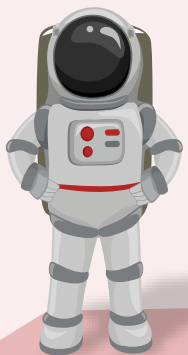


企業參與新創帶動 綠色新商模

彭啟明 博士
台灣氣候聯盟/
天氣風險管理開發股份有限公司

企業主體認
永續重要性

供應鏈的要求



國際趨勢
及發展

盤查驗證
訂定減碳目標

碳資產管理
企業節能

衍伸綠色商機

合作建立
學習曲線

購買綠電

評估或購買
碳權?



Carbon finance is another key to achieving the goal of a consistent and diverse supply of energy. The Taiwan Stock Exchange and the National Development Fund, in collaboration with our EPA (Environmental Protection Administration), are in discussion to establish a **carbon exchange platform**, as it will **facilitate international collaboration in the global effort** to reduce carbon emissions. (By Taiwan President Tsai, 2023/4/19)

碳權交易所新進度 林修銘：最晚九月上路

工商時報 魏喬怡、戴瑞瑤、呂淑美 2023.05.03



證交所董事長林修銘表示，碳權交易所7月來不及成立，最晚會在9月上路。圖／本報資料照片



碳權交易所上路恐延期！立委邱志偉關切碳權交易所，碳權交易很容易成為吸金詐騙新的名目，要求金管會在推動碳交所上路時，對碳權交易也必須注意該問題。至於能否如期在7月上路？證交所董事長林修銘回應，碳交所成立時間目前有好幾個版本，原先說最快7月，但現在看來7月來不及，最晚會在今年第三季，即9月的時候上路。

yahoo! 股市

台灣碳權交易所具2特點 學者：有望成為國際模範



李瑞瑾 | Yahoo財經特派記者

2023年5月9日 週二 上午8:48



證交所與國發基金將共同出資成立「臺灣碳權交易所」，預計於今（2023）年完成設立登記。學者表示，台灣碳權交易所將是全球第一、最為特殊的官民一體碳權交易所，加上提供破顧問諮詢服務，是一個符合便利、民主、法治的金融開放平台，看好未來有望成為國際模範。

總統報明牌 特斯拉碳權賺翻 三陽、華紙...4檔「冷門股」為何漲不停？

15:54 2023-05-04 | 旺得富理財網 | 旺得富編輯中心



因此接下來風電、太陽能、地熱的企業，甚至是環保相關的產業都有機會賣出自家多餘的碳權。那麼為什麼這陣子華紙帶頭漲不停？甚至全部紙類概念股都跟著衝高高？原因很簡單，華紙目前在兩岸三地擁有林木大約3萬公頃，這些資源當然會成為可交易的碳權，而華紙的母公司是永豐餘，當然也跟著政策紅利受惠。

另外農林同樣擁有大批林木資源，甚至也積極設置太陽能光電案場，光是屏東地區就規劃大約400頃開發，因此股價也動了起來。這邊要特別補充一點是三陽工業這幾年大買農林股票，甚至進入公司派營運，所以三陽工業近期的股價跟著農林帶動，同樣出現「母以子貴」。



4檔碳權冷門股技術線圖。(資料來源 / 玩股網、玩股講客人)

台灣碳權交易所 定案

工商時報 呂淑美 2023.05.27



圖／美聯社



證交所為配合政府推動氣候變遷因應政策，26日董事會通過，擬與行政院國發基金共同設立台灣碳權交易所公司，初步資本額為10億元，其中證交所擬投資6億元；證交所指出，碳權交易所預計7月底、8月初成立，初期先以「碳顧問諮詢和教育宣導服務」為主。

台灣碳權交易所概況

類別	說明
資本額	額定資本額15億元，首次發行1億股
股東	初期證交所及國發基金分別出資6億元、4億元
成立時間	預計今年7月底、8月初成立
總部	總部設在高雄，資訊交易中心設在台北， 兩地分設據點分工營運
營業項目	氣候變遷因應法所定額度的交易、國外碳權買賣， 及碳顧問諮詢和教育宣導服務，未來將配合相關法規 開放進程，分階段實施

資料來源：證交所

製表：呂淑美

碳定價 Carbon Pricing

自願性

企業內部碳定價

外部成本內部化，制定內部碳價，向每單位收取碳費，透過收費，協助企業共同減碳，以減少排碳。

碳抵換(Offset)

以溫室氣體減量或移除專案，削減溫室氣體排放。可向政府或獨立認證機構申請抵換額度。

強制性

碳費/碳稅

依據管制源排放之溫室氣體量，收取碳費或依稅率收費。

總量管制 (Cap and Trade)

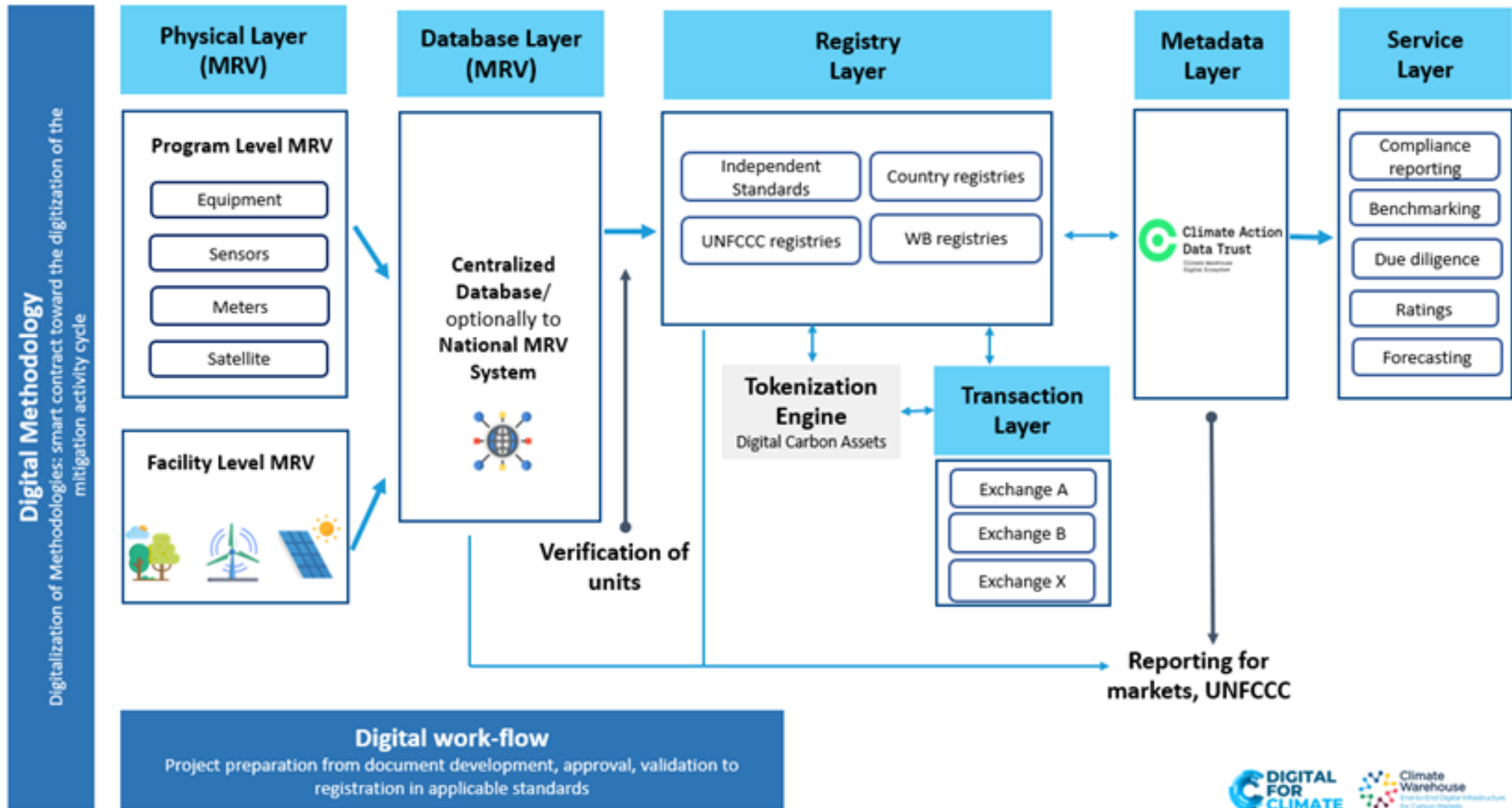
國家訂定總量排放限制，分配予管制產業/企業排放許可額度，排放許可額度可進入交易市場交易。

需要一個通用資料系統來收集和構建碳權生命週期中所有可公開讀取的數據，以提高透明度、信任度和完整性

。

World Bank's [Climate Warehouse program](#), the Government of Singapore, and the International Emissions Trading Association (IETA) developed the [Climate Action Data Trust \(CAD Trust\)](#) -- a free, open-source global platform that connects, aggregates and harmonizes carbon credit data.

https://blogs.worldbank.org/climatechange/why-data-infrastructure-key-transparent-carbon-market/?cid=SHR_BlogSiteTweetable_EN_EXT



Key-transpare

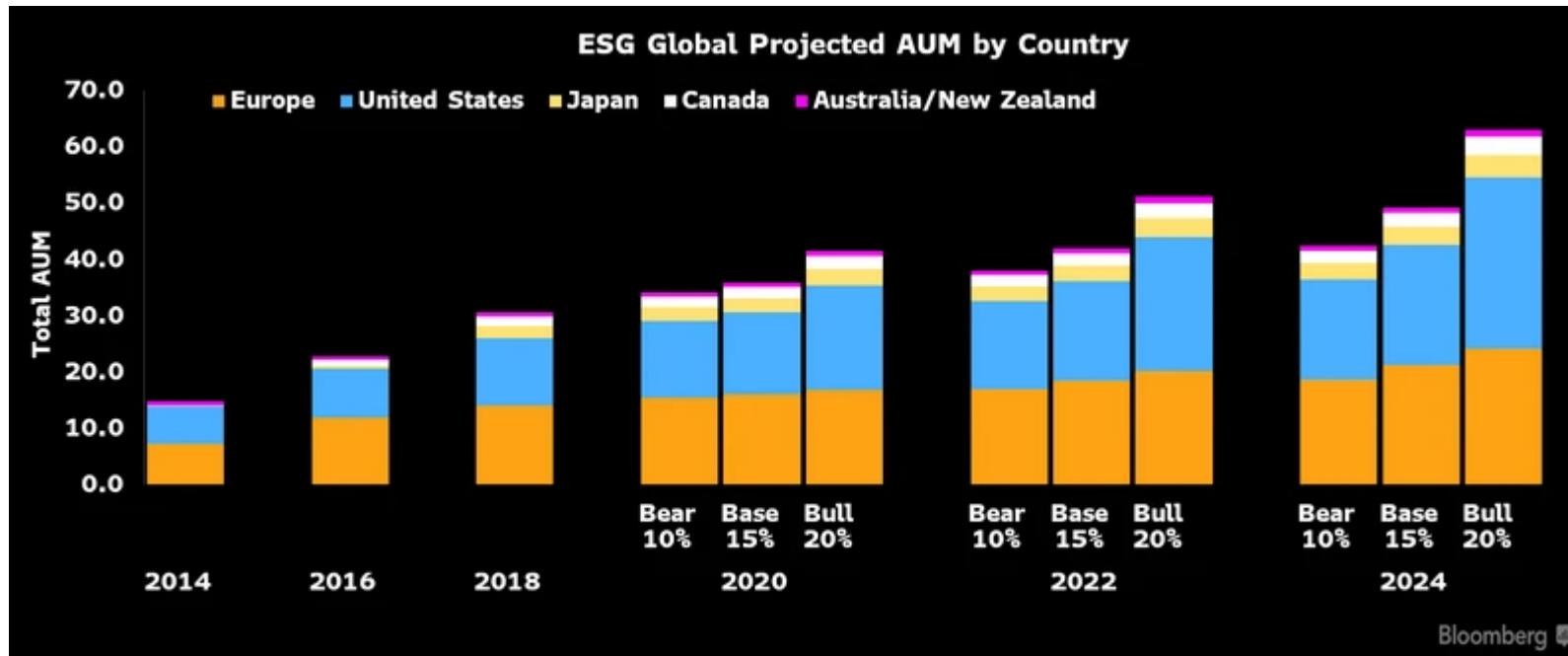


國家碳登記系統，使用數位 MRV 系統，以支持符合條件的項目在國際碳市場上的交易過程。其他包括可以在區塊鏈平台上儲存和交易的碳權數位化呈現的機制（標記化）；以及簡化從項目開發商註冊到項目發布請求的準備和流程的數字平台。

Emerging digital technologies will play a vital role in creating more streamlined, trusted, and transparent carbon markets. Capacity-building and knowledge-sharing will be crucial, particularly in developing countries, to effectively deploy market infrastructure and ensure carbon markets are game-changers in the fight against climate change.

<https://www.worldbank.org/en/news/feature/2022/07/27/what-you-need-to-know-about-the-measurement-reporting-and-verification-mrv-of-carbon-credits>

*Global ESG assets are on track to exceed **\$53 trillion by 2025**, representing more than **a third of the \$140.5 trillion** in projected total assets under management.*



Source:
<https://www.bloomberg.com/professional/blog/esg-assets-may-hit-53-trillion-by-2025-a-third-of-global-aum/#:~:text=Global%20ESG%20assets%20are%20on%20track,financial%20risks%20and%20harness%20capital%20markets.&text=Global%20ESG%20assets%20are,and%20harness%20capital%20markets.&text=assets%20are%20on%20track,financial%20risks%20and%20harness>



EU taxonomy



Glasgow Financial Alliance for Net Zero 淨零金融聯盟

Glasgow Financial Alliance for Net Zero

Achieving the objective of the Paris Agreement to limit global temperature increases to 1.5°C from pre-industrial levels requires a whole economy transition.

Every company, bank, insurer and investor will need to adjust their business models, develop credible plans for the transition to a low-carbon, climate resilient future and

格拉斯哥淨零金融聯盟 (GFANZ)

GLASGOW FINANCIAL ALLIANCE FOR NET ZERO

- 提供金融資源，民間部門可以提供實現淨零目標所需總投資的 70%
- 包括銀行貸款、風險投資、私募、共同基金、捐贈基金、購買股票或債券等，可以引導資金流向有助於減碳又可盈利的投資項目。
- 成員包括450多家銀行、保險公司、投資者、證券交易所、評級公司和指數供應商，資產總計高達150兆美元。這個規模足以在2050年前融資130兆美元來投資於新技術開發應用，也足以為企業和金融機構推動自身重組。
- 聯盟承諾將制定「基於科學」(SBT)的目標，到2030年大幅減碳、到2050年實現淨零排放，為推動轉型、企業減碳、鼓勵有助於抗衡氣候變化的行業實現增長提供資金，且每年報告進展情況。

GFANZ spans the financial sector

Net Zero Asset Owners Alliance

Members: 69 investors representing **\$10.5tn**

Commitments: transition portfolios to net zero emissions by 2050, publishing interim targets every 5 years, starting with 2025

Structure: UN convened

Net Zero Asset Managers Initiative

Members: 220 AMs representing **\$57tn**

Commitments: interim 2030 target for proportion of assets to be managed in line with net zero by 2050. Review target every 5 years, working for 100% asset coverage by 2050.

Structure: led by Investor Agenda (IIGCC, AIGCC, Ceres, IGCC, CDP, PRI)

Net Zero Banking Alliance

Members: 102 banks representing **\$67tn**

Commitments: align operational and financed emissions with net-zero by 2050 or sooner, including 2030 interim targets

Structure: industry-led, co-founded by UNEP FI and HRH's Sustainable Markets Initiative (SMI).

Paris Aligned Investment Initiative

Members: 53 asset owners representing **\$2.9tn**

Commitments: transition investment portfolios to net zero emissions by 2050, including 2030 interim targets

Structure: convened by IIGCC, Ceres, AIGCC and IGCC

Net Zero Insurance Alliance

Members: 21 (re)insurers

Commitments: members commit to transition underwriting portfolio to net zero emissions by 2050, including 2030 interim targets

Structure: U-convened

Net Zero Financial Service Providers Alliance

Members: 23 across credit rating agencies, data providers and listing exchanges

Commitments: align services and products to support financial firms to reach net zero by 2050 or sooner, consistent with a maximum average global temperature rise of 1.5°C above pre-industrial levels

Formalised in international architecture



Reports into the FSB, ensuring policy recommendations and workstream outputs captured in international regulations



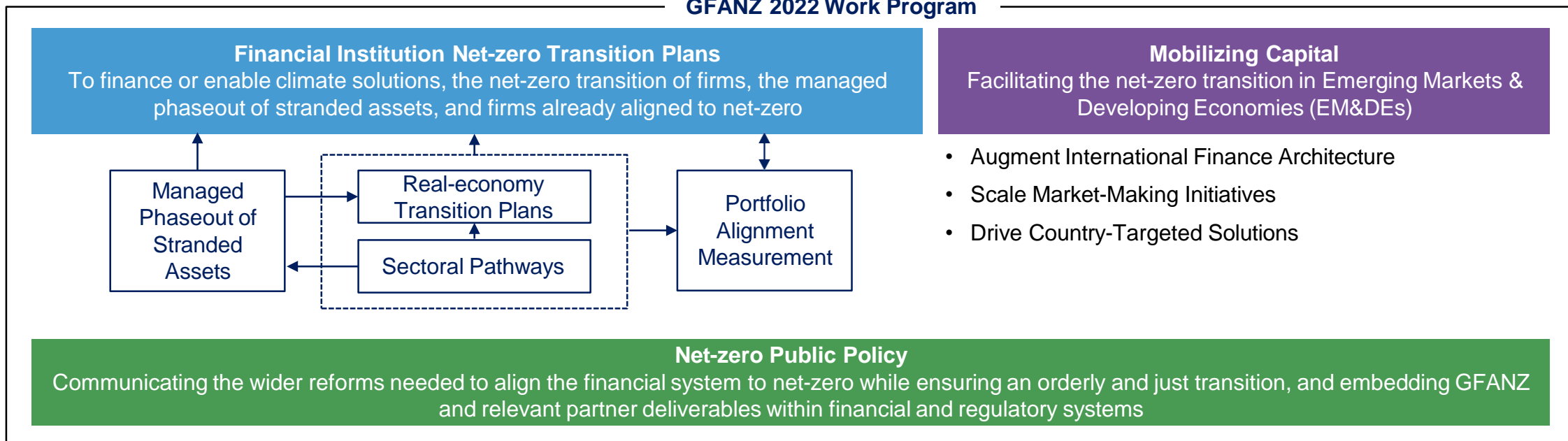
Underpinned by the rigour of UNFCCC's Race to Zero. Criteria set by independent expert group of academics, scientists and NGOs/



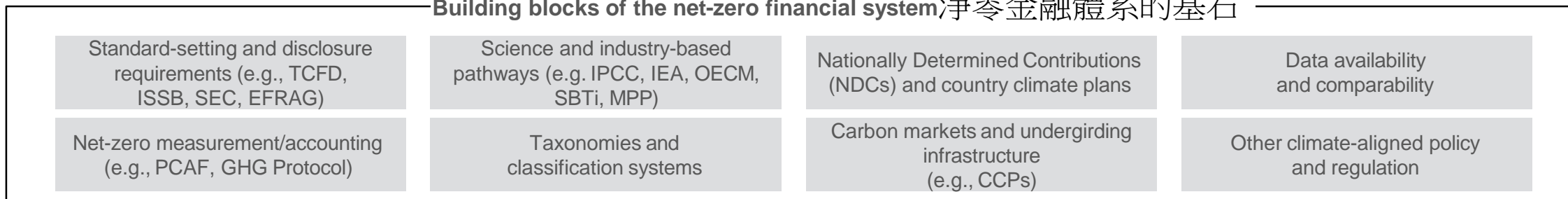
Regional hubs in Asia and Africa to ensure geographic representation and reach

構建淨零金融體系

GFANZ 2022 Work Program



Building blocks of the net-zero financial system 淨零金融體系的基石



KEY: X → Y Indicates that X is a reference for or input into Y

Financial Institutions' emissions

Scope 1 & 2

Operations



Scope 1

E.g. Company facilities, vehicles



Scope 2 (upstream)

E.g. Electricity, heating

Scope 3

Operations



Upstream

E.g. Business travel, supply chain

Clients and portfolio companies

Focus of the report

GHG emissions associated with a financial institution's investment, lending and underwriting portfolios or from clients of investment consultants or financial service providers



Downstream

Scope 1

Scope 2

Scope 3

Make sense of it all.

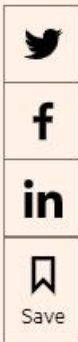
Become an FT subscriber. Pay annually and save 20%.

Climate change

+ Add to myFT

Lloyd's and five big insurers quit sector's net-zero initiative

Alliance members fear antitrust lawsuits and have faced criticism from US Republican politicians



Financing the Managed Phaseout of Coal-Fired Power Plants in Asia Pacific

PUBLIC CONSULTATION
Guide to support the financing of the early retirement of coal-fired power plants as part of a just net-zero transition

June 2023



Asia-Pacific Network of the Glasgow
Financial Alliance for Net Zero

 **GFANZ**
Glasgow Financial Alliance for Net Zero

- 高排放資產的提前退役將是走向淨零的碳排放減少的關鍵要素。有序淘汰（ Managed phaseout, MPO ）指的是為提前退役提供融資或支持的策略。
- 尤其他燃煤發電廠（ CFPPs ） MPO的經驗，為承諾實現淨零的金融機構考慮是否在近期支持燃煤淘汰交易融資提供實用指南。
 - 亞洲開發銀行（ ADB ）的能源轉型機制（ ETM ），該機制旨在通過與成員國的合作，利用市場方法提前退役燃煤電力資產，而不是保留在現有所有者手中。
 - 國家主導的能源轉型平台，特別是印尼和越南公正能源轉型夥伴關係（ JETPs ），其中MPO是能源部門碳排放減少可以實現的主要手段之一——除了投資電網、電池儲能和可再生能源。

Figure 1: Proposed three-step process for consideration of coal phaseout plans

STEP A:

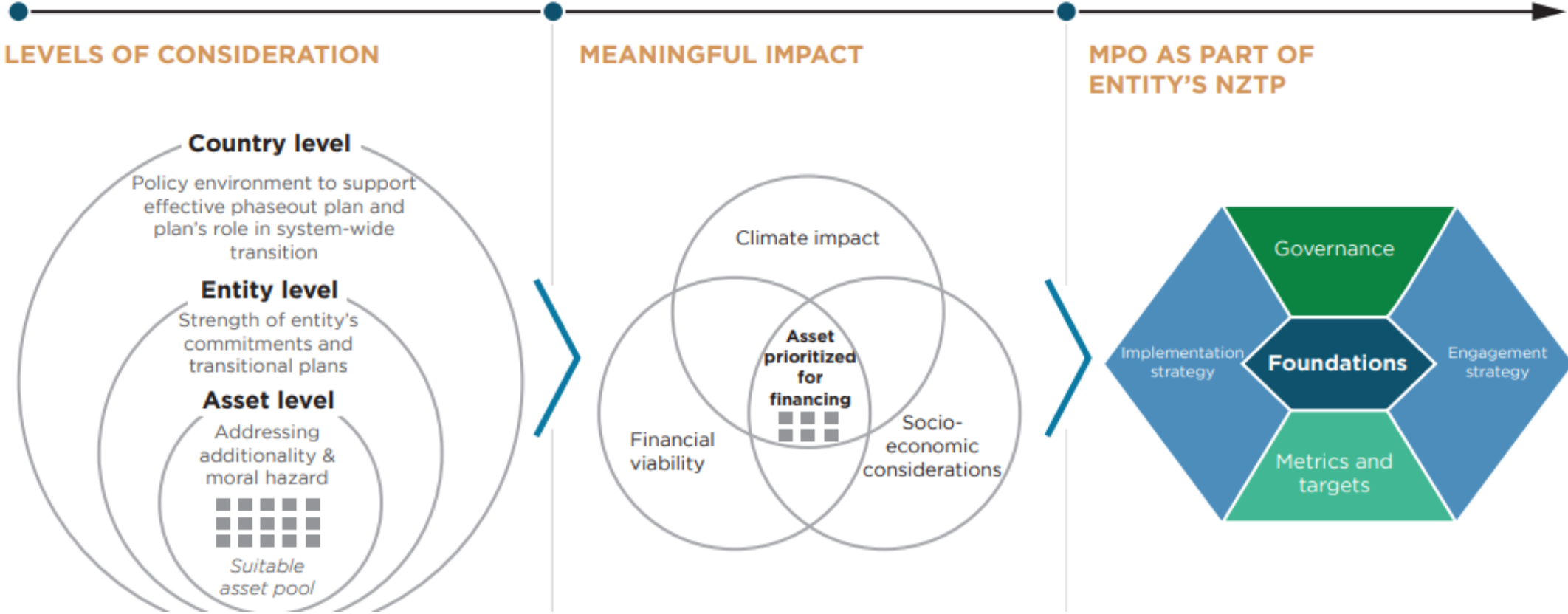
Ensuring credibility of relevant energy transition and coal phaseout plans

STEP B:

Optimising meaningful impact

STEP C:

Achieving transparency and accountability



台灣的離岸風電發展的財務壓力

- 國內銀行團對離岸風電的融資，已超過4000億台幣，部分銀行已經接近產業授信集中度的限制。
- 依照第三階段未來開發計畫，未來10年共15 GW，若以每MW約兩億台幣估計，將需要2兆元的融資。
- 未來將顯著有授信動能不足，資金短缺的隱憂。
- 長期再生能源購電協議(CPPA) 也有顯著的風險度。





TOPLINE ESTIMATES:

TOTAL REVENUE RAISED	\$737 billion
<i>15% Corporate Minimum Tax</i>	<i>222 billion*</i>
<i>Prescription Drug Pricing Reform</i>	<i>265 billion***</i>
<i>IRS Tax Enforcement</i>	<i>124 billion**</i>
<i>1% Stock Buybacks Fee</i>	<i>74 billion*</i>
<i>Loss Limitation extension</i>	<i>52 billion*</i>
TOTAL INVESTMENTS	\$437 billion
<i>Energy Security and Climate Change</i>	<i>369 billion*</i>
<i>Affordable Care Act Extension</i>	<i>64 billion**</i>
<i>Western Drought Resiliency</i>	<i>4 billion***</i>
TOTAL DEFICIT REDUCTION	\$300+ billion

* = Joint Committee on Taxation estimate

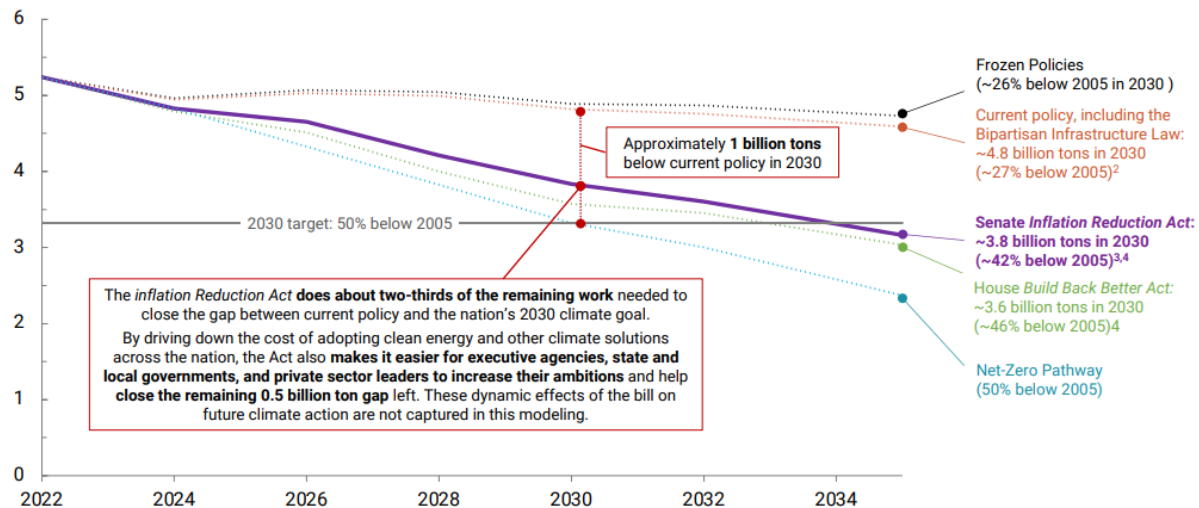
** = Congressional Budget Office estimate

*** = Senate estimate, awaiting final CBO score

將近 3700 億美元，11 兆台幣做氣候變遷

Modeled Net U.S. Greenhouse Gas Emissions (Including Land Carbon Sinks)

billion metric tons CO₂-equivalent (Gt CO₂-e)¹



Source: https://repeatproject.org/docs/REPEAT_IRA_Preliminary_Report_2022-08-12.pdf

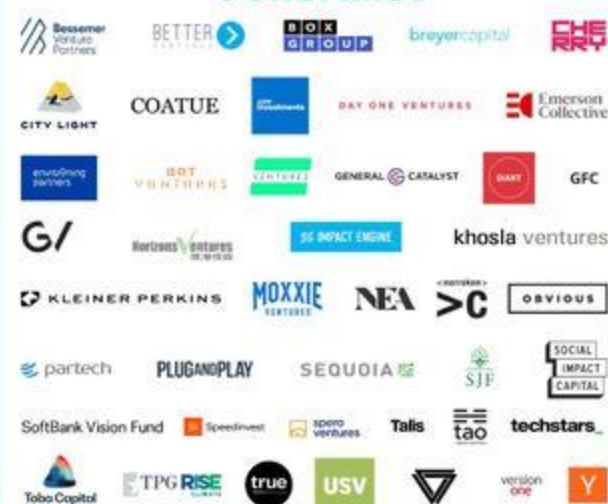
CTVC's 2023 Climate Tech Venture Cohort



Climate



Generalist

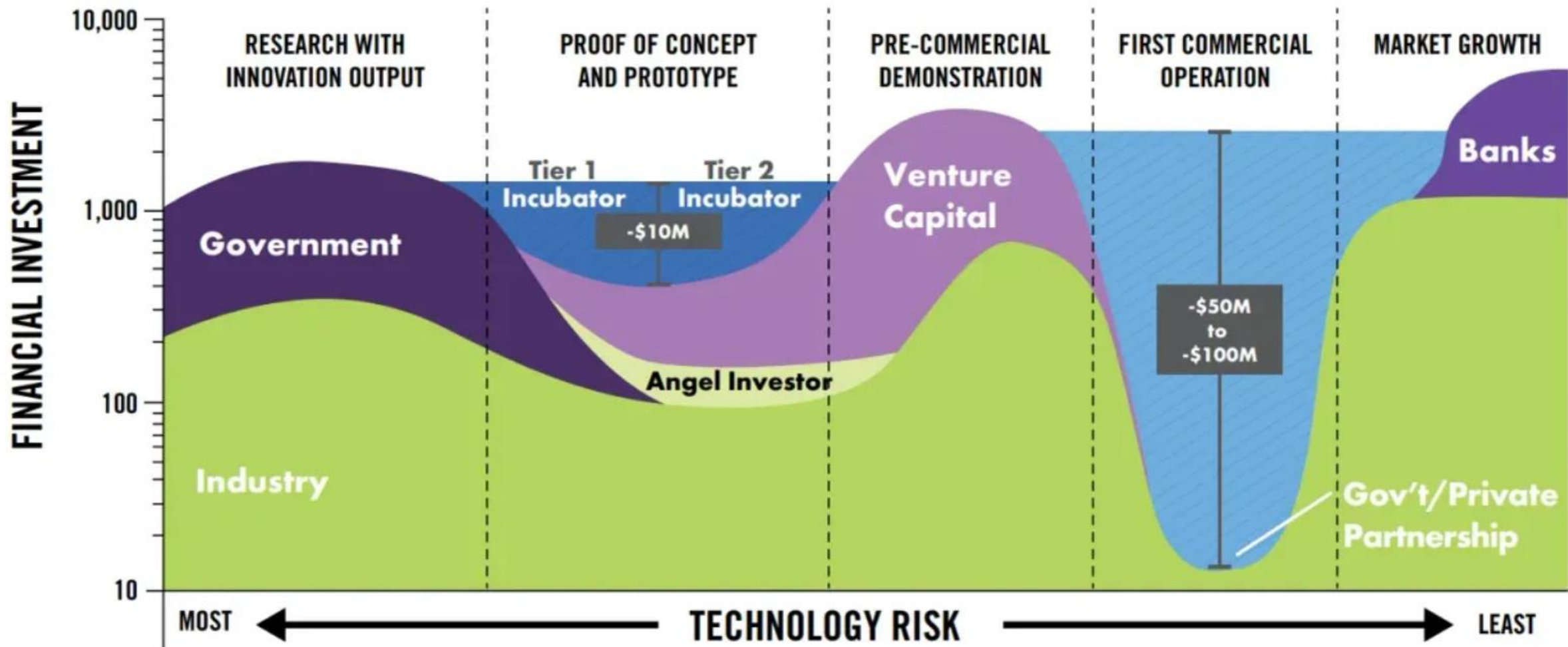


Vertical specialist



Deeptech





➤ Source: [Maryland Energy Innovation Accelerator](#)

STATE OF CLIMATE TECH '22

A Net Zero Insights' analysis on funding data in the private market venture space in Europe and North America

WHAT IS CLIMATE TECH?

Conceptually aligned with the framework of the EU taxonomy for sustainable activities, the analysts at Net Zero Insights refer to “Climate Tech” as any technology and innovation that contributes significantly to at least one of the six environmental objectives (see right-sided figure).

The [Net0 Platform](#) features startups and SMEs that have an innovative technology, product or business model.

For clarity, it's worth to highlight that the scope of the analysis includes only private companies developing innovative solutions contributing to at least one of the six environmental objectives.



ENVIRONMENTAL OBJECTIVES



Climate change mitigation



Climate change adaptation



Sustainable and protection of water and marine resources



Transition to a circular economy



Pollution prevention and control



Protection and restoration of

CLIMATE CHANGE CHALLENGE AREAS



ENERGY



WATER



TRANSPORT



BUILT ENVIRONMENT



CIRCULAR
ECONOMY



GHG CAPTURE,
REMOVAL & STORAGE



INDUSTRY



NATURAL
ENVIRONMENT



FOOD &
AGRICULTURE



EMISSIONS CONTROL,
REPORTING & OFFSETTING

Given its aim to reduce emissions and the impacts of human activity on the environment across every activity sector, climate tech is often referred to as a theme rather than a vertical.

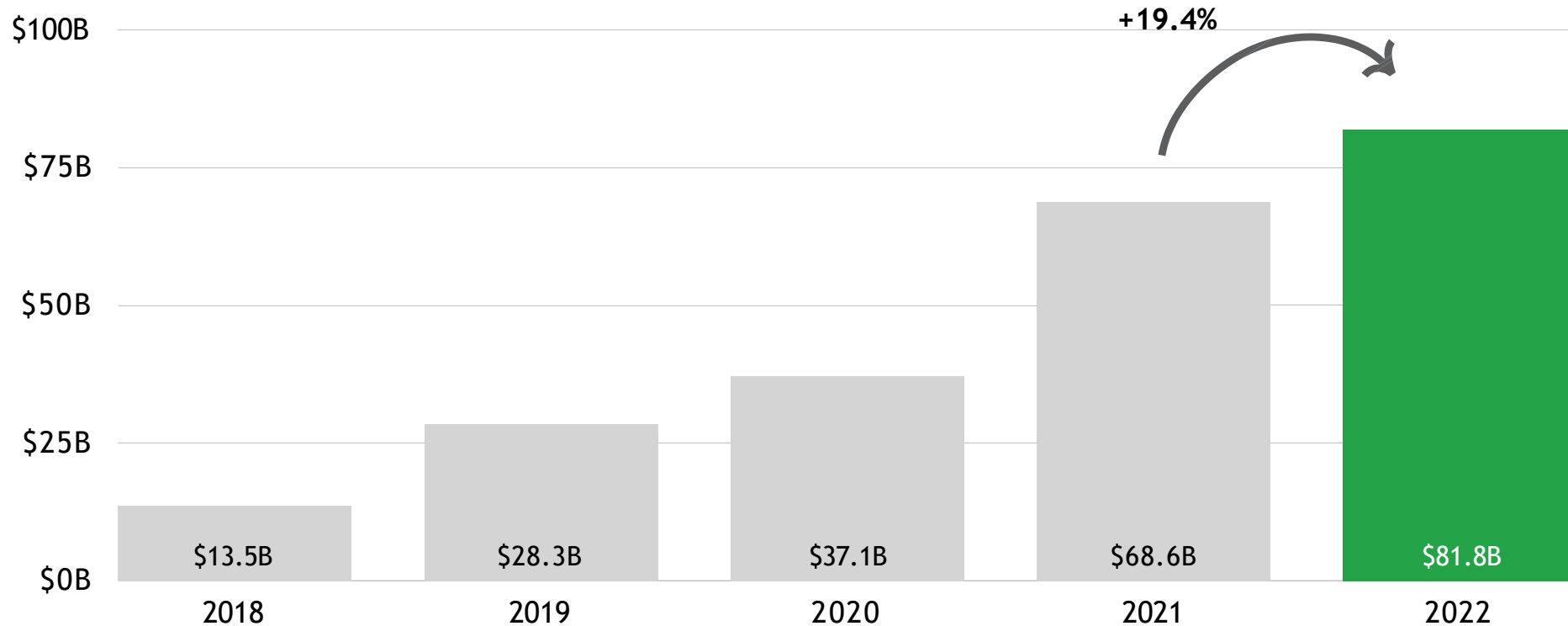
Consequently, our data attempts to capture the most pressing thematic trends by categorising organisations in relation to the climate change challenge areas that their solutions aim to address.

Each challenge area is defined and analysed in this report in the last section *Focus: challenge areas*.

An organisation can contribute to more than one challenge area.



CLIMATE TECH INVESTMENT IN 2022 REACHES ALL-TIME HIGH WITH \$82B INVESTED, A 19.4% YOY INCREASE.



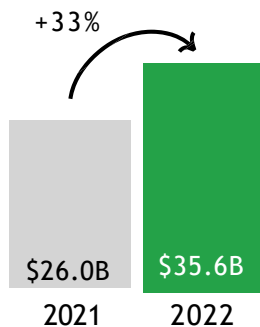
[Source: Net Zero Insights](#)

THE US RAISED MORE CAPITAL ACROSS LARGER ROUNDS BUT EUROPE IS GROWING FASTER.

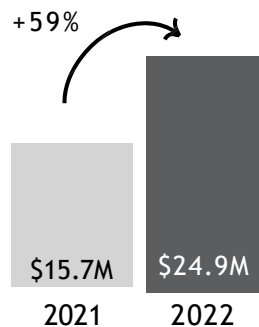


EUROPE

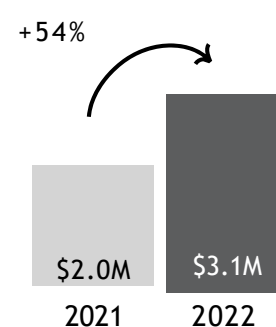
TOTAL FUNDING



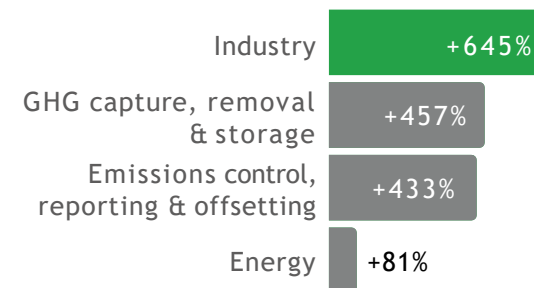
AVERAGE DEAL SIZE



MEDIAN DEAL SIZE

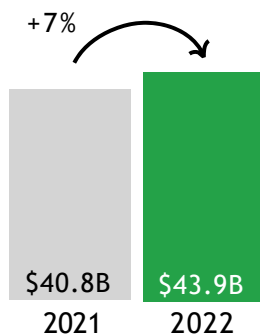


TOP CHALLENGE AREAS BY YOY GROWTH

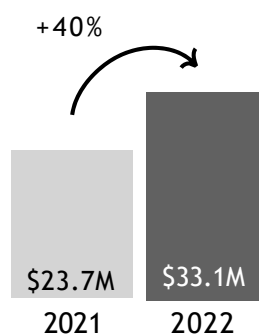


THE US

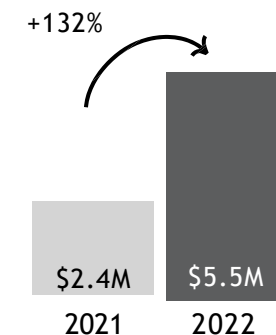
TOTAL FUNDING



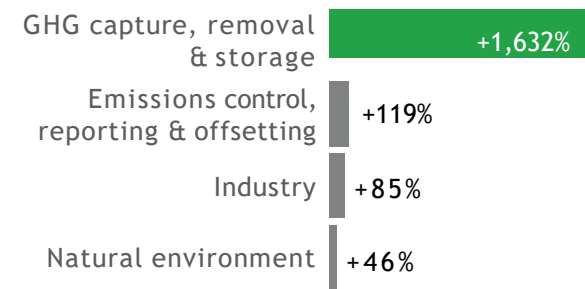
AVERAGE DEAL SIZE



MEDIAN DEAL SIZE

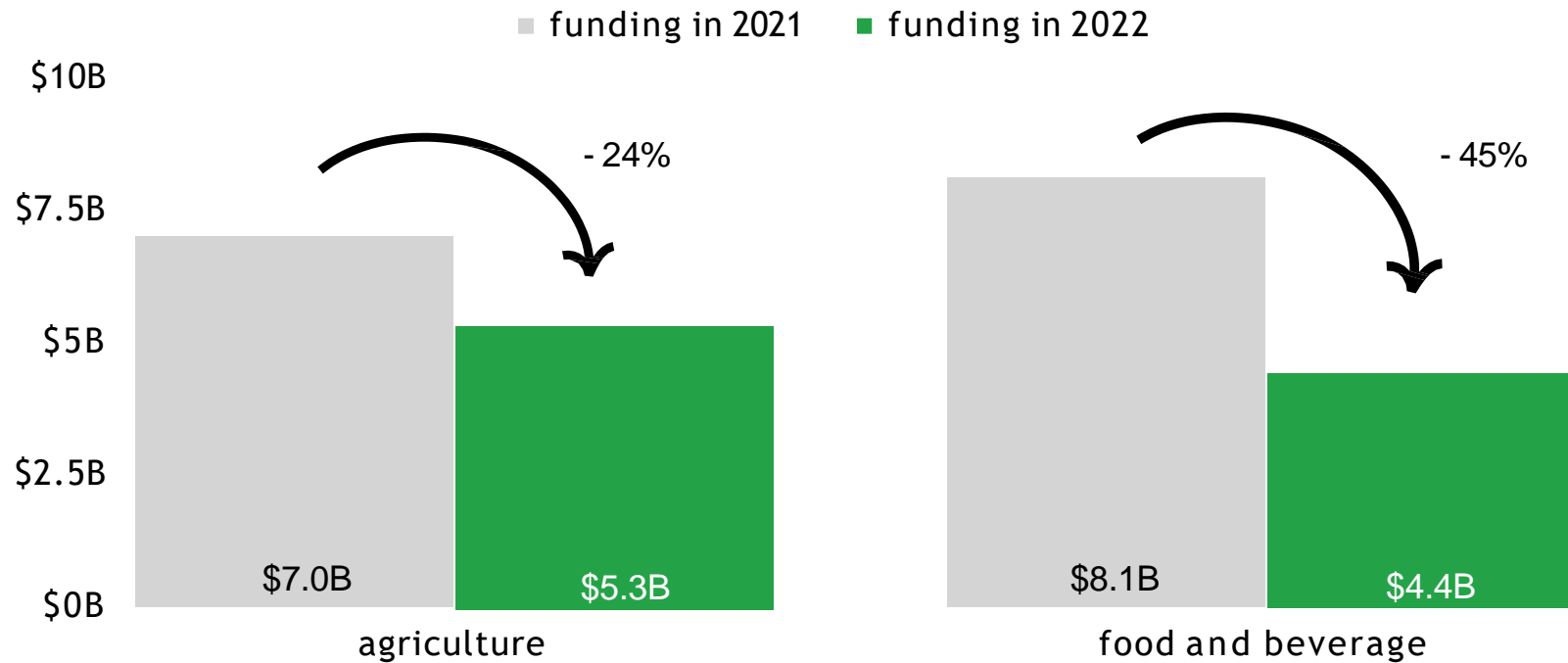


TOP CHALLENGE AREAS BY YOY GROWTH



Source: Net Zero Insights

FUNDING IN BOTH SUSTAINABLE FOOD AND BEVERAGE AND AGRICULTURE DECREASED, 45% AND 24% RESPECTIVELY.

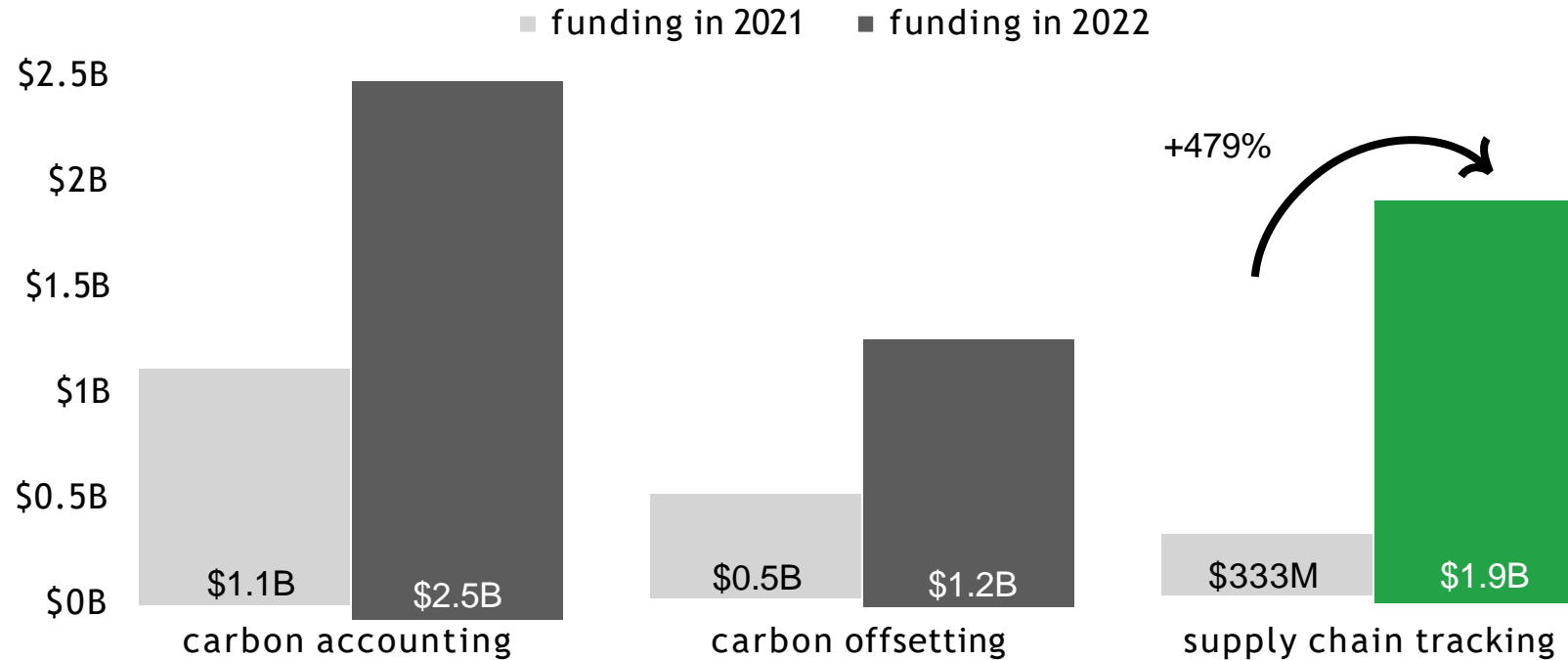


[*An organisation can fall under different categories. Therefore, the same round can be included more than once.](#)

[Source: Net Zero Insights](#)



THE EMISSIONS CONTROL, REPORTING & OFFSETTING SECTOR EXPLODED IN 2022. SUPPLY CHAIN TECH UP 479% YOY.

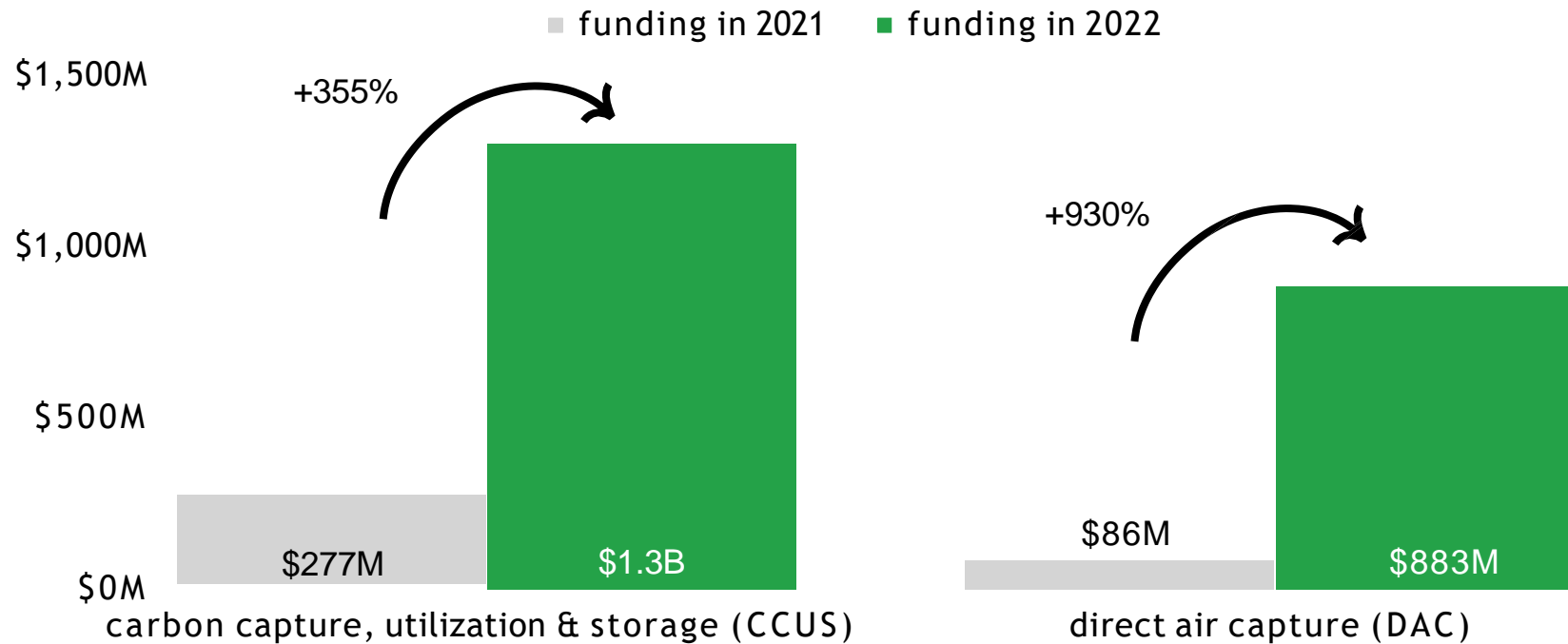


*An organisation can fall under different categories. Therefore, the same round can be included more than once.

Source: Net Zero Insights



FUNDING IN CCUS AND DAC INCREASE TREMENDOUSLY IN 2022, 355% AND 930% RESPECTIVELY.



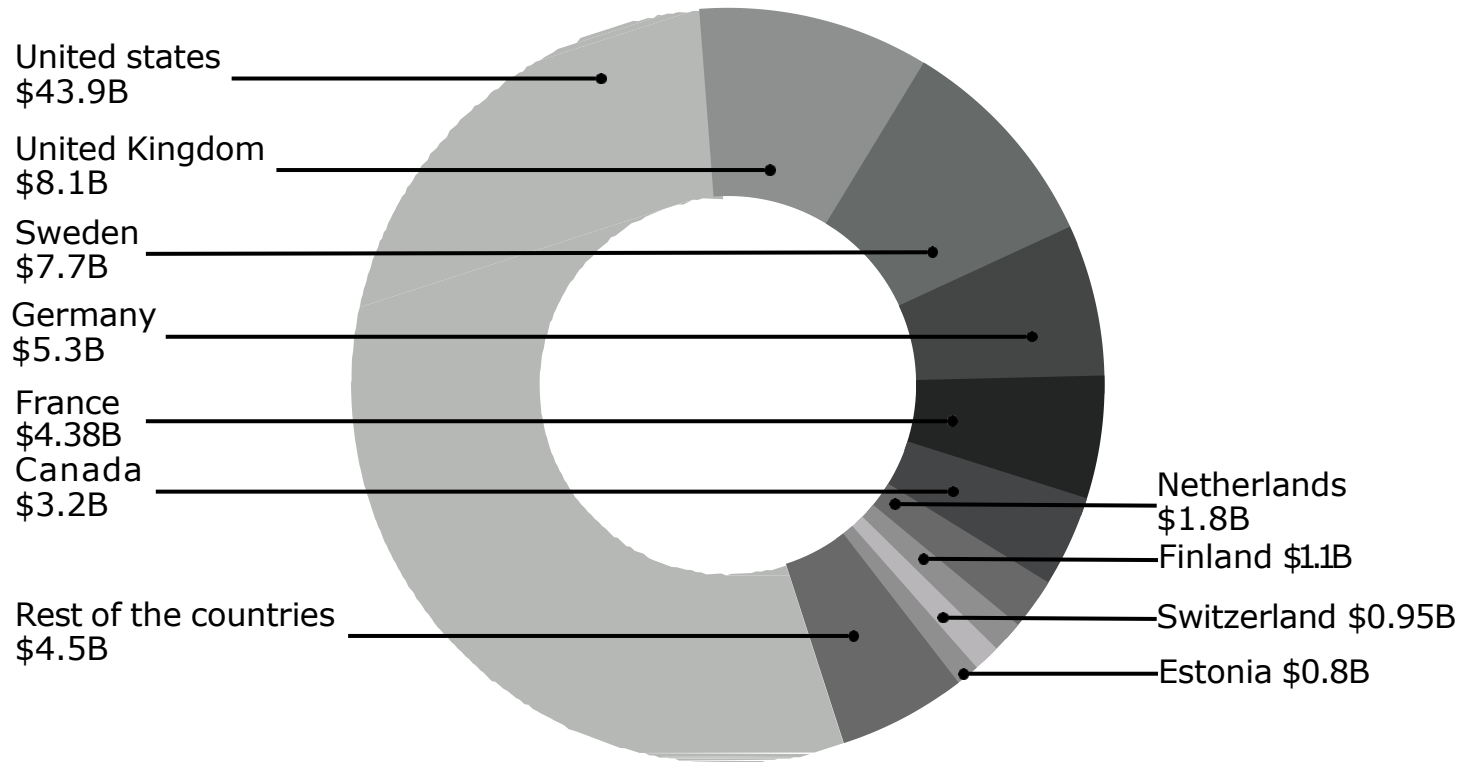
[*An organisation can fall under different categories. Therefore, the same round can be included more than once.](#)

[Source: Net Zero Insights](#)

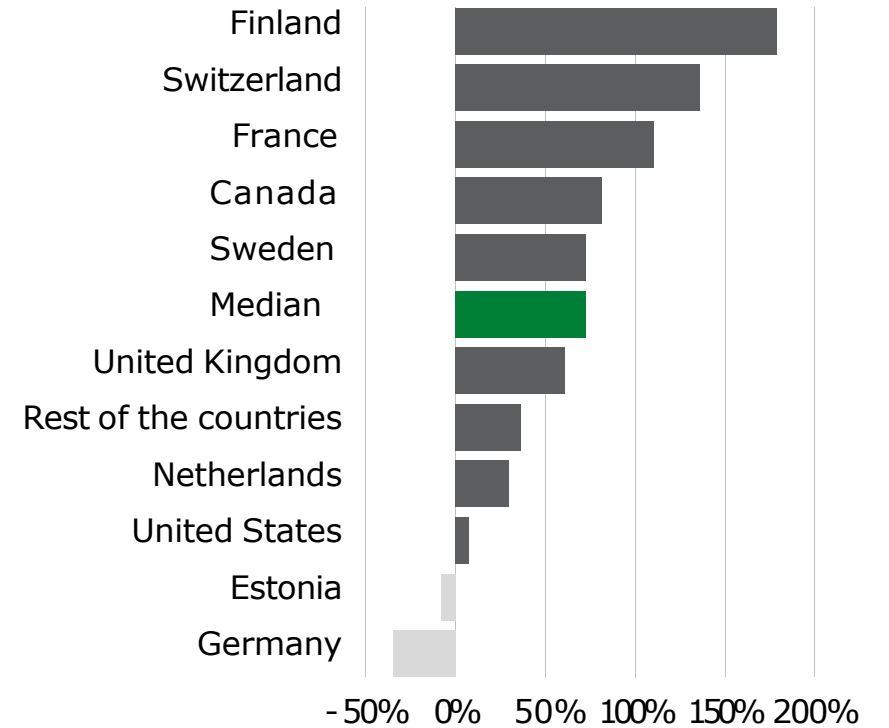


US, UK AND SWEDEN LEAD ON TOTAL CAPITAL RAISED BY COUNTRY. FINLAND SAW 179% YOY GROWTH.

FUNDING BY TOP COUNTRIES



YOY VARIATION

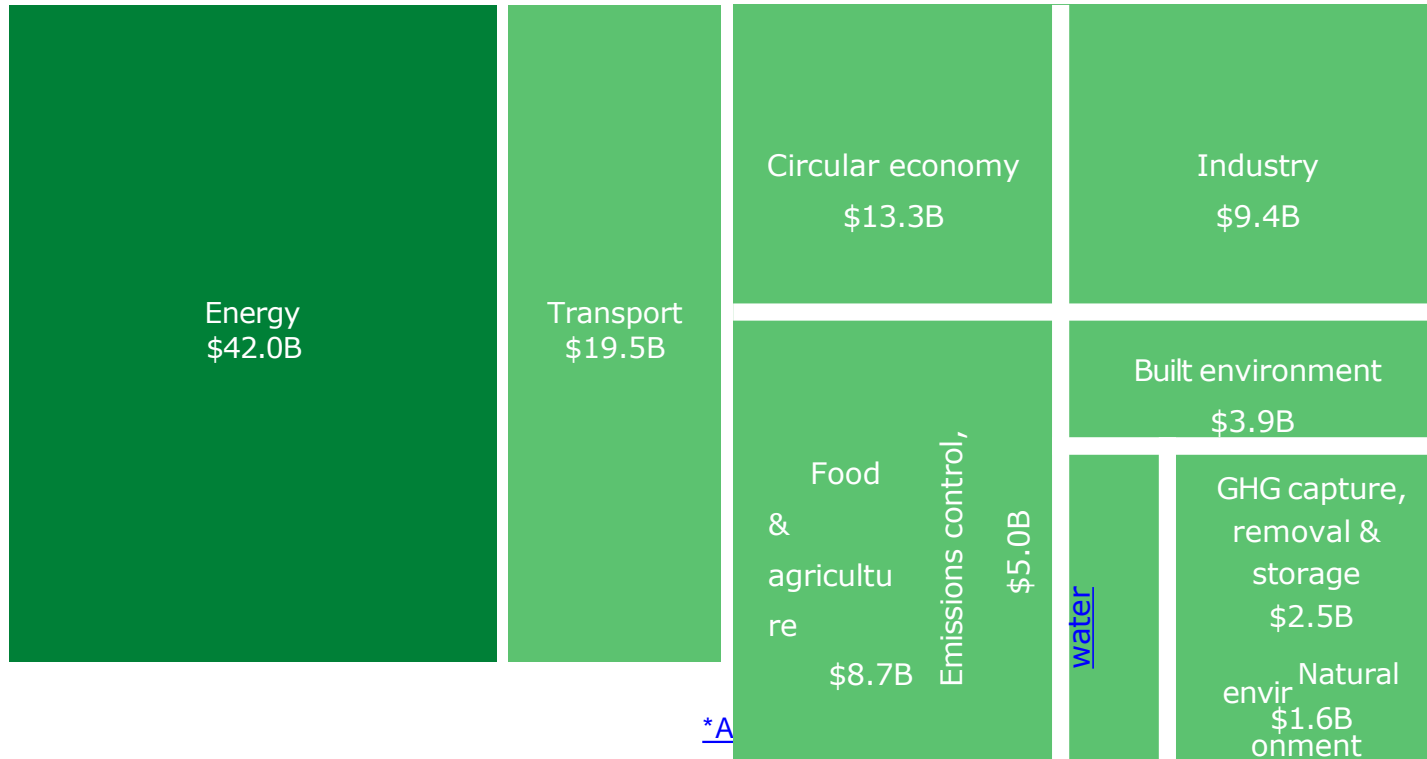


Source: Net Zero Insights

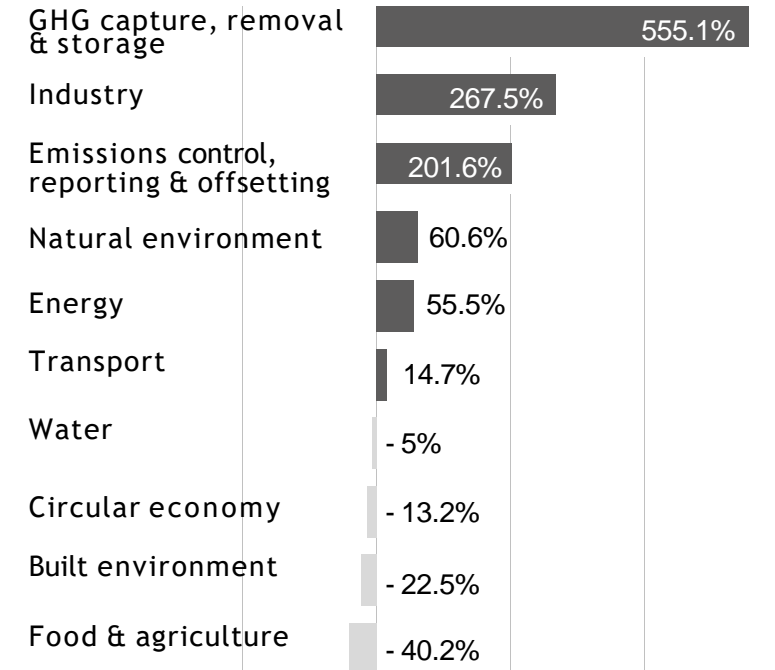


ENERGY ATTRACTED OVER HALF OF FUNDING. GHG CAPTURE, REMOVAL & STORAGE SAW FASTEST GROWTH.

FUNDING BY CLIMATE CHANGE CHALLENGE AREA



YOY FUNDING VARIATION



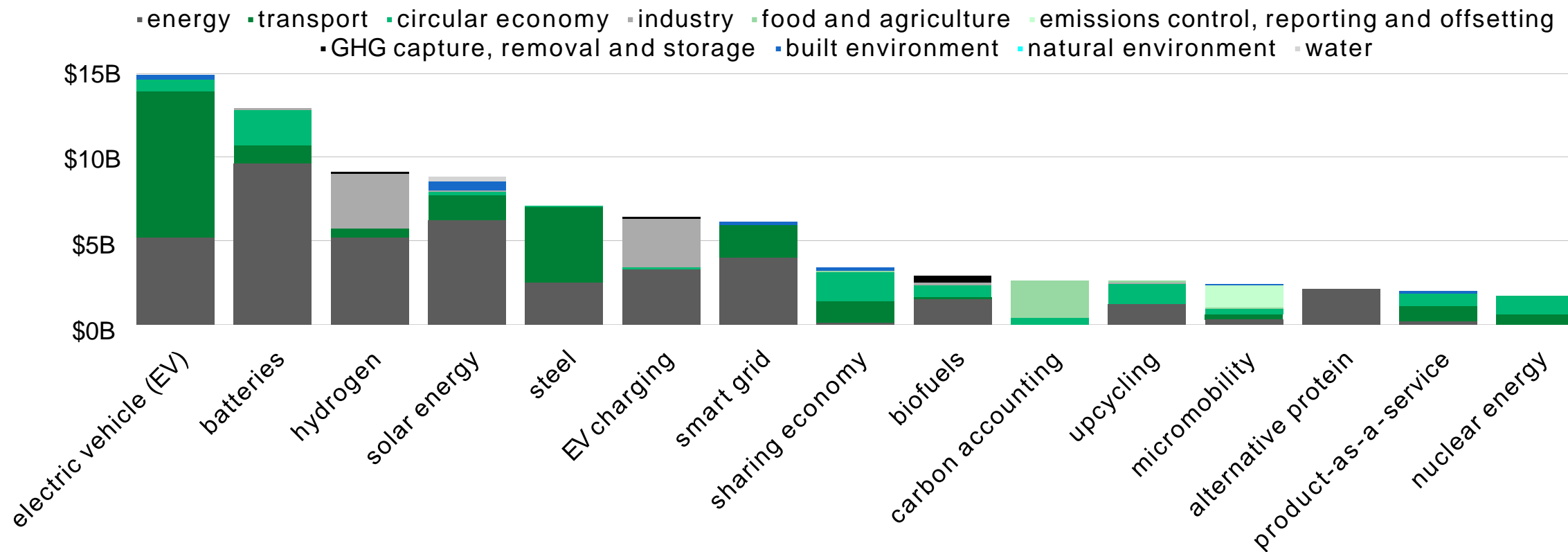
*A

Therefore, the same round can be included more than once.

Source: Net Zero Insights



ELECTRIC VEHICLES, BATTERIES, HYDROGEN AND SOLAR ENERGY GET THE MOST CAPITAL IN 2022.



**An organisation can fall under different categories. Therefore, the same round can be included more than once.*

[Source: Net Zero Insights](#)



臺灣2050淨零轉型

四大策略 兩大基礎

轉型策略

能源轉型

風力、太陽光電
系統整合及儲能

新能源(氫能、深層地熱、海洋能等)

產業轉型

高科技產業、傳統製造業
建築營造業、運具電氣化
食品農林、資源循環

生活轉型

綠運輸
電氣化環境營造
住商生活型態 (行為改變)

社會轉型

公正轉型
公民參與
(社會對話)

治理基礎

科技研發

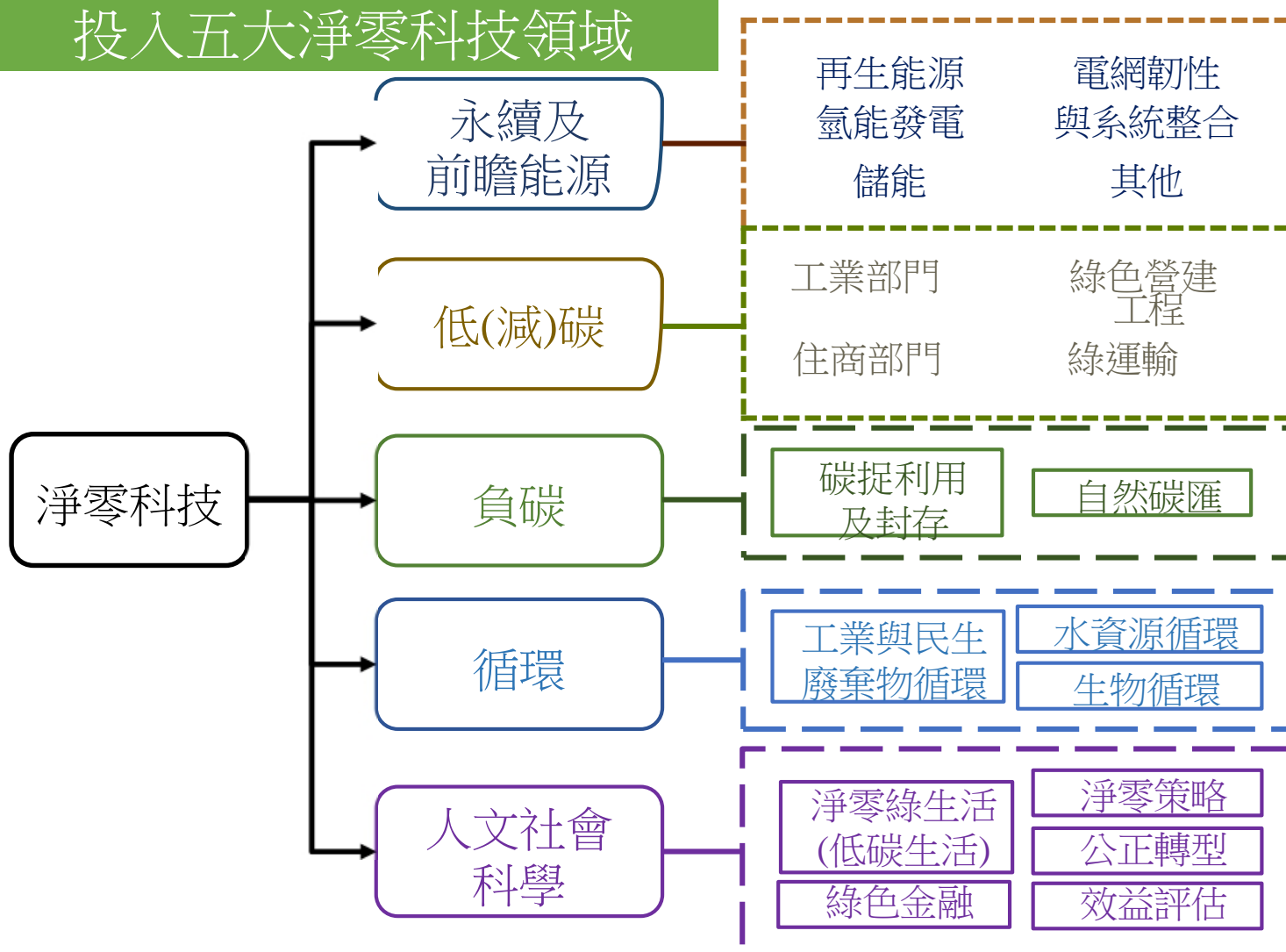
淨零技術
負排放技術

氣候法制

法規制度及政策基礎
碳定價 綠色金融

我國淨零科技方案策略

投入五大淨零科技領域



聚焦四項核心重點

- **以人為本**
 - 人文社會系統面引導科技投入
 - 結合民間力量推動淨零新生活
- **以終為始**
 - 串連科技研發與落地實踐
 - 促進產業全生命週期發展
- **布局未來**
 - 投入高減碳效益潛力科技
 - 探索突破式創新研發
- **比肩國際**
 - 策略性與全球指標性機構合作
 - 掌握具國際領先之關鍵科技

行政院 112.3.28 核定淨零科技方案(2023-2026)

✓ 國科會2022年12月5日召開第2次委員會議，通過「淨零科技方案」的淨零轉型推動

✓ 以跨部會協作、公私協力、國際合作等方式進行全面性、系統性淨零科技



人文社會科學
投入四大轉型調適及社會經濟等 基礎研究，支援決策參考與社會溝通



永續與前瞻能源

- 投入**前瞻能源**研究，極大化**再生能源**供給
- 布局**儲能與電網**系統整合科技發展
- 投入**氫能**發電關鍵基礎設施



減碳

- 扣合國際產業淨零排放需求，落實高碳排產業**減碳技術應用**，並**導入氫能**應用
- 布局**載具電氣化**技術，減少運輸碳排



循環

- 開發資源循環應用技術，**提高資源再利用率**，**降低國內資源需求**，以降低碳排



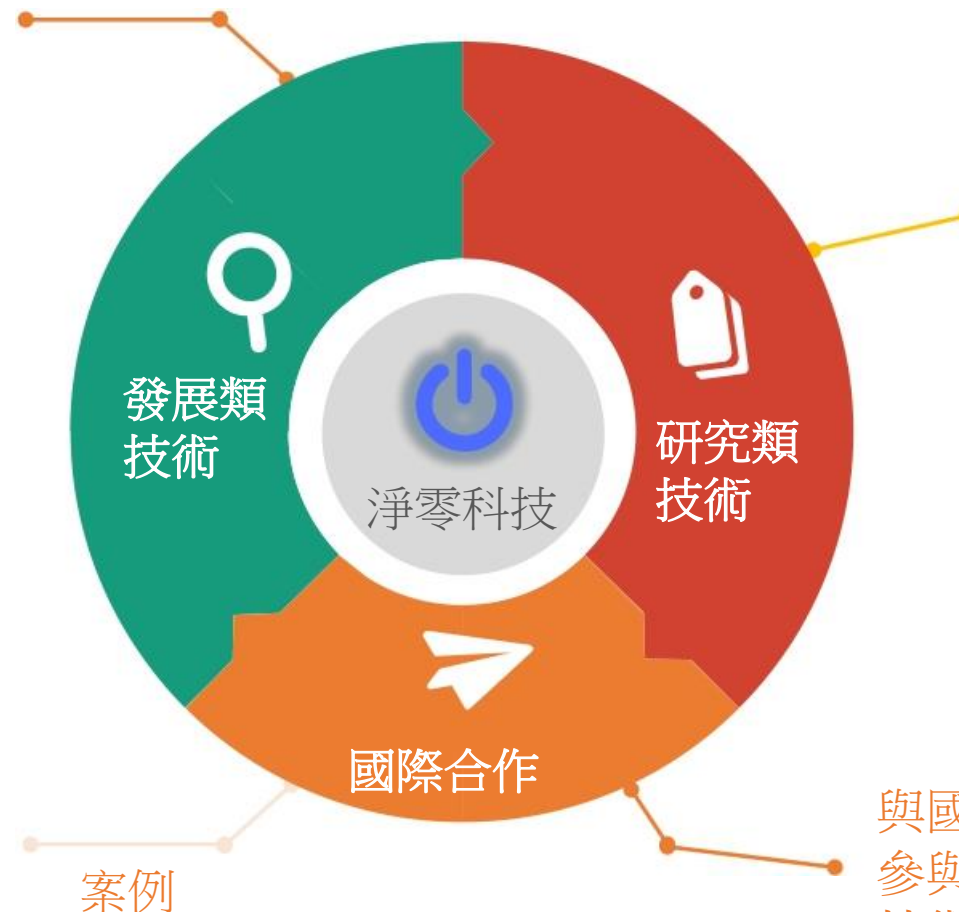
負碳

- 發展**碳捕獲**、**碳封存**與**自然碳匯**技術，建立國家長期減碳潛力

我國淨零科技推動重點

2030前技術落地

- 永續及前瞻能源：海上型太陽能、氫能基礎建設、抽蓄式水力、分散式儲能與電網整合技術
- 低(減)碳：高排碳(石化、鋼鐵、電子、建築)產業之減碳技術(含AI智慧節能、低碳營建工法)
- 循環：強化投入營建廢棄物、廢塑膠、電池等資源回收再利用技術



案例

合作項目	氫能源發電
減碳潛量	7,300萬噸
合作內容	氫燃氣渦輪技術引入
國外合作對象	  德國西門子 三菱重工
國內介接機構	台電公司

2050前技術示範

- 永續及前瞻能源：地熱(深層地熱、海洋地熱)、海洋能(洋流發電、海洋溫差發電)、天然氣裂解產氫
- 低(減)碳：氫能工業應用(氫氣燃燒、氫能煉鋼)
- 負碳：碳捕獲封存與再利用、自然碳匯、負碳農耕等技術
- 循環：以開發全循環創新石化材料

與國際標竿組織/廠商合作
參與示範與商業化技術開發
技術聯合開發，淨零科技人才培育

- 台灣的氣候作為仍與國際有很大距離，需要由**氣候科技投資與碳市場機制**來強化，並須與**國際連結**，**民間資源的誘因與導入**很重要。
- 台灣的科技業是面對氣候變遷、**低碳轉型**主要驅動力。
- 避免漂綠，不是只有 ESG，而是**綠色轉型**。
- **碳資產管理**是一切的基石，台灣還需要支持企業之**碳自願市場交易機制**。

感恩大家

Line 氣象達人彭啟明

