

Cleantech Group

Scaling Cleantech Innovation, 2022 and Beyond

13 January 2022

Cleantech innovation rising again – What is different this time around?

Standing on the shoulders of Cleantech 1.0 giants

Greater sense of urgency

Cheaper, more accessible enabling tech (sensors, AI, 5G, robotics)

Innovators displacing competitors, not categories

Corporates are now market conduits, not just competitors

Where are the bottlenecks?

Corporate Carbon Neutrality
≠ Net Zero

- ESG practices mostly inward-looking, don't provide enough insight to macro-level climate impact.
- 43% of the world's largest 632 public company targets plan to use carbon offsets in their net zero strategies.
- Only 10% of those companies have ruled out using offsets to reach their net zero targets.

Hardware is Still Hard

- Institutional investors struggle to participate in financing rounds – pension funds, mutual funds, etc., have low tolerance for risk.
- Traditional VC 10-year VC fund more amenable to software model of rapid and explosive growth – rollout of alternative patient capital funds not commensurate with need or urgency for deep tech and hardware.
- Lack of a common vocabulary – “Climate” and “Impact” funds not all created equal, media and ecosystem need mechanisms to distinguish funds based on decarbonization potential.

Demonstration Dilemmas

- De-risking technology in the hardest-to-abate sectors requires significant technology demonstration projects.
- Equity financing makes cost of capital untenable for demonstration projects, more corporate financing and government sponsorship required.

Trends to watch in 2022 – Financing starts to catch up








SPACs look beyond electric vehicles and batteries






SPACs are not just targeting battery and electric vehicle innovators. Both alternative hardware including hydrogen, long-duration storage and fuel cells and software related sectors including DER management and home automation are new targets.

Expect to see increasing target diversity, but also a cooling down of SPAC activity with more realistic valuations.

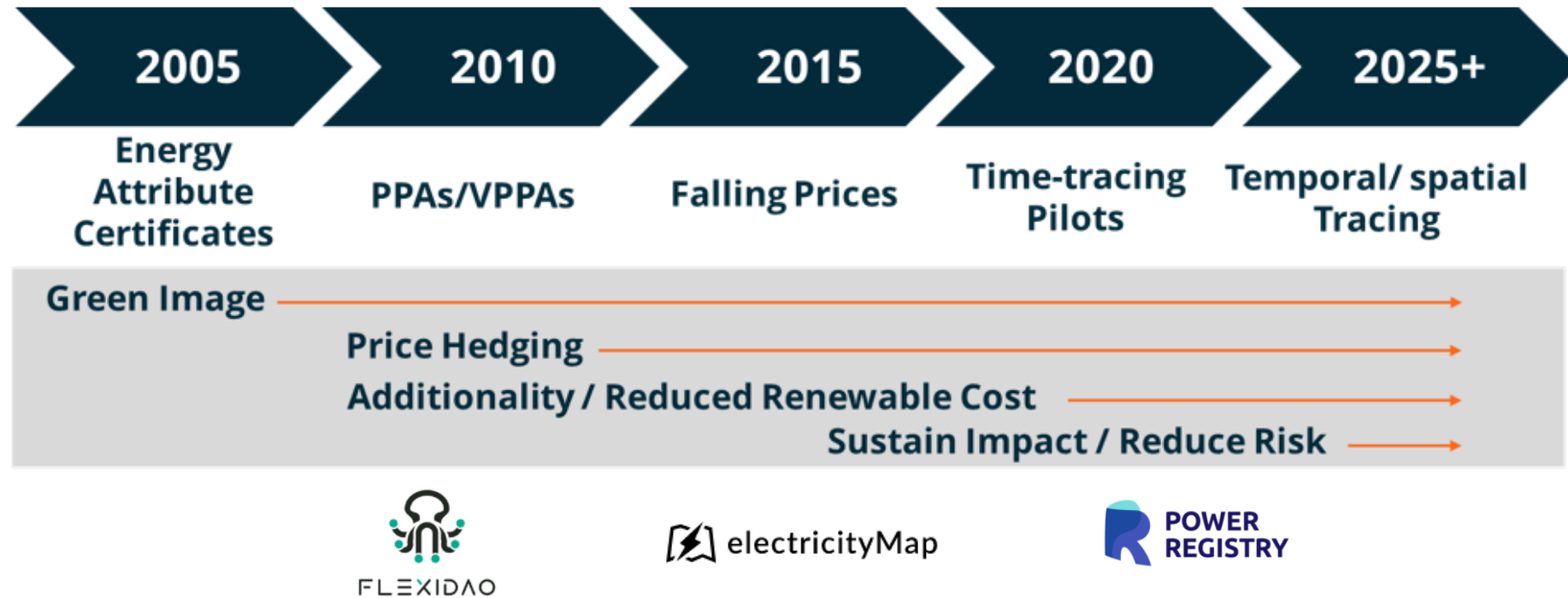
Increased availability of late-stage funding

Access to commercialization will continue to be a hurdle for capital intensive hardware. However, both the private and public sector are beginning to build late-stage patient capital war chests, particularly important for sectors such as storage, hydrogen and next-generation renewable power.

Company	Valuation	Technology
	\$8bn	Distributed Solar, Wind, Hydropower
	\$2.2bn	Home Automation / IoT
	\$1.4bn	Utility-scale Storage
	\$1.35bn	Smart Storage / Grid Participation Enablement
	\$1.6bn	Energy-efficient glass
	\$1.15bn	Renewable Natural Gas Production
	\$358mn	Fuel Cell Polymers and Membranes

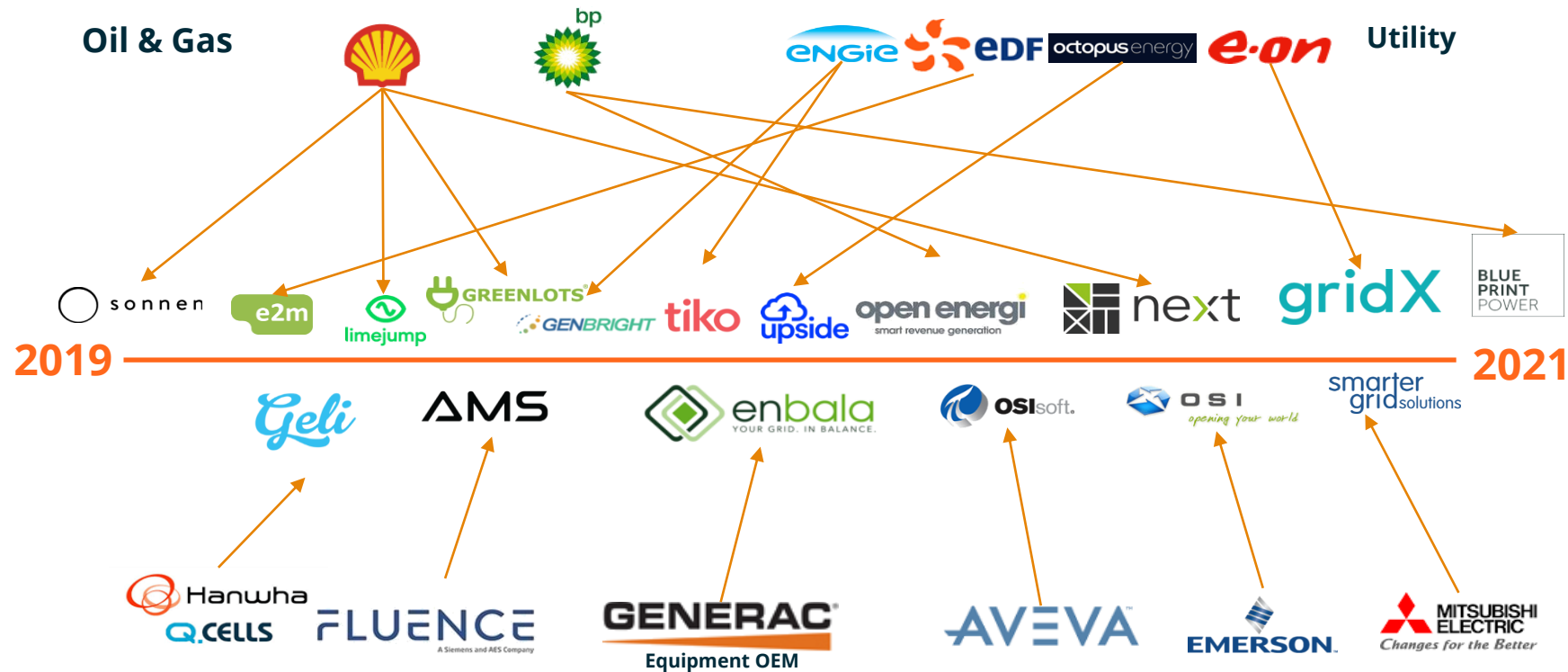
Investor	Amount	Target
	\$400M	Solutions with emissions reduction potential > 100 Mt CO ₂ e per year
	\$545M	Hydrogen, long term storage, aviation fuels, direct capture
	\$1.2BN (target)	Hydrogen value chain
	\$1BN (target)	Late-stage growth renewable and mobility tech.
	\$950M	High-capex energy innovation

Trends to watch in 2022 – Digitalization begins enabling carbon-aware energy networks



- Electricity grids, hydrogen and heat networks are just few examples of where carbon intensity needs to be accurately tracked and accounted for in real-time for corporates to accurately account for their CO2 impact.
- Tech corporations including Google and Microsoft are among the first movers creating carbon-aware energy transactions while transitioning towards 24/7, 365 renewables, matching renewable supply to demand in real-time.

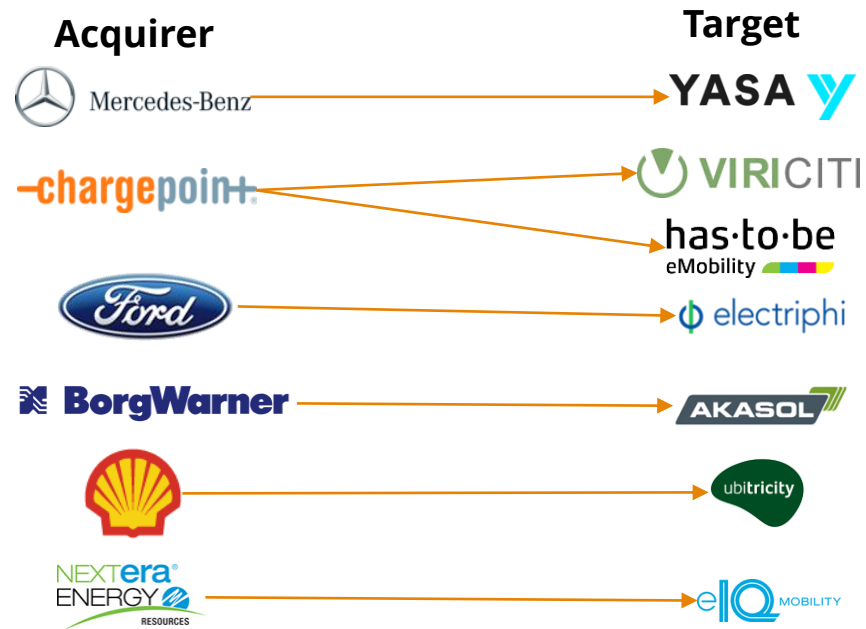
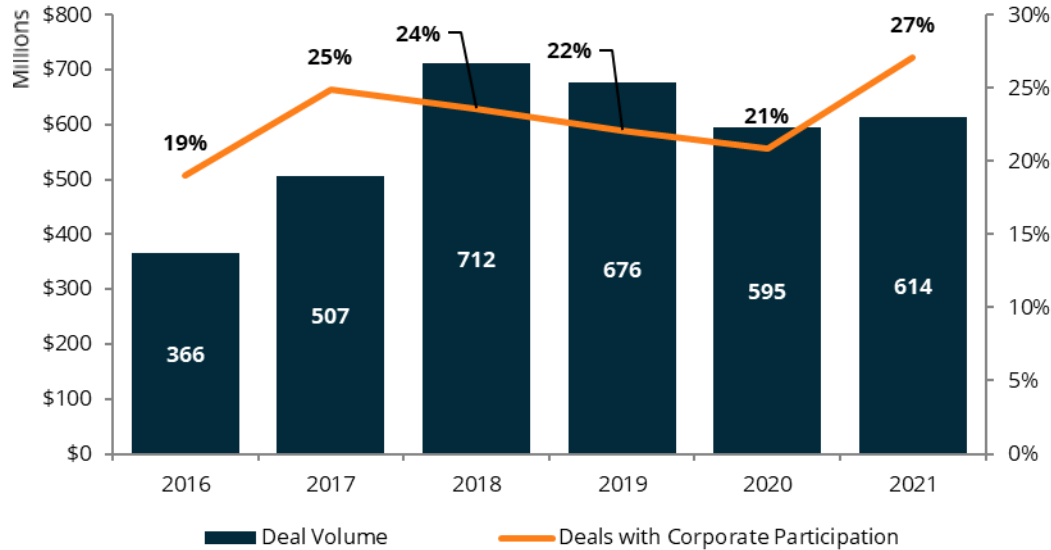
Trends to watch in 2022 – A race to own the distributed energy management network



- Consolidation is rampant as corporates look to have a foot in emerging consumer facing DER aggregation, dispatch and optimization services.
- The US FERC Order No. 2222 and alignment on the role of independent aggregators in the EU Clean Energy Package creates opportunities for value-driven DER participation in energy markets.

Trends to watch in 2022 – Mobility incumbents' innovation needs accelerate

Corporate Participation in Mobility Deals











- The nexus of electrification, sharing and autonomy are continuing to unlock new business models in mobility services and logistics such as as-a-service offerings and asset-heavy business models that benefit from asset optimization and lower fuel and operating costs of EVs. Incumbent business models are being disrupted faster than ever.
- Mobility has seen a significant number of acquisitions in the past year as automakers, charging providers, oil & gas majors and energy companies expand their offerings across the electrification value chain.
- As vehicles and surrounding ecosystem (charging/fueling, maintenance, etc.) become increasingly electrified and digitized, incumbents are looking to own more of the customer experience and generate recurring revenue.

Trends to watch in 2022 – Bigger bets on the big picture

The 20-45% emissions reduction required of the global electricity sector to limit global warming to 2 to 1.5 degrees Celsius is actually a 30-90% reduction by 2030 if expanded energy needs are accounted for.

Nuclear fusion offers one of the paths to an energy mix that avoids emissions and meets the world's expanded energy needs. 2021 was a year with multiple significant fusion financing events.

Hydrogen is a solution to energy needs in route for hard-to-abate sectors, long-distance transport, and seasonal power balancing. Electrolyzers and other hardware components are the key CAPEX bottleneck to economical green hydrogen production. Funding for commercialization of hydrogen production tech and distribution infrastructure began coming online throughout 2021.

	Company	2021 Deals	Technology
Nuclear Fusion	 Commonwealth Fusion Systems	\$1.8bn	Advanced nuclear fusion with high-temperature superconductors
	 generalfusion	\$130mn	Magnetized target nuclear fusion
	 HELION	\$500mn	World's first nuclear fusion plant
Hydrogen	 sunfire®	\$125mn	Solid oxide fuel cells and renewable synthetic fuels based on solid oxide electrolyzers
	 FE FUEL	\$105mn	Hydrogen charging networks, fuel cells and liquid fuel reformer
	 BayoTech™	\$157mn	On-site hydrogen production solutions using gas-as-a-service
	 HTEC Hydrogen Technology & Energy Corporation	\$170mn	Hydrogen purification systems, distribution infrastructure and fueling solutions
	 m&nolith	\$100mn	Plasma pyrolysis for hydrogen production

Championing Sustainable Innovation, Catalyzing Business Opportunities

Cleantech Group's research, consulting and events catalyze opportunities for sustainable growth powered by innovation.