Nanotechnology Powering Industry and Environment

Dotz Nano Limited [ASX:DTZ] Corporate Deck

September 2024

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Dotz at a Glance.

VALIDATED PROPRIETARY TECHNOLOGIES

Patent protected, superior nanotechnology for cost-effective, wide-scale CO_2 capture

Validated commercial technology for in-product authentication

ATTRACTIVE TARGETED MARKETS

Early phase booming market

STRATEGIC PARTNERSHIPS

Development and commercial partnership including SINTEF, Rice University and Melbourne University

SUPERIOR ENVIRONMENTAL PROFILE

Creating a circular economy, utilizing plastic waste, clear pathway to net-zero

BUILT FOR GROWTH

Highly scalable licensing business model

Dotz EARTH

Carbon Capture

Development

Dotz SHIELD

In-product Authentication

Commercial

Strategic partners.

SINTEF

RICE UNIVERSITY

GLOBAL CCS INSTITUTE

Experienced leadership team with proven experience in leading growth and value.

EXECUTIVE TEAM

Sharon Malka

CEO

Michael Shtein, Ph.D.

Founder, CTO

Liat Bar Ziv Alperovitz

CFO

Shirley Shoshaney-Kleiner

CMO

BOARD OF DIRECTORS

Bernie Brookes

Chairman

Doron Eldar

Director

Kerry Harpaz

Director

Glenn Kelly

Director

Mitchell Board

Director

DOTZ.EARTH

CO_2 Capture

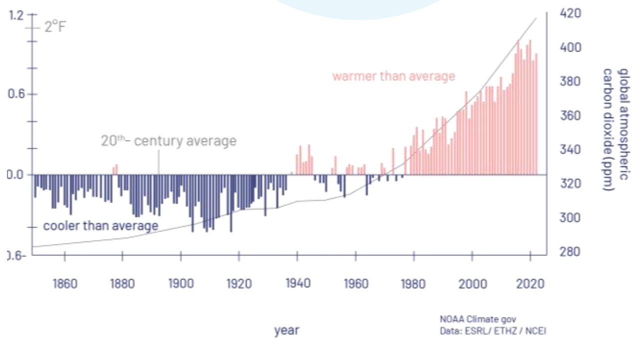
Carbon capture plays pivotal role in energy transition.

1

CO_2

concentration increase
from fossil fuel

Yearly global surface temperarture and atmospheric carbon dioxide (1850-2022)

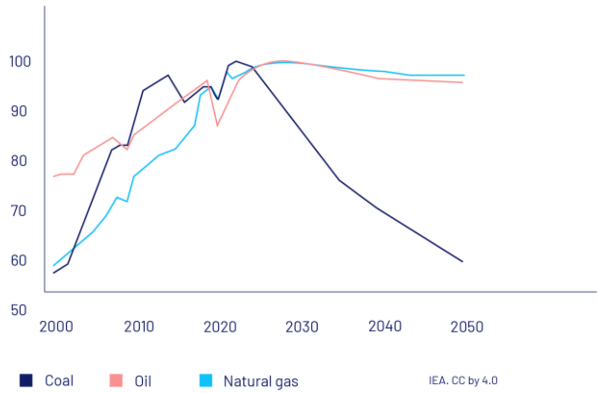


2

Fossil Fuel

Remains a key energy source

Fossil fuel consumption by fuel in the STEPS, 2000-2050

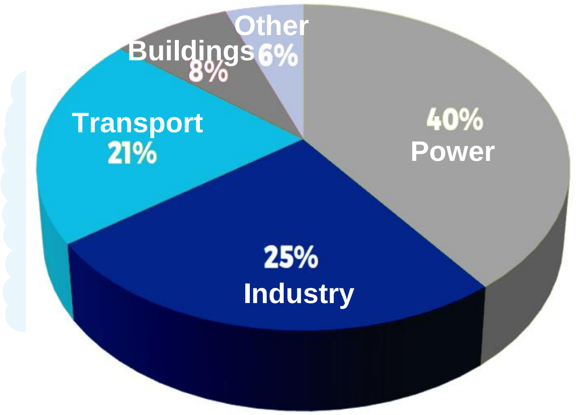


3

Energy combustion & industrial processes

account for ~65% of global CO_2 emissions

Annual CO_2 emission breakdown

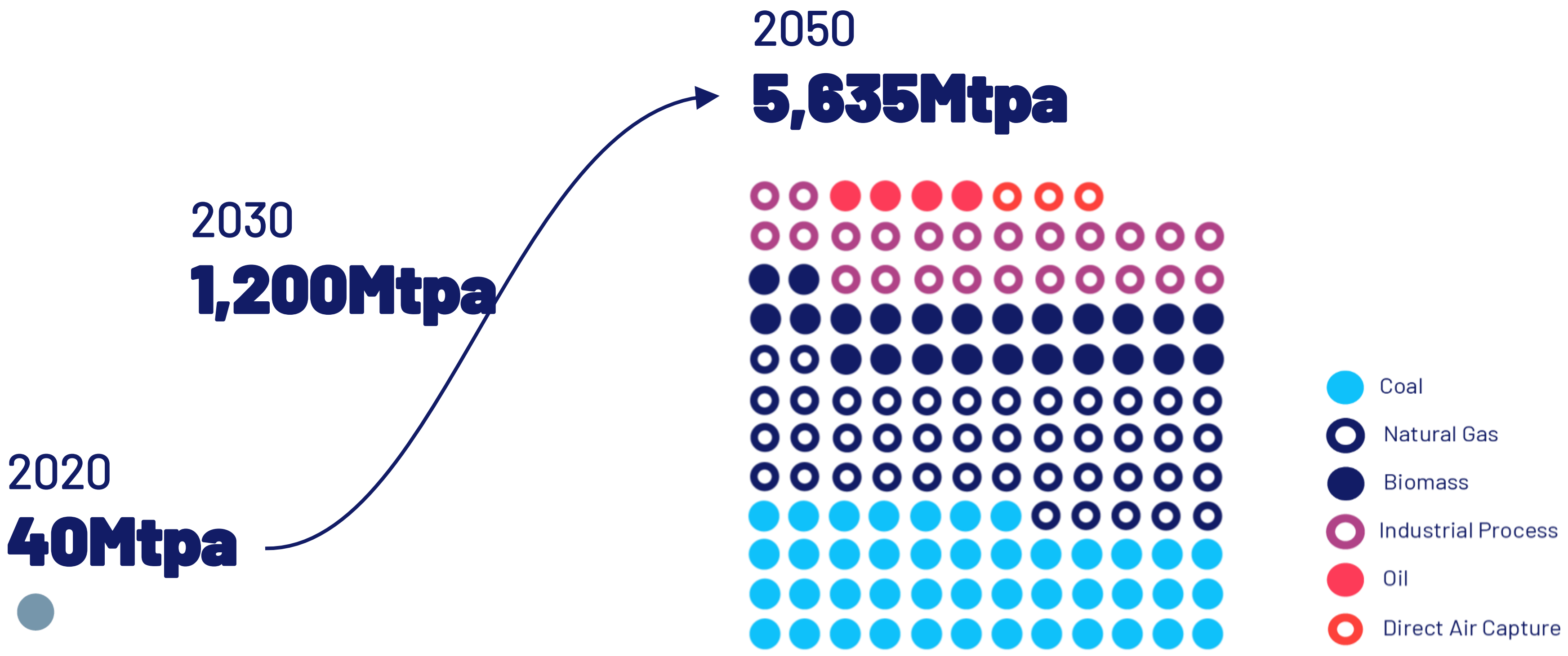


Source: International Energy Association, Net Zero by 2050

A large and growing market

Carbon capture capacity must grow more then 100x.

Carbon capture capacity by sector in the IEA sustainable development scenario



Source: International Energy Association

An urgent problem

Early phase of booming market while market drivers support CCS market attractiveness.

Pricing

40% of global emissions presently covered by pricing mechanism (Emissions Trading Systems, Carbon Taxes, or Tax Credits)

Incentives

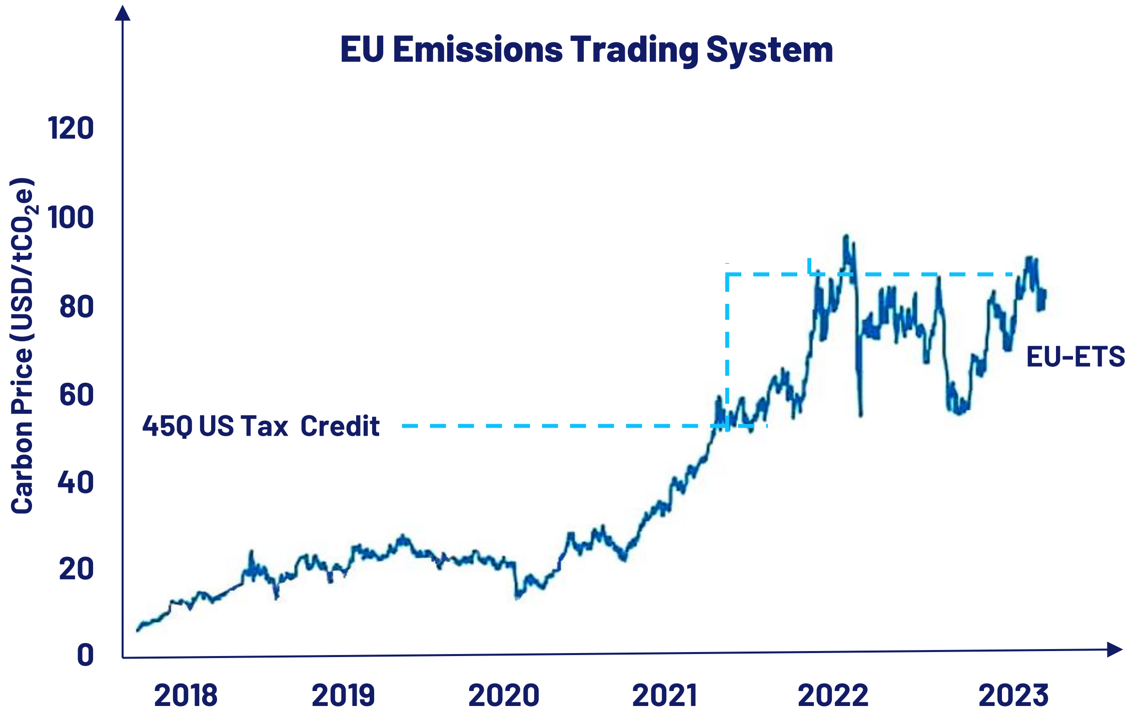
CCS incentives are increasing globally

Lower costs

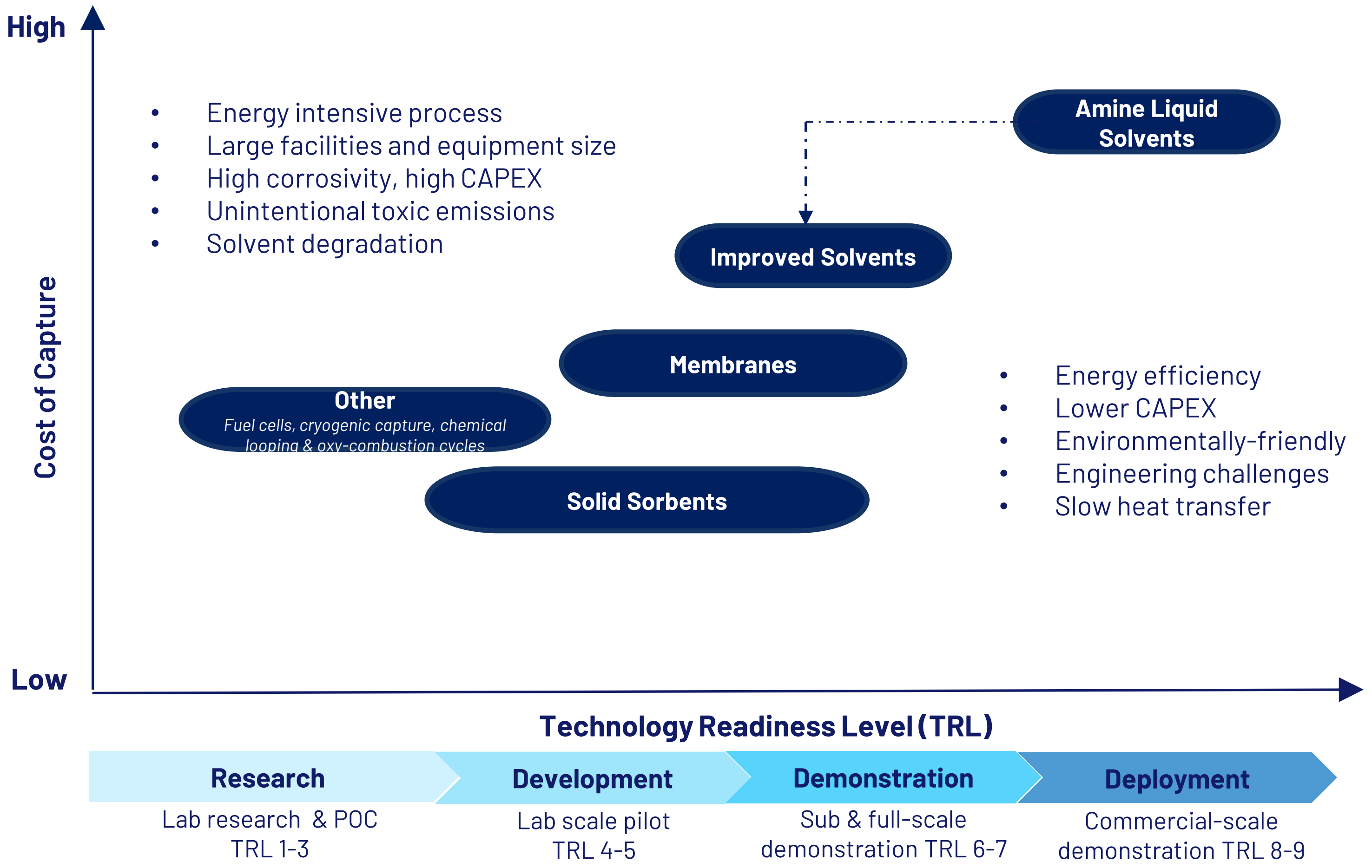
Costs are decreasing as technologies and projects mature

Storage

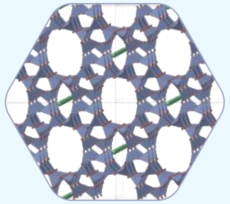
Transportation and storage availability is accelerating



Energy efficiency, resistance to degradation and low cost, make nanoporous carbon sorbent ideal for carbon capture.

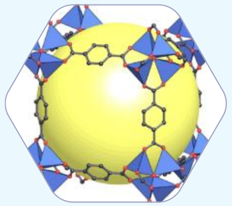


Zeolite



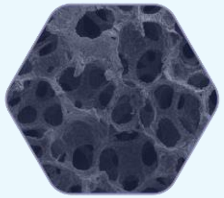
- Cost of sorbent
- Selectivity
- Thermal stability
- Resistance to H_2O
- Resistance to impurities

Metal organic frame-work



- CO_2 capacity
- Selectivity
- Resistance to H_2O
- Cost of sorbent
- Resistance to impurities

Porous materials

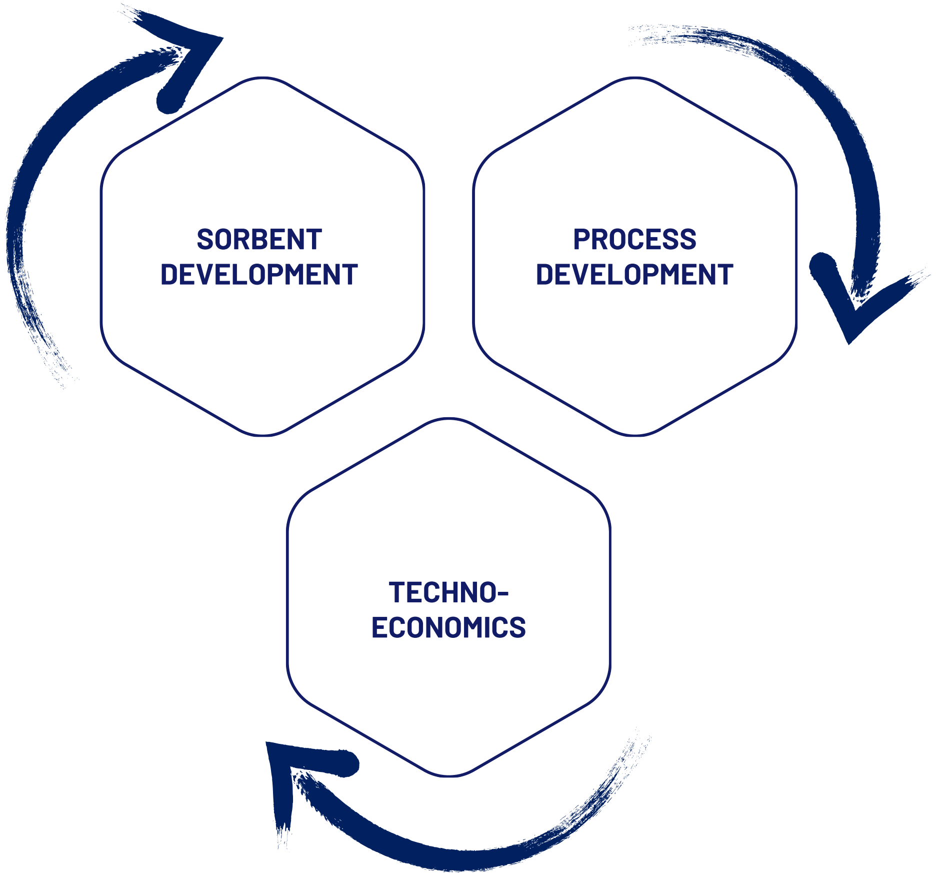


- CO_2 capacity
- Selectivity
- Resistive to impurities
- Inexpensive

Source :Next generation carbon capture technology: technology review work package 2 (publishing.service.gov.uk)

Tuning sorbent, process & economics to enable cost-efficient low-carbon cement production.

Innovative porous structured sorbentsoffer high CO_2 adsorption, high selectivity and low heat duty
- Ability to modify sorbent physical, chemical & mechanical characteristics
- Simplify amine binding
- Scalable synthesis process

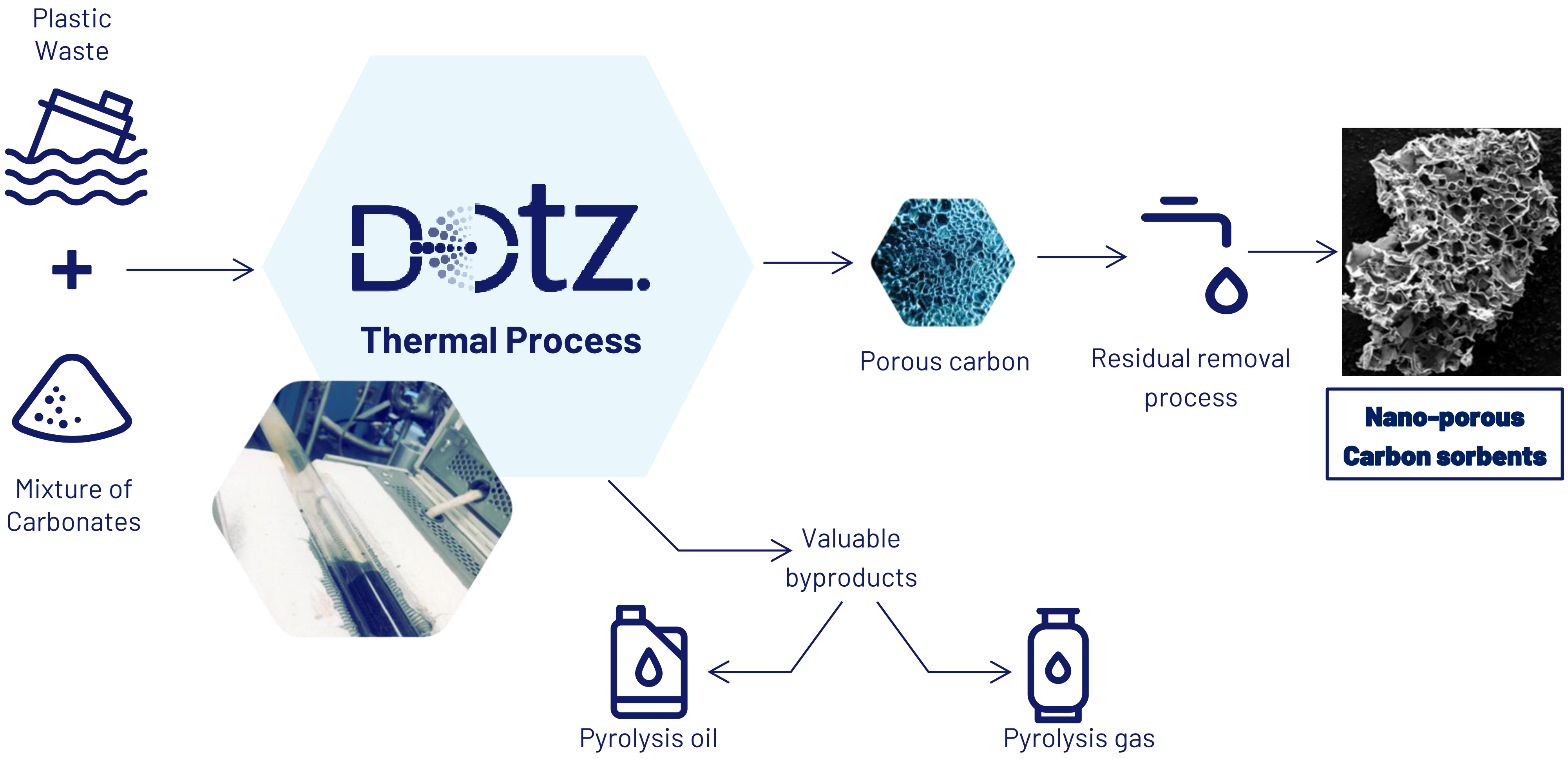


Adjusting capture processes to sorbent and targeted applications
- Process simulations
- Demonstration of process concepts
- Optimize process design

Ongoing techno-economic assessments
- Technical and economic evaluations
- Focus on cost reduction

Dotz

Patented synthesis method for converting plastic waste into porous carbon sorbents.



Abundant, low-cost feedstock

Pyrolysis is mature process & scalable

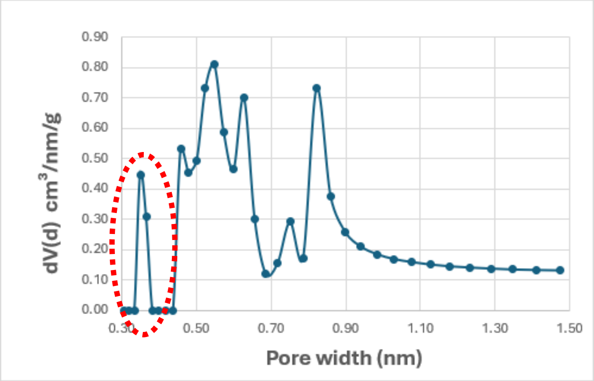
Valuable byproducts: energy recycling & cost reduction

Tunable porosity & surface properties

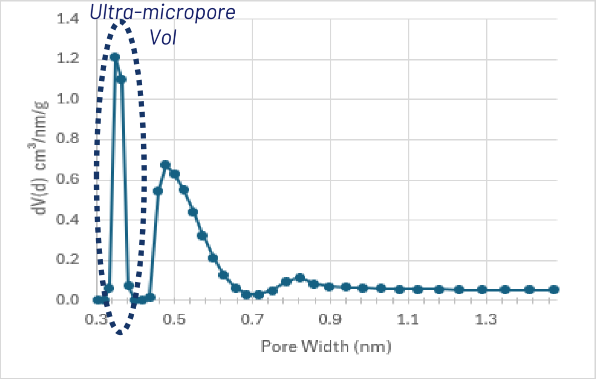
Pore volume & distribution ideal for CO_2 capture.

Dotz's innovative nano-porous sorbents have high volume of fine micropores that are responsible for the physical adsorption of CO_2 and with a very high surface area

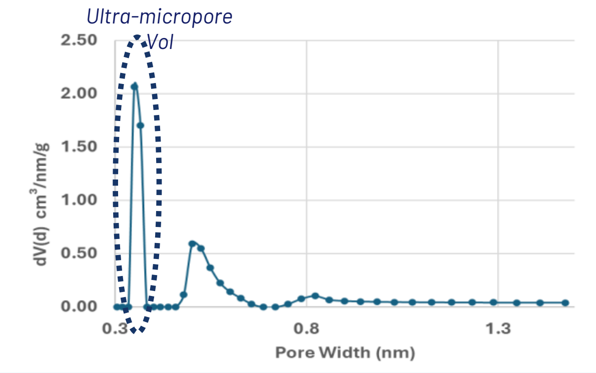
Commercial Activated Carbon* pore volume and distribution



Dotz NPC pore volume and distribution, with ultra-micropore volume ideal for CO_2



Dotz NPP pore volume and distribution, with ultra-micropore volume ideal for CO_2



CO_2 molecule
0.33nm diameter

- *Provided by Blücher (Germany)*
- *NPC – nano-porous carbon sorbent*
- *NPP – nano-porous polymeric sorbent*

Superior technology

A new era of sorbents powered by nanotechnology enabling wide-scale, cost effective CO_2 capture.

High CO_2 adsorption capacity

Facilitated by unique structure & surface area

High selectivity

Of CO_2 over N_2

Low moisture affinity

Insensitiveness to humidity

Resistance to impurities

Associated with flue gas such as SOx and NOx

Lower energy penalty

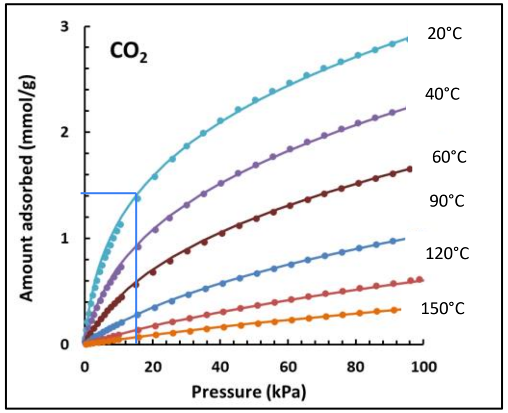
Less energy requirments for sorbent regenration

Regenerable and reusable

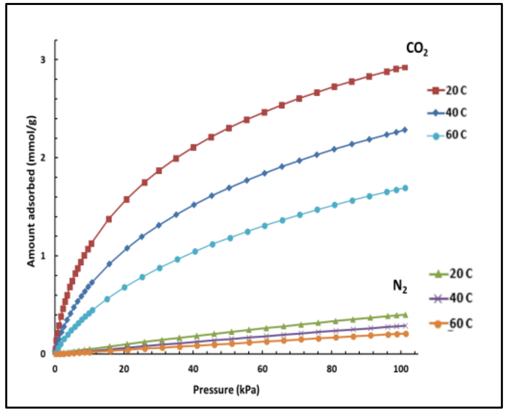
For multiple cyclic capture processes

Validation testing demonstrated enhanced properties.

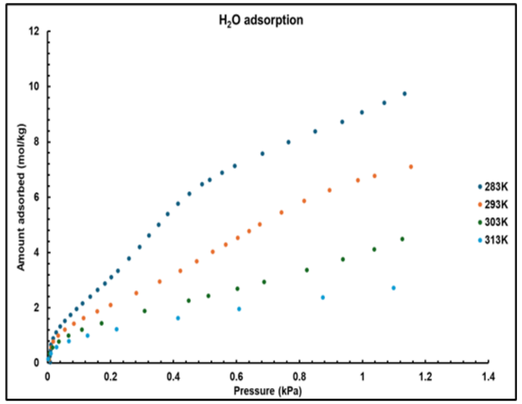
Dotz's nano-porous carbon sorbent



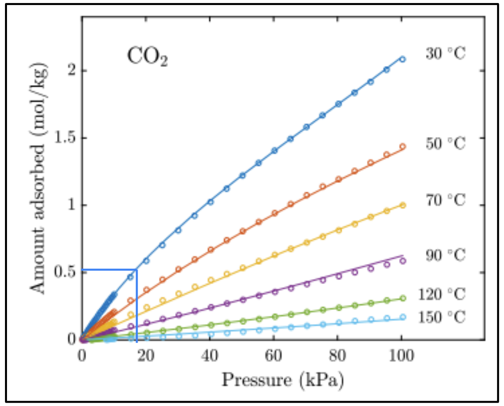
Dotz's nano-porous carbon sorbent



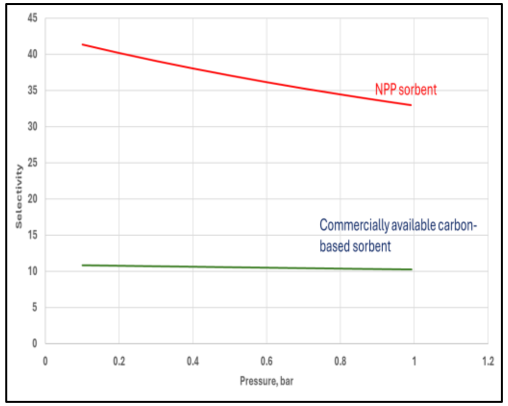
Dotz's nano-porous carbon sorbent



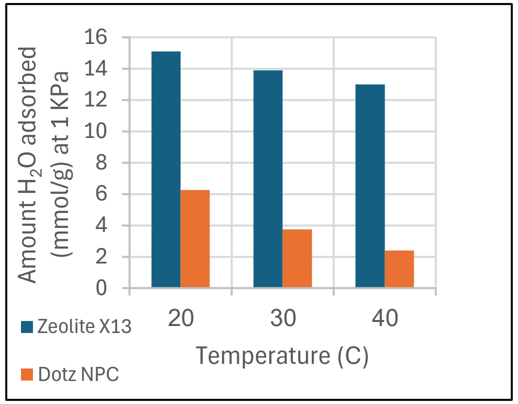
Commercial activated carbon*



Commercial activated carbon*



Commercial zeolite



3X higher adsorption capacity (at 10-20 kPa) compared to commercial AC

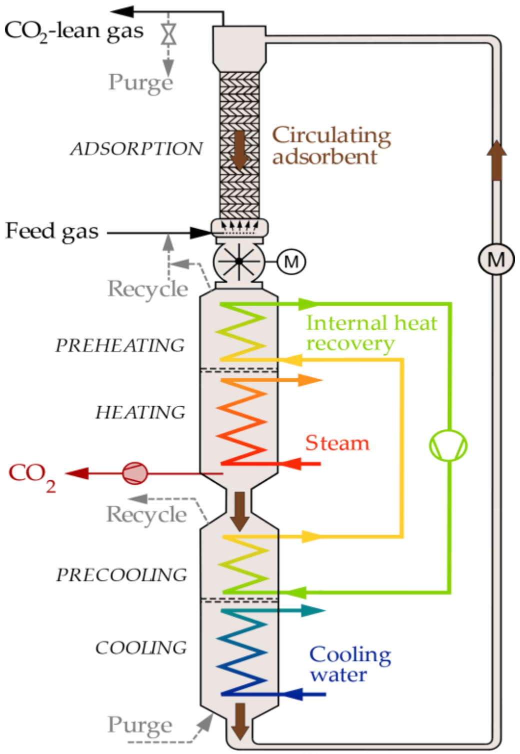
3-4X higher selectivity compared to commercial AC

50%-80% lower H_2O adsorption compared to zeolite X13

** Provided by Blücher (Germany)*

CO_2 capture technology: low-pressure drops & fast heating.

- Moving bed temperature swing adsorption (MBTSA) is a proprietary post-combustion CO_2 capture technology
- In the moving bed process, the temperature swing is achieved by circulating the adsorbent through sections at different temperatures - each section of the moving bed system can be designed and operated according to its specific purpose
- The main benefits of MBTSA are **low pressure drops** in the adsorption zone and the possibility to heat the adsorbent **faster** than standard adsorption technologies
- Offers good heat and mass transfer rates, while avoiding the risk of hot spot formation



Schematic diagram of the MBTSA process

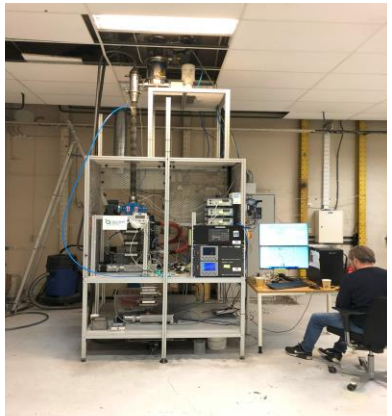
1. The adsorbent particles fall vertically through the **adsorption section**, counter-currently to the flue gas
2. Then into the **regeneration section** where CO_2 is adsorbed and extracted using light vacuum at the bottom of the section
3. The unloaded adsorbent is then cooled down in the **cooling section** and transported back to the top of the reactor
4. For uniform sorbent flow distribution structured packing is used in the adsorption section
5. Both adsorption and cooling sections are operated by **indirect contact heat exchangers**
6. **Preheating** and **precooling** sections are employed for heat recovery

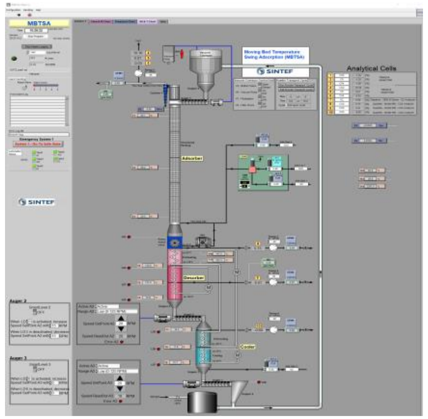
Process simulations resulted with preferable performance.

Process simulation performed on SINTEF's Moving Bed Temperature Swing system (Waste-to-Energy scenario)

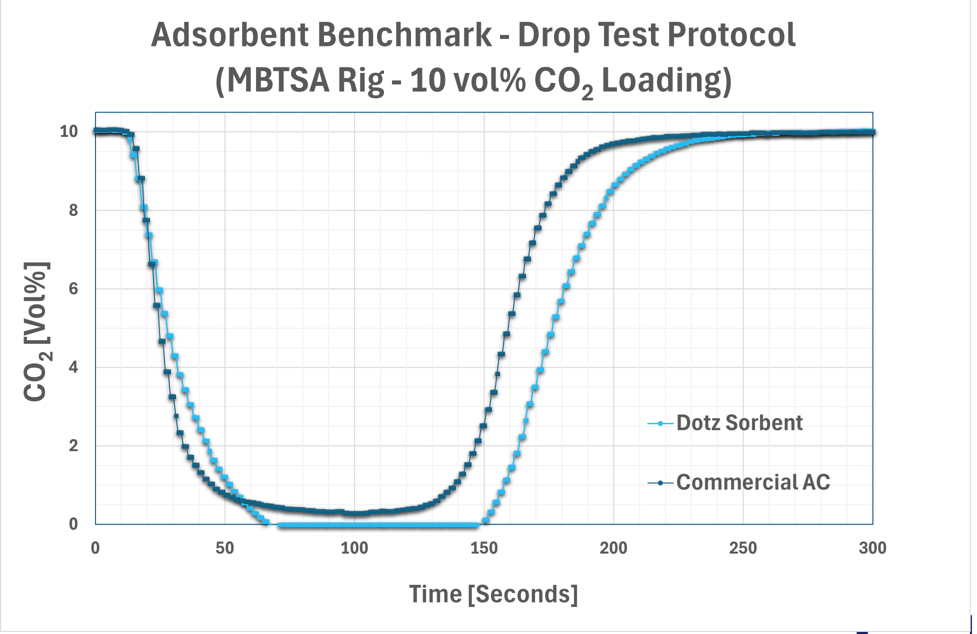
Process performance and main operating conditions			
		Comm. AC WtE	**Dotz NPC WtE**
Amount of circulating sorbent	**kg/h**	**650**	-45% **360**
CO_2 captured	**kg/h**	**8.26**	**8.6**
CO_2 purity	%	97.2	98.1
CO_2 capture rate	%	90.8	93.5
System footprint	**m^2**	**203**	-63% **75**
External heat duty (sorbent regeneration)	kW	47	29.5
External cooling duty	MW	46	28
Specific heat duty	**GJ/t CO_2**	**5.7**	-40% **3.4**

Lab-scale pilot demonstration corroborated validation and simulation results.



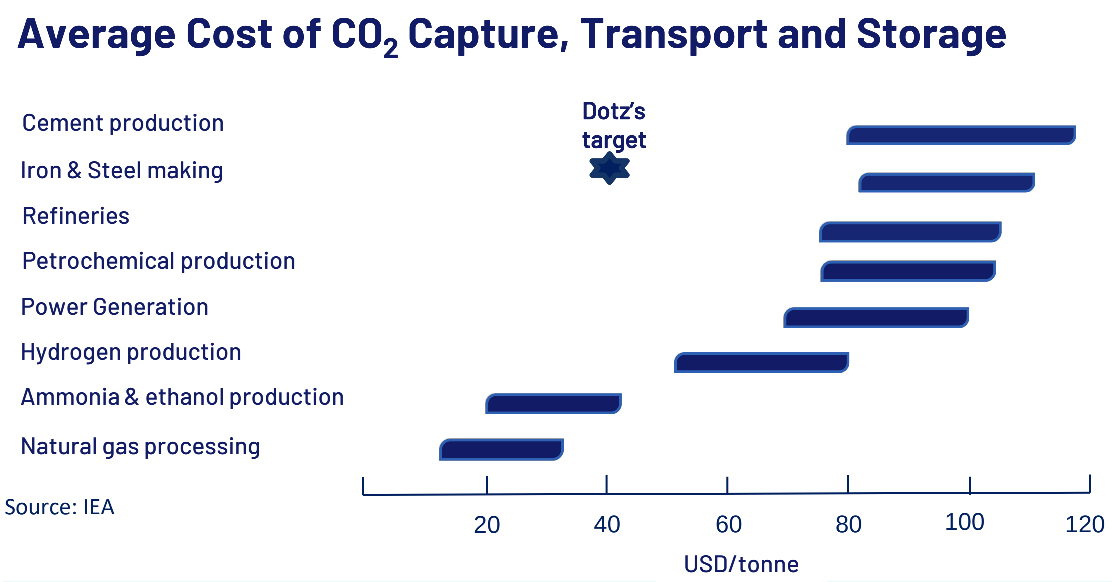


- Moving bed rig run was operated with fixed operating conditions* simulating Waste-to-Energy flue gas conditions (Ambient adsorption temperature, fixed desorption temperature, sorbent solid flux flue gas flow rate and composition)
- The results demonstrate:
  - The Dotz Sorbent's consistent higher effective adsorption capacity relative to a commercial reference
  - The Dotz Sorbent resulted higher in situ CO_2 purity (based on its higher selectivity of CO_2 over N_2 when compared with a commercial reference)
  - Thermal stability of the Dotz Sorbent based on approximately 140 adsorption/desorption cycles in the MBTSA lab-scale pilot rig



*Adsorbent benchamrking protocol as defined by SINTEf for the MBTSA pilot rig – consisting of batch sorbent drop tests and continuous operation cycles

A new era of innovative sorbents demonstrate potential to significantly drive down the cost of carbon capture .



Estimates of cost to capture a ton of CO_2 vary by industry and such factors as the amount of exhausted gas from a plant, the concentration of CO_2 in the exhaust and its pressure

TARGET PERFORMANCE CRITERIA:

Cost of sorbent:
<20 USD/Kg

Energy requirement:
<2.5 GJ/t CO_2

Cost of carbon capture:
<50 USD/t CO_2

Clear growth pathway

Prioritized Target Industries.

Carbon Concertation

0.04%
Ambient Air

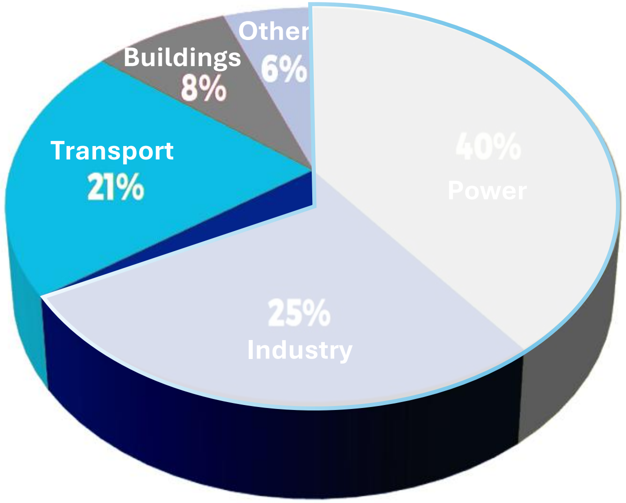
<15%
Caol & Natural Gas Power Plants

15%-35%
Chemical Plants, Steel, Cement Mills & Refineries

+80%
Ammonia, Ethanol & Natural Gas Processing

Source: Bettenhausen, Craig. "The life-or-death race to improve carbon capture," Chemical & Engineering News

Annual CO_2 emission breakdown



Source: International Energy Association, Net Zero by 2050

Prioritized Target Segments

Iron & Steel
Share in global emissions[1]: 12%
Annual CO_2 emissions (2020)[1] : 2.6GT

Cement
Share in global emissions[1]: 8%
Annual CO_2 emissions (2022)[2] : 1.6GT

Power Generation
Share in global emissions[1]: 40%
Annual CO_2 emissions (2022)[1] : 36.8GT

Chemicals
Share in global emissions[2]: 5%
Annual CO_2 emissions (2022)[1] : 1.3GT

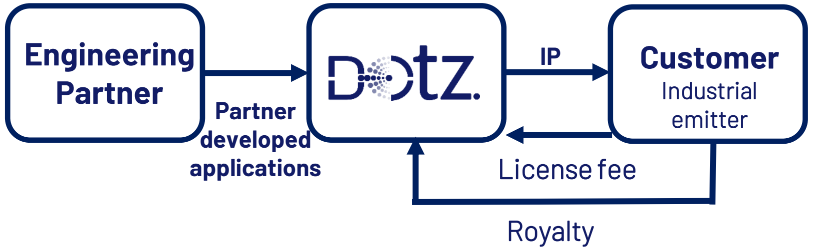
Dotz.

1 International Energy Association (IEA) ; 2 "Net-zero emissions chemical industry in a world of limited resources", Gabrielli et al, 2023;

Clear growth pathway

Highly scalable IP licensing model with multiple revenue streams.

IP licensing model



- Scalable model
- Provide high level engineering design, technical and customer support services
- No construction risk
- Three revenue streams:
  - Technology license fee
  - Annual royalties per CO2 volume captured (% of carbon value)
  - Revenues from ongoing sorbent supply

Illustrative revenue potential

Capacity	***100 TPD*** = *35 kTPA*	***300 TPD*** = *100kTPA*	***1,000 TPD*** = *350kTPA*
Tax cost saving Based on 100 $/t	*~$3.5M*	*~$10M*	*~$35M*
Revenue potential			
License fee 5% of CAPEX	*$0.5-1.0M*	*$1.5-2.0M*	*$2.0-3.0M*
Annual royalties 10%-15%	*$0.4-0.5M*	*$1.0-1.5M*	*$3.5-5.5M*

Superior technology

Technology development roadmap.

2024 *TRL 3 – lab validation*

- ✓ **Bench-scale demo unit**
  Objective: technology demonstration at lab scale
- ✓ **Sorbent validation**
- ✓ **Process simulation**

- ✓ **Scale-up of production**

→

2025 *TRL 4-5 – lab demonstration*

lab-scale pilot unit

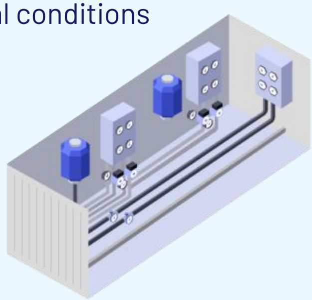
Design, build & operate a lab-scale demo unit designed to capture <1 TPD
Objective: validate a technology for a given flue gas/application in a controlled environment

→

2026 *TRL 6 – field demonstration*

Small-scale modular pilot unit

Design, build & operate a mobile testing unit designed to capture 1-2 TPD
Objective: validate a technology for a given flue gas/application in real conditions



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2028 *TRL 7 – field demonstration*

Industrial pilot unit

Design, build & operate an industrial unit designed to capture >10 TPD
Objective: unit for small/med scale emitters / first step CCS implementation

Sorbent optimization

Formulation and formation of the sorbent, scale-up and optimization

DOTZ.SHIELD

In-product Authentication

Advanced and validated authentication solutions for anti-counterfeiting and monitoring.

VALIDOTZ™

- Dozens of optical taggants
- Embedded in the product
- Compatible with a range of hosting materials

INSPEC™

- Hand-held devices
- Easy-to-operate
- Real-time, on-site, information reading

Dotz solution benefits:

In-field real-time Detection & measurement

Compatible with a range of hosting materials

Simple, **easy-to-use** solution

Validated solution – various successful field trials

Multiple applications across range of industries

Value proposition addressing established industry challenges.

Anti-counterfeiting & anti-alteration

Authenticating bulk product in a robust way

Product liability & anti-dilution

Providing insight into how customers are using a product

Quality Assurance (QA)

A tool to monitor production and manufacturing processes

ESG validation & circular economy

Providing proof of origin and increase transparency along supply chains

In-field measurement

Allowing lab tests to be conducted in the field, saving on time and expenses

Large and growing market

Attractive and focused industrial markets[1] with unmet need.

- Stricter environmental and social regulations
- Increased losses due to counterfeiting and parallel markets
- Product ownership validation becomes common
- The need to connect physical goods to the digital world

1 Source: McKinsey's market research, 2023

Investment Highlights

VALIDATED PROPRIETARY TECHNOLOGIES

Patent protected, superior nanotechnology for cost-effective, wide-scale CO_2 capture

Validated commercial technology for in-product authentication

ATTRACTIVE TARGETED MARKETS

Early phase booming market

STRATEGIC PARTNERSHIPS

Development and commercial partnership including SINTEF, Rice University and Melbourne University

SUPERIOR ENVIRONMENTAL PROFILE

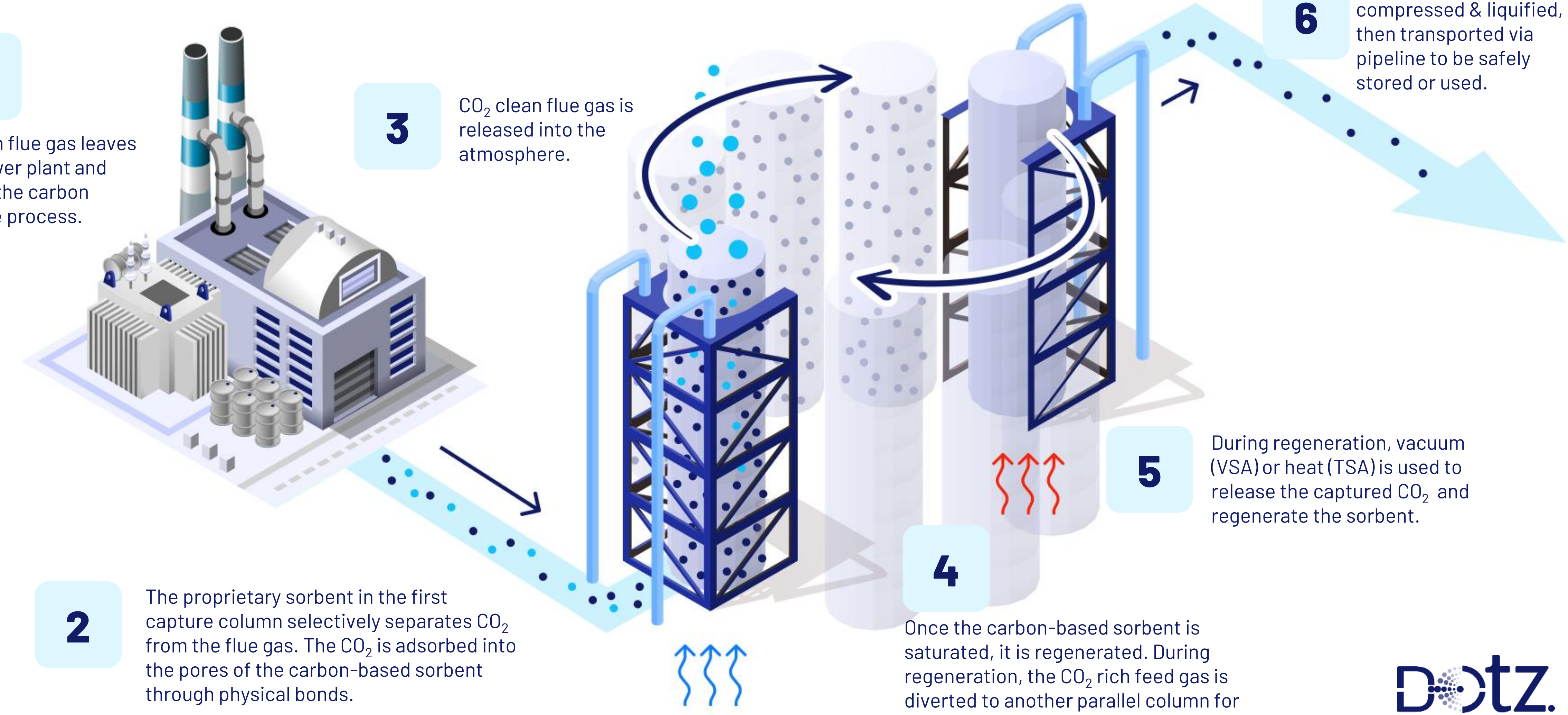
Creating a circular economy, utilizing plastic waste, clear pathway to net-zero

BUILT FOR GROWTH

Highly scalable licensing business model

Join our Journey

Simple, straightforward and modular process facilitates lower cost of capture and easy integration.



1 CO_2 rich flue gas leaves the power plant and enters the carbon capture process.

2 The proprietary sorbent in the first capture column selectively separates CO_2 from the flue gas. The CO_2 is adsorbed into the pores of the carbon-based sorbent through physical bonds.

3 CO_2 clean flue gas is released into the atmosphere.

4 Once the carbon-based sorbent is saturated, it is regenerated. During regeneration, the CO_2 rich feed gas is diverted to another parallel column for continuous removal process.

5 During regeneration, vacuum (VSA) or heat (TSA) is used to release the captured CO_2 and regenerate the sorbent.

6 A pure stream of CO_2 is compressed & liquified, then transported via pipeline to be safely stored or used.