BNEF Pioneers 2020

Ten companies recognized for their leadership in transformative technologies

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Introduction



- Ten early-stage companies have been named as the 2020 BNEF Pioneers. The winners are pursuing some of the most exciting opportunities in areas as diverse as advanced materials, distributed energy, industrial digitalization, intelligent mobility, metals, satellites, and energy storage.
- Now in its eleventh year, the BNEF Pioneers competition has expanded its traditional focus from companies developing cutting-edge renewable energy products and services, to companies that are leading the transition to a low-carbon economy through a broader set of approaches.
- With assistance from BloombergNEF (BNEF) staff, an independent panel of industry experts selected ten winners from a pool of well over a hundred applicants from 24 countries. The panel evaluated candidates against three criteria: the potential to scale the opportunity; the level of innovation of the technology or business model and the novelty each company brings to the market; and momentum as demonstrated by strong commercial development.

Selection Process





Source: BloombergNEF

121 applications from 24 countries









Number of applications by sector

Source: BloombergNEF Note: Digital industries refers to the application of emerging technologies, such as AI, IoT to both energy and industry. Decentralized Energy refers to the integration of distributed energy resources like rooftop PV, batteries and EV charging into the energy system. Frontier Power includes microgrids and off-grid power and heating

BloombergNEF

BNEF

2020

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Source: BloombergNEF. Note: 'IPO – declining' is where the company has floated but the market capitalization has declined to much lower levels. 'Thriving', 'Progressing ' and 'Surviving' are based on BNEF's assessment of current status of remaining privately held, independent companies.

Source: BloombergNEF



ZERO MASS water **







AutoGrid



Greensmith

🔿 limejump





Examples of past winners



2020 BNEF pioneers winners





Industrial process to produce low cost steel without carbon emissions



Thermal energy management and storage using smart materials



A modular and flexible platform for configurable electric vehicles using intelligent wheels

Transportation software platform for cities to plan and envision future mobility systems

New generation of lithium ion batteries allowing electric vehicles to be charged in five minutes



Software-driven automation for manufacturing industries





Enterprise software platform for AI, predictive analytics and IOT applications





Satellites and sensors to monitor methane and other GHG emissions >> remix



Virtual power plant operator, asset aggregator and VPP software provider



Source: BloombergNEF

Selection Committee



Douglas Arent	Deputy Associate Lab Director Scientific Computing and Energy Analysis, NREL
Ignacio Gimenez	Managing Director, BP Ventures – Europe & Middle East
Peter Gutman	Investor/Adviser, Blue Bear Capital
Wendolyn Holland	Managing Director, Holland Consulting
Bruce Huber	CEO and Founder, Alexa Capital
Susan Kish	Vice President, Strategic Marketing & Communications, OGCI Climate Investments
Michael Liebreich	Founder & Senior Contributor, BloombergNEF
Hanne May	Head of Communications, Deutsche Energie-Agentur (German Energy Agency)
Andrée-Lise Méthot	Founder & Managing Partner, Cycle Capital
Nick Sangermano	Managing Director, Rubicon Infrastructure Advisors
Sarah Butler-Sloss	Founder and Chair of Trustees, Ashden
lan Tuft	Director – Group Operations and Construction, China Light & Power
Michael Wilshire	Head of Strategy, BloombergNEF

Criteria

Potential Scale

What is the scale of the opportunity being addressed? Is it a niche market of limited scale, will it transform a major industry, or could it change the world by impacting everyone? Is the business local or can it be rolled out across multiple geographic markets? Will it spawn an entire ecosystem of new supporting businesses? The transformation required in the world's energy and resource infrastructure is enormous, so thinking big beats small ambitions.

Innovation

How original is the technology or business model? Is it a modification of what others are doing, or is it something completely new? Is the technology patented or otherwise protected from being copied? Does the organization have a plan to stay ahead of the game? Pioneers do not have to be technology companies, but they do have to be doing something new and different.

Momentum

Does the candidate demonstrate strong traction? Is it still funded by R&D grants or making real commercial sales? Does it have strong industry partnerships in place? Has it established distribution channels to take their product or service to market? Is it achieving meaningful and consistently growing sales? We are not looking for great ideas that are simply impossible to implement or are ahead of their time. We are looking for companies that are currently addressing big opportunities, with innovative solutions and which have proven track records. The criteria to the left have been used to assess these companies.

With regards to the criteria, as in previous years our ballpark is that companies will "generally have annual sales of under \$50m". although we do allow for some flexibility to consider fast growing companies that might have recently exceeded that threshold. A small number of companies included in this year's cohort of finalists have revenues that are higher than this figure, but we have decided to advance them due to the high rate of revenue growth they have undergone in the past 3-4 years and the high quality of their applications.

10 Winning Pioneers

Company profiles



Boston Metal is developing an industrial-scale process to produce low-cost steel without carbon emissions. Its technology eliminates the need for coal in the steel production process, using just electricity.

Company	Boston Metal	Established	2012	
Headquarters	USA	Staff	45	

Momentum

Boston Metal plans to commission the world's first emission-free steel plant in 2025. The company has signed two deals to build ferroalloy plants and has entered key industry partnerships.

Route to market

Boston Metal will employ direct plant sales for its first market, ferroalloy producers, before eventually transitioning to a licensing model to enter the steel market.

Industry partnerships

Boston Metal's partnerships and agreements include technology development and marketing deals, which focus on market entry and technology validation.

Top customers or clients

The company signed two deals with ferroalloy producers in 2019. One is for toll production (where the processor's output is processed or finished by a 3rd party), and the other is a customer-funded development program. Boston Metal anticipates that the first customer installation will be commissioned in 2020.

Source: BloombergNEF, Boston Metal. Note: Blast furnace represents a basic oxygen furnace.

\$30m

Fundraising to date Investors **Breakthrough Energy Ventures OGCI** Climate Investments **Prelude Ventures** The Engine Partners CBMM **Primetals RHI** Magnesita

Innovation

Traditionally, coal/carbon is used in smelters, both as a fuel and as a chemical reduction agent to strip oxygen atoms from iron ore. Boston Metal has developed the Molten Oxide Electrolysis (MOE) process as a completely new way to produce low-carbon steel. MOE uses electricity to separate the constituents of iron ore into oxygen and liquid metal in the presence of an inert anode. This enables low-cost production of modular, emissions-free, high-volume steel and ferroalloys. The process provides an alternative to direct reduction processes and hydrogen-based options.





Boston Metal's molten oxide electrolysis process



Potential Scale

The steel industry is estimated to be worth around \$900 billion, with annual production of 1,800 million metric tons in 2018. About 70% of this production is primary production from iron ore, relying on coal for both fuel and as a feedstock to remove oxygen from the iron ore.

Steel is a capital-intensive, low-margin industry with established players, so partnerships are important. MOE is a potential route to lower-cost, lowercarbon production. Its modular approach allows for flexible implementation and applications across a wider set of ferroalloys.

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Bright Machines

Company Summary

Bright Machines builds software defined modular robots ('microfactories') that automate labor-intensive manufacturing processes. They provide complete automation solutions for a variety of common assembly and inspection tasks used in the manufacturing of products.

Company	Bright Machines	Established	2018
Headquarters	U.S.	Staff	465

Momentum

Bright Machines has raised \$200m to date, and has more than 100 deployments producing more than 30 different products around the world.

Route to market: Bright Machines provides robotics equipment and integrates its own software. It markets these machines to both original equipment and contract manufacturers. The microfactories include software, robotic cells and other hardware, and installation services. It competes as an automation solution provider rather than a robotics manufacturer.

Top customers or clients: Bright Machines has not disclosed the names of any its customers except for Flex Ltd., one the world's largest electronics manufacturing service companies and Diagnostics for the Real World (DRW), a manufacturer of point of care test kits. Other customers come from sectors including automotive, consumer products, batteries, hand tools and audio equipment.

Innovation

Bright Machines uses machine learning, computer vision and intelligent software to deliver software-defined manufacturing. Bright Machines states that its microfactories are comparable in cost to manual labor, while also being more flexible and more easily repurposed, helping customers move towards improved resiliency through reshoring.

Bright Machines relies on software abstraction (a higher-level approach to programming) for application portability and equipment virtualization, which offers customers plug-and-play automation programs and analytics tools. For example, rather than write a program from scratch, customers can develop an application using a library of pre-programmed functions. Customers can simulate virtual models of the equipment before full implementation



300 Bright Machines employees work in R&D, representing 65% of its staff. They include data scientists, software engineers and hardware or mechanical engineers.

Potential Scale

The electronics manufacturing sector is large with intricate work that is often difficult to automate. Bright Machines focuses on this sector. Assuming 3.5 million assembly line workers globally with an average annual wage of \$4,800 at a labor to cost ratio of 50% suggests a maximum addressable market size of some \$34 billion, comparable with the total revenue of todays existing robotics industry estimated at some \$40 billion globally in 2019. Bright Machines describes itself as a new growth opportunity for robotics manufacturers rather than a direct competitor. Challenges include the slow pace of change in some manufacturing sectors and potential concerns over the impact of automation on jobs.



C3.ai

Company Summary

C3.ai is a leading enterprise AI software provider for accelerating digital transformation that provides a Platform as a Service (PaaS) and pre-built applications for developing, deploying, and operating enterprise-scale AI, predictive analytics, and IoT applications.

Company	C3.ai	Est.	2009
HQ	U.S.	Staff	450+

Momentum

C3.ai has achieved strong revenue growth. The company has attracted a number of leading industry partners, investors, and clients.

Partners	
Microsoft (Azure)	
Amazon (AWS)	
IBM	

Route to market

C3.ai's points of differentiation include rapid Enterprise AI development and deployment timelines, and a wide selection of in-production models. Baker Hughes, Microsoft, AWS, IBM and others are C3.ai industry partners. C3.ai is also working with multiple system integrators.

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C3.ai's partnerships include a	Sutter Hill	
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strategic partnership with Microsoft, a strategic system integration partnership with IBM, and a distribution partnership with Baker Hughes in Oil & Gas.

Top Customers

C3 ai's customer list includes market leading companies seeking to implement top-down digital strategies.

\$387m

Fundraising to date

Investors

Ventures

Clients

Defense

Shell

3M

Enel

TPG Growth

Breyer Capital

The Rise Fund

Department of

Koch Industries

Innovation

C3.ai provides a Platform as a Service (PaaS), pre-built software applications, development tools, a model-driven architecture, and a low-code or no-code environment. C3.ai's software is designed to be interoperable, easier to use, and faster to scale.

The C3.ai platform offers a model-driven architecture designed to accelerate integration and development of AI-based applications and to speed time to value. By abstracting the end-to-end process, it ingests and manages any kind of data, from structured data and streaming sensor data to images, text, and other unstructured data, making it easier and faster to prepare the necessary infrastructure so that data scientists and analysts can spend more of their time creating, training, and validating machine learning models to achieve the best insights and predictions.

C3.ai can deploy on all major cloud platforms, on premises, and in mixed environments.

Potential Scale

The business analytics and AI market is growing rapidly. Although the energy industry is just a segment of this, BNEF expects every industrial player to have to digitalize within 10 years. C3.ai is focusing on this opportunity. The company covers multiple industries around the world, including financial services, utilities, Oil & Gas, manufacturing, aerospace, defense, and pharma and has industry partnerships with leading companies.

Energy and manufacturing industries have been slow to digitalize and wary of big data, cloud computing, and AI. C3.ai's low-code and no-code applications address major concerns with training and upskilling. C3.ai's R&D investments signal the company's commitment to innovation as it scales.



Company Summary

GHGSat operates a fleet of nanosatellites in low-earth orbit to monitor greenhouse gas emissions (GHG). Its high sensitivity sensors are able to detect emissions from facilities around the world. It has one satellite in orbit now, providing data as a commercial service, with future launch plans.

Company	GHGSat Inc	Established	2011
Headquarters	Canada	Staff	44

Momentum

After an initial satellite launch in 2016, GHGSat plans to launch two more satellites and an aircraft sensor in 2020, with ten more satellites planned for 2022. The company currently targets the oil and gas sector and has Shell and Canada's Oil Sands Innovation Alliance amongst its clients.

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Fundraising to date

Investors
Schlumberger Technology Investments
Oil & Gas Climate Initiative
Space Angels

Route to market

GHGSat sells directly to clients, counting on regulatory and ESG pressures to bring more interested parties to the table. It is exploring other distribution channels and plans to expand beyond oil and gas to other industries and the public sector.

Subscribers pay for direct measurements of their facilities and premium subscriptions are offered with additional analyses such as predicting the risk of new emissions.

Innovation

GHGSat emphasizes as a particular strength its ability to monitor emissions at the facility level. It invented and patented a new way to use the Fabry-Perot interferometer (which measures different wavelengths of light) to measure from space trace gases on the ground, such as escaping methane emissions. Sensors on its satellites can detect CO2 and methane at high resolution (1pixel resolution = 25m), which is claimed to be 100 times better than other satellites.

Each satellite is roughly the size of a microwave oven, and can orbit the Earth about 15 times a day. Manufacturing of its proprietary sensors and satellite hardware is outsourced while all software is developed in-house. IP development has been split roughly evenly between satellite hardware and analytics software.

Potential Scale

GHGSat interferometer sensor

Increased pressures to reduce methane emissions as a key element of GHG may support demand for monitoring, whether that comes from shareholders, specific regulations or policy frameworks such as the Paris Agreement. Companies in the oil & gas sector looking to reduce their emissions or with specific emissions reduction targets may use GHGSat's monitoring technology.

Other larger satellite operators or new entrants could enter the market, but there are few competitors and offering highresolution emissions data is a specialized area. Satellites in orbit cannot be retrofitted with new sensors, so GHGSat has a timing advantage.





Company Summary

Next Kraftwerke operates a Virtual Power Plant (VPP) which aggregates on its own account some 7,700MW of grid-connected assets that can deliver power, as well as managing larger commercial and industrial resources and loads. It dispatches the connected capacity into wholesale power markets in Europe, operating in Germany, Austria, Belgium, France, Italy, the Netherlands, Poland, and Switzerland. It also offers virtual power plant (VPP) software-as-a-service (called NEMOCS) to utilities, grid operators and other aggregators.

Company	Next Kraftwerke GmbH	Est.	2009
Headquarters	Germany	Staff	170

Momentum

Next Kraftwerke has grown the capacity connected to its VPP by 47% each year on average since 2013.

Route to market: Next Kraftwerke is a VPP aggregator in Europe, aggregating resources from thousands of clients, mostly small 'independent' renewable energy operators. It uses a profit-sharing model, but for its software-as-a-service (SaaS) also charges based on the number of connected assets. Its SaaS clients include utilities, grid operators and other aggregators.

Key industry partnerships: Next Kraftwerke is partnering with Toshiba and is working with the Port of Hamburg. It is also working with Jedlix to integrate EV charging into its VPP.

Innovation

Next Kraftwerke's underlying technology is software that optimizes and aggregates many power assets that are smaller in scale than traditional power plants and which bids them into wholesale and balancing service markets. It allows for monitoring and controlling a large amount of distributed assets.

The key innovation is Next Kraftwerke's ability to manage small and large-scale distributed renewable energy resources as well as large commercial and industrial resources. The average asset size is around 850kW – its 7,700MW VPP portfolio consists of more than 9,000 assets. It is also integrating electric vehicle charging into its VPP, in partnership with another software company for the optimization and control of the charging itself.

Potential Scale

Next Kraftwerke plans to build its business by expanding geographically and offering its VPP software as a service to other companies to operate their own VPPs. The need for flexibility is growing in most regions in the world, driven by growth in renewables, the associated volatility, and decentralization of power grids. The total market potential remains uncertain but Next Kraftwerke cites ancillary service market estimates of between \$5bn and \$15bn.

Customers	Service	Partners	Nature of relationship	
Wattner	Since 2012 – grown 10-20MW of PV a year.	Toshiba ESS	MoU to cooperate on a VPP	
Tohoku	Demonstration with one of Japan's largest utilities	Port of Hamburg	100 automated guided vehicles for grid balancing	
Ecotricity	Wind monitoring and curtailment	Jedlix	Integration of EV charging into	
Renesola	Forecasting and trading of generation from 12.8MW grid-		Next Kraftwerke's VPP. Jedlix software controls the charging	
Nourvon	Demand-side management using	Greenpeace	Integration of power-to-gas	
	industrial loads for grid balancing	Energy	electrolyzer into VPP	



Company Summary

Phase Change Solutions (PCS) is a smart materials science company that designs and produces a bio-based family of materials for thermal energy storage and temperature control. The materials can be tuned to change from a solid to a gel or to another solid form at specific temperatures, between -50 and 175°C. The company serves the pharmaceutical, food, refrigeration, telecom and buildings industries globally.

Company	Phase Change Solutions	Established	2011		
Headquarters	U.S.	Staff	66		

Momentum

After an early partnership with a leading restaurant chain, the company's sales accelerated in 2015, when it brought on a Tier I telecom company, a major food services distributor, and a large life science logistics company as customers. PCS expects major account sales to increase further in 2020.

Route to market

The company sells its thermal energy control products primarily through strategic channel partners. The materials can be sold as blocks, panels, or sheets, or integrated into an existing product. PCS is also open to technology licensing opportunities. As an example, one of the company's strategic partnerships is with a large life science logistics leader, with access to several large global pharmaceutical companies, and major healthcare distribution and logistics partners.

Top customers

PCS' top customers are in the telecom, pharmaceutical and life science cold chain and food service industries. PCS customers include leading Quick Serve Restaurant chains – deploying PCS solutions both domestically and globally.

Innovation

PCS has developed a family of proprietary phase change materials (BioPCM) from non-edible plant sources that do not compete with the food chain. BioPCM can regulate temperatures and act as smart thermal mass by storing and releasing large amounts of latent heat. It claims better thermal performance than current phase change materials with the most extensive available temperature range and options of any currently offered commercial bio-based phase change materials, although some synthetic materials might have different temperature ranges.

PCS highlights BioPCM's safe use and handling due to the solid-to-gel or solid-tosolid form factors with a lower carbon footprint than other commercial materials. PCS states that BioPCM is more cost-effective than existing pharmaceutical cold storage options, and is more effective than conventional insulation at a given temperature, offering the same insulative value in a much thinner sheet.

A key element of PCS' differentiation is environmental; most thermal energy storage materials are not made from renewable materials and have significant carbon footprints. BioPCM is certified with 100% bio-based content and listed among the USDA BioPreferred products, demonstrating PCS' commitment to sustainability, environmental impact, and waste reduction in some of the world's largest industries. It is designed to be thermally cycled for more than thirty thousand times without loss of thermal performance, and repurposed at the end of its life.

Potential Scale

By operating in several markets at the same time, PCS has access to a large addressable market. The current global market demand for phase change materials is estimated to be in excess of \$1.8 Billion. For example, PCS has installed its BioPCM® in about 1,500 bank branches. There are 90,000 bank branches in the U.S., suggesting a potential addressable market of some \$800 million for that sector. It also has installed systems at approximately 10,000 out of 121,000 U.S. telecom shelters. Annual U.S. purchases of phase change materials in the pharmaceutical industry are about \$500 million. PCS plans to grow globally, specifically in the EU and Asia Pacific. Pharmaceuticals are an important sector; with 27 out of the top 50 selling drugs requiring cold transport.

PLASTIC[®] ENERGY

Company Summary

Plastic Energy uses pyrolysis to chemically recycle contaminated and lowgrade mixed plastic waste that is currently sent to landfill or incinerated. The output is hydrocarbon oils, similar to naphtha, which is used in existing steam crackers to make virgin-grade recycled plastics.

Company	Plastic Energy	Established	2015
Headquarters	United Kingdom	Staff	120

Momentum

Plastic Energy is one of the leading providers and operators of pyrolysis technology for recycling applications. Since 2018, it has enjoyed a growing number of petrochemical companies as clients. By 2025 Plastic Energy plans to have built the capacity to process at least 300,000 tonnes per year of plastic waste (or at least 10 plants).

Route to market

Top customers

Business Model

The company directly petrochemicals companies that are trying to respond to mounting policy risk and consumer it is the only pyrolysis company in the EU with REACH certification, which allows the naphtha output to be sold as a petrochemical product.

Repsol, the Spanish oil engages major oil and company, is a longstanding client. In December 2018, Plastic Energy signed an offtake agreement with SABIC, the Saudi Aramco-owned chemicals processed in the company, to supply its pressure. It states that Netherlands plant with recycled naphtha. This was followed by an agreement with Petronas to build a pyrolysis plant in Malaysia. The company has also signed an agreement with Ineos in May 2020, as well as with other (not yet public) petrochemical companies.

The pyrolysis plant must be customized to the customer's specifications, so that the output can be customer's steam cracker. The company's approach is to build and operate new plants through long term contracts (10+ years) with a single off-taker that will buy the entire output.

Innovation

Plastic Energy uses pyrolysis, a process whereby plastic waste is heated in the absence of oxygen, to produce shorter-chain hydrocarbons such as naphtha. This naphtha is used as feedstock in chemical plants to produce 'virgin-quality' recycled plastic products.

The company has a proprietary agitator and separation technology that allows higher control of the hydrocarbon chain length. This is a crucial feature to meet the specifications of customers, whose steam crackers are tailored to process specific hydrocarbons. Plastic Energy's process is complementary to existing methods of recycling because it targets plastic waste that cannot be mechanically processed. It offers an alternative to landfills and incineration, can handle multi-layers and black plastics, and enables the production of virgin-quality recycled materials.

Potential Scale

Plastic Energy is positioned in the growing market for plastics and recycled products. One of the advantages of pyrolysis is that it can recycle a broader range of plastic waste with more limited need for additional infrastructure in a given country. This could enable quick deployment globally - especially in developing countries where most plastic leakage into marine environments occurs.

Pyrolysis output is exposed to commodity price volatility. However, the company is partly insulated by long-term off-take agreements and customers' very high demand for recycled plastics. The economics of pyrolysis depend on access to suitable plastic waste, the costs of which could increase if capacity growth creates a competitive market for previously unrecyclable, low value plastic waste.



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Compan	v Sur	nmarv

REE Automotive has developed a scalable, modular EV platform, with a corner module system that integrates all drivetrain, powertrain, suspension and steering components into the wheel arch – supporting a flat, modular chassis. This enables EVs that are space optimized, autonomous ready and faster to develop, giving customers flexibility to design the vehicle they need within an affordable structure. REE's platforms are supported by a global network of the world's Tier1 manufacturers and aimed at specific markets including logistics, commercial, last-mile delivery and shuttles.

Company	REE	Established	2013
Headquarters	Israel	Staff	100

Momentum

REE has signed several commercial agreements to bring its technology to market and established a large global and exclusive network of partnerships with leading automotive Tier 1 suppliers, most of which are investors. REE has raised \$160 million from undisclosed parties, which include automotive manufacturers, Tier 1 suppliers and institutional financial investors.

Route to market

REE develops and assembles its corner modules and platforms in its integration centres while producing the subsystems via strategic and exclusive automotive Tier1 partners, selling directly to automakers, logistics players and new mobility companies.

Partners and Cooperations										
Hino	Toyota truck-arm									
FCA	Commercial vehicle division									
Mitsubishi Corporation	Japanese conglomerate active in automotive with Mitsubishi Motors and Isuzu and a global car dealership network.									
КҮВ	Global automotive Tier 1 – dampers and steering									
American Axle	Global automotive Tier 1 – powertrain and drivetrain									
NSK	Global automotive Tier 1 – bearing and steering									
Musashi Seimitsu	Global automotive Tier 1 - drivetrain (Honda owns 25%)									

Innovation

With a clean sheet approach to automotive legacy design, REE's REEcorner modules integrate all drivetrain, powertrain, suspension and steering components into the arch of the wheel - a pioneering bywire control system that carries a totally flat, autonomous-ready EV platform, designed to meet the needs of future e-mobility applications. REE highlights as benefits increased space, total body design freedom, easier vehicle assembly and greatly reduced total cost of ownership and downtime, with each REEcorner capable of being replaced in less than an hour.

Typical electric vehicle



REE technology



Potential Scale

REE targets purpose-built electric vehicles for cargo and passengers, offering customers manual or autonomous sector-specific solutions. BloombergNEF expects the annual market size for shared electric cars in 2040 (driven or autonomous) to be 13 million units, and for light duty commercial vehicles to then be just under 7 million units per year. Currently, shared fleets and taxis use 'standard' passenger cars and BNEF estimates that there are about 1.1 million electric vehicles in such fleets globally. Electric delivery vans are more popular in Europe and China, with some tens of thousands of units sold each year. BNEF expects that fully autonomous (levels 4 and 5 of automation) passenger-carrying vehicles will only significantly enter the market in the 2030s, but niche applications such as shuttles and autonomous vehicles for last mile deliveries, could be adopted much earlier.

remix

Company Summary

Remix offers software to plan, analyze and coordinate transport within a city. The platform is designed to be used for street planning, transit management and understanding shared mobility, all with minimal training required.

Company	Remix	Established	2014
Headquarters	U.S.	Staff	65

Fundraising to date

\$26.6m

Momentum

The increased volume of data from shared mobility and public transit has given cities new opportunities to improve efficiency, if they have the skills and tools. Currently, Remix has software contracts with over 340 cities and transit agencies across 22 countries and 5 continents.

Route to market

Remix markets software-as-a-service subscriptions to cities and public agencies. The platform is sold in various modules leaving opportunities for account growth.

Code for America Energy Impact Partners Sequoia Capital Y Combinator

Investors

Potential Scale

There are 19,000 cities in the U.S. alone, collectively spending \$1.2B annually on public transit and street planning software. Remix estimates that its current product addresses 50% of that market. It has begun to expand internationally, setting up an office in Amsterdam, the Netherlands. With an established presence in cities there are a range of additional transport software products that could be introduced, such as clean air zone management and congestion control.

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Innovation

Low-barrier city planning: Software commonly used for city planning such as AutoCAD and GIS offers detailed engineering options, but often does not readily facilitate integration of different sources of data that are typically siloed in different departments. As a result, these programs are often only used by a few specialists within the municipality. Remix addresses this problem with software designed to be intuitive.

Unified platform: Remix brings different departments within city planning together on one common software platform. The platform is cloud-based and integrates mobility and other data streams with city statistics and construction cost factors, to help city planners quickly analyze the impact of different transport scenarios via a map based interface. Without Remix, part of this work would still happen but typically using pen and paper, printed maps and excel spreadsheets.

Shared mobility: Remix was early to capitalize bringing micromobility providers into the same picture as transit and street-level data, to help cities evaluate and plan at a more holistic, collaborative level.

City transportation software needs and select active companies

	Streets	Transit	Shared mobility					
The task	Envision, plan, and design streets for the multimodal city	nvision, plan, and design ets for the multimodal city vision to implementation						
		🔀 remix						
Select active companies	ArcGIS AUTOCAD	Ecolane [®] mcsobi bestmile	POPULUS COORD					
Possible entrants	NYGAARD	See companies active in shared mobility	Google Maps Citymapper					

Source: BloombergNEF

StoreDot

Company Summary

StoreDot's proprietary multifunction electrode enables ultra-fast charging. The company aims to manufacture advanced lithium-ion based batteries that will allow electric vehicles (EVs) to be charged in a matter of minutes, reducing the need for large batteries and helping to overcome some of the main barriers to mainstream adoption of EVs – range and charging anxiety.

Company	StoreDot	Established	2012
Headquarters	Israel	Staff	120

Momentum

The company has demonstrated its technology can be deployed beyond the lab, and has the backing of several key partners who have a vested interest in seeing this technology reach the market.

Route to market

StoreDot works with several partners to validate its technology for electric vehicle applications. The company intends to initially manufacture and market its technology itself. It is planning a large-scale plant (OneGiga), to be commissioned by 2024, and is currently finalizing its location. This new facility is planned to have an initial capacity of 1GWh, with the potential to reach 10GWh. StoreDot aims to produce batteries for 500,000 cars by 2025.

Innovation

StoreDot uses standard NMC cathode active materials, but combines these with novel organic components that enable ultra-fast charging. In 2019, the company demonstrated the world's first full live charge of an EV in just five minutes. Best in class EV batteries today typically have a charging period of 20 minutes.

The anode includes nano-silicon particles (60%) and elements such as tin and germanium. By using silicon, instead of graphite which is commonly used, it can achieve much faster charging, without the risk of lithium plating at the anode which can lead to cell malfunction and capacity losses.

Potential Scale

The passenger electric vehicle market is growing rapidly. In 2019, around 117GWh of lithium-ion batteries were deployed in the EV market. By 2030 the passenger EV market will require 1.3TWh of batteries annually. Including other demand segments, the market is projected to total 1.8TWh annually, worth around \$115 billion. Ultra-fast charging will enable the development of smaller battery packs, helping to reduce the upfront cost of EVs and further accelerating consumer uptake.

BNEF take on when next generation battery technologies could surpass the performance of traditional lithium-ion systems



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