Part 2: Carbon markets – world scenario, and carbon credits - how they work?
Credits vs. Offsets

Dr.V.V.L.N. Sastry

Jurist & Financial Economist

M.E, M.B.A, FCMA (CIMA), CMA, CGMA, CPA, CACA, MSc (Economic Policy), LL.M, Ph.D.

Post Doctorate in Economics.

Carbon credits, and the way they work!

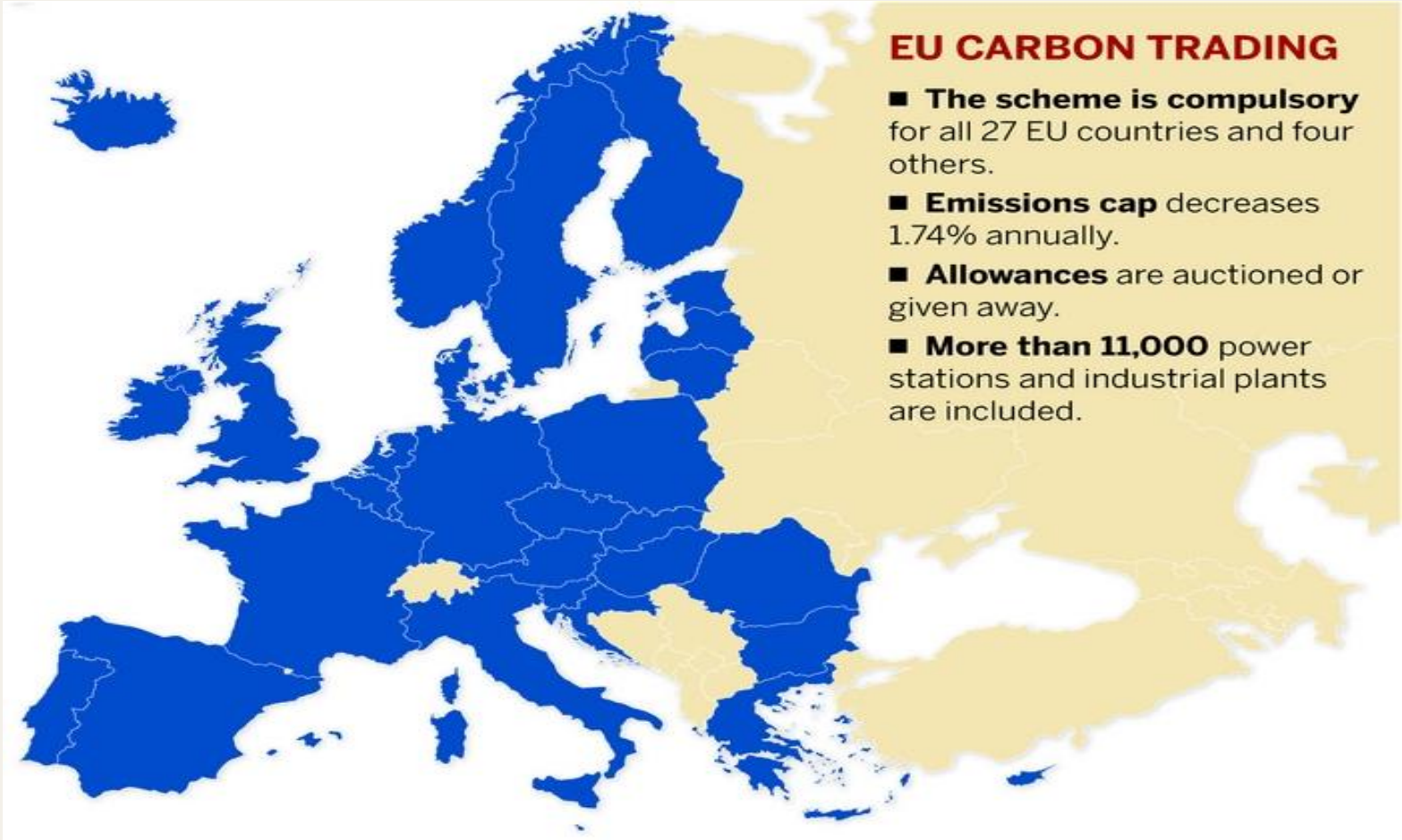
(A brief recap from Part-1, in next 5 slides)

Carbon markets and the way they operate, They can take various forms, such as regional, national, or international systems.

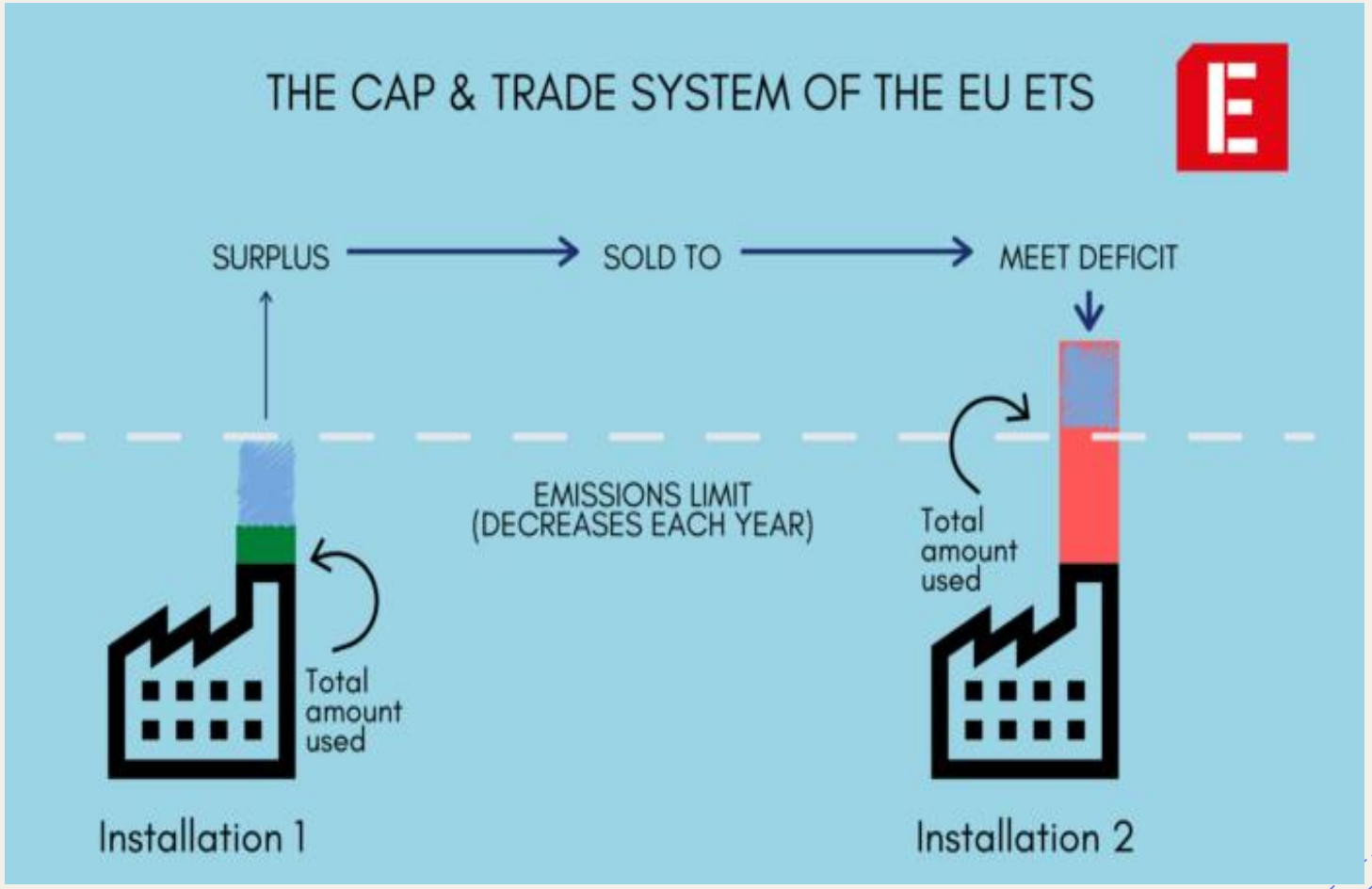
Some of the most well-known carbon markets include:

- European Union Emissions Trading System (EU ETS): Covering various sectors in the European Union, this is one of the largest and oldest carbon markets globally.
- California Cap-and-Trade Program: California operates a statewide cap-and-trade system, which is one of the most prominent in the United States.
- Regional Greenhouse Gas Initiative (RGGI): This is a cooperative effort among several U.S. states in the Northeast to cap and reduce power sector emissions.
- Kyoto Protocol Mechanisms: The Kyoto Protocol established international carbon market mechanisms like the Clean Development Mechanism (CDM) and Joint Implementation (JI), which allow developed countries to invest in emission reduction projects in other nations.
- Carbon markets are designed to promote cost-effective emissions reductions and encourage the adoption of cleaner technologies, making them a valuable tool in addressing climate change and achieving international emissions reduction goals.

Carbon markets can take various forms, such as regional, national, or international systems. European Union Emissions Trading System (EU ETS)



European Union Emissions Trading System (EU ETS)



European Union Emissions Trading System (EU ETS)

Practice of Emissions Trading in the EU-ETS

Facility operators which emit CO2 must present a valid ETS certificate for each ton of CO2 they emit. The facilities are allocated a certain quota of CO2 certificates at the beginning of the year. If the CO2 emission exceeds the amount of allocated certificates of a plant, operators have to buy certificates in the emission allowance trading. The ton of carbon dioxide saved, also known as 1 EUA, thus receives a direct monetary value that is determined on the basis of supply and demand.

On April 30 of each year, plant operators must disclose their emissions allowance balance: If the number of allowances does not match the amount of CO2 actually emitted, a penalty of 100 euros per missing EUA is due, and the missing certificate must be submitted subsequently. The disclosed emissions are then used to prepare a forecast for the following year.

Technical Process of Emissions Trading

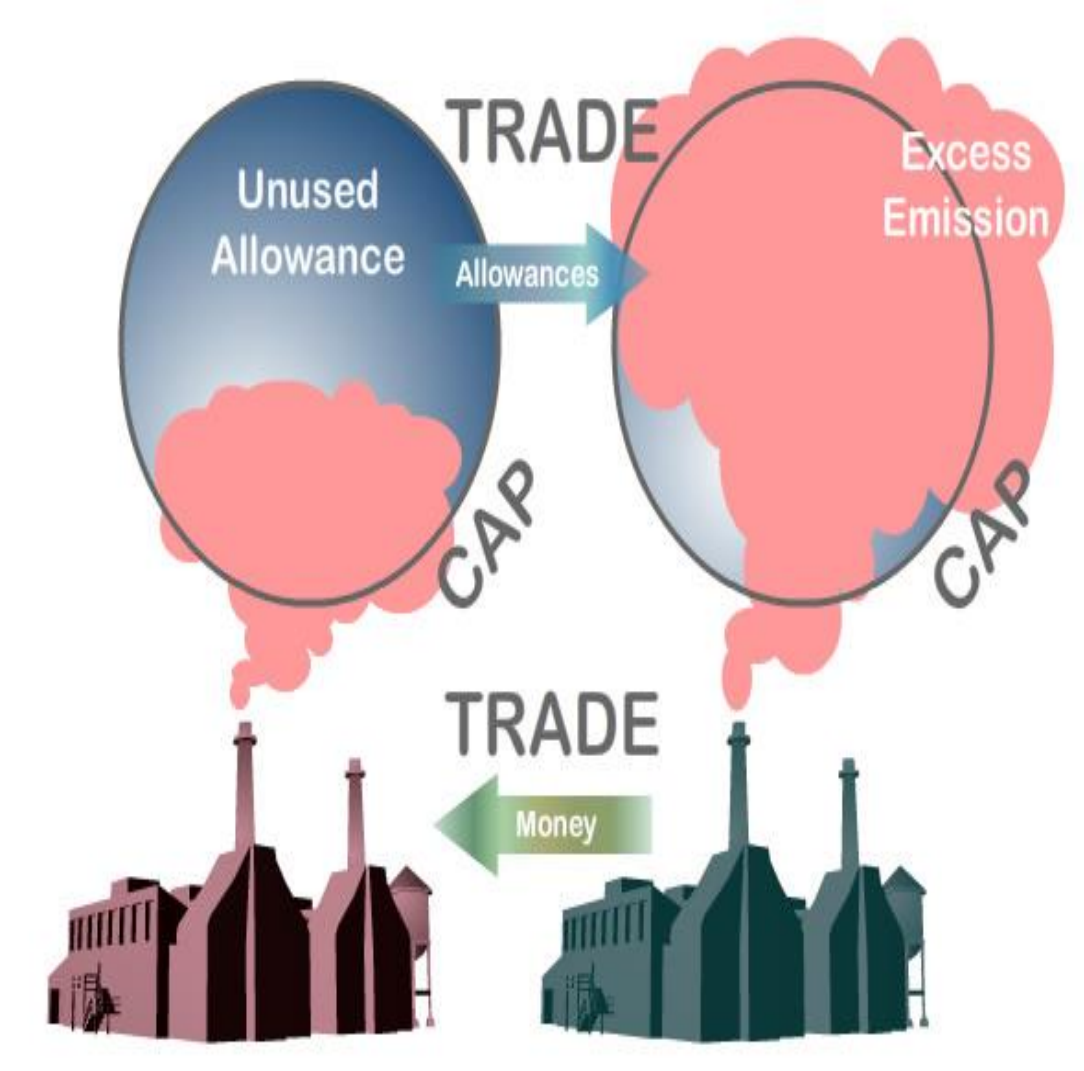
EU emission allowances do not exist as documents - trading takes place in purely electronic form, similar to electricity trading, both via exchanges and over-the-counter (OTC). The most important trading venues are the ECX (European Climate Exchange) in London, the EEX in Leipzig and the EXAA in Vienna. At 11 a.m., the EEX publishes the so-called Carbix each day, which is the EEX Carbon Index of the spot market price for the CO2 price development in Europe.

EU emission certificates are not globally applicable, but can be offset against other Kyoto Protocol certificates (Emission Reduction Units (ERU), Assigned Amount Unit (AAU), Certified Emission Reduction (CER)) as well as other emission certificates under certain conditions. In addition to certificate trading, countries also have the option of trading CO2 quotas based on bilateral agreements.

Steering Effect through Scarcity of Certificates

In order to have a steering effect, i.e. to actually reduce the amount of CO2 emitted, the quantity of freely available certificates must always be below the forecast emission volume. Alongside a statutory minimum price per metric ton of CO2, this is one of the central parameters of EU emissions trading.

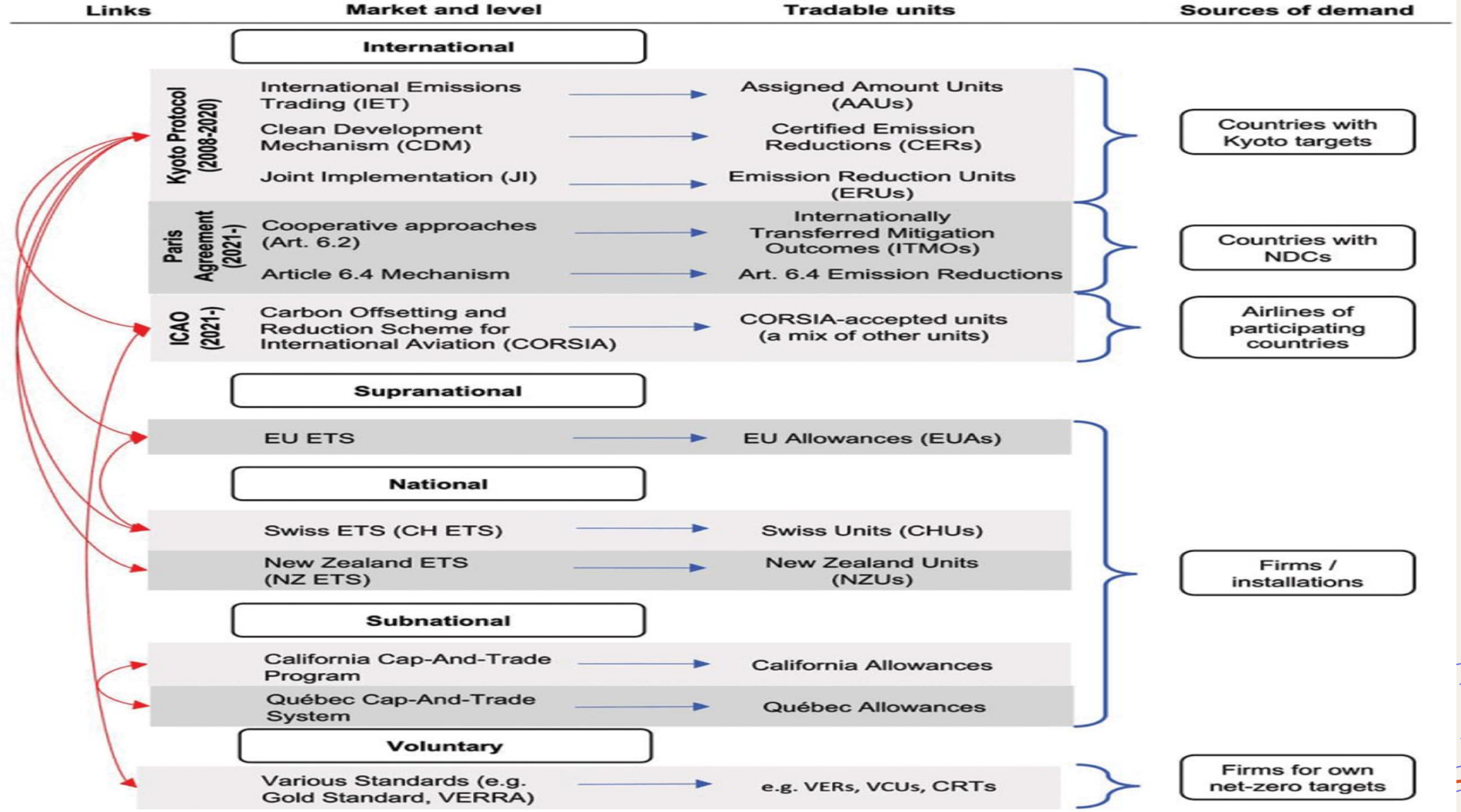
California cap and trade program



- A cap and trade program can work in a number of ways, but here are the basics. The government sets the limit, or "cap" on emissions permitted across a given industry. It issues a limited number of annual permits that allow companies to emit a certain amount of carbon dioxide and related pollutants that drive global warming. Other pollutants that contribute to smog can also be capped.
- The total amount of the cap is split into allowances. Each allowance permits a company to emit one ton of emissions. The government distributes the allowances to the companies, either for free or through an auction.
- But the government lowers the number of permits each year, thereby lowering the total emissions cap. That makes the permits more expensive. Over time, companies have an incentive to reduce their emissions more efficiently and invest in clean technology as it becomes cheaper than buying permits.
- Companies are taxed if they produce a higher level of emissions than their permits allow. They may even be penalized for a violation. On the other hand, companies that reduce their emissions can sell allowances ("trade" them) to other companies that pollute more. They can also bank them for future use

Part II
World Scenario

Main international carbon markets, their linkages, and traded units.



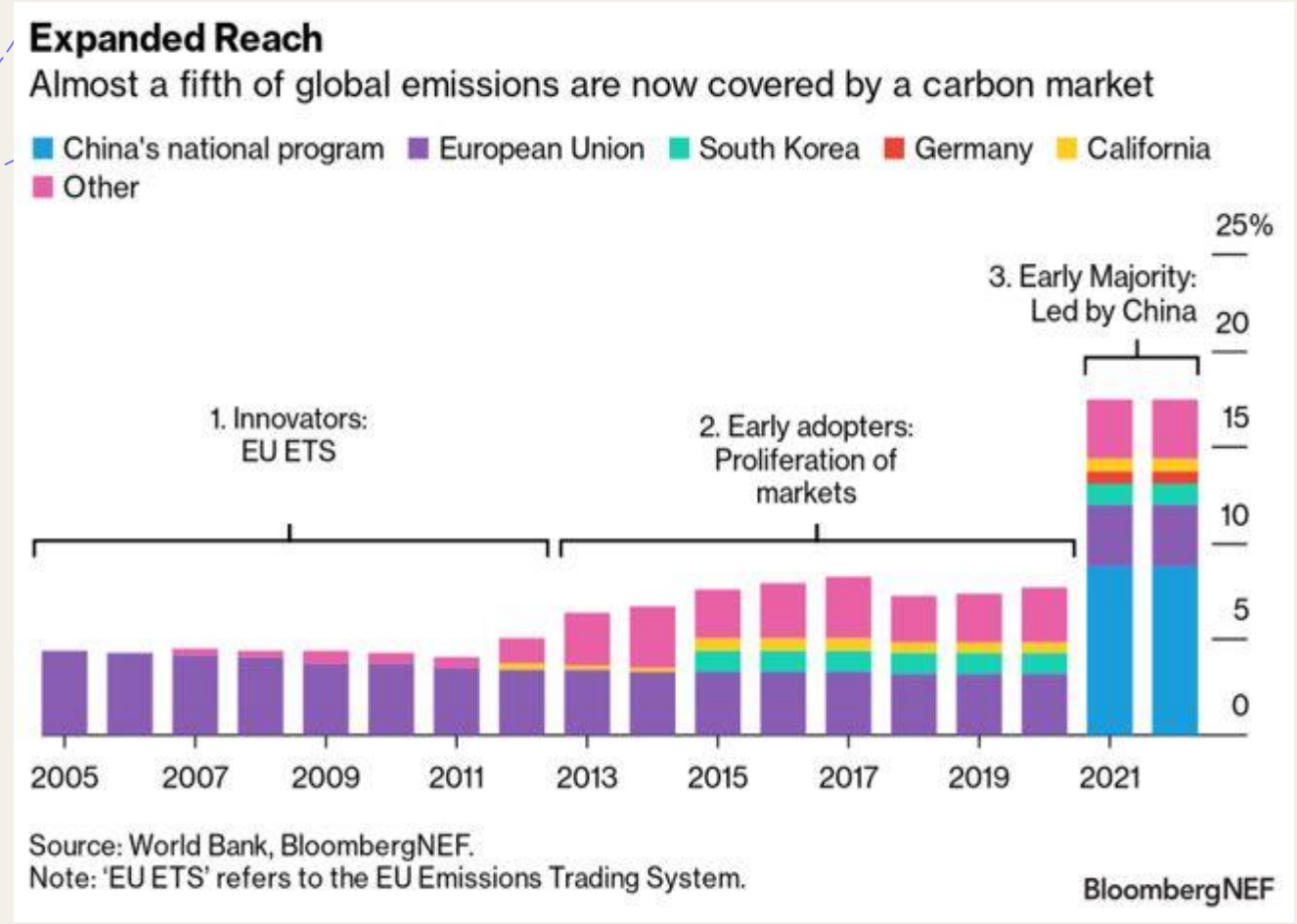
The red arrows depict direct links between the different systems which allow them to trade with each other. In addition to this, some markets may be linked indirectly – e.g., the EU ETS and the NZ ETS are connected through their link to the Kyoto Protocol mechanisms.

More countries are recognizing the value of putting a price on carbon

As a means to achieving their climate goals,

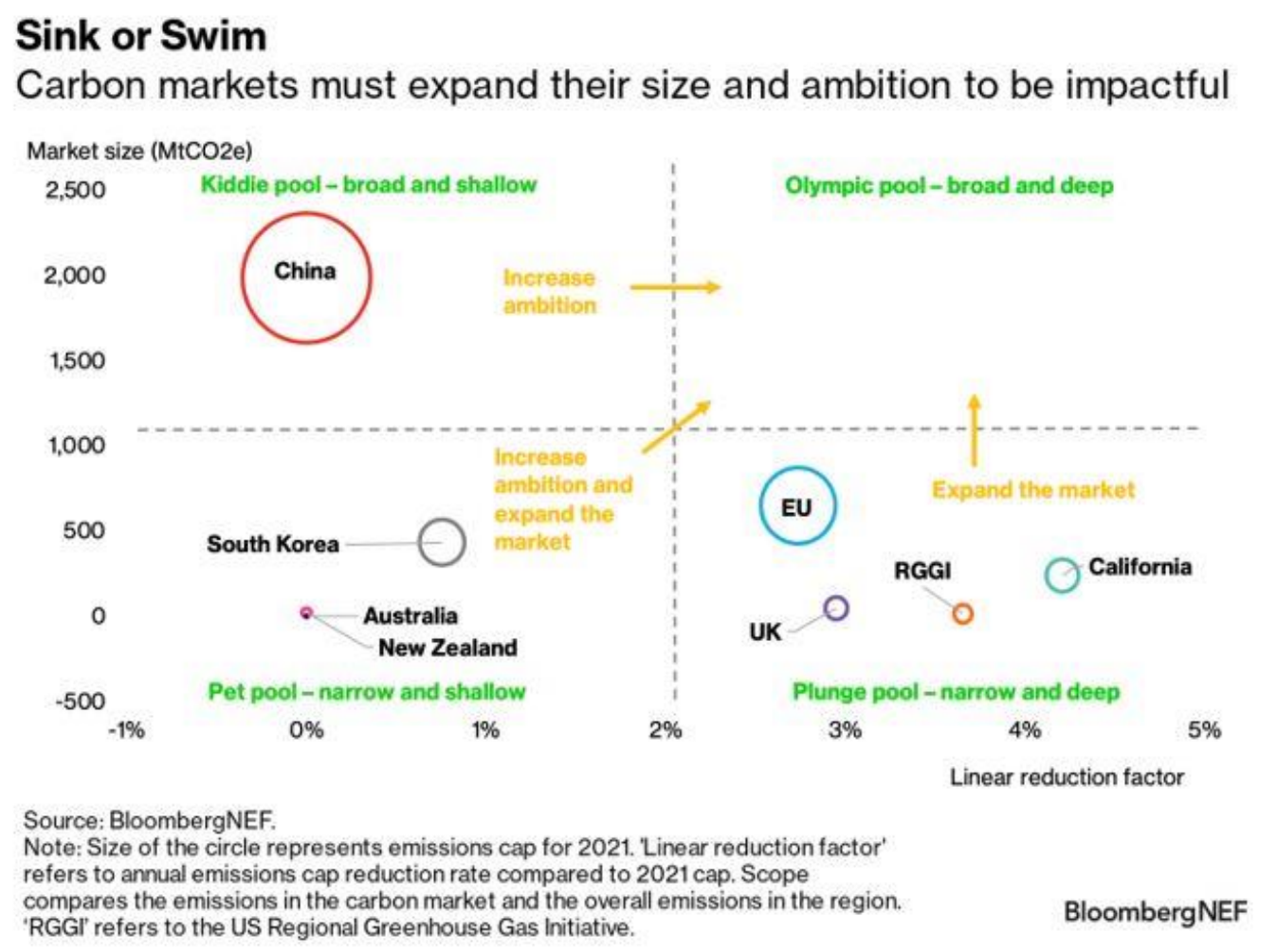
- **Close to a fifth of global emissions are now covered by a so-called ‘compliance-based carbon market, up from just 5% a decade ago.’**
- **But while support for carbon markets is growing, mass adoption is still a long way off, with many of the world’s largest emitters remaining on the sidelines.**
- **Prices and ambition also need to be raised for these market mechanisms to play a substantial role in the shift to a greener future.**
- **On the voluntary side, carbon offsets are gaining traction as corporations hunt for ways to neutralize their emissions, although the market remains hampered by oversupply and questions over credibility.**
- **Still, stricter regulation could enable voluntary carbon markets to take off in the coming decades and address any residual emissions that cannot be abated through other means.**

Untapped potential of global carbon markets - Compliance markets broaden their horizons



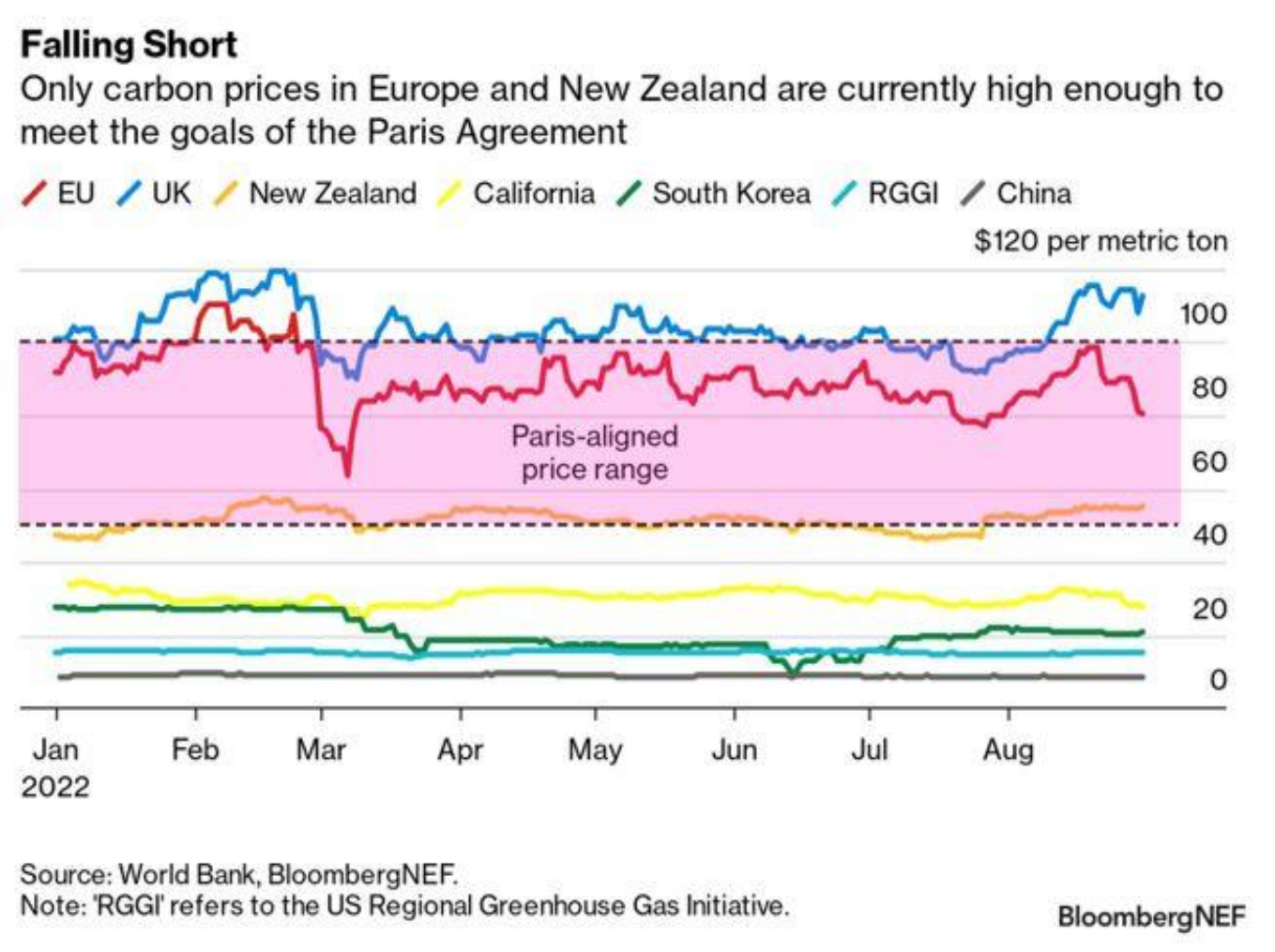
- **The growing acknowledgment of the need to put a price on pollution has seen carbon markets established in more regions and expand in terms of both the volume of emissions covered and traded value.**
- **There are now 30 'compliance' carbon markets operating around the world, in which entities must purchase or trade allowances for the emissions they produce.**
- **Together, these markets reached a value of more than $850 billion and cover close to a fifth of global greenhouse gas emissions.**
- **The European Union was one of the early innovators with the debut of its Emissions Trading System back in 2005, and momentum was turbocharged when China joined the party in 2021 with the launch of its national market.**
- **"A few key jurisdictions have yet to enter the fray, such as India and the US." While the US has some state-level schemes, which covered 8% of its emissions, a national US scheme remains unlikely. India has more discussed implementing a compliance carbon market but in the near term has decided to focus on voluntary schemes.**

More ambition is needed for real impact



- **On top of the need for new markets, existing carbon pricing programs must significantly ramp up their size and ambition if they are to play a major role in decarbonizing the global economy.**
- **While some compliance carbon markets are undertaking sweeping reforms, there is still work to be done for them to advance from splashing around in a shallow pool to swimming in the big leagues.**
- **BNEF considers a well-functioning carbon market, referred to as an 'Olympic pool', to be both broad and deep. This means it must have ambitious emission reduction goals and a large scope to enable the most decarbonization. None of the world's major carbon markets have yet reached Olympic level.**
- **The EU could manage to achieve such a feat if the reforms under its Fit for 55 package are passed without being watered down, meanwhile, the likes of China could push forward by increasing its ambition and creating a higher price signal to support abatement.**

Higher prices are needed



- **While the proliferation of carbon markets is undoubtedly good news, prices are by and large still too low to have a material climate impact.**
- **This is particularly true for sectors outside of power generation where switching to low-carbon alternatives remains an expensive proposition.**
- **The World Bank estimates that a carbon price of $50-100 per metric ton of carbon dioxide is required by 2030 to meet the temperature goals of the Paris Agreement – to limit global warming to well below 2 degrees Celsius above pre-industrial levels.**
- **However, only the EU, UK and New Zealand currently have prices within or above this range, with other major markets falling well short.**
- **Prices in China, the world's largest market in terms of emissions covered, are languishing below $10 per ton of CO2. The laggards will require reforms to their market designs to reach the necessary price level.**
- **For many, this will involve tackling oversupply of allowances, both in terms of banked past allowance surpluses (for schemes that allow this practice) and reducing future allocation to encourage future scarcity. Alongside price levels, the salience of a carbon price is also key, whereby highly visible prices are more likely to result in behavioral change.**

At this stage understanding carbon credits Vs. offsets is essential

Carbon credits Vs. Offsets

What are Carbon Credits?

- Carbon credits are marketable permits that each reflect one metric ton of carbon dioxide (CO2) emissions (or other greenhouse gases) that a business is allowed to emit.
- Carbon credits are used in the context of emissions trading in which companies are given a fixed amount of credits depending on their emissions. They can later purchase more credits or sell their extra.

What are Carbon Offsets?

- Carbon offsets are typically created when companies or individuals finance projects that reduce greenhouse gas emissions elsewhere.
- Projects to reduce carbon often fall into one of two categories: mechanical or natural. Reforestation and wetland restoration activities are examples of solutions that "naturally" collect carbon in the environment. Mechanical solutions include investments in new technology that result in higher efficiency or lower emissions, like renewable energy projects or direct carbon capture technologies.

Carbon credits Vs. Offsets

What's the Difference?

- Carbon offsets can be considered a measurement unit to "compensate" a business for investing in green projects or initiatives (whether natural or mechanical) that eliminate emissions.
- Carbon credits are a measurement unit to "cap" emissions (meaning permitted emissions).
- Once an offset has been produced, it can either be kept by the company that carried out the project or traded on a voluntary carbon market.

How are carbon credits bought and sold?

These credits only exist where a "cap-and-trade" system is used. A cap-and-trade system establishes a cap on maximum emissions in order to reduce aggregate emissions from a group of emitters. This market-based approach promotes lower pollutant emissions and promote investment in energy efficiency and fossil fuel alternatives.

How are carbon offsets bought and sold?

As compared to carbon credits that are bought and sold via a cap-and-trade system, carbon offsets are traded on a voluntary market. It includes all businesses and people who aim to decrease their carbon footprint. There are no regulations governing voluntary market participation. Participants purchase carbon offsets to achieve internal carbon emission goals **(Continued in next slide….)**

How are carbon offsets bought and sold?

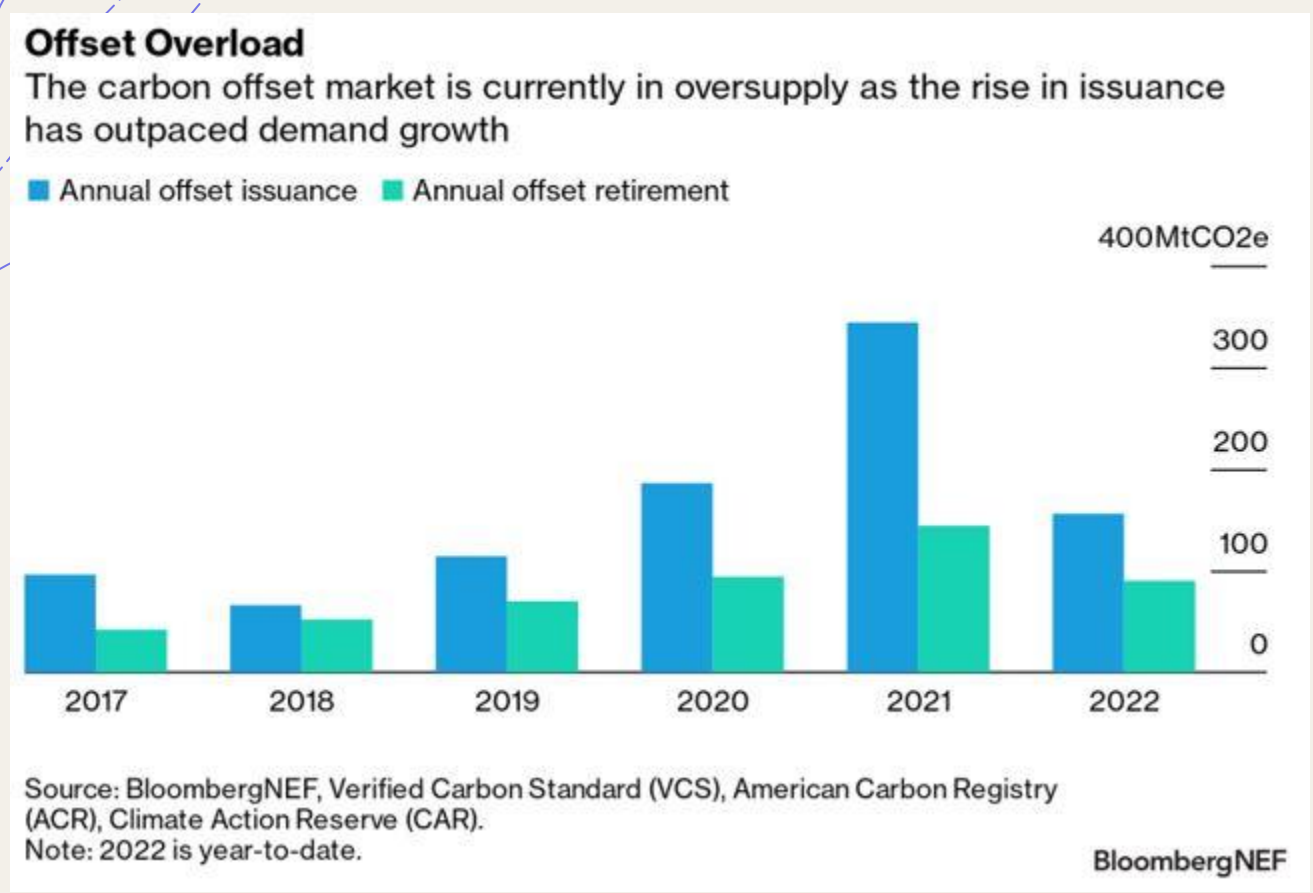
(Continued from last slide)

- **However, this absence of control does not imply that offsets bought via this market do not adhere to specific requirements. Organizations are encouraged to invest in approved programs in order to demonstrate their environmental credentials and avoid charges of "greenwashing," which involves making false environmental claims to promote brand image.**

- **Programs like the Verified Carbon Standard or the Gold Standard set industry standards. These programs outline criteria that offsets should achieve in order to get certification. Projects are then examined and accredited in accordance with their standards.**

- **Overall, carbon credits and carbon offsets are both important tools for reducing emissions. Businesses can use these tools to reduce their emissions while also receiving a financial benefit in return.**

Voluntary markets gain momentum



- **The other side of the carbon coin is voluntary markets, whereby entities purchase offsets from projects that remove or avoid emissions to help neutralize their own environmental footprint.**
- **Demand for offsets is accelerating. Over 144 million offsets were retired in 2021 – each corresponding to one ton of CO2 equivalent – up more than 50% from a year earlier.**
- **Despite corporate demand for offsets mounting as new net-zero targets are set, the market remains oversupplied with energy generation and avoided deforestation offsets – many of which are low quality, both of these factors have kept prices in the market extremely low, leaving corporations with little incentive to prioritize other decarbonization strategies.**
- **The supply-demand balance could shift quickly, as groups like the Science Based Targets initiative (SBTi) push for the use of only removal offsets to achieve net-zero emissions.**
- **Meanwhile, countries including Indonesia, Papua New Guinea and India are planning to halting the export of carbon credits to help meet their own domestic climate goals.**

The next great commodity market?

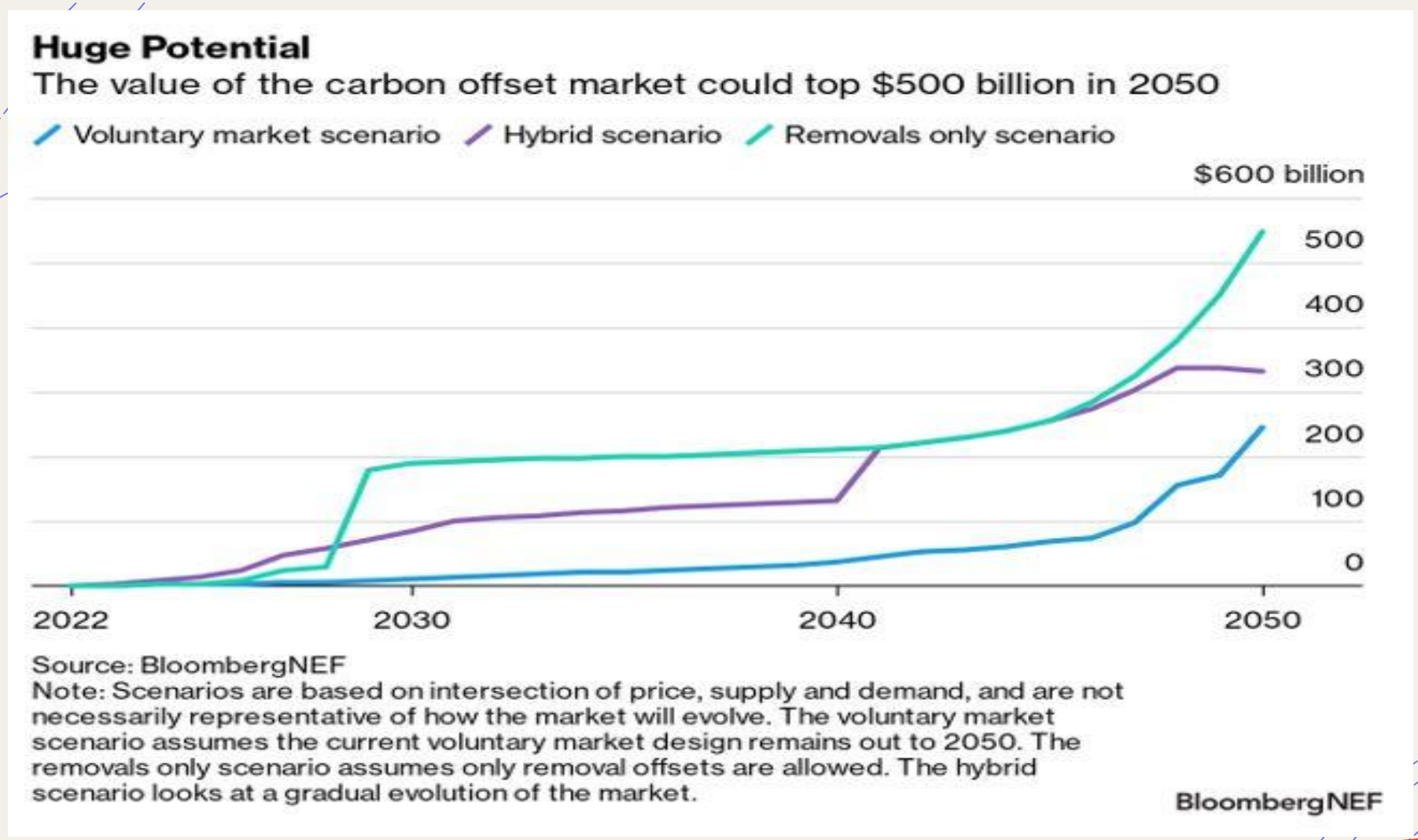
- Despite the hype of voluntary carbon markets, they are still very small compared to compliance markets, valued at around $1 billion to $2 billion in 2021.
- But their potential is huge, particularly as companies will likely look to offset any residual emissions in the coming decades after all other abatement options are exhausted.

- In a scenario where only removal offsets are permitted, demand for offsets could grow 40-fold between now and 2050, to 5.2 billion tons of CO2 equivalent, which is equal to 10% of global emissions today.
- Prices could reach $120 per ton in 2050.
- More stringent regulation around supply and demand could turn the offset market from the annoying little brother of the carbon world into the next great commodity market, valued at over half a trillion dollars.

- The work of various registries, independent initiatives and technology providers will therefore be key in the market's development.

- There is also the potential for compliance and voluntary carbon markets to shift closer together, with seven major compliance carbon markets now allowing the use of offsets in some form and the COP26 (Conference of the Parties, and the summit was attended by the countries that signed the United Nations Framework Convention on Climate Change (UNFCCC)) summit laying the groundwork for global carbon trading to become a reality.

The next great commodity market?



Leading carbon exchanges

European Energy Exchange (EEX) - Located in Leipzig, Germany. EEX is a major European energy exchange that also facilitates the trading of emission allowances.

Euronext - Euronext operates multiple stock exchanges across Europe, and it offers trading in carbon allowances, primarily in the European Union Emissions Trading System (EU ETS).

Intercontinental Exchange (ICE) - ICE is a global exchange operator with headquarters in the United States. It offers various commodities and financial products, including carbon credits.

Climate Trade - A global carbon trading platform that allows users to buy and sell carbon credits. It operates online, so it doesn't have a physical location.

China Emissions Exchange (CEEX) - Located in Beijing, China, CEEX is a major exchange for carbon trading in China, where carbon markets have been rapidly developing.

Tokyo Commodity Exchange (TOCOM) - TOCOM, located in Tokyo, Japan, facilitates the trading of carbon allowances and offsets.

Leading carbon exchanges

- Air Carbon Exchange (ACX): The easiest and most streamlined platform. Air Carbon Exchange was launched in Singapore in 2019 as a digital exchange platform for airlines to trade carbon credits.

- Carbon Trade Exchange (CTX): The most cost-effective spot trading exchange. Carbon Trade Exchange (CTX) is one of the earliest players in the global carbon market, dating back to 2009. Unlike other carbon exchanges, CTX is a member-based spot exchange with various participants. They range from individual brokers and project developers to big corporations. CTX is expanding fast with current locations in the UK, Australia, Europe, and Asia. It covers projects in Africa, Asia, Europe, and North and South America.

- Toucan: Creator of the most liquid carbon-to-crypto market. Toucan created its own so-called Carbon Pool or liquidity pool. It turns carbon offsets into more liquid carbon index tokens. This allows buyers to discover prices for different classes of carbon assets and creates a useful Web3 building block. Once bridged, the TCO2 tokens can be deposited in a Carbon Pool. Each offset in the Carbon Pool creates a carbon reference token. TCO2 is backed by one of the carbon offsets with the necessary attributes. And as the offsets are on public blockchains in smart contracts, each TCO2 is verifiable. Verification is straightforward all the way down to the offset’s source registry.

- Xpansiv: The most intelligent exchange for ESG-inclusive commodities. By hosting around 90% of all voluntary carbon credit transactions worldwide, Xpansiv is currently the dominant player in the market.

Instruments traded on carbon exchanges world wide

Carbon exchanges facilitate the trading of various financial instruments related to carbon emissions and environmental markets. The specific instruments traded can vary by exchange and region, but some of the common instruments traded on carbon exchanges worldwide include:

- Emission Allowances (Carbon Credits): These are permits or allowances that allow entities to emit a certain amount of greenhouse gases. They are often traded to meet regulatory emissions targets or to generate revenue.
- Carbon Offsets: These are credits generated from projects that reduce or remove greenhouse gas emissions. They can be bought and sold to compensate for emissions in other activities or sectors.
- Carbon Futures: These are standardized contracts that allow traders to speculate on the future price of carbon allowances. They are often used by entities to hedge against future emissions costs.
- Renewable Energy Certificates (RECs): RECs represent the environmental attributes of renewable energy generation. They can be traded to demonstrate the use of renewable energy for compliance or sustainability goals.
- Voluntary Carbon Credits: These are carbon credits generated from projects that reduce emissions beyond regulatory requirements. They are often purchased voluntarily by organizations and individuals for carbon neutrality or sustainability purposes.
- Compliance Carbon Markets: In regions with emissions trading schemes, compliance instruments such as European Union Allowances (EUAs) in the European Union Emissions Trading System (EU ETS) are traded.
- Environmental Commodities: Some exchanges also trade other environmental commodities like sulfur dioxide (SO2) allowances and nitrogen oxide (NOx) allowances, which are regulated in emissions trading programs.
- Environmental Derivatives: Some exchanges offer derivatives products related to environmental markets, such as options and swaps based on carbon allowances or offsets.
- Clean Development Mechanism (CDM) Credits: CDM credits, known as Certified Emission Reductions (CERs), were generated under the Kyoto Protocol and could be traded internationally. The CDM has been succeeded by other mechanisms in more recent agreements.
- REDD+ Credits: These are credits generated from **reducing emissions from deforestation and forest degradation**, as well as enhancing forest carbon stocks. They can be traded in voluntary markets.

India’s Plans

Q: What is the Indian Carbon Market (ICM)?

A: The Indian Carbon Market, or ICM, is a market-based carbon trading system established by the Indian government to reduce carbon emissions and combat climate change. It aims to regulate emissions through a 'cap-and-trade' system, where carbon credits are traded among industries to achieve emission reduction targets.

Q: What is the Carbon Credit Trading Scheme (CCTS) 2023?

A: The Carbon Credit Trading Scheme 2023 is a draft framework that sets out the basic governance structure and responsibilities of various stakeholders participating in the Indian Carbon Market. It forms the cornerstone of India's carbon market and provides guidelines for emission reduction targets and trading mechanisms.

Q: What is the difference between a voluntary market and a compliance market?

A: In a voluntary market, carbon credits are traded based on voluntary commitments and self-imposed targets by industries. A compliance market, on the other hand, relies on legislative tools and codified industry-specific targets to drive demand for carbon credits.

Q: What lessons can India learn from the PAT scheme for its carbon market?

A: The Perform, Achieve, and Trade (PAT) scheme provides valuable insights into India's carbon market. While the scheme achieved improvements in industrial energy use, it faced challenges such as loose targets and limited industry coverage, which must be addressed to ensure the effectiveness of the carbon market.

Q: How does the recent amendment to the Energy Conservation Act contribute to the Indian Carbon Market?

A: The recent amendment to the Energy Conservation Act lays the groundwork for the imminent voluntary market by allowing notification of energy consumption standards for various entities. This paves the way for a credit-granting authority and shapes the scope of the Indian Carbon Market.

Q: What is the role of stakeholders in the Indian Carbon Market?

A: Various stakeholders, including landowners, developers, verifiers, and carbon credit registries, play essential roles in the Indian Carbon Market. They contribute to the market's functioning, ensuring credibility and transparency in carbon trading.

Currently, How Indian Companies are Benefitting from Carbon Credits?

Indian companies - carbon credits

Several Indian companies had benefited from carbon credits through Clean Development Mechanism (CDM) projects and other emission reduction initiatives. Some of the prominent Indian companies known to have been involved in carbon credit projects include:

- Tata Steel: Tata Steel is one of India's largest steel manufacturers and has been involved in CDM projects to reduce emissions from its steelmaking processes.
- Reliance Industries Limited: Reliance Industries has been engaged in various energy efficiency and emissions reduction projects, particularly in its petrochemical and refining operations.
- Infosys: The IT giant Infosys has implemented several energy-efficient and green initiatives in its data centers and campuses, resulting in carbon credit generation.
- Wipro: Wipro has undertaken multiple initiatives related to energy efficiency and renewable energy installations, leading to the generation of carbon credits.
- Mahindra & Mahindra: Mahindra & Mahindra, a prominent automobile manufacturer, has worked on projects involving clean energy technologies and more fuel-efficient vehicles.
- Hero MotoCorp: This leading motorcycle and scooter manufacturer has been involved in CDM projects related to the reduction of emissions from its manufacturing processes.
- Aditya Birla Group: The Aditya Birla Group, with interests in various sectors, including cement and aluminum, has undertaken emissions reduction projects.
- Suzlon Energy: Suzlon, a wind turbine manufacturer, has benefited from carbon credits by promoting wind energy as a clean and sustainable source of power.

Indian companies in carbon markets

Indian companies were benefiting from carbon credits primarily through their participation in the Clean Development Mechanism (CDM) and other carbon offset projects. Here's how Indian companies were benefiting from carbon credits at that time:

- Clean Development Mechanism (CDM) Projects: Indian companies, particularly those in energy-intensive industries, were implementing CDM projects to reduce their greenhouse gas emissions. These projects could involve the adoption of cleaner technologies, renewable energy installations, or energy efficiency improvements. By successfully implementing such projects, these companies could earn Certified Emission Reductions (CERs), which could be sold in the global carbon market. The revenue generated from selling CERs provided a financial incentive for companies to invest in emission reduction projects.
- Offsetting Emissions: Indian companies also benefited from carbon credits by offsetting their emissions. This involved purchasing carbon credits or offsets from projects in other regions or countries. By buying offsets, Indian companies could compensate for their own emissions and demonstrate a commitment to reducing their carbon footprint, often in alignment with corporate sustainability goals.
- Financial Incentives: Earning carbon credits through CDM projects provided Indian companies with additional revenue streams. These credits could be sold in global carbon markets, generating income for the companies. The income from carbon credit sales could be reinvested in further emission reduction projects or used for other corporate purposes.
- Compliance with Carbon Regulations: In some cases, companies in India had compliance obligations under national or regional carbon regulations. By participating in emission reduction projects and earning carbon credits, they could fulfill their compliance requirements and avoid penalties.

Future of carbon credits market in India.

The future of the carbon credits market in India depends on various factors, including government policies, international agreements, market dynamics, and global efforts to combat climate change.

Here are some key considerations for the future of the carbon credits market in India:

- Policy and Regulatory Framework: The future of the carbon credits market in India will be influenced by the government's policies and regulations related to carbon emissions. India's commitment to the Paris Agreement and its NDC (Nationally Determined Contributions) targets will play a significant role in shaping the carbon market's future.
- Carbon Pricing: India may consider implementing carbon pricing mechanisms, such as carbon taxes or cap-and-trade systems, to encourage emission reductions and provide a market for carbon credits. The design and effectiveness of such mechanisms will be crucial.
- International Agreements: India's participation in international agreements and carbon markets, such as the United Nations Framework Convention on Climate Change (UNFCCC), will impact the country's ability to trade carbon credits on a global scale.
- Clean Development Mechanism (CDM): The CDM, a major source of carbon credits, has evolved over time, and its future depends on international negotiations. The role and relevance of CDM projects in India may change.
- Voluntary Carbon Market: The voluntary carbon market, where companies and individuals purchase carbon credits voluntarily for sustainability purposes, may grow in India as businesses and consumers become more environmentally conscious.
- Renewable Energy and Energy Efficiency: Investments in renewable energy and energy efficiency projects in India are likely to continue, providing opportunities for carbon credit generation.

Future of carbon credits market in India.

- Private Sector Engagement: Indian companies, including those in the energy, manufacturing, and IT sectors, may continue to engage in emission reduction projects and leverage carbon credits for revenue and sustainability goals.

- Technology and Innovation: Advancements in technologies for monitoring and verification of emissions reductions will make carbon credit projects more efficient and attractive.

- Economic Growth and Emissions Reduction: As India continues to grow economically, it faces the challenge of reducing emissions while meeting energy demands. The carbon credits market can play a role in balancing these factors.

- Investor Interest: The interest of investors and financial institutions in sustainability and carbon markets may drive the growth of the market in India.

It's important to note that the carbon credit market is evolving, and the future will depend on how India positions itself in the global effort to address climate change. Indian companies, government agencies, and organizations will need to adapt to changing market dynamics and take advantage of emerging opportunities in the carbon credits market to contribute to emission reductions and sustainability goals.

Rest in Part-III

Thanks for your patient listening

Now the floor is left for Q&A