fuels, new materials, and carbon capture all provide potential routes to decarbonization. Decarbonizing the agriculture and food sector is still in its infancy in China.
- VC/PE investment is critical to fund new low-carbon technologies in China. While corporate capital and government subsidies have played a much bigger role in China than elsewhere, many innovations required for deep decarbonization, such as direct air capture and sustainable materials, are often too early stage or capital intensive for corporates to develop internally, but would be perfect for VC/PE investors to fund. VC/PE activity would also encourage healthy competition among technologies when the route to achieve net-zero is uncertain.

China’s climate-tech VCPE fundraising by month in 2021



China’s climate-tech VCPE fundraising and deals, 2020-2021

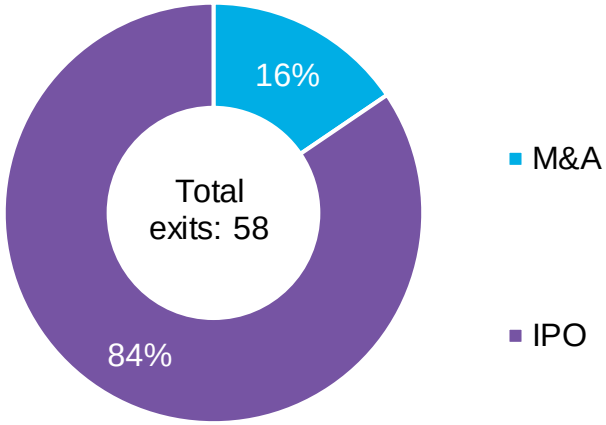


Source: BloombergNEF, Pitchbook

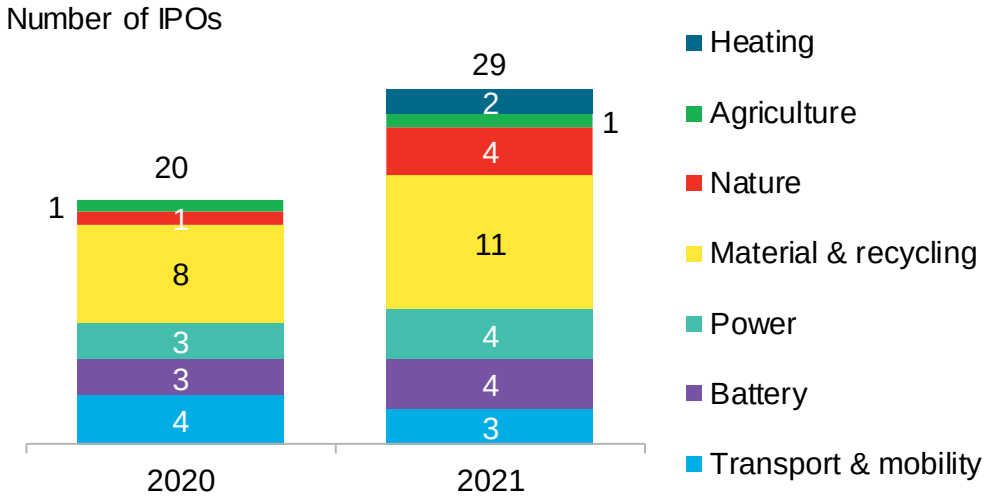
The IPO market offers a route to exit for new technologies

- The large inflow of capital in 2021 was partly driven by investor expectation of high returns upon exit. Over the past two years, IPOs have been the main exit route for climate-tech investors in China, accounting for 84% of exits. The number of IPOs increased by almost 50% in that time period, from 20 in 2020 to 29 in 2021. While the number of IPOs of transport, battery and power companies remained similar to the year before, there was an increase in 2021 of IPOs by companies doing waste recycling and treatment, as well as companies providing nature monitoring and restoration solutions. These companies benefited from favorable policies as well as government procurement to address waste and environmental issues. Two companies developing heating and cooling equipment also went public in 2021.
- While Chinese companies face increasing scrutiny from both the U.S. and China on listing overseas, a lot of solar and electric vehicle companies are pursuing a listing in the domestic capital market. BloombergNEF found that the price-to-earning ratios of solar companies listed in China are much higher than those listed in the U.S. on average, perhaps an incentive for Chinese companies to go public domestically for a higher valuation. The two biggest exchanges in China, the Shenzhen stock exchange and the Shanghai stock exchange, are competing to attract companies that align with China's carbon neutrality goal. Both exchanges have launched ETF and index products tracking companies in the climate or green-tech areas, and they are among the stock exchanges where issuers have the lowest carbon intensity , according to the UN Sustainable Stock Exchanges initiative.

China's climate-tech startup exits percentage by exit type 2020 - 2021



China's climate-tech startup IPOs by company sector, 2020-2021

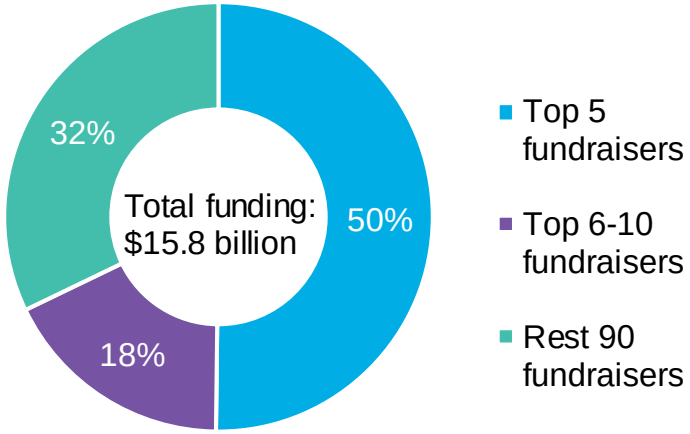


Source: BloombergNEF, Pitchbook

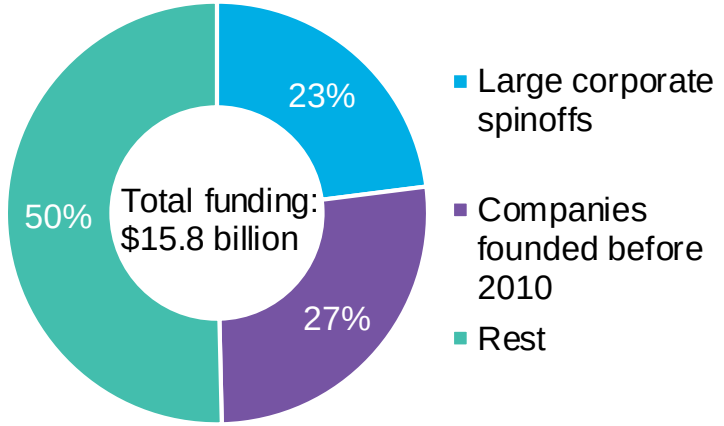
Most VCPE funding has gravitated toward large or mature climate-tech companies

- China's climate-tech investors have mostly gravitated toward the largest and most mature startups. The top five fundraisers, namely the battery companies SVOLT and CALB, the electric vehicle companies Leapmotor and Hozon, and the energy company Envision, bagged over half the year's total investment. Ride sharing and micro-mobility companies such as Didi Bike, Caocao Mobility and Hello Inc. are also among the top 10 fundraisers in 2021, which combined accounted for almost 70% of the year's fundraising.
- Companies backed by large corporates or those founded more than a decade ago were the most successful in raising money in 2021. Last year, seven companies spun off from industry incumbents accounted for 23% of total fundraising. This includes SVOLT and FTXT Energy Technology, both of which are backed by Great Wall Motor; Weineng Battery backed by EV maker NIO; and Beiqing Electricity backed by energy equipment maker SEC Machine. Another 27% of the money went to 17 companies that were founded, or have had operational history, for over a decade. They include some battery makers, waste treatment companies, as well as solar module makers that pivoted product lines and rebranded recently. Funding raised by the remaining 100 companies in 2021 comprised 48% of the total money.
- In China, technology innovation is mostly driven by large or mature companies with a lot of resources and industry networks. The dominance of state-owned companies across all sectors limits the ability of startups to scale. This might have shaped the preference of VCPE investors, which have allocated most of their money to mature startups with backing from large industrials. While this is not necessarily a bad thing given China's unique ecosystem, it may put the truly innovative lab-stage projects at a disadvantage in terms of fundraising.

China's climate-tech startup funding, split by scale of fundraising, 2021



China's climate-tech startup funding, split by fundraiser background, 2021

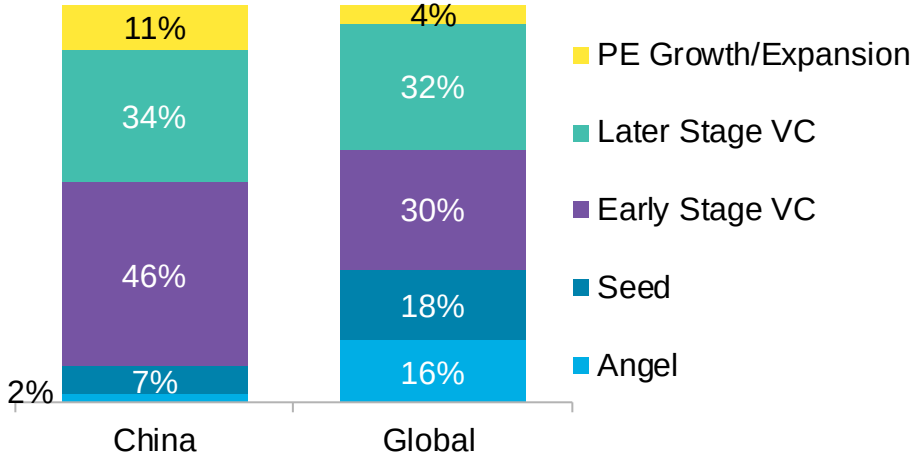


Source: BloombergNEF, Pitchbook

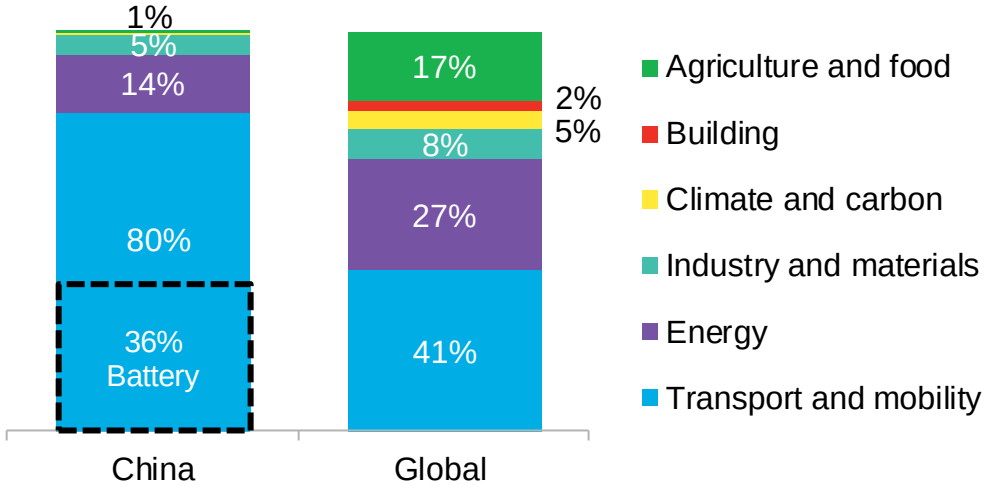
Chinese VCPE sector focus and deal types are somewhat unique

- Compared to the global landscape, China's climate-tech VCPE market has quite a different sector focus and variety of deal types. Overall, China has much fewer angel and seed stage deals, and more PE growth-stage deals. As there are very few climate-tech incubators or government programs in China, startups at the ideation or lab stages have limited funding available. This partly explains why a lot of deep-tech innovation in the climate area came from big corporation spinoffs or government-backed labs.
- Low-carbon transport startup deals accounted for 46% of 2021's deals and 80% of funding. Around half of this went to battery or battery material companies supplying components to electric vehicles. China's low-carbon energy startups raised much less VC/PE funding proportionally than their foreign peers, and the funding was mostly driven by a few large deals raised by equipment manufacturers and digital power companies. In China, there were only 46 deals in the energy sector in 2021, less than those in the industry/material sector.
- While sustainable agriculture and alternative protein are becoming a major theme for climate-tech investment globally, they have yet to take off in China. In 2021, there were seven deals in precision or sustainable agriculture and nine deals in alternative proteins, all of which are under $10 million. While agriculture tech might struggle to scale in China where farmlands are small and scattered, food tech has the potential to replicate the growth story of other consumer goods. In fact, the alternative protein company Starfield raised a $100 million round in early 2022, the largest deal in this area in China, from mainstream investors including Primavera and Lightspeed Capital.

Percentage of climate-tech startup deals by stage, China and global, 2021



Percentage of fundraising by climate-tech startups by sector, China and global, 2021

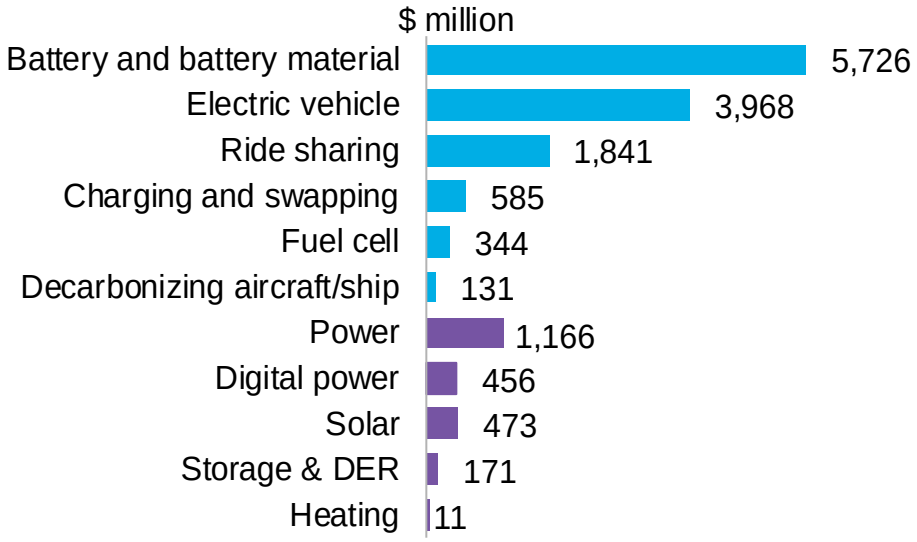


Source: BloombergNEF, Pitchbook. Note: Crowdfunding and grants are not included in the VCPE funding number.

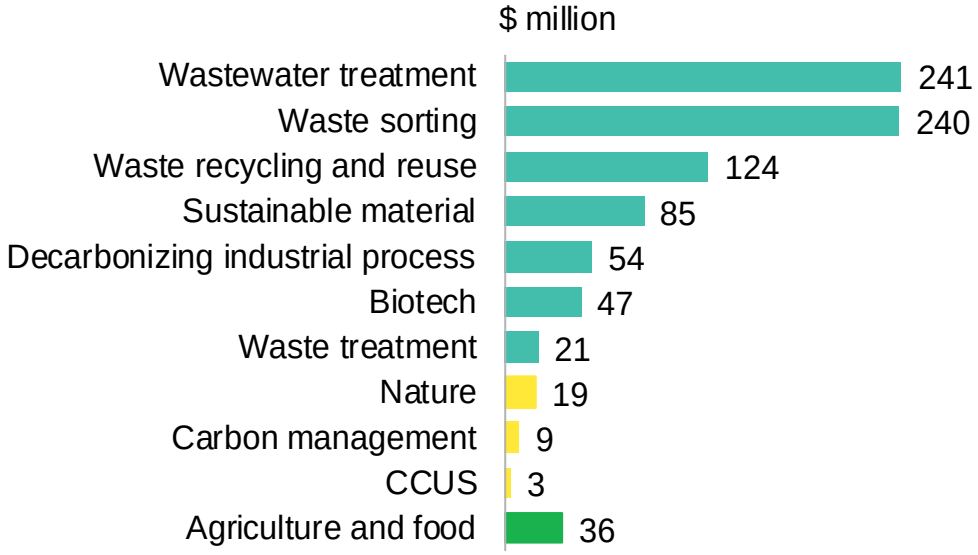
Breakdown of fundraising by company technology

- In 2021, battery and battery material companies topped VCPE fundraising in China. A few large deals drove up the fundraising, including the $3 billion raised by SVOLT and $1.8 billion by CALB. Battery material companies also raised money, partly driven by commodity price increases and the industry's urge to go upstream along the supply chain. Most of the fundraising was used for capacity expansion rather than R&D, as these companies try to compete with industry leader CATL, which has IPO'd and raised $7 billion through a private placement in 2021.
- Material and recycling companies raised $814 million in 2021, partly driven by the industry's IPO rush in China in 2021. Waste sorting company Aihuishou and bioplastic company Hisun Biomaterials both raised a big pre-IPO round before going public. Wastewater treatment company Shandong Econ Technology also raised a $233 million round before getting acquired by a state-owned company.
- Digital power companies raised $456 million in 2021, almost parallel to solar technology startups. Fundraising gravitated toward a few large companies in this area, with Newlink Group raising $400 million to scale its energy IoT platform across the power and O&G sector, and Clobotics raising $31 million for its drone-based wind inspection platform. While the fundraising of Envision Energy was categorized under the power group, a big part of Envision's wind business comes from digital technologies for turbine monitoring and wind farm planning.

Chinese startup fundraising by transport and energy technologies, 2021



Chinese startup fundraising by industry, carbon and other technologies, 2021



Source: BloombergNEF, Pitchbook

Transport and mobility | Energy | Industry and material | Climate and carbon | Agriculture and food

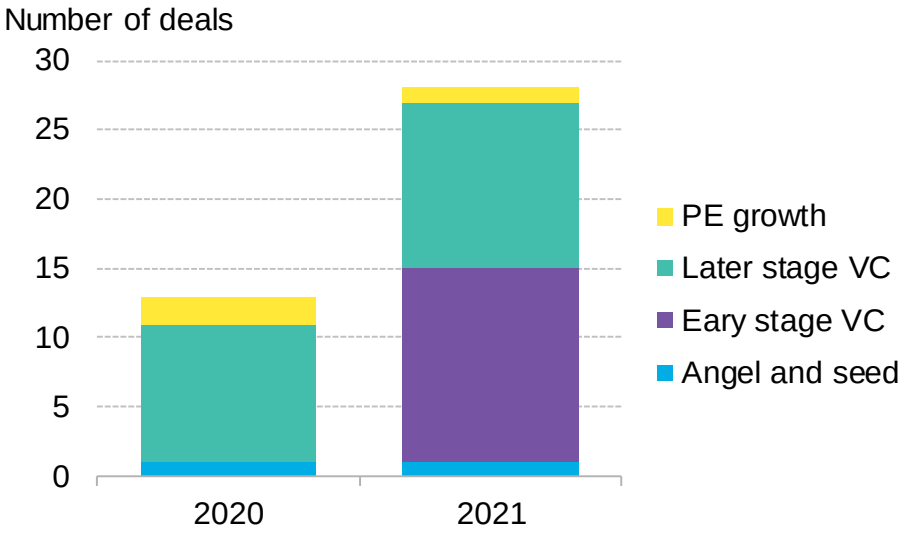
Investment signposts

Comparing 2021 to 2020

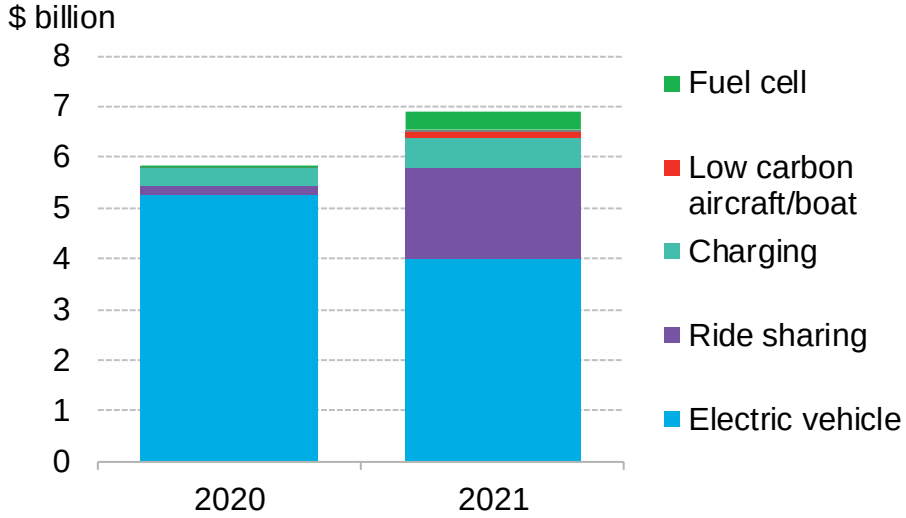
Investors in transport are looking for new technologies and early-stage deals

- The largest EV startups in China have already gone public or will be going public soon. In 2021, the first-tier EV makers (with annual sales of over 90,000 vehicles) such as Li Auto and Xiaopeng went public, while their strong contenders Leapmotor, Hozon and Weltmeister all raised multi-billion dollar pre-IPO rounds. With this, VCPE investors are now looking for other early-stage companies to invest in, still in the growing EV market in China. There were 15 early-stage EV deals in 2021 compared to almost none in 2020. Startups such as Avatar Technology, a company backed by a Chinese automaker and some supply-chain partners such as Huawei and CATL, are trying to leverage their supply chain or technology advantages to break into the EV market. Two companies developing electric motors, a key component for electric vehicle, as well as three companies making electric trucks and logistic vehicles for industrial applications, also raised early stage VC money in 2021.
- Away from electric vehicle manufacturers, funding to ride-sharing, charging and battery swapping companies increased significantly in 2021. While China's charging infrastructure market is dominated by three large players, a lot of opportunities exist for startups to aggregate charging poles in the fragmented or remote regions, or to specialize in the O&M of charging assets using digital technologies (CECE technology). China also has an eVTOL company, AutoFlight, that raised $100 million – the only Chinese company that has broken into the growing urban air mobility market. Fuel cell vehicles are another growing market in the transport sector and will be discussed in slide 12.

Number of deals in Chinese electric vehicle startups by stage, 2020-2021



Chinese transport startup fundraising by technology, 2020-2021

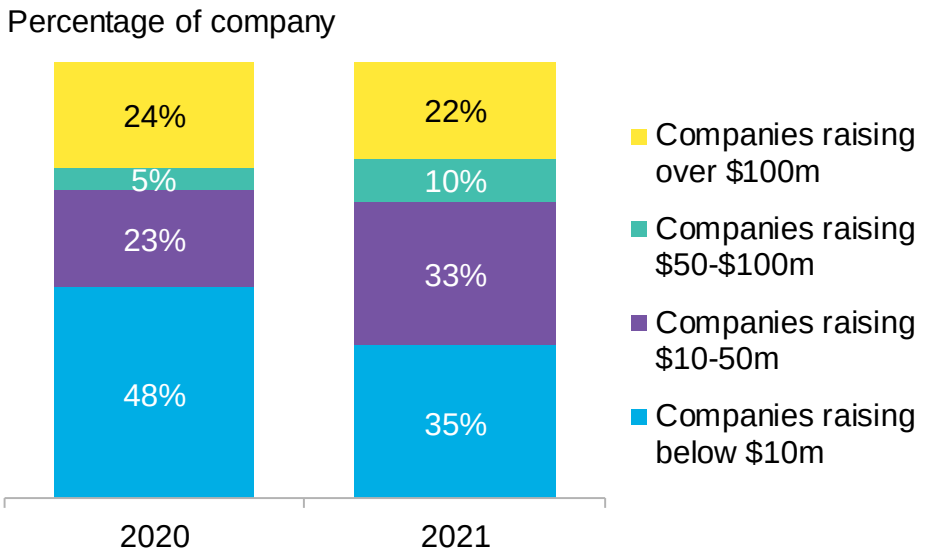


Source: BloombergNEF, Pitchbook

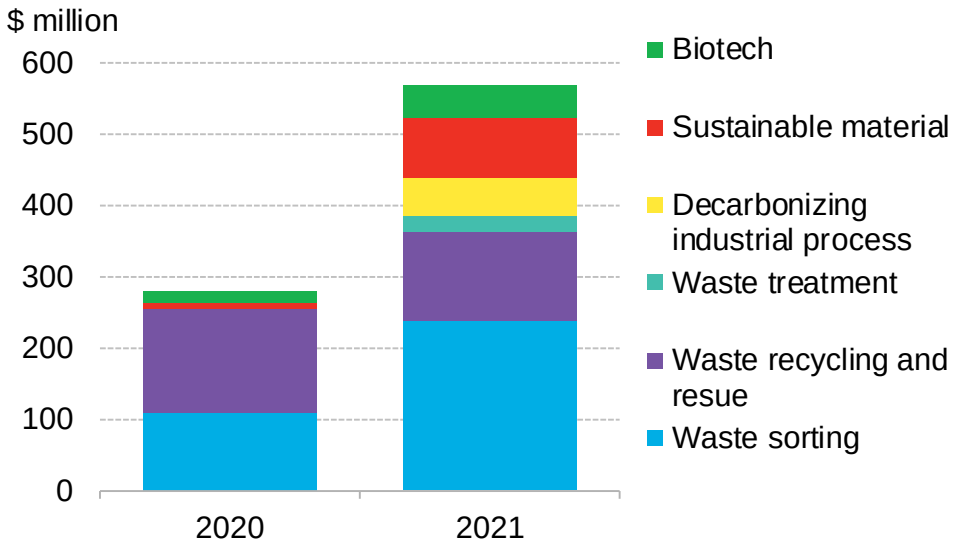
Material companies have become the growing ‘middle class’ of fundraisers

- In 2021, 45% of China’s climate-tech startups raised between $10 million and $100 million, a step-up from 2020 when only one-third achieved this. The growing check size from investors, especially those investing in early-stage companies, might indicate the growing valuations of climate-tech companies in China, as has happened to U.S climate-tech startups in recent years. Startups that did particularly well in 2021, compared to 2020, were sustainable materials and recycling firms.
- Among those that raised $10 million to $100 million, material and recycling companies are the second-largest group after the transport sector. In 2021, companies in this area raised $570 million, a twofold increase from 2020. While companies raising money in 2020 were predominantly waste sorting and recycling companies, the fundraisers in 2021 are much more diversified and tackle technologies that could potentially provide deep decarbonization solutions to the industry. For example, bioplastic producer Hisun Biomaterials and industrial waste heat recovery company Wote Energy Efficiency raised $71 million and $53 million respectively. Biotech companies are also getting traction in China. New synthetic biotechnologies could use enzymes to produce feedstock materials for food, pharmaceutical and other high-end uses, reducing emissions and waste from petrochemicals and other industrial processes. Biotech companies Readline and Lyxia both raised over $10 million in 2021.

Chinese climate-tech startups, split by amount raised, 2021



Fundraising amounts of Chinese material and recycling startups, 2020-2021

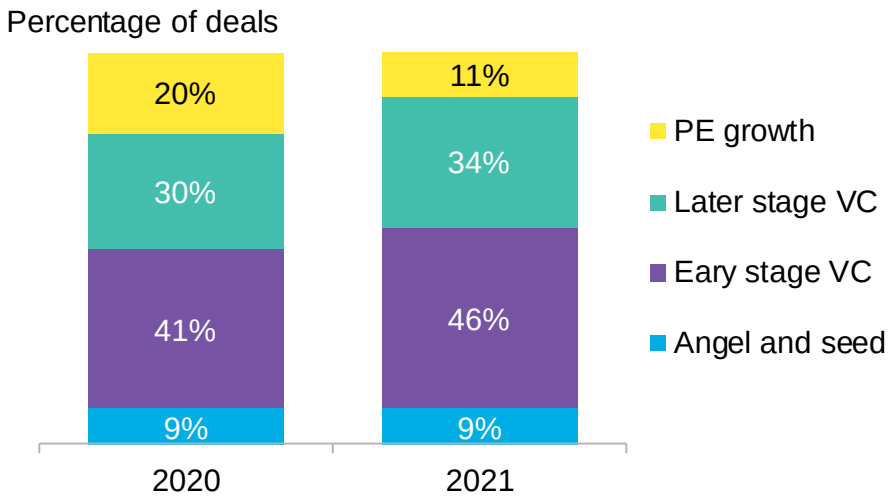


Source: BloombergNEF, Pitchbook

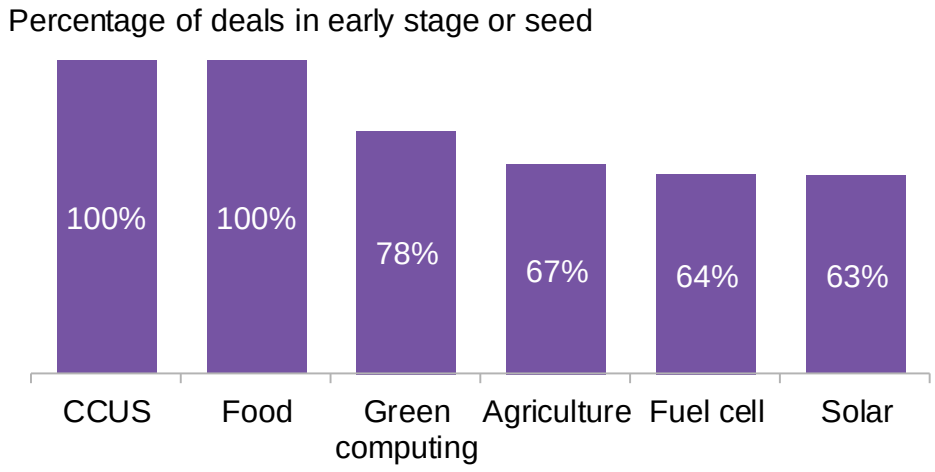
Emerging climate tech in China is driving up early-stage deals

- There was an uptick in the number of early-stage deals in 2021. While this was partly driven by investors looking for early-stage opportunities in mature technologies such as electric vehicles, another driver was the growing investor interest in less mature technologies. In 2021, three CCUS companies raised money. They include carbon-capture company Roxyl Carbon, and carbon-utilization companies Poly Material and CarbonEnergy Technology. These technologies are more nascent in China than elsewhere in the world. For instance, these companies each raised under $5 million, falling far short of global leaders such as Climeworks.
- Chinese hydrogen fuel-cell companies raised $344 million from VCPE in 2021, a more than 10-fold increase from the $24 million raised in 2020. 64% of the deals in this sector are seed or early stage. Fuel-cell companies benefited from a government policy in 2021 that subsidized a few pilots in China to develop hydrogen refueling infrastructure and fuel-cell vehicles. The policy could result in a fivefold growth in fuel-cell trucks and buses in China by 2025. Despite the favorable policies, fuel-cell vehicles face significant challenges in competing with electric vehicles in the passenger and short to medium commercial applications, posing difficulty for manufacturers to achieve economies of scale.
- Solar companies raised $473 million from VCPE investors in 2021. Most of the early-stage deals were raised by perovskite solar cell developers working to increase cell efficiency and reduce production costs. This technology may target niche markets such as flexible panels but will not compete with existing technologies within the next five years. However, the sheer size of China's solar and wind markets (it wants to have over 1,200GW of wind and solar capacity by 2030) means a decent potential for next-generation technologies.

Percentage of deals by deal stage, 2020-2021



Percentage of deals in early or seed stage by technology, 2021



Source: BloombergNEF, Pitchbook. Note: Green computing means energy efficient computing chips and equipment.

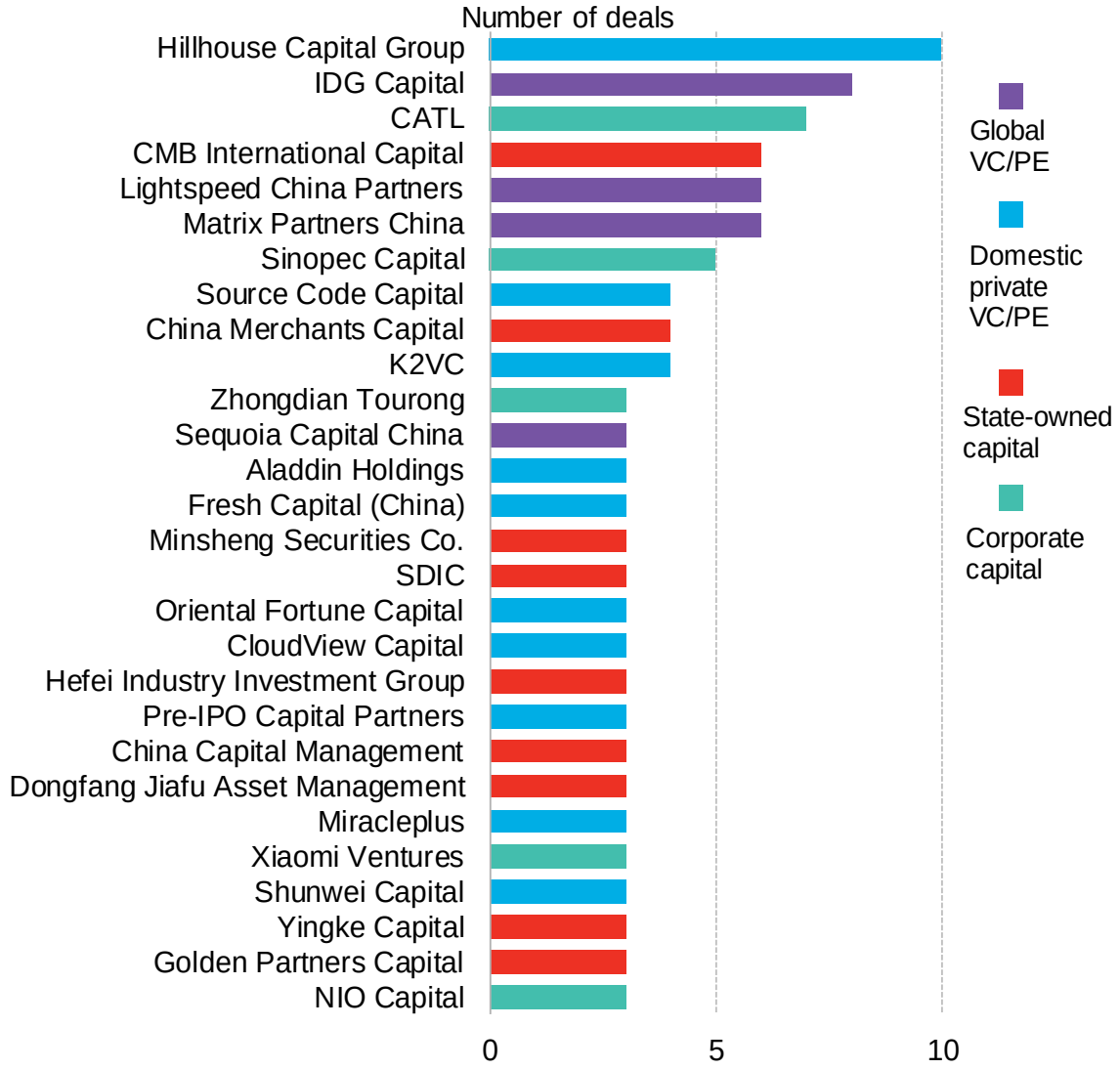
Climate-tech investors in China

Who is investing in climate tech?

Hillhouse, IDG and CATL among the most active investors in 2021

- The most active climate tech VCPE investors in China in 2021 were Hillhouse Capital, IDG Capital and the battery manufacturing giant CATL. Many investors invest in a few rounds of their portfolio companies within the same year to strengthen their positions.
- Foreign investors in China are few but have a proportionally high representation among the active climate-tech investor group. While foreign funds are aggressive in seeking climate-tech deals, they do not necessarily have an advantage over domestic or state-owned capital, given that Chinese startups may prefer investors able to bring a local network and projects.
- CATL, Sinopec and Xiaomi represent three different kinds of industry players investing in climate tech: CATL is investing to strengthen its upstream supply chain; Sinopec is making investments to diversify into new materials and biotech areas, while Xiaomi represents tech companies venturing into the transport sector.
- Some investors have bet on more mature technologies, such as battery storage, ride hailing and charging, while others focus their investments in emerging technologies such as fuel cells, new materials and recycling. For example, K2VC invested in a few fuel-cell companies, and Fresh Capital took on a few deals in the waste sorting and recycling areas.

VCPE investors with over three Chinese climate-tech deals in 2021



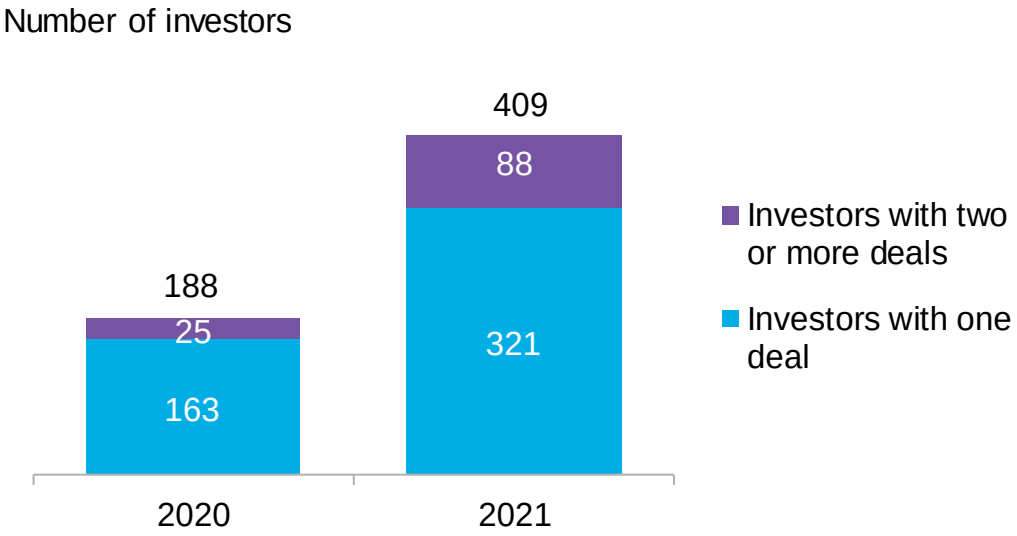
Source: BloombergNEF, Pitchbook

BloombergNEF

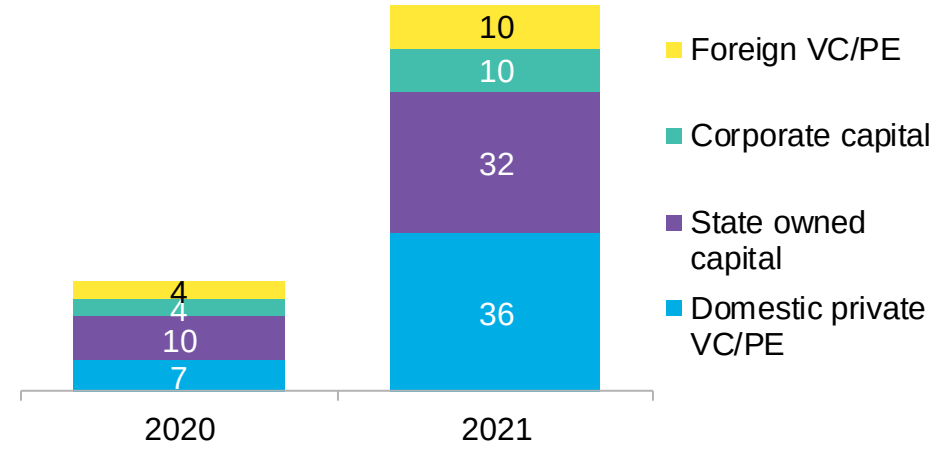
The inflow of state-owned capital has brought in more private investors

- In 2021, 409 investors made VCPE investments into climate-tech companies in China, a twofold increase from 2020. The number of active investors, those investing in two or more deals, rose more than threefold in 2021. 88 investors invested in over two deals in 2021, compared to only 25 in 2020. The majority of new investors in 2021 were either state-owned funds or local private investors, while the number of foreign investors and corporate investors saw only a moderate increase.
- The inflow of state-owned capital brought in more private investors to climate tech 2021. The presence of state-owned capital in the less-mature technology areas such as fuel cells, new materials and recycling is encouraging to private investors because state-owned capital could bring more government projects to these companies, and signals potential favorable policies.
- In China, some private investors have the backing of state-owned capital – for example the funds affiliated to public universities and academic institutes. Tsinghua University and Zhejiang University have a strong academic background in chemistry and mechanical engineering, and they have partnered with high-profile alumni or private companies to set up investment funds that invest in startups spun off from internal research teams. The Chinese Academy of Sciences, a state-owned lab, also set up a VC investment arm, CAS Star.

Number of investors in Chinese climate-tech startups, 2020-2021



Number of investors in Chinese climate-tech startups with two or more deals, 2020-2021



Source: BloombergNEF, Pitchbook. Note: state-owned capital means funds with controlling stakes from the central or local state-owned asset supervision and administration council (SASAC).

Relevant BNEF research

Climate-tech fundraising trends

- *Energy Transition Investment Trends 2022* (web | terminal)
- *Technology Radar January 2022: What We Learned in 2021* (web | terminal)

Transport and mobility

- *China's Lithium-Ion Battery Supply Chain Update 2021* (web | terminal)
- *Battery Swapping Part 2: Scaling Up the Infrastructure* (web | terminal)
- *The Next Ride-Hailing IPO Wave: Gojek, Grab, Dida and More* (web | terminal)
- *Hydrogen: Fuel Cell Vehicle Outlook* (web | terminal)
- *Low-Carbon Aviation Technology Startup Investment Trends* (web | terminal)

Power and building

- *Perovskite PV: Not a Game Changer for the Next Five Years* (web | terminal)
- *China's Energy Storage Market and Technology Outlook 2021* (web | terminal)
- *Smart Grid: From Buzz to Business* (web | terminal)
- *Commercial Building Decarbonization: Digital Innovations* (web | terminal)
- *Technology Radar April 2021: Smart City Trends in China* (web | terminal)

Recycling

- *Material Tech Highlight: Automating Waste Sorting* (web | terminal)
- *Lithium-Ion Battery Recycling Market Outlook* (web | terminal)
- *Chemical Recycling: Technologies, Costs and Capacity* (web | terminal)
- *Circular Economy Series: Steel* (web | terminal)

Sustainable material

- *Advancing Sustainable Materials: Climate-Tech White Paper* (web | terminal)
- *Bioplastics (Part 1): Market Overview* (web | terminal)
- Decarbonizing Petrochemicals: Technologies and Costs (web | terminal)
- *China's Steel Reforms to Enter New, Greener Era in 2022* (web | terminal)

Negative carbon tech and nature monitoring

- *Understanding Our Planet: Climate-Tech White Paper* (web | terminal)
- *Material Tech Highlight: Direct Air Capture* (web | terminal)
- *Material Tech Highlight: CO2 Utilization* (web | terminal)

Agriculture and food

- *Alternative Proteins: Fake It Till You Make It* (web | terminal)
- *Advancing Agriculture: Majors Bet On Digital Technology* (web | terminal)

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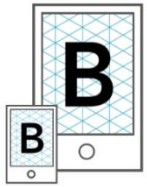

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