Wednesday, 20 March 2024

RESEARCH REPORT

CORPORATE CONNECT

Dotz Nano (DTZ)

Nanotechnology solutions for product authentication and carbon capture

Investment Summary

- DTZ is in the process of commercialising two key technologies under the Dotz Earth and Dotz Shield brands. While the latter is expected to progress sooner, the primary focus is on ground-breaking carbon management technologies as enablers of a carbon-neutral future. These have the potential to deliver company transformational products in coming years.
- DTZ has attractive target markets, with the estimated value of the product authentication technology market in the oil & gas and chemicals sectors being US$900m and the carbon capture technology market being US$100bn by 2030 and US$600bn by 2050. There is an urgent need for emitters to find better and cheaper ways to cut emissions and meet agreed targets.
- The company's carbon capture technology has several inherent advantages to other technologies, some of which are already commercially used. These include greater adsorption capacity, better selectivity, and lower energy requirements, resulting in being much lower cost and more environmentally friendly. The technology is also able to be retrofitted to existing plants.
- In the product authentication market, DTZ has successfully completed industrial scale field trials for Dotz Shield with a leading NASDAQ-listed oilfield technology and services provider. Commercial discussions are currently being progressed.
- DTZ has secured new funding of up to A$12m via convertible note issue to Mercer Street Global Opportunity Fund LLC to support further development of Dotz Earth. While this should be sufficient for FY24, DTZ will likely require significant additional funding to fully commercialise its technology.

Financials (US$)

		FY20	FY21	FY22	FY23
Sales	US$m	0.4	0.3	0.2	0.1
growth	%		-19%	-37%	-72%
EBITDA	US$m	-2.4	-4.3	-4.5	-4.4
EBIT	US$m	-2.6	-4.7	-4.9	-4.8
PBT	US$m	-2.6	-4.8	-5.4	-5.9
Adj NPAT	US$m	-2.6	-4.8	-5.4	-5.9
growth	%		86.5%	12.3%	8.6%
Rep NPAT	US$m	-4.0	-7.9	-5.4	-6.6
Adj EPS	cps	-0.7	-1.1	-1.2	-1.1
EPS grwth	%		61.6%	6.2%	-3.0%
PE	x	-15.7	-9.7	-9.2	-9.5

Source: Company data and CCR estimates

Joh Snyman

+61 400 897 559

johsnyman@corporateconnect.com.au

Company Data

ASX code	DTZ
ASX price	$0.165
Shares on issue	520.5m
Market capitalisation	$85.9m
Cash on hand	~$1.3[1]
12-month price range	$0.138 – $0.272
ASX turnover (3m avg. daily vol.)	0.35m

[1] Cash = Latest reported balance FY23

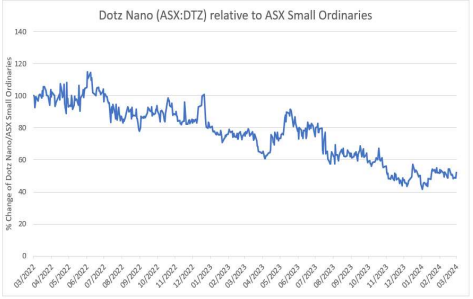
Key Personnel

Sharon Malka	CEO
Liat Bar Ziv Alperovitz	CFO
Michael Shtein	Founder, CTO
Bernie Brookes	Chairman

Major Shareholders

Southern Israel Bridging Fund	16.47%
Marzameno Ltd	9.15%
Dr Zvi Graubard	2.15%
Avocado Ventures Inc	1.97%

Price Chart (ASX: DTZ)



Source: Factset

Readers should be aware that Corporate Connect Research Pty Ltd has been engaged and paid by the company covered in this report for ongoing research coverage. Please refer to the important disclosure pages of this report for the general advice warning, disclaimer, and full disclosures.

Dotz Nano (DTZ)

Nanotechnology solutions for product authentication and carbon capture

Investment Summary

Investment Thesis

Dotz Nano (DTZ) is a leading nanotechnology company focussed on developing innovative climate and industrial nanotechnologies. The key elements of the investment thesis for DTZ are as follows:

- Diversified technology platform – DTZ is currently in the process of commercialising two main technologies under the Dotz Earth and Dotz Shield brands. While the latter is expected to be commercialised sooner, the primary focus is on ground-breaking carbon management technologies as enablers of a carbon-neutral future. These have the potential to deliver company transformational products in coming years.
- Attractive target markets – The company's nanotechnology solutions can be deployed in many applications in multiple industries. The current focus is on the product authentication technology market in the oil & gas and chemicals sectors (estimated at >$900m) and the carbon capture technology market (estimated at US$100bn by 2030 and US$600bn by 2050).
- Rising demand for carbon capture – The expectation of ongoing global reliance on fossil fuels as an energy source for decades to come, means emitters will need to find better and cheaper ways to capture carbon in order to meet agreed targets by 2030 and 2050. This is an urgent problem for which DTZ has an efficient and economic solution – a nano-porous carbon solid sorbent.
- Validated technology – DTZ has proven the efficacy of its carbon capture technology and demonstrated the ability to scale up to lab scale. The next stage is a small scale pilot unit by FY25 with customer validation through potential development partnership agreements with emitters.
- Collaborating with SINTEF – DTZ has entered a strategic collaboration agreement with SINTEF, Norway's largest research institute for energy and climate technology, to advance the development of the Dotz Earth technology.
- Competitive advantage – The company's carbon capture technology has several inherent advantages to other technologies, some of which are already commercially deployed. Key advantages include greater adsorption capacity, better selectivity and lower energy requirements, resulting in significantly lower cost of capture and being more environmentally friendly. The technology is also able to be retrofitted to existing industrial and power plants.
- Licencing revenue model – DTZ is aiming to commercialise its technology through licencing agreements with potential customers, rather than seeking to sell an off-the-shelf industry-wide solution.
- Commercial discussions underway – In the product authentication market, DTZ has successfully completed industrial scale field trials for Dotz Shield with a leading NASDAQ-listed oilfield technology and services provider. Commercial discussions are currently being progressed.
- New funding secured – As at Dec 2023, DTZ held cash of $1.3m and debt of $3.4m (incl. leases) after negative operating cash flow of $4.6m during FY23. Post year end, DTZ has secured new funding of up to A$12m via convertible note issue to Mercer Street Global Opportunity Fund LLC to support further development of Dotz Earth. While this should be sufficient for FY24, DTZ will likely require significant additional funding to fully commercialise its technology. This will involve significant reliance on access to future capital raisings and government grants, in addition to potential contract wins for Dotz Shield.
- New Board and management – During FY23, DTZ made several new appointments to the executive team and the Board, including a new CEO, CFO and Directors with climate technology industry expertise. The current management team have strong experience within the technology and materials science sectors, with a proven track record. Various senior management and Board members are currently also shareholders of DTZ (c.7.8% aggregate), demonstrating alignment with investors.
- New applications upside - DTZ's current technologies are potentially employable in other applications. These include emitters outside of the power generation and cement industries and authentication needs outside of oil & gas and chemicals industries.

Milestones

Key events and data points to track the company's progress over coming periods include the following:

- Upcoming 1H FY24 result, due in Aug 2024.
- Demonstrated progress in discussions with potential customers in the oil & gas and chemicals sectors to secure commercial agreements for the Dotz Shield authentication solution.
- Further ongoing development and optimisation of the Dotz Earth sorbent technology, followed by a small-scale pilot unit to demonstrate the efficiency of the sorbent at greater scale and in a given application / hard-to-abate industry.
- Ongoing progress in negotiations with leading emitters to pursue joint development projects or partnerships for Dotz Earth towards an industrial pilot demonstration.

Readers should be aware that Corporate Connect Research Pty Ltd has been engaged and paid by the company covered in this report for ongoing research coverage. Please refer to the important disclosure pages of this report for the general advice warning, disclaimer, and full disclosures.

Dotz Nano (DTZ)

Nanotechnology solutions for product authentication and carbon capture

Company Profile

Dotz Nano (DTZ) is a technology company specialising in high-value advanced materials. DTZ develops and commercialises innovative solutions addressing global environmental and industrial challenges, utilising its carbon-based nanotechnologies. The company's two main areas of focus are:

- In-product tagging authentication and tracing solution for monitoring and anti-counterfeiting, primarily in the oil & gas and chemicals sectors.
- Carbon-based solid sorbent technology for industrial decarbonisation and sustainability.

Background

DTZ was established in 2015 and listed on the ASX in 2016. Over the period of 2017-2022 the company was involved in the development, scale-up and commercialisation of carbon and graphene quantum dotz (GQD) technologies. During 2023, under the current new management team, the company narrowed the target market focus for the GQD technology to authentication and tracing solutions for anti-counterfeiting and monitoring.

This was followed also in 2023 by the strategic acquisition of innovative CO_2 capture technology. Consequently, the company is now comprised of two separate business units, as follows:

- Dotz Shield – Authentication technology
- Dotz Earth – Carbon capture technology

DTZ is hoping to accelerate the commercialisation and ramp up of the Dotz Earth business in the short to medium term, as it transitions its primary focus to capitalising on the $600bn market opportunity in carbon capture. The company expects the Dotz Shield business to help underwrite earnings and cash flows as it continues to develop and commercialise the carbon capture technology.

Business Model

Dotz Shield – Authentication technology solutions

The Dotz Shield business is focussed on developing end-to-end customised authentication solutions for specific applications, including tracing, monitoring and anti-counterfeiting, based on its in-product tagging technology. The technology is compatible with a range of hosting materials in multiple industries.

The Dotz Shield solution provides customers with many benefits, including:

- In-field real-time detection and measurement, while most alternatives use expensive and slow lab-based practices.
- Marker compatibility with a range of hosting materials.
- Simplicity and ease of use.
- Validation from various successful field trials.
- Having multiple applications across a range of industries.
- Providing a very high level of security.

Dotz Earth – Carbon Capture Technology

In May 2023, DTZ announced it had entered into a binding asset purchase agreement with H2 Blue Tech Limited to acquire its carbon dioxide (CO_2) capture assets and technology.

The innovative CO_2 capture technology utilises plastic waste to produce a nano-porous carbon-based solid sorbent ideal for capturing CO_2 from post-combustion flue gas.

Readers should be aware that Corporate Connect Research Pty Ltd has been engaged and paid by the company covered in this report for ongoing research coverage. Please refer to the important disclosure pages of this report for the general advice warning, disclaimer, and full disclosures.

The technology was developed at Rice University in Houston, Texas, and has been fully characterised by SINTEF[1][2], Europe's largest research institution for energy and climate technologies.

The new technology represents the next generation of carbon capture sorbents, demonstrating several benefits over existing technologies including energy efficiency, low cost of ownership and longer lifetime.

DTZ views the acquisition as highly strategic and value enhancing, providing a valuable addition to the company's nanotechnology platform. The CO_2 capture industry is undergoing significant growth while playing a critical role in energy transition and industrial decarbonisation.

DTZ intends to commercialise the carbon capture technology by entering contractual agreements with emitters to install the technology in existing plants. It is expected that the company will employ a technology licencing revenue model, with the main revenue stream being charged based on the number of installations under contract.

It is important to note many potential customers may be able to access potential reimbursements available via government subsidies and/or grants as governments look to provide incentives for the transition to net zero.

Products

Dotz Shield

The Dotz Shield in-product tagging authentication solution involves optical taggants (called Validotz) being embedded in the product requiring authentication.

DTZ has also developed a set of easy-to-operate hand-held 'Inspec' devices, which provide real-time, on-site information reading. In addition, the company has developed an 'Insight' IT management platform and mobile app, which provides user-friendly presentation of the collected data from the Inspec devices.

Dotz Earth

The Dotz Earth sorbent is made from waste plastics feedstock synthesized with certain potassium salts under thermal treatment using a well-established proprietary process known as pyrolysis. The process is illustrated in the chart below and leads to certain by-products including pyrolysis oils and gasses.

Technically, the resultant sorbent is a polymeric nano-porous carbon-based sorbent.

DTZ's technology for carbon capture is based on this proprietary carbon-based solid sorbent. Some of the inherent advantages of the company's technology include:

- Abundant and renewable process
- Tailorable surface properties, with high CO_2 adsorption facilitated by unique structure and highly porous surface area
- Enhanced CO_2 adsorption, with high CO_2 selectivity and moisture sensitive
- Regenerability and reusability (including valuable by-products such as Paraffins)
- Versatility and compatibility with diverse sources and capture conditions

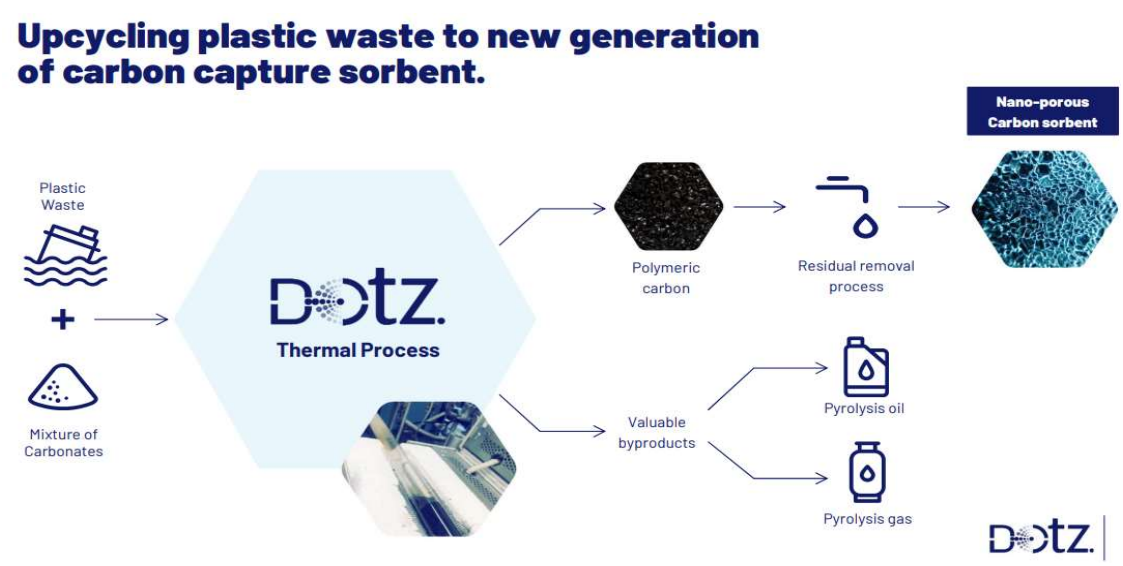
Post the acquisition of the technology, DTZ is now focussed on optimising its unique nano-porous carbon sorbent as a superior sorbent for industrial flue gas decarbonisation. Recently DTZ achieved a technology demonstration milestone in its first-generation sorbent, with the completion of a bench-scale unit, showing enhanced performance and potential to significantly drive down the cost of carbon capture.

[1] SINTEF refers to *Stiftelsen for Industriell og Teknisk Forskning* in Norwegian (The Foundation for Industrial and Technical Research), headquartered in Trondheim, Norway.
[2] https://doi.org/10.1021/acsnano.2c00955

Dotz Nano (DTZ)

Nanotechnology solutions for product authentication and carbon capture

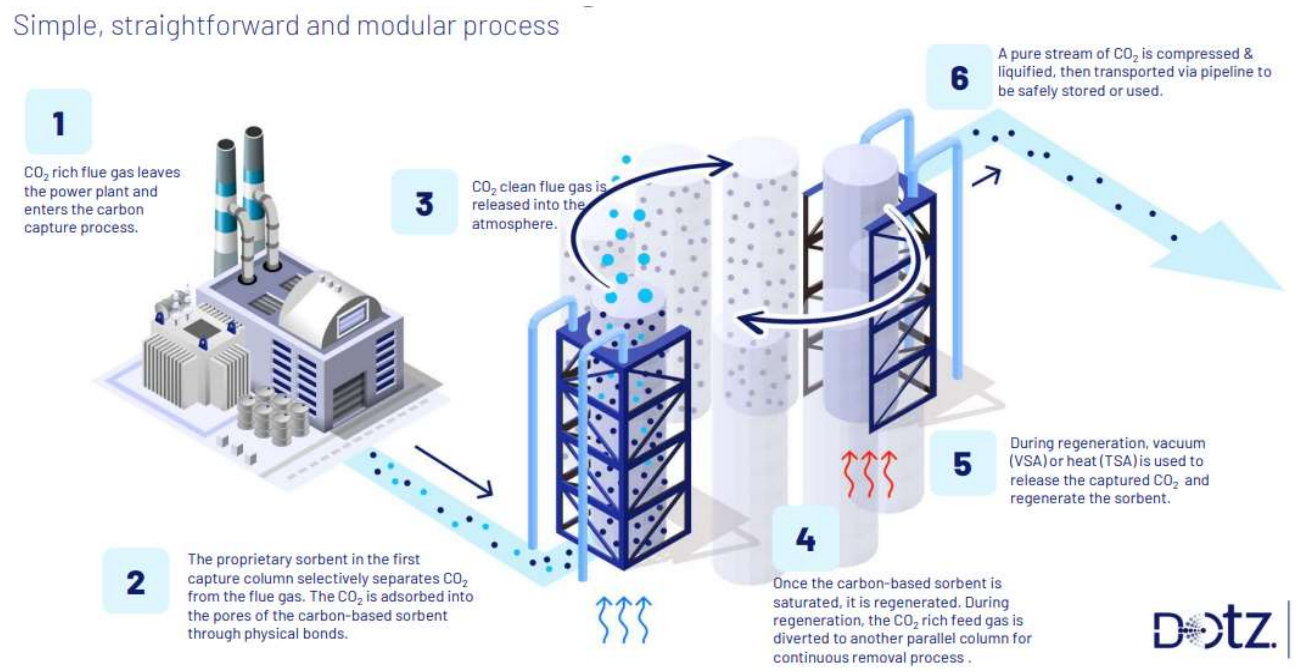
Fig. 1 – DTZ sorbent production process



Source: DTZ

Deployment of DTZ's carbon capture product involves a simple, straightforward and modular process, which facilitates lower cost of capture and easy integration. The conceptual design is shown below.

Fig. 2 – Illustrative Conceptual Design



Source: DTZ

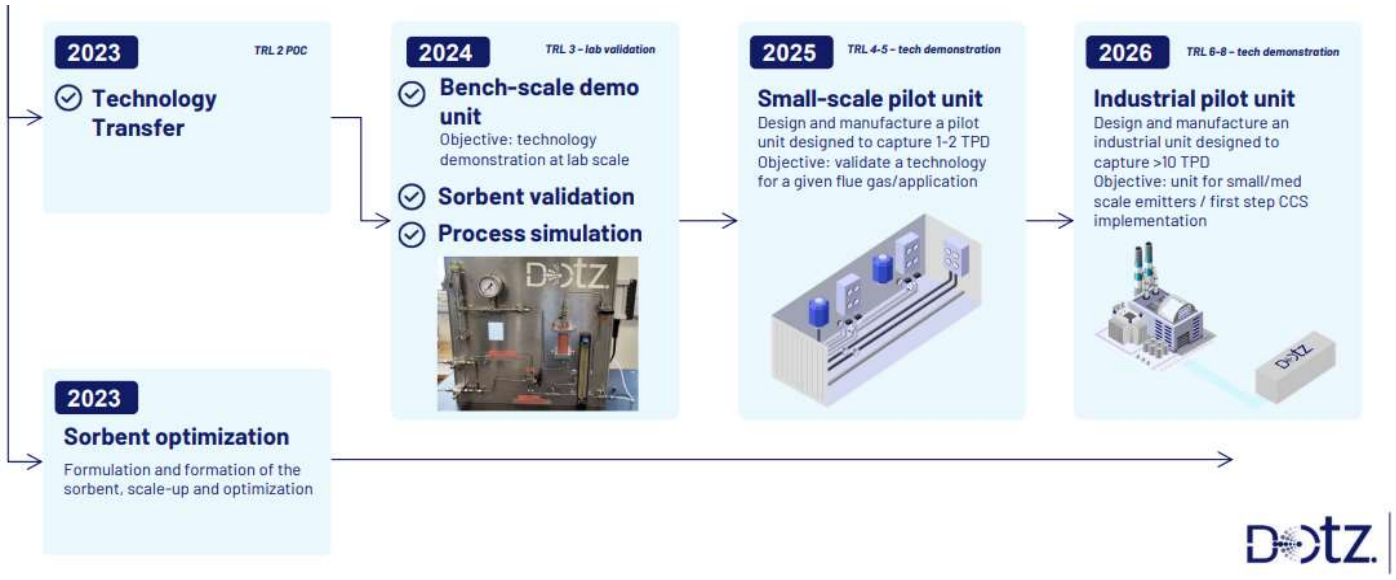
Other advantages of DTZ's nanotechnology sorbents for carbon capture include:

- Energy efficiency
- Low cost of ownership
- Environmental friendliness
- Selective adsorption[3]
- Scalability
- Proprietary and patented
- Adaptability across multiple industries

Development Plans

DTZ has a clear development roadmap to advance its innovative carbon capture technology through commercial deployment, with multiple value creation milestones.

Fig. 3 – Dotz Earth high level development roadmap



Source: DTZ

The company recently announced the successful achievement of a technology demonstration milestone for Dotz Earth, with the completion of a bench-scale demonstration unit.

DTZ completed the construction of the unit ahead of schedule and demonstrated the effectiveness of the Dotz Earth proprietary nano-porous carbon sorbent technology for the capture of CO_2.

[3] Selectivity refers to the ability of a sorbent to preferentially adsorb one gas over another at a given temperature and pressure.

Readers should be aware that Corporate Connect Research Pty Ltd has been engaged and paid by the company covered in this report for ongoing research coverage. Please refer to the important disclosure pages of this report for the general advice warning, disclaimer, and full disclosures.

Validation testing and process simulations of the sorbent in a Moving Bed Temperature Swing Process (MBTSA) produced data that demonstrated superior properties compared with existing commercial activated carbon-based sorbents, including:

- Greater adsorption capacity (3x higher)
- Significantly better selectivity over nitrogen
- Significant reduction in required regeneration energy

The above testing highlights the potential for Dotz Earth to deliver substantial practical advantages and meaningfully drive down the cost of carbon capture. DTZ has now commenced the design and building of a small-scale pilot unit with SINTEF to further advance the technology readiness.

Customers

Dotz Shield

The Dotz Shield product has multiple applications across a range of industries. However, DTZ has narrowed its core focus going forward to the oil and gas industry and chemical manufacturers, or services providers to these industries, where it has identified the most promising opportunities for its tagging solutions.

The customer value proposition varies across industries, but key elements are listed below:

- Anti-counterfeiting and anti-alteration – authenticating bulk product in a robust way.
- Product liability and anti-dilution – Providing insight into how customers are using a product, supporting customer success activities.
- Quality assurance – A tool to investigate production and manufacturing processes.
- ESG validation and circular economy – Providing proof of origin and increased transparency along supply chains.
- In-field measurement – Allowing lab tests to be conducted in the field, saving on time and expenses.

During FY23, DTZ held various discussions with potential customers of its authentication solutions. This has allowed the company to enter negotiations to secure new projects for its in-product tagging solutions to address the challenges of anti-counterfeiting, in-field quantification and quality assurance that potential customers in several industries increasingly face.

Specifically, a leading NASDAQ-listed oilfield technology and services provider successfully completed an industrial-scale field trial of DTZ's solution in multiple locations across North America to monitor corrosion inhibitors in-field. DTZ is in advanced discussions with the customer regarding commercial supply. This would lead to an opportunity for further purchase orders and a ramp-up of the company's tagging solutions within the oil and gas industry.

DTZ continues to have discussions with potential customers and partners to secure commercial collaborations for the Dotz Shield tagging solution. The company notes however, that while negotiations continue to move forward, it has little control over timing, given the size and complexity of the targeted large corporate clients. It does however, remain confident of its ability to secure agreements.

Dotz Earth

The CO2 capture industry is undergoing significant growth while playing a critical role in the energy transition and industrial decarbonisation, representing a significant opportunity of >US$100bn worldwide by 2030.

Power generation and industrial processes currently account to ~65% of global emissions, which is discussed further in the industry section of this report. These are the key industries that could benefit from DTZ's innovative carbon capture technology.

More specifically, DTZ will seek to target the following industry segments as key emitters that would benefit from deployment and use of the company's carbon capture technology:

- Power generation
- Cement
- Iron and steel
- Chemical and petrochemical

- Aluminium
- Pulp and paper

This is a large and growing market, which requires carbon capture capacity to grow ~140x from 40Mtpa today to >5,600Mtpa by 2050, in order to limit global temperature rise to 1.5ºC[4].

Following the completion of the acquisition of the Dot Earth technology, the company is focussed on advancing the technology development program and forming strategic alliances with industry leaders.

DTZ aims to market its carbon capture technology products in Australia, Europe and the US. The company will seek to expedite commercialisation by pursuing partnership agreements that are exclusive to given territories and/or industries.

Partners

DTZ believes there are several participant groups that are key to enabling the energy transition to net zero. These include:

- Technology innovators – supporting industry and government to find efficient solutions to mitigate emissions.
- Governments – provide R&D funding, regulation and subsidies.
- Industries – bear responsibility for reducing carbon emissions, balanced against the need to sustain shareholder returns.
- Investors – public and private investments funds may be available for the development of carbon capture projects.

DTZ seeks to collaborate with various partners in order to expedite the development and commercialisation of its carbon capture technology. These collaborations provide assistance in the areas of technology development, validation and application.

Fig. 4 – Collaborations across the CO_2 value chain

Source: DTZ

[4] International Energy Agency (IEA) sustainable development scenario.

SINTEF collaboration

In Oct 2023, DTZ officially partnered with SINTEF, one of Europe's largest independent contract research and development organisations, to collaboratively advance the development of the Dotz Earth solid sorbent carbon capture technology, leveraging SINTEF's extensive experience and knowledge in carbon capture technologies.

The company is working closely with SINTEF's scientists to optimize its nano-porous carbon sorbent with enhanced properties as an ideal solid sorbent for industrial flue gas and a viable solution for industrial decarbonisation.

The strategic collaboration with SINTEF enables DTZ to advance its carbon capture development faster and to de-risk the development progress.

Government and regulation

Government funding

The availability of government funding for subsidies and reimbursements is likely to play a significant role in the market transition to Net Zero by 2050. Progressive regulation may also play a role in achieving reduced carbon emissions within the required time frame to limit global warming.

DTZ will seek to access at times, various R&D grants to help fund development of its carbon capture technology. Examples of some of the funding programs potentially available include:

- Australian Carbon Capture Technologies Program – provides grants for undertaking projects that support CO_2 capture and utilisation technologies. Available funding is generally $1m-15m, with government covering up to 75% of expenditure.
- Cooperative Research Centres Projects (CRC-P) Grants – provide funding for short term research collaborations, with the aim to improve the competitiveness, productivity and sustainability of Australian industries, to use high quality research to solve industry identified problems, and to encourage and help SMEs to take part in collaborative research. Available funding is generally up to $3m (matched).
- International Climate-Tech Program (Israel Innovation Authority) – aims to accelerate the development and scale-up of ground-breaking climate technologies by funding innovative Israeli technology companies to co-develop solutions with leading global corporates to address their climate challenges through joint R&D projects, as well as supporting international R&D collaboration with leading climate-tech hubs such as Sweden and Switzerland.

Patents

DTZ seeks to protect its intellectual property through patents. The company's sorbent technology utilises a method of converting plastic waste to carbon-based sorbents for the purposes of capturing CO_2 from flue gas.

The company's method of converting plastic waste to carbon-based sorbents is patented. There are multiple families of patents, both composition of matter / method and use.

During FY23, DTZ successfully completed a transfer of the Dotz Earth technology from Rice University to the company's facility, utilising newly installed pyrolysis reactors. This technology transfer process resulted in the filing of a patent application in the US to cover a significant simplification of the manufacturing and scale-up process of the carbon-based sorbent. The completion of the technology transfer to DTZ's facility is an important step in advancing the company's innovative technology development.

On the Dotz Shield side, the company has developed its own method, process, know-how and intellectual property for manufacturing graphene and carbon quantum dots, which it believes is valuable and material to its business. DTZ has already been granted several patents to date for these methods and processes.

The chart below provides a summary of some of DTZ's key patents.

Fig. 5 – DTZ key patents

RICE TECH ID 2020-008 - Conversion of plastic waste to porous polymeric carbon sorbants for CO2, H2 and other gases.						
Porous Polymeric Carbon Sorbants for CO2 Capture and Methods for Making and Using the Same	National Stage	US	Active	4/13/22	17/768,790	Carter Kittrell, Wala Algozeeb, Paul E Savas
	National Stage	AU	Active		2020366355	
	National Stage	CA	Active		3154766	
	National Stage	SA	Active		522432248	
	National Stage	EP	Active		20801107.2	
RICE TECH ID 2021-052 - Synthesis of Porus Sorbent from Polymer Wate for CO2 Capcture and Gas Storage Applications						
Patent Title	**Patent Type**	**Country**	**Status**	**Filing Date**	**Serial Number**	**Inventors**
Porous Polymeric Carbon Sorbents and Methos of Making and Using Same	PCT	N/A	Active	4/14/21	PCT/US21/0237371	James M. Tour, Wilbur Carter Kittrell, Wala Algozeeb, Paul E Savas
Rice Tech ID 2023-028 - Method of Converting Plastic Waste into Highly Porous Activated Carbon for Amine Impregnation and Efficient CO2 Capture						
Patent Title	**Patent Type**	**Country**	**Status**	**Filing Date**	**Serial Number**	**Inventors**
Plastic-Waste-Derived Micro-Mesoporous Carbon for Amine Impregnation and Efficient CO2 Capture and Methods of Making and Using Same	Provisional	US	Active	5/1/23	63/499,316	James M. Tour, Zhe Yuan, and Paul E Savas

Source: DTZ

Dotz Nano (DTZ)

Nanotechnology solutions for product authentication and carbon capture

Business Analysis

The Authentication and Monitoring Technology Market

The market opportunity

DTZ's Dotz Shield nanotechnology solution encompasses in-product tagging, in-field tracing and monitoring, and real time reporting and measurement. Key applications for the technology relate to product authentication and anti-counterfeiting.

The technology is potentially suitable to a wide range of industry applications. However, under DTZ's current management team, the company has narrowed its targets to attractive and focussed industrial markets that are exhibiting the greatest demand for the technology. These sectors include;

- Oil & gas
- Chemicals

Dilution of crude oil is a significant issue, resulting in damages of $275m-$800m pa. In the APAC region, it is estimated that 10-20% of lubricants sold are counterfeit. The Australian lubricant market accounts for 40% of the entire global industry.

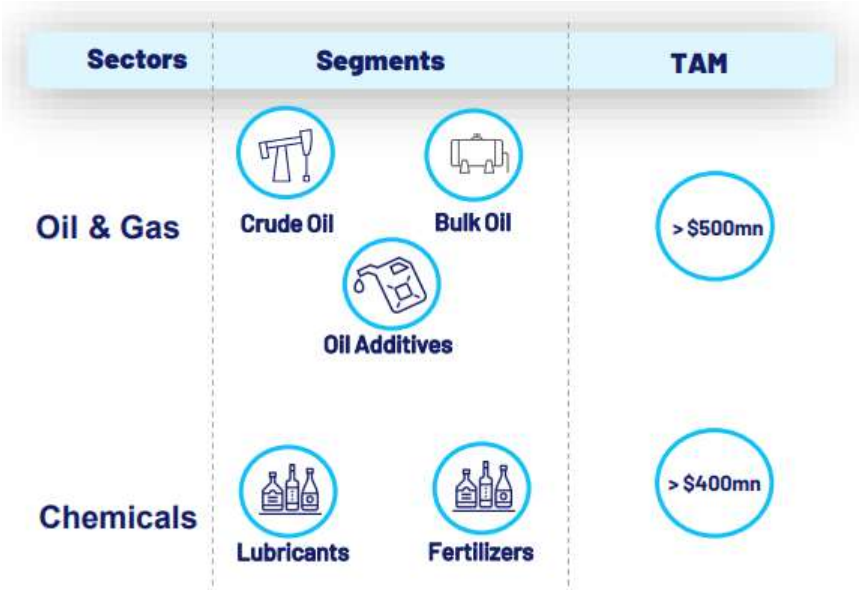
This gives rise to a clear growing need for anti-counterfeiting solutions and DTZ's proprietary nanotechnology ensures that it is well placed to participate in this growing opportunity.

The problem of counterfeiting has become deeply ingrained into many global supply chains. As it continues to grow both businesses and governments are poised to ramp up their investments in anti-counterfeiting solutions to safeguard brands and maintain the integrity of products.

Furthermore, certain companies are also working to protect the integrity of their products and samples to ensure there is no confusion around origins or ownership and whether they have been stored and transported at optimal temperatures.

DTZ commissioned a comprehensive market research study conducted by McKinsey & Co, which estimated that the Total Addressable Market (TAM) in the Oil & Gas and Chemicals industry sectors amounts to US$500m pa and US$400m pa respectively, as illustrated in the chart below.

Fig. 6 – Total addressable market in target segments



Source: DTZ / McKinsey & Co

Dotz Nano (DTZ)

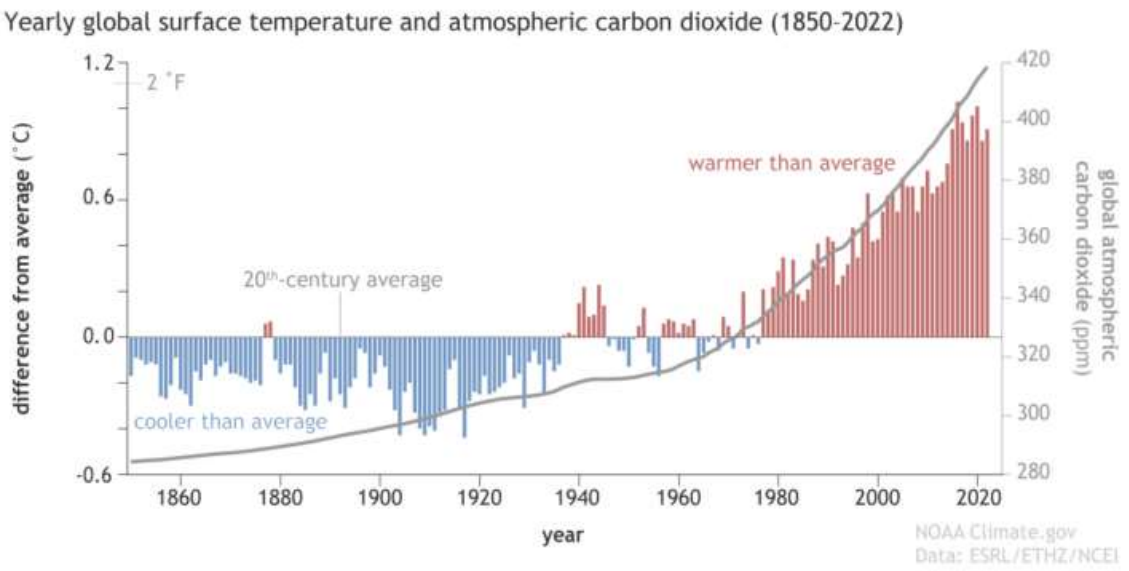
Nanotechnology solutions for product authentication and carbon capture

The Carbon Capture Technology Industry

The fundamental problem of rising global temperatures

Since around 1980, average global temperatures have risen by approximately 1.2°C, driven by increasing concentration of atmospheric CO_2. This is illustrated in the chart below.

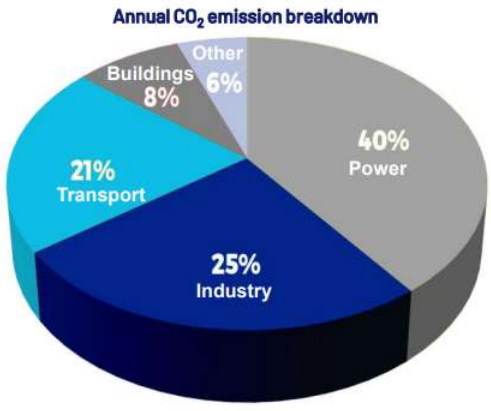
Fig. 7 – Rising average global temperatures



Source: DTZ / NOAA Climate.gov

Some of the key sources of CO_2 emissions include power generation, general industry, transport and buildings, as shown in the chart below. Notably, power generation and industrial processes account to ~65% of global emissions, or ~24Gt of CO_2 every year. These are the industries that DTZ is targeting.

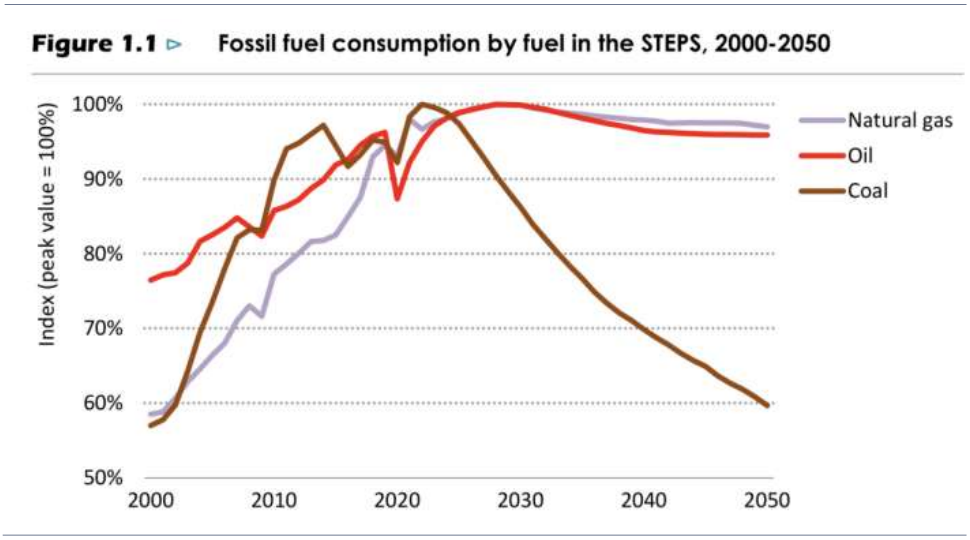
Fig. 8 – Key sources of CO_2 emissions



Source: DTZ / IEA (Net Zero by 2050)

According to International Energy Agency (IEA) forecasts, fossil fuels will remain a major energy source for the foreseeable future, as development of renewables cannot substantially replace fossil fuels whilst keeping pace with growth in energy demand. This is demonstrated in the chart below.

Fig. 9 – Future use of fossil fuels



Source: DTZ / IEA

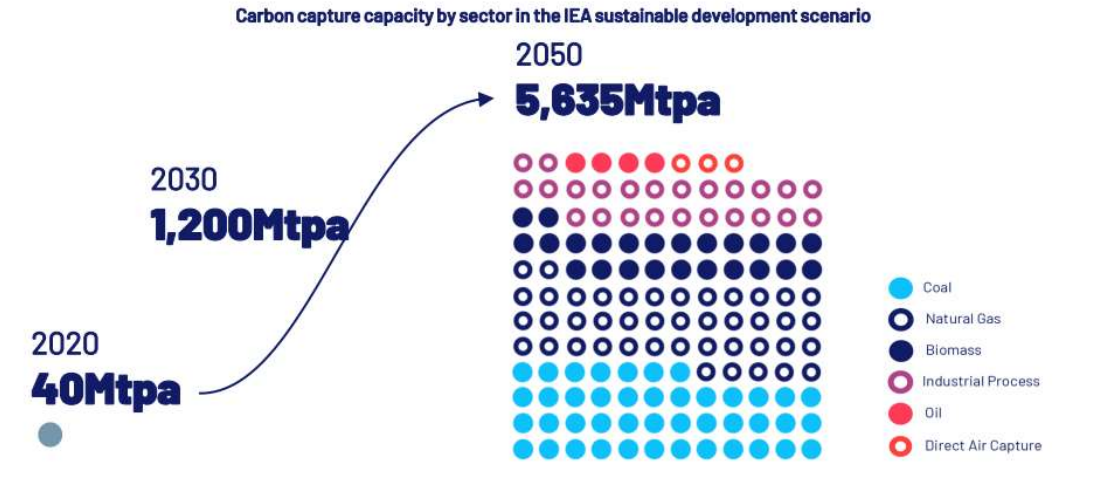
Market opportunity

Given the ongoing need for fossil fuels as an energy source, major emitters face a significant and urgent challenge to meet agreed carbon reduction targets by 2030 and 2050. Carbon capture will likely play a pivotal role in this energy transition.

Specifically, the IEA estimates that in order to limit global warming to 1.5ºC, the following is required:

- 1.2Gtpa of CO_2 must be captured by 2030
- 5.6Gtpa of CO_2 must be captured and sequestered by 2050

Fig. 10 – Global carbon capture capacity by sector



Source: DTZ / IEA Sustainable Development Scenario

Readers should be aware that Corporate Connect Research Pty Ltd has been engaged and paid by the company covered in this report for ongoing research coverage. Please refer to the important disclosure pages of this report for the general advice warning, disclaimer, and full disclosures.

The current rate of carbon capture (2020) is just 0.04Gtpa. This means global carbon capture capacity needs to expand by a factor of ~140x from present levels.

The carbon capture market thus represents a very large opportunity. The market is backed by mounting government policies and budgets aimed at development and adoption of decarbonisation solutions as well as increasing global pricing mechanisms.

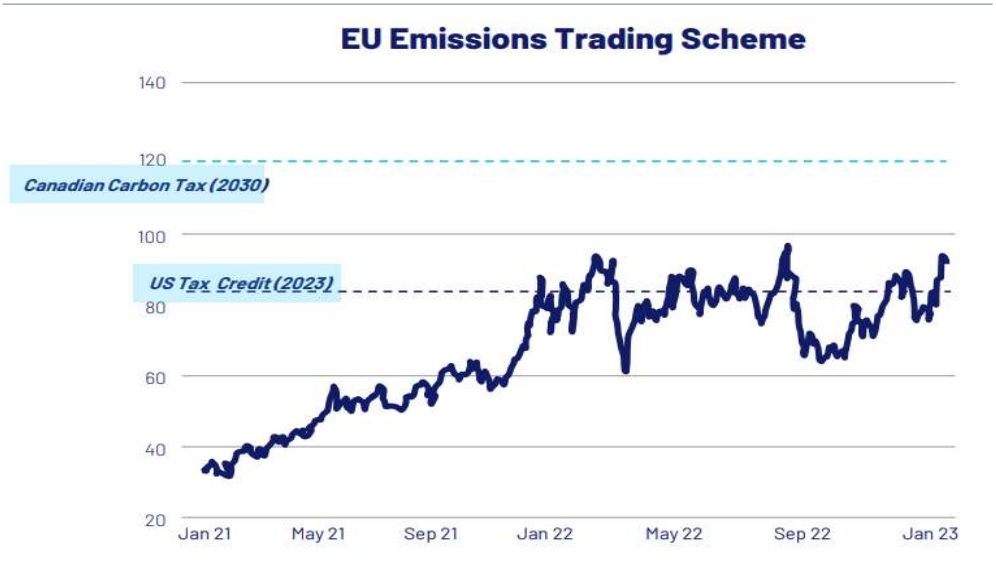
Carbon pricing

There is a value or price of carbon set in many jurisdictions globally, including Europe, Canada, China and some US states. DTZ estimates that ~40% of global emissions are currently covered by some kind of pricing mechanism. The mechanism for setting the price varies, but is usually one of the following, or combination thereof:

- Emissions Trading System
- Carbon Tax
- Tax Credits

In recent years, the value/price of carbon has been increasing, as demonstrated by the EU ETS in the chart below. This rise is driving increased adoption and financial viability of carbon capture. Governments are allocating more financial resources to carbon capture research and development. Incentives provided by Government should provide an additional boost to drive greater investment by emitters to manage their emissions.

Fig. 11 – Carbon pricing trends



Source: DTZ / S&P

The price of emission allowances (EUAs) traded on the EU ETS peaked in Feb 2023 at ~EUR100/t of CO_2. Since then, the EUA price has materially retraced previous gains, particularly since about Oct 2023, to reach ~EUR63/t in mid Mar 2024. Key factors that have driven the decline in recent months include recession concerns and lower emissions from the power and industrial sectors, due to a weaker European economy and lower industrial production. Increased renewable energy capacity has also played a role.

Market estimate

Using the required carbon capture capacity outlined previously, plus an indicative carbon price of US$100/t, DTZ estimates that the size of the global carbon capture market is in the order of US$600bn. This is based on a broad average of current carbon prices under various mechanisms in various jurisdictions and notwithstanding the noted recent price decline for EUAs under the EU ETS.

Readers should be aware that Corporate Connect Research Pty Ltd has been engaged and paid by the company covered in this report for ongoing research coverage. Please refer to the important disclosure pages of this report for the general advice warning, disclaimer, and full disclosures.

Separately, the Office of Clean Energy Demonstrations has estimated that carbon capture represents an addressable market of nearly US$100bn by 2030 and US$600bn by 2050 – just in the US.

Goals and Strategy

DTZ's primary focus is centred on the development and commercialisation of its ground-breaking carbon capture technology, Dotz Earth, as an enabler of carbon neutrality. Simultaneously, the company is continuing discussions with potential customers and partners to secure commercial collaborations for its tagging solution, Dotz Shield.

In the carbon capture space, DTZ's goal is to provide industrial emitters with a sustainable and affordable means to reduce their carbon footprint, capitalising on the estimated US$600bn market opportunity.

The company believes it made significant progress in FY23, delivering against its plan and setting the foundations for growth in FY24 and beyond.

DTZ continues to leverage technical achievements to progress commercial discussions with potential customers and partners to secure commercial collaborations for both its key technologies.

Key short-term objectives for FY24 include:

- Securing a commercial partnership for Dotz Shield.
- Advancing the Dotz Earth technology maturity, including;
  - The establishment of a bench-scale demonstration unit in 1H FY24 (This has recently been completed ahead of schedule).
  - Continued discussions with leading companies to pursue partner licencing/development agreements.

Competition

Authentication Technology – competitive landscape

DTZ has assessed the competitive landscape across the industry use cases for authentication solutions, to identify where its main competition lies. Within the company's target sectors of oil & gas and chemicals manufacturers, the following key competitors were identified.

Fig. 12 – Competitive landscape

	Chemicals	Oil & gas (upstream)	Oil & gas (downstream)
In-product solutions	• TraceTag • Authentix • STCPA • Polysecure • Tailorlux • Security Matters	• TraceTag • Polysecure • Authentix	• STCPA • Polysecure • Authentix
On-product solutions	• Polysecure • VerifyMe • Security Matters		

Source: DTZ

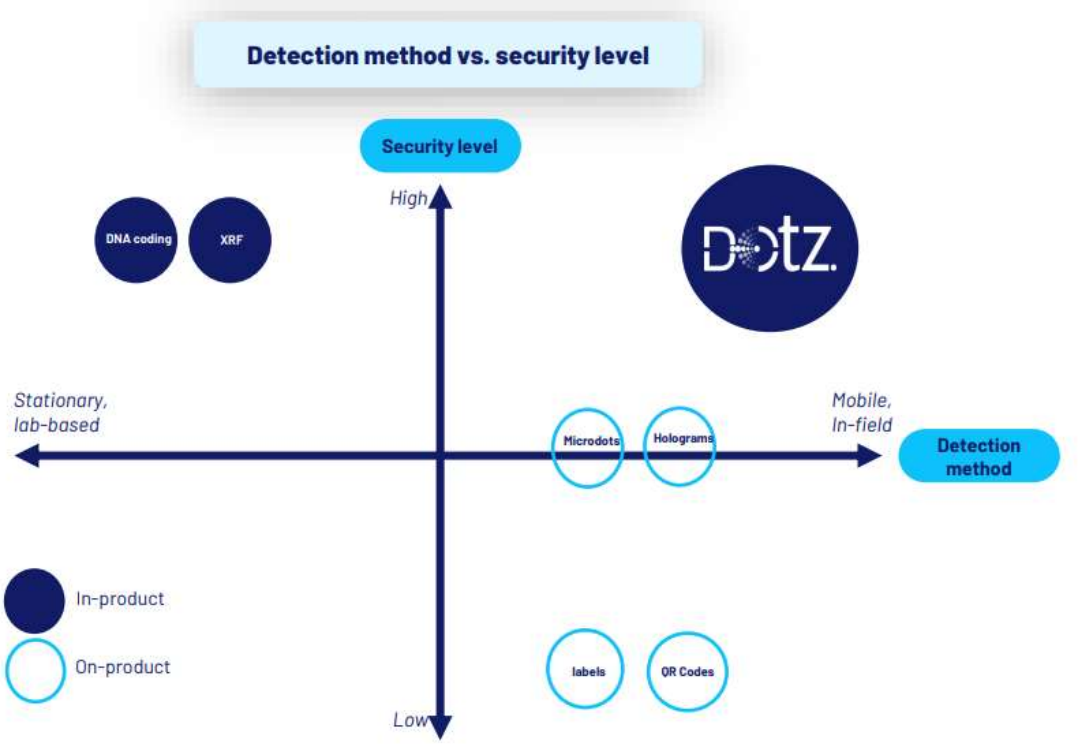
The Dotz Shield product is an in-product technology with the highest level of security solution while also allowing for on-site detection as opposed to slower and expensive lab-based processes used by many competitors.

Readers should be aware that Corporate Connect Research Pty Ltd has been engaged and paid by the company covered in this report for ongoing research coverage. Please refer to the important disclosure pages of this report for the general advice warning, disclaimer, and full disclosures.

Dotz Nano (DTZ)

Nanotechnology solutions for product authentication and carbon capture

Fig. 13 – Competitor attributes



Source: DTZ

Carbon capture – competitive landscape

Carbon capture is one of the only viable solutions to reduce CO_2 emissions from industrial processes and energy production, in order to reach net zero and mitigate the extent of climate change and its adverse effects. Development of efficient and sustainable methods for CO_2 capture is therefore increasingly important.

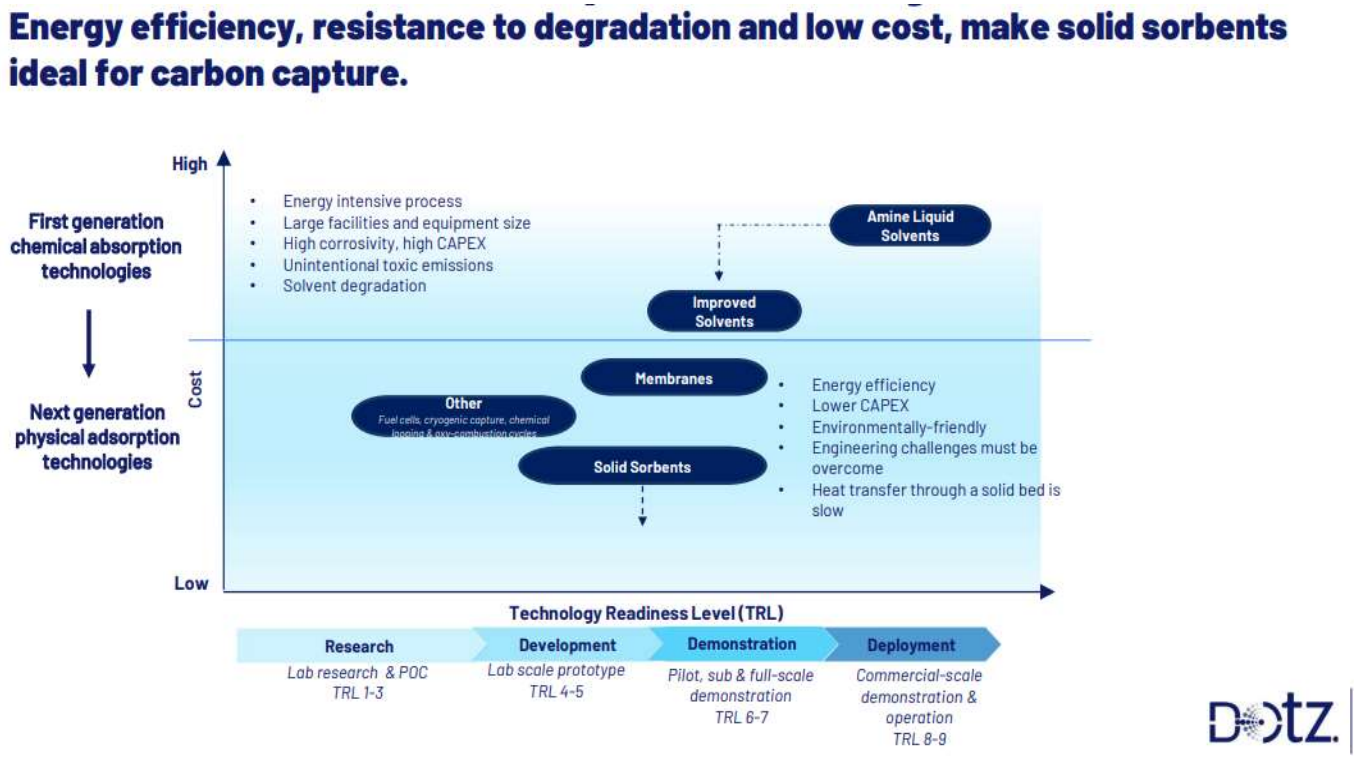
Carbon capture technology background

There are 4 main post-combustion technologies potentially employed for carbon capture processes (in existing plant settings), or hybrid processes that feature various combinations of these technologies.

- Absorption – Absorption (solvent-based) capture is the most mature capture technology, normally involving a heat-driven temperature swing process. The process can offer high capture rates (>98%) and a CO_2 stream with high purity (>99.9%). Most absorption processes are based on aqueous amine technology. Such solvents require emission control and emission monitoring.
- Membranes – Membrane technology is appealing for being operationally simple and not relying on free chemicals. It is inherently an electricity driven process, relying on compression and/or a vacuum. Membranes are well suited for bulk removal of CO_2. However, few membrane technologies are available at high TRL for post combustion applications.
- Cryogenic separation – Cryogenic capture is based on cooling flue gas to the point where phase separation occurs. This is by nature an electricity-driven process and there is an inherent need to remove moisture from the flue gas. There are relatively few developers of cryogenic technology.
- Adsorption – Adsorption involves capture of CO_2 on a solid material. There is a large variety of potential processes and materials that can be employed in CO_2 capture, offering many opportunities for development. Heat integration is usually a challenge with adsorption. There is only a limited number of adsorption technologies that have progressed to high TRL.

Readers should be aware that Corporate Connect Research Pty Ltd has been engaged and paid by the company covered in this report for ongoing research coverage. Please refer to the important disclosure pages of this report for the general advice warning, disclaimer, and full disclosures.

Fig. 14 – The evolution of carbon capture technologies



Source: DTZ

Solid sorbents used for CO_2 capture

Solid sorbent technologies, particularly carbon-based sorbents, have shown great potential to address the main drawbacks of more established aqueous amine-based capture technologies, particularly with respect to driving down the cost of capture.

There are various families of solid sorbents potentially useable for CO_2 capture, some operating at high temperatures and some at low temperatures. These families include[5]:

- Zeolites – Zeolites are crystalline aluminosilicate minerals, with a porous structure, high surface area and good thermal stability. They capture CO_2 through physical adsorption via their microporous structure. However, they are sensitive to moisture and can lose their CO_2 adsorption capacity in humid environments such as flue gasses, when they effectively capture water. Zeolites are also prone to fouling and deactivation due to the presence of impurities in the CO_2 source.
- Activated carbons – Carbon-based solid sorbents are typically highly porous materials with a large internal surface area that can physically adsorb CO_2 due to surface interactions. They typically demonstrate high selectivity, are inexpensive and resistant to impurities.
- Metal-Organic Frameworks (MOFs) – MOFs are crystalline materials comprised of metal ions connected by organic ligands. They demonstrate high porosity and surface area, providing high CO_2 selectivity and adsorption. However, MOFs are prone to degradation under industrial conditions typical in CO_2 capture (e.g. high temperatures, humidity, impurities) and scalability has

[5] Choi et al, ChemSusChem, 2009

not been proven. MOFs are also complex and expensive to produce, making them less economically viable for large scale CO_2 capture applications. In addition, some MOFs may contain toxic or environmentally harmful components (e.g. heavy metals), which makes safe handling, disposal and long-term use problematic.

- Organic-Inorganic hybrids – These materials capture CO_2 through chemisorption as apposed to physisorption for many other solid sorbents. As a consequence, they are highly selective to CO_2.
- Amine-based sorbents – These sorbents contain amines or derivatives and chemically react with CO_2 to form stable compounds. They have high CO_2 selectivity and capacity, but suffer from corrosion issues, are energy intensive to regenerate and can degrade over time. This translates to high costs of capture.
- Calcium-based sorbents – Limestone or Calcium Oxide (lime) react with CO_2 to form stable calcium carbonate. These sorbets can be used in carbonation/calcination cycles to capture CO_2 when exposed to the gas and release it when heated. However, they typically require high temperatures for efficient CO_2 capture and also high energy input to achieve release. The high energy requirements again make these sorbents less economically viable.
- Lithium Zirconate – Lithium Zirconate is a promising material for CO_2 separation from flue gas at high temperature. The material is known to be able to adsorb a large amount of CO_2 with a slow sorption rate. Addition of potassium carbonate can improve the sorption rate.
- Hydrotalcites – Hydrotalcites are a group of minerals that naturally capture atmospheric carbon dioxide.
- Silica-based sorbents – Sorbents such as amorphous silica or mesoporous silica have shown promise for CO_2 capture. They can be functionalised with amine or other reactive groups to boost CO_2 adsorption. While these sorbents have many positive qualities, they also have significant disadvantages, including typically having lower CO_2 capture capacity. This means more sorbent material is needed per unit of CO_2 captured, resulting in higher capital and operating costs. Regeneration of silica-based sorbents is also energy intensive due to high temperatures required.

Low temperature sorbents include Activated carbons, Zeolites and MOFs.

The inherent advantages of solid sorbents mean they are well-placed to become the key commercial technology for carbon capture in coming years.

The carbon capture technology acquired by DTZ is essentially an activated carbon-based solid adsorbent produced from plastic waste. The process involves CO_2 being captured in the product's nanometer pores. It was initially developed at Rice University in Texas, USA. Developed specifically for capturing CO_2, the DTZ nano-porous carbon solid sorbent is ideal for capturing CO_2 from industrial flue gas given its high surface area and porosity.

The characteristics of carbon-based sorbents, such as Dotz Earth, make them a promising and effective approach for large-scale CO_2 capture. In addition, the Dotz Earth sorbent offers a cost effective and environmentally friendly solution to industrial decarbonisation.

Competitive advantages

In the carbon capture market, the ideal sorbent would exhibit properties such as low cost, high stability, high selectivity, high reactivity and water tolerance. Current research in sorbent development is focussed on the key aspects of reducing the heat of reaction (to reduce required energy and cost), increasing adsorption capacity and improving sorbent stability and tolerance to industrial flue gasses containing impurities.

The Dotz Earth sorbent meets these requirements and has specific competitive advantages over other solid sorbents, including:

- Abundant and renewable – The Dotz Earth product is made from an abundant feedstock, waste plastics, and is synthesized using a well-established process known as pyrolysis. The proprietary process of pyrolyzing waste plastics with certain potassium salts also leads to certain by-products including pyrolysis oils and gasses. These can be used to power the process and drive down the cost of synthesis, which makes the Dotz Earth sorbent more economically attractive as well as readily accessible. The production process, unlike some other sorbents, does not rely on rare of limited resources. This makes it more sustainable and feasible for large-scale CO_2 capture applications.
- Tailorable surface properties – The DTZ production process enables highly customisable sorbent surface characteristics, allowing for specific modifications to enhance CO_2 adsorption ability. These modifications include chemical activation, surface functionalisation and pore size engineering to optimise the sorbent's CO_2 capture capacity and selectivity (over N_2).
- High Adsorption capacity – The DTZ sorbent demonstrates high CO_2 adsorption capacity given its unique highly porous structure, which creates a large surface area for CO_2 molecules to interact with and be captured. The high adsorption capacity makes the DTZ sorbent highly efficient in capturing CO_2 from flue gasses and other sources of emissions. The Dotz Earth sorbent has demonstrated a 3-fold higher adsorption capacity compared with a competitive commercial activated carbon.

- Regenerability and reusability – Capturing CO_2 is only part of the challenge, an effective process must also be able to release or convert CO_2 for storage or utilisation. Most carbon-based sorbents offer excellent regenerability, allowing them to be used in a cyclic CO_2 capture process. Regeneration is usually achieved by applying heat, pressure or a combination of both to enable release of CO_2. This ability enhances the economics and environmental sustainability of carbon-based sorbents.
- Versatility and compatibility – Carbon-based sorbents demonstrate compatibility with a wide range of CO_2 sources and capture conditions. They can be used in power plants and industrial facilities and are generally robust and subject to little degradation over time. They can operate effectively under diverse ranges of temperature and pressure, increasing their versatility and adaptability to different CO_2 capture scenarios.

Key Risks

Product development

DTZ's core technologies, particularly Dotz Earth, remain in relatively early stages of development. Whilst testing and development of the technologies to date are highly promising, this is no guarantee of successful development of a commercial product capable of widespread adoption in the market. Even if the company is successful in developing the technologies, there may be risks associated with how the technologies fit in with industry standards and to what extent they are accepted by the market.

Even if the company is able to successfully commercialise its technologies, there is no guarantee that DTZ will be able to achieve a commercial return.

Intellectual property

DTZ seeks to protect its intellectual property through patents. However, there exists ongoing risk of unauthorised use or misuse of its intellectual property or reverse engineering of its technology by competitors.

It is possible that third parties may assert intellectual property infringement, unfair competition or like claims against DTZ under patents or other laws. If the company is forced to defend claims of intellectual property infringement, whether they are with or without merit or are determined in the company's favour, the costs of such litigation may be potentially significant and may divert management's attention from normal commercial operations.

Legal standards relating to the validity, enforceability and scope of protection of intellectual property rights vary across jurisdictions. Effective patent, trademark, copyright and trade secret protection may not be available to DTZ in every country in which the technology may eventually be sold.

Competition and new technologies risk

The carbon capture and authentication industries are subject to global competition which is fast paced and rapidly evolving, though immature. Competitors may succeed in developing alternative products and services which are more innovative, easier to use or more cost effective than those of DTZ. This may cause pricing pressure for DTZ's product offering and may impact on its ability to attract new or retain existing customers/partners.

DTZ's existing or new competitors may have substantially greater resources and access to more markets than the company. The ability of DTZ to respond and adjust to changes in the industry will affect its success and ability to remain competitive.

Maintenance of key relationships

DTZ relies on relationships with key development partners (Rice University and SINTEF) and strategic partnerships (industrial emitters and engineering companies) to enable it to continue to develop its products. The company could lose support from one or more of these partners if it fails to maintain key relationships.

DTZ may also lose strategic relationships if third party business partners are acquired by or enter relationships with a competitor.

Government funding risks

Several of DTZ's key customer target markets are expected to be reliant on government funding and subsidies to some extent. Any material failure by government to support transition to Net Zero could have an adverse impact on DTZ's future sales.

Access to capital

DTZ's operations continue to be focused on development and commercialisation of its technologies. As such, it is unlikely to deliver positive operating cash flow in the short term at least, possibly longer. Combined with a net debt balance as at Dec 2023, the company will be reliant on future capital raisings to sustain its ongoing R&D and to support working capital requirements. Consequently, continued access to sources of capital on favourable terms is a key risk.

Any additional equity financing may be dilutive to existing shareholders and debt financing, if available, may be very expensive and involve restrictive covenants. Regardless of operating performance, unfavourable market conditions may adversely affect the company's ability to access capital.

International conflict

DTZ's operations are largely based in Israel. Given the current situation in the Middle East, there is ongoing risk of disruption to the company's operations.

The group's commercial insurance does not cover losses that may occur as a result of an event associated with the security situation in the Middle East. The reinstatement value of direct damages that are caused by terrorist attacks or acts of war that the Israeli government is currently committed to covering might not be maintained or may not be sufficient to fully compensate DTZ for damages incurred. Any armed conflict involving Israel could result in material adverse impacts to operations.

Readers should be aware that Corporate Connect Research Pty Ltd has been engaged and paid by the company covered in this report for ongoing research coverage. Please refer to the important disclosure pages of this report for the general advice warning, disclaimer, and full disclosures.

Financial Analysis

Business Economics

FY23 Result

DTZ announced its full-year financial results for FY23 (Dec year-end) in Feb 2024. The company reported group revenue of $0.1m, compared with $0.2m in the prior year. The company is still in the process of commercialising its key technologies, so the reported revenue is not reflective of the potential of the business going forward.

At the EBITDA level, the company made an underlying loss of $4.4m (pcp $4.5m loss). In deriving CCR underlying EBITDA, we have excluded a non-cash charge of $0.71m related to share-based payments (pcp $0.02m).

DTZ operating expenses largely comprise R&D costs, sales and marketing, working capital, corporate expenses and other costs incurred and investments made to fast-track commercialisation of the company's technologies.

The FY23 result includes for the first time, results from the acquisition of the carbon capture technology in April 2023.

At the NPAT level, DTZ reported an underlying net loss for FY23 of $5.9m (pcp $5.4m).

Operating cash flow was negative $4.6m, compared with negative $4.8m in FY22.

Outlook

DTZ expects to continue pursuing key milestones in both its Dotz Shield and Dotz Earth technologies as it progresses their development and commercialisation, with a view to delivering significant growth opportunities over time.

The company remains in ongoing discussions with leading participants in the oil & gas and chemicals sectors, with the aim of securing commercial partnerships for the Dotz Shield authentication solution.

For Dotz Earth, the company's primary focus in the short term is to continue development of the technology, combined with the establishment of a small-scale pilot unit to allow further validation and optimisation of the sorbent on a larger scale and in real life industrial environments. Meanwhile DTZ plans to continue its discussions with leading emitters to pursue joint development and demonstration projects.

Capital Management

DTZ listed on the ASX in Nov 2016, raising A$6.0m in new equity through the issue of 30m shares at A$0.20 per share. The proceeds of the IPO were primarily used to fund development of the company's graphene quantum dots technology and to support working capital requirements.

Due to the nature of the DTZ's activities, the company does not have ready access to credit facilities, with the primary source of funding being equity raisings. Therefore, the focus of capital risk management is the current working capital position against the requirements of the group to meet R&D programs and corporate overheads. The company's strategy is to ensure appropriate liquidity is maintained to meet operating requirements, with a view to initiating capital raisings as required.

In Aug 2023, DTZ raised US$2.6m via private placement of 19.8m shares supported by existing shareholders and sophisticated investors. This raising enabled the company to pursue growth initiatives including the new carbon capture technology acquisition and funding of subsequent development. As part of the carbon capture acquisition, DTZ issued 15.7m shares to H2 Blue Tech (see details below).

During FY23 the company also issued a total of 18.25m shares under the Lind funding agreement (see further details below).

As at Dec 2023, DTZ's cash balance was $1.3m (pcp $3.0m). Total debt stood at $3.4m (pcp $2.9m), including the Lind facility balance of $1.87m and lease liabilities. Net debt was $2.0m (pcp $0.2m).

Given the net debt position of the company and significant negative operating cash flows, which are likely to continue at least in the short term, DTZ will need to continue to raise capital to fund ongoing R&D and working capital requirements. The company also believes it will be able to access material funding from government grants and subsidies in coming periods.

Subsequent to the year end, additional funding has been secured (see Mercer funding agreement below).

DTZ is satisfied that the group will have access to sufficient cash to fund its forecast expenditure for a period of at least 12 months from the FY23 Annual Report date.

Readers should be aware that Corporate Connect Research Pty Ltd has been engaged and paid by the company covered in this report for ongoing research coverage. Please refer to the important disclosure pages of this report for the general advice warning, disclaimer, and full disclosures.

The company is not currently paying any dividends and given its stage of growth and current balance sheet and cash flow position, it is unlikely to do so in the near future.

At the date of this report, DTZ's issued capital and other instruments comprise the following:

- 520.5m ordinary shares
- 2.2m convertible notes maturing 31 Jul 2025 (held by Mercer)
- 71.4m options of various expiry dates and exercise prices

The above totals include all first tranche notes, options and shares issued to Mercer, but none of the subsequent tranches.

Mercer funding agreement

In early Feb 2024, DTZ secured a new funding agreement for up to A$12m (US$8.2) with Mercer Street Global Opportunity Fund LLC, a US-based investment fund managed by Mercer Street Capital Partners LLC. Under the agreement, DTZ will issue to Mercer up to 13.2m convertible notes at a face value of A$1.00 each. This will be done in several tranches, as follows:

- First tranche – 2.20m notes issued initially to raise A$2.0m, with DTZ granting Mercer general security over all of its assets.
- Second tranche – 1.65m notes to be issued no later than 29 Feb to raise A$1.5m.
- Third tranche – 1.65m notes to be issued in Mar 2024 to raise a further A$1.5m, subject to obtaining shareholder approval at a general meeting of shareholders to be held no later than 15 March.
- Subsequent tranches – Further notes to raise up to A$7.0m, subject to agreement by DTZ and Mercer.

Furthermore, in addition to the convertible notes, DTZ will also concurrently issue to Mercer the following securities under the terms of the agreement:

- First tranche – 2,857,143 options and 475,889 shares (both for no consideration).
- Second tranche – 2,142,857 options (for no consideration).
- Third tranche – 2,142,857 options and 475,889 shares (both for no consideration).
- Subsequent tranches – such number of options (for no consideration) which is equal to 50% of the investment amount in respect of each subsequent convertible note issue divided by $0.35, plus for the initial subsequent tranche 1,332,448 shares (for no consideration).

Each Mercer option entitles the holder to subscribe for 1 fully paid ordinary share in DTZ, at an exercise price of $0.35. The options may be exercised at any time and each option expires 36 months after issue.

The proceeds of the convertible notes issue will be used primarily to accelerate the development of the Dotz Earth carbon capture technology and support the company's general working capital requirements.

Lind funding agreement

In Sep 2022, DTZ entered into an agreement with Lind Global Fund II LP, a fund managed by The Lind Partners, for an investment of A$5.15m (US$3.39m). The funding facility provided was a hybrid instrument, which included a combination of debt and a derivative conversion feature.

Under the agreement, DTZ received the investment total of A$5.15m upfront as an advance payment, in return for options and an advance payment credit worth A$5.65m, which could be used to subscribe to placement shares during the term of the funding (being 24 months plus a 6-month extension option).

DTZ issued 5.5m initial shares to Lind on the funding date at A$0.45 per share, together with 7.1m options at an exercise price of A$0.475 per share (expiring 48 months after the date of issue).

During FY23, DTZ issued 18.25m shares at a deemed issue price of A$0.12 - A$0.20 in respect of the funding agreement. This amounted to a total value of A$2.9m (US$1.97m).

As at Dec 2023, the balance of the facility was A$2.75m (US$1.87m).

In Jan 2024, DTZ issued 3.33m shares at a deemed issue price of A$0.12 under the funding agreement. Later in the month, the company repaid Lind the remaining unused advance payment credit of A$2.35m (US$1.6m).

Readers should be aware that Corporate Connect Research Pty Ltd has been engaged and paid by the company covered in this report for ongoing research coverage. Please refer to the important disclosure pages of this report for the general advice warning, disclaimer, and full disclosures.

Carbon capture technology acquisition

The acquisition of H2 Blue Tech's carbon dioxide (CO_2) capture assets and technology in May 2023 comprised a performance-based deal structure consisting of upfront consideration and additional deferred consideration, consisting of cash, fully paid ordinary shares in DTZ and options over shares, payable upon achievement of certain milestones. The milestones can be satisfied at any time within 3 years of completion.

The terms of the asset purchase agreement is summarised below. Note that DTZ has amended the agreement such that $0.3m of the upfront cash payable will be settled by issue of an additional 3.8m shares instead.

Fig. 15 – H2 Blue Tech asset purchase agreement consideration

	Performance Milestone	Shares (m)	Options (m) (Ex price)	Cash (US$m)
On close		15.7	8.0 ($0.80)	0.75
Earn out A	Upon successful scale-up production of carbon-based sorbent from recycled plastic that meets pre-defined performance parameters.	7.5	8.0 ($0.85)	
Earn out B	Upon lab-scale pilot unit with a capacity of capturing 1.0t per day of CO_2 at an efficiency rate of 90%	7.5	8.0 ($0.90)	0.55
Earn out C	Upon (i) a non-diluting and non-refundable grant funding of $5m and (ii) partnership with at least US$3m investment in the CO_2 capture activity with a major strategic partner.	7.9	9.0 ($0.95)	0.55
Earn out D	Upon successful recruitment of carbon capture leadership team and special matter experts.	1.4		0.53
	Total maximum consideration payable on achievement of milestones	**40.0**	**33.0**	**2.38**

Source: DTZ

Forecasts and valuation

Given DTZ's very early stage of development, with both of its key technologies still in the process of being commercialised, it is extremely difficult to make any meaningful projections of the company's future potential earnings, cash generation and balance sheet. There is naturally a very high level of uncertainty around any potential forecast assumptions until the company is able to advance its business plans and strategy to a point where more reliable assumptions and estimates and be made.

Accordingly, we have not developed any forecasts or valuation for DTZ at this stage, pending further progress with the commercialisation of the company's authentication and carbon capture technologies.

Readers should be aware that Corporate Connect Research Pty Ltd has been engaged and paid by the company covered in this report for ongoing research coverage. Please refer to the important disclosure pages of this report for the general advice warning, disclaimer, and full disclosures.

Appendix 1: Board of Directors

Mr Bernie Brookes AM

Non-Executive Chairman

BA, Dip Ed

Mr. Brookes is an experienced Australian executive, CEO and Chairman with substantial expertise in retail, supply chain management, wholesale operations and IT systems. He has more than four decades of business management experience. Previously he was a senior Executive at Woolworths, CEO of Myer Holdings Limited for nine years and Edcon South Africa for three years.

Mr. Brookes strengths include expertise in business management, displaying energy and self-confidence with the ability to find solutions to complex situations through analytical, conceptual and entrepreneurial skills. Ultimately, he is motivated by results.

Mr Brookes advises to Private Equity companies, owns a number of Retail Accessories businesses and runs a number of retail awards and scholarships. He was awarded an Order of Australia for his efforts in retail and Philanthropy and for over 30 years has been the Patron of Australia's largest retail industry award.

Mr Sharon Malka

CEO and Executive Director

Certified Public Accountant, B.Sc. in Business Administration and MBA

Mr Malka is an accomplished senior executive with over 20 years of strategic, operational, commercial and financial leadership in innovative technology companies.

Prior to joining Dotz, Mr Malka served as Chief Executive Officer of MediWound Ltd, a Nasdaq-listed biopharmaceutical company. Prior to that, he was a partner at Variance Economic Consulting Ltd., a multi-disciplinary consulting boutique, specialising in financial services for international and local Hi-Tech clients. Mr. Malka now serves on various boards of biotechnology companies.

Mr Glenn Kelly

Non-Executive Director

B.Sc (Hons) in Civil Engineering, MBA

Glenn Kelly has over 35 years of operational, business development and strategic leadership in the natural resources and clean technology sectors.

He started his career in oil and gas exploration for Chevron Canada Resources. Mr. Kelly then undertook to develop underground storage of natural gas in Eastern Canada, as founder and President of Intragaz Inc. He was then named President of Rabaska Inc., a $1 billion LNG import terminal project, after which he was named President and CEO of CO2 Solutions, which developed proprietary carbon capture technologies used for greenhouse gas reductions. In 2013 he was named Vice-President and COO of Orbite Aluminae, a producer of high purity alumina used in the fabrication of lithium-ion batteries. He was promoted to President in 2014 until the sale of the company to an Australian mining company in 2019. Mr. Kelly now serves on various boards and acts as a strategic consultant to technology companies.

Readers should be aware that Corporate Connect Research Pty Ltd has been engaged and paid by the company covered in this report for ongoing research coverage. Please refer to the important disclosure pages of this report for the general advice warning, disclaimer, and full disclosures.

Mr Doron Eldar

Non-Executive Director

BA in Business Economics

Mr. Eldar brings more than a decade of experience in senior leadership roles and is currently a Melbourne-based partner at venture capital fund SIBF and Oxen9. Mr Elder has extensive experience within start-up and pre-revenue companies, executing the development of new business models, channel growth and effective go-to-market strategies.

Ms Kerry Harpaz

Non-Executive Director

LL.B - College of Management Academic Studies, Israel

Practical Legal Training- The Collage Of law, Sydney, Australia

Mind, Brain and Behaviour 1 – Psychology Course – Melbourne University, Australia

Sustainability and Corporate Responsibility – Macquarie University, Australia

Positive Psychology – Tel Aviv University, Israel

Mrs Harpaz, LLB, has more than 18 years of experience in senior management and leadership with speciality in building large teams with a focus on coaching and mentoring to build successful cultures.

Mr Mitchell Board

Non-Executive Director

B.Sc (Hons) in Economic and Social Sciences, EMBA

Mitchell Board is an experienced executive with over 15 years of experience in carbon markets, global commodities trading, and renewables infrastructure investment. He has worked at top-tier firms, including Trafigura and Mercuria across the UK, Switzerland, Singapore, and Australia.

Mitchell has built and grown international businesses with experience in trading, leadership, management, analysis, investment, contract negotiation, commercial development, logistics and strategy. As Chief Investment Officer and Head of Markets at Climate Friendly, Mr. Board is responsible for the management of one of the world's leading carbon removal portfolios and growth of the company's customer base.

Readers should be aware that Corporate Connect Research Pty Ltd has been engaged and paid by the company covered in this report for ongoing research coverage. Please refer to the important disclosure pages of this report for the general advice warning, disclaimer, and full disclosures.

Dotz Nano (DTZ)

Nanotechnology solutions for product authentication and carbon capture

Dotz Nano (DTZ: A$0.165 / US$0.108)

Valuation data

Year ending Dec	2019	2020	2021	2022	2023
EPS (c)	**0.0**	**(0.7)**	**(1.1)**	**(1.2)**	**(1.1)**
P/E ratio (x)	**0.0**	**(15.7)**	**(9.7)**	**(9.2)**	**(9.5)**
P/E relative					
EPS growth (%)			**61.6%**	**6.2%**	**-3.0%**
EV / EBIT (x)	**0.0**	**0.0**	**0.0**	**0.0**	**(12.3)**
EV / EBITDA (x)	0.0	0.0	0.0	0.0	(13.3)
CFPS (c)	0.0	(0.7)	(1.0)	(1.0)	(0.9)
Price / CF (x)	0.0	0.0	0.0	0.0	(12.0)
DPS (c)	0.0	0.0	0.0	0.0	0.0
Yield (%)	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
Franking (%)	0%	0%	0%	0%	0%
NTA per share	$0.00	$0.02	$0.01	$0.01	$0.00
Pr / NTA	0.0	7.1	9.8	11.5	28.8

Profit and loss (US$m)

Year ending Dec	2019	2020	2021	2022	2023
Sales revenue	0.0	0.4	0.3	0.2	0.1
growth over pcp			*-19%*	*-37%*	*-72%*
EBITDA	0.0	(2.4)	(4.3)	(4.5)	(4.4)
Dep'n and amort'n	0.0	(0.2)	(0.4)	(0.4)	(0.4)
EBITAg	**0.0**	**(2.6)**	**(4.7)**	**(4.9)**	**(4.8)**
Goodw ill amortisation	0.0	0.0	0.0	0.0	0.0
EBIT	**0.0**	**(2.6)**	**(4.7)**	**(4.9)**	**(4.8)**
growth over pcp			*77.7%*	*4.3%*	*-2.6%*
Net interest expense	0.0	0.1	(0.1)	(0.5)	(1.1)
Pre-tax profit	0.0	(2.6)	(4.8)	(5.4)	(5.9)
Tax	0.0	0.0	0.0	0.0	0.0
Effective tax rate	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
Preference dividends	0.0	0.0	0.0	0.0	0.0
Minorities	0.0	0.0	0.0	0.0	0.0
Share of assoc	0.0	0.0	0.0	0.0	0.0
CCR adjustments	0.0	0.0	0.0	0.0	0.0
CCR adj profit	**0.0**	**(2.6)**	**(4.8)**	**(5.4)**	**(5.9)**
Reported profit (pre abn)	0.0	(2.6)	(4.8)	(5.4)	(5.9)
Abn / extra's (after tax)	0.0	(1.4)	(3.1)	0.0	(0.7)
Reported net profit	0.0	(4.0)	(7.9)	(5.4)	(6.6)

Profitability ratios

Year ending Dec	2019	2020	2021	2022	2023
EBITDA / sales (%)	0%	-645%	-1424%	-2366%	-8329%
EBITAg / sales (%)	**0%**	**-703%**	**-1541%**	**-2552%**	**-8995%**
EBIT / sales (%)	**0%**	**-703%**	**-1541%**	**-2552%**	**-8995%**
Return on assets (%)	0%	-45%	-88%	-107%	-72%
Return on equity (%)	0%	-49%	-118%	2206%	-244%
Dividend cover (x)	0.0	0.0	0.0	0.0	0.0

Liquidity and leverage ratios

Year ending Dec	2019	2020	2021	2022	2023
Net debt / (cash) ($m)	0.0	(5.2)	(3.5)	(0.2)	2.0
Debt / equity (%)	0%	1%	15%	-1181%	140%
Net debt / equity (%)	**0%**	**-100%**	**-87%**	**65%**	**84%**
Interest cover (x)					

Segments (US$m)

	2019	2020	2021	2022	2023
Consolidated	0.0	0.4	0.3	0.2	0.1
Other	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.0
Corporate	0.0	0.0	0.0	0.0	0.0
Sales revenue	**0.0**	**0.4**	**0.3**	**0.2**	**0.1**
Consolidated	0.0	(2.4)	(4.3)	(4.5)	(4.4)
Other	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.0
Corporate	0.0	0.0	0.0	0.0	0.0
EBITDA	**0.0**	**(2.4)**	**(4.3)**	**(4.5)**	**(4.4)**

Cashflow (US$m)

Year ending Dec	2019	2020	2021	2022	2023
EBIT	0.0	(2.6)	(4.7)	(4.9)	(4.8)
Net interest paid	0.0	0.1	(0.1)	(0.5)	(1.1)
Dep'n and amort'n	0.0	0.2	0.4	0.4	0.4
Tax paid	0.0	0.0	0.0	0.0	0.0
Dividends from assoc	0.0	0.0	0.0	0.0	0.0
Gross cash from op'n	**0.0**	**(2.4)**	**(4.4)**	**(5.0)**	**(5.5)**
(Inc) / dec in w k'g cap	0.0	0.2	0.2	0.7	(0.5)
Other	0.0	(0.3)	0.1	(0.5)	1.4
Operating cashflow	**0.0**	**(2.4)**	**(4.2)**	**(4.8)**	**(4.6)**
Investing cashflows					
Capital expenditure	0.0	(0.0)	(0.2)	(0.0)	(0.7)
Asset sales	0.0	0.0	0.0	0.0	0.0
Investments / Divestments	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	(0.1)	0.3
Financing cashflows					
Equity raised	0.0	4.8	0.6	0.0	2.6
Dividends paid	0.0	0.0	0.0	0.0	0.0
Chg in loans	**0.0**	**(0.1)**	**(0.2)**	**3.0**	**0.7**
Other non-op flow s	0.0	1.3	3.1	0.9	0.1
Net chg in cash	**0.0**	**3.5**	**(0.8)**	**(1.0)**	**(1.7)**

Balance sheet (US$m)

Year ending Dec	2019	2020	2021	2022	2023
Cash	0.0	5.3	4.1	3.0	1.3
Receivables	0.0	0.2	0.1	0.0	0.2
Inventories	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.0
Current assets	**0.0**	**5.5**	**4.3**	**3.1**	**1.5**
Net PPE	0.0	0.2	0.2	0.2	0.3
Investments	0.0	0.0	0.0	0.0	0.0
Goodw ill	0.0	0.0	0.0	0.0	0.0
Other intangibles	0.0	0.0	0.5	0.3	4.7
Other	0.0	0.0	0.3	1.0	0.1
Non-current assets	**0.0**	**0.3**	**1.1**	**1.5**	**5.1**
Total assets	**0.0**	**5.8**	**5.3**	**4.6**	**6.7**
Debt	0.0	0.0	0.6	2.9	3.4
Payables	0.0	0.4	0.6	1.2	0.9
Other	0.0	0.1	0.1	0.7	0.0
Total liabilities	**0.0**	**0.5**	**1.3**	**4.8**	**4.3**
Equity / reserves	0.0	32.6	39.4	40.4	49.6
Retained profits	0.0	(27.4)	(35.3)	(40.7)	(47.2)
Total s/h funds	**0.0**	**5.2**	**4.1**	**(0.2)**	**2.4**
Minorities	0.0	0.0	0.0	0.0	0.0
Total funds emp.	**0.0**	**5.8**	**5.3**	**4.6**	**6.7**

Model summary as at 21/3/24

Readers should be aware that Corporate Connect Research Pty Ltd has been engaged and paid by the company covered in this report for ongoing research coverage. Please refer to the important disclosure pages of this report for the general advice warning, disclaimer, and full disclosures.

Dotz Nano (DTZ)

Nanotechnology solutions for product authentication and carbon capture

Corporate Connect Research Pty Ltd Independent Research Report Disclaimer

General disclaimer and copyright
This report ("report" or "Research") has been commissioned by the Company the subject of this report ("**Company**") and prepared and issued by Joh Snyman (AR number 1283725) of Corporate Connect Research Pty Ltd ("Corporate Connect Research") (ABN 95640 464 320 – Corporate Authorised Representative (**AR number 1281982**) of Sequoia Asset Management (SAM) (Australian Financial Services Licence (AFSL) Number 341506) in consideration of a fee payable by the Company. Corporate Connect Research may be paid additional fees for the provision of additional services to the Company. Where Corporate Connect Research has been commissioned to prepare content and receives fees for its preparation, fees are paid upfront in cash and NO part of the fee, compensation or employee remuneration paid will either directly or indirectly impact the content provided.

Accuracy of content
All information used in the publication of this report has been compiled from publicly available sources that are believed to be reliable, however Corporate Connect Research does not guarantee the accuracy or completeness of this report and has not sought for this information to be independently verified. Opinions contained in this report represent those of the analyst of Corporate Connect Research (**Joh Snyman AR 1283725**) at the time of publication.
The analyst has received assistance from the Company in preparing this document. The Company has provided the analyst with access to senior management and information on the Company and industry.
From time to time, Corporate Connect Research's representatives or associates may hold interests, transact or hold directorships in, or perform paid services for, companies mentioned in this report. Corporate Connect Research and its associates, officers, directors and employees, may, from time to time, hold securities in the companies referred to in this report and may trade in those securities as principal and in a manner that may be contrary to recommendations mentioned in this report.
As part of due diligence, the analyst has independently and critically reviewed the assistance and information provided by the Company to form the opinions expressed in the report. However, due diligence site visits have not been undertaken at this time. Care has been taken by the analyst to maintain objectivity in preparing this report and making any recommendation. The analyst is responsible for ensuring that this report accurately reflects his or her view of the matters set out in it and that it was prepared in an independent manner.
Forward-looking information or statements in this report contain information that is based on assumptions, forecasts of future results and estimates of amounts not yet determinable, and therefore involve known and unknown risks, uncertainties and other factors, which may cause the actual results, performance or achievements of their subject matter to be materially different from current expectations. This report is prepared as at the date stated in it, and to the maximum extent permitted by law, Corporate Connect Research (on its own behalf and on behalf of the analyst) disclaims any responsibility to inform any recipient of this report of any matter that subsequently comes to its notice, which may affect any of the information contained in this report.

Exclusion of liability
To the fullest extent allowed by law, Corporate Connect Research (on its own behalf and on behalf of the analyst) shall not be liable to any person for any direct, indirect or consequential losses, loss of profits, damages, costs or expenses incurred or suffered by you or any other person arising out or in connection with the access to, use of or reliance on any information contained in this report.
No guarantees or warranties regarding accuracy, completeness or fitness for purpose are provided by Corporate Connect Research (on its own behalf and on behalf of the analyst), and under no circumstances will any of Corporate Connect Research's analysts, representatives, associates or agents be liable for any loss or damage, whether direct, incidental or consequential, caused by reliance on or use of the content.

General advice warning
This report and any other Research must not be construed as personal advice or recommendation nor as an inducement to trade the report's named company or any other security. Corporate Connect Research encourages investors to seek independent financial advice regarding the suitability of investments for their individual circumstances and recommends that investments be independently evaluated. Investments involve risks and the value of any investment or income may go down as well as up. Investors may not get back the full amount invested. Past performance is not indicative of future performance. Estimates of future performance are based on assumptions that may not be realised. If provided, and unless otherwise stated, the closing price provided is that of the primary exchange for the issuer's securities or investments. The information contained within the Research is published solely for information purposes and is not a solicitation or offer to buy or sell any financial product or participate in any trading or investment strategy.
Analysis contained within the Research is based upon publicly available information and may include numerous assumptions. Investors should be aware that different assumptions can and do result in materially different results. The Research is distributed only as may be permitted by law. It is not intended for distribution or use by any person or entity located in a jurisdiction where distribution, publication, availability, or use would be prohibited. Corporate Connect Research makes no claim that the Research content may be lawfully viewed or accessed, whether inside or outside of Australia. Access to the Research content may not be legal for certain persons and in certain jurisdictions. If you access this service or content from outside of Australia, you are responsible for compliance with the laws of your jurisdiction and/or the jurisdiction of the third party receiving such content. The Research is provided to our clients through our website and our distribution partners (www.sharecafe.com.au and www.informedinvestor.com.au).
Some Research products may also be made available to our clients via third party vendors or distributed through alternative electronic means as a convenience. Such alternative distribution methods are at Corporate Connect Research's discretion.

Access and use
Any access to, or use of, the Research is subject to the Terms and Conditions of Corporate Connect Research. By accessing or using the Research you hereby consent to Corporate Connect Research collecting and using your personal data (including cookies) in accordance with our Privacy Policy (https://corporateconnect.com.au/privacy/), including for the purpose of a) setting your preferences and b) collecting readership data so Corporate Connect Research may deliver an improved and personalised service to you. If you do not agree to our Terms and Conditions and/or if you do not consent to Corporate Connect Research's use of your personal data, please do not access this service.
Copyright of the information contained within the Research (including trademarks and service marks) are the property of the irrespective owners. The Research, or any portion thereof, may not be republished, reprinted, sold, or redistributed without the prior and written consent of Corporate Connect Research.

Australia
Corporate Connect Research Pty Ltd is a Corporate Authorised Representative (1281982) of Sequoia Asset Management Pty Ltd who holds an Australian Finance Services Licence (Number: 341506) which allows Corporate Connect Research to offer financial service advice to wholesale and retail clients. Any advice given by Corporate Connect Research is general advice only and does not consider your personal circumstances, financial situation, needs or objectives. You should, before ac ting on this advice or making any investment decision or a decision about whether to acquire or dispose of a financial

product mentioned in any Research, consider the appropriateness of the advice, having regard to your objectives, financial situation, and needs. If our advice relates to the acquisition, or possible acquisition, of a particular financial product you should read any relevant Product Disclosure Statement or like instrument, and also seek independent financial, legal and taxation advice.

New Zealand
The Research in this document is intended for New Zealand resident professional financial advisers or brokers This is not a solicitation or inducement to buy, sell, subscribe, or underwrite any securities mentioned or in the topic of this document. For the purpose of the FAA, the content of this report is of a general nature, is intended as a source of general information only and is not intended to constitute a recommendation or opinion in relation to acquiring or disposing (including refraining from acquiring or disposing) of securities. The distribution of this document is not a “personalised service” and, to the extent that it contains any financial advice, is intended only as a “class service” provided by Corporate Connect Research within the meaning of the FAA (i.e., without taking into account the particular financial situation or goals of any person). As such, it should not be relied upon in making an investment decision.

United Kingdom
This document is prepared and provided by Corporate Connect Research for information purposes only and should not be construed as an offer or solicitation for investment in any securities mentioned or in the topic of this document. A marketing communication under FCA Rules, this document has not been prepared in accordance with the legal requirements designed to promote the independence of investment research and is not subject to any prohibition on dealing ahead of the dissemination of investment research.
This Communication is being distributed in the United Kingdom and is directed only at (i) persons having professional experience in matters relating to investments, i.e. investment professionals within the meaning of Article 19(5) of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005, as amended (the "FPO") (ii) high net-worth companies, unincorporated associations or other bodies within the meaning of Article 49 of the FPO and (iii) persons to whom it is otherwise lawful to distribute it. The investment or investment activity to which this document relates is available only to such persons. It is not intended that this document be distributed or passed on, directly or indirectly, to any other class of persons and in any event and under no circumstances should persons of any other description rely on, or act upon, the contents of this document.
This Communication is being supplied to you solely for your information and may not be reproduced by, further distributed to or published in whole or in part by, any other person.

United States
Corporate Connect Research relies upon the "publishers' exclusion" from the definition of investment adviser under Section202(a)(11) of the Investment Advisers Act of 1940 and corresponding state securities laws. This report is a bona fide publication of general and regular circulation offering impersonal investment-related advice, not tailored to a specific investment portfolio or the needs of current and/or prospective subscribers. As such, Corporate Connect Research does not offer or provide personal advice and the research provided is for informational purposes only. No mention of a particular security in this report constitutes a recommendation to buy, sell or hold that or any security, or that any particular security, portfolio of securities, transaction or investment strategy is suitable for any specific person.

Analyst Verification
I verify that I, Joh Snyman, have prepared this research report accurately and that any financial forecasts and recommendations that are expressed are solely my own personal opinions. In addition, I certify that no part of my compensation is or will be directly or indirectly tied to the specific recommendation or financial forecasts expressed in this report.

For more information contact Corporate Connect

https://www.corporateconnect.com.au/

Level 7
7 Macquarie place
Sydney NSW 2000

Phone: +61 400 897 559

Email: enquiries@corporateconnect.com.au
https://www.corporateconnect.com.au/