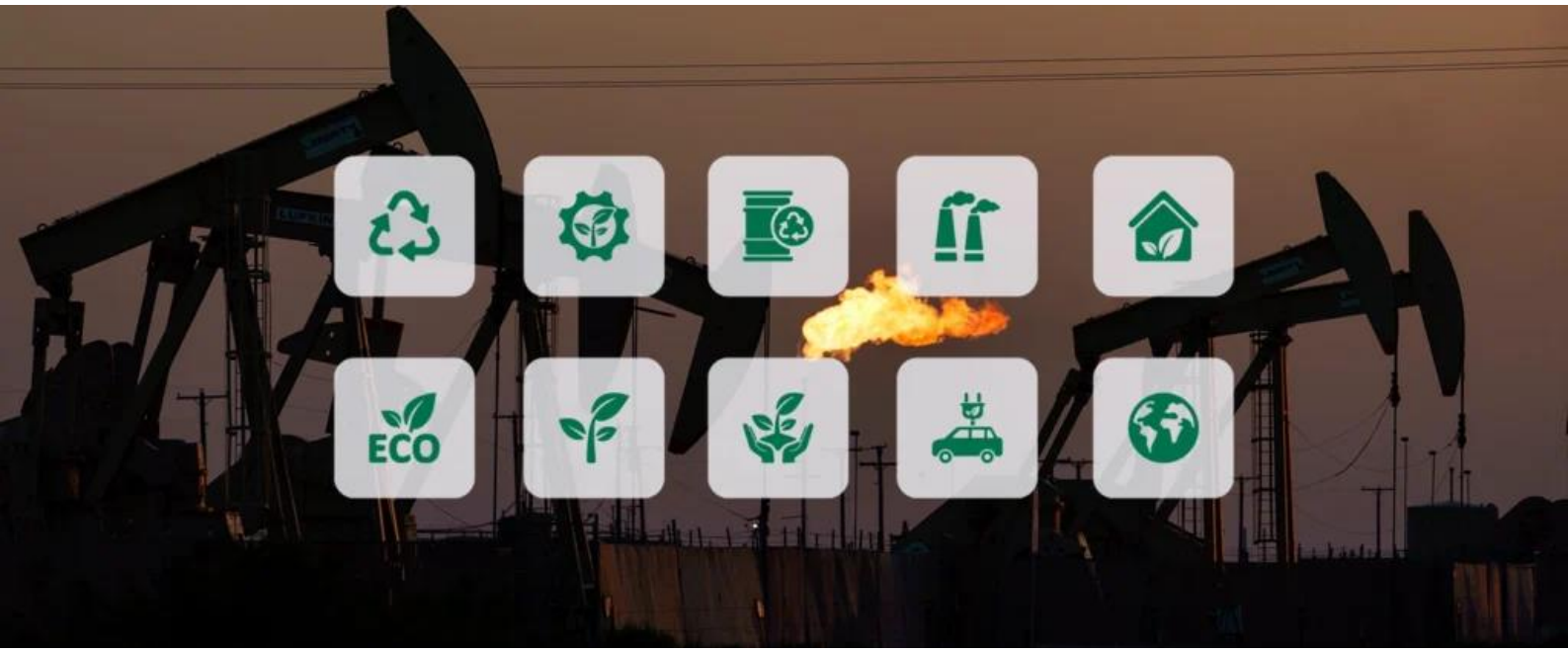
CARBON CREDIT (CARBON OFFSET): CONCEPT AND APPLICABILITY TO IRAQ AND KRI

Roman Jamal | October 8, 2024



Executive Summary

Climate change became a concern for societies and their policymakers when its global consequences were recognized. This recognition tampered with the meaning of clearly defined borders that the traditional understanding of territorial sovereignty depends on. As a result, new frameworks for governance and combined efforts were required. This accelerating phenomenon has crucially affected the developing countries with restricted capacity to mitigate emissions, and the invoked climate actions call for immediate investments in adaptation and resilience.

To communicate actions needed to reduce emissions, the Paris Agreement serves as an important legal treaty that calls all nations into a common cause. Iraq ratified this agreement in 2021, showing commitment to tackling environmental pollution. The Paris Agreement sets long-term goals and targets for reducing emissions, and keeps track of the progress periodically to ensure the stability and consistency of the actions, while setting processes and frameworks to avoid disorganization and mutual conflicts between the parties.

The Paris Agreement questions the possibility of practicing carbon offsetting through international collaborations and voluntary participations. These carbon credit mechanisms present a potential for Iraq as a means of achieving its Nationally Determined Contributions (NDCs), and for providing further support. Given this situation, this paper highlights Iraq's commitment to addressing climate change, investigates the advancing landscape of carbon market with exploring the future implications of carbon markets for Iraq. It also offers policy suggestions and practical advice for meeting NDCs and making a relevant impact in global climate action.

Introduction

Human activities and natural sources such as the methane emissions from farming rice and the livestock's dung and digestion processes accompanied by the subsequent human-made emissions from burning of fossil fuels, deforestation and other industrial processes are contributing to driving up the earth's temperature. Therefore, reducing these greenhouse gases (GHGs) emissions is the main priority to tackle the issue.[1]

A state where global warming stops essentially translates to net zero, which is an interconnected term with carbon offsetting that requires having a permanent GHG free atmosphere. [2]

In carbon markets, the participants put capital into carbon reduction projects through the power of trade to accelerate the net-zero goal progress.[3] However, just like other markets in the world, carbon markets are facing challenges. A lack of common standards, fragmentation and uncertainty in carbon credit quality have all limited participation and the ability for faster decarbonization. A framework that can improve market interactions and foster investments is needed through making carbon credits trackable and in demand through rules and standards.

Carbon Offset; Concept and Potentials

There is a lot more to carbon offsetting than just reducing carbon dioxide emissions. Carbon offsetting is the act of compensating for unavoidable emissions by companies and individuals through promoting worthwhile projects that cut down emissions elsewhere. [4]

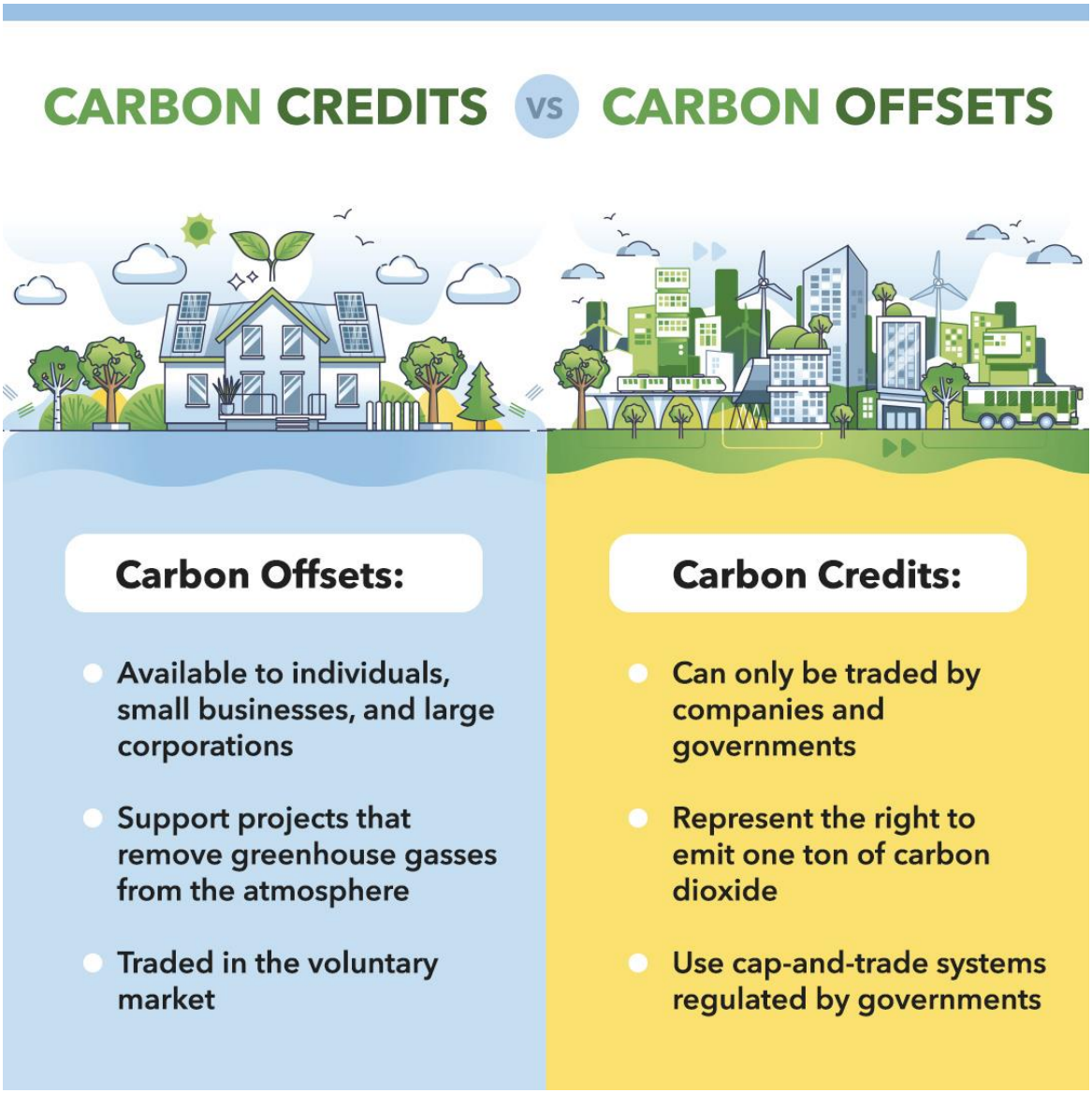
Carbon offsets can be categorized into avoidance and removal projects based on the mechanism they use to abate the release of GHGs into the air.[5] In the avoidance projects, GHGs emissions are prevented through funding projects such as protecting forests from deforestation or using renewable energy sources instead of processes that release carbon dioxide, while the removal projects focus on extracting GHGs from the air through planting new forests (Afforestation) or utilizing carbon capture technologies.[6] Both kinds of projects are deemed effective for achieving carbon neutrality, protecting biodiversity, and providing employment opportunities.

Iraq is becoming heavily water, air and land polluted on an unprecedented scale.[7] Many acres of land are contaminated by hydrocarbon and chemical spills, rivers receive tons of discharges from medical, industrial, and domestic wastewater, apart from the vast amount of GHGs being released into the atmosphere periodically. Dust storms, heat waves and droughts have triggered extra pressure on the local climate that is already facing elevated water scarcity and demographic growth where even reconstruction is seen as a dangerous approach in this case if they are not designed according to sustainable measures.[8] These sustainable measures can be exercised through enforced and voluntary investments to decarbonize the operations of business firms, industries, and all sorts of organizations. Carbon offsetting is an explicable measure for minimizing the carbon footprint and contributing toward the United

Nation's Sustainable Development Goals.[9] Carbon offset projects are seen as a valuable opportunity for Iraq to shift its economy away from reliance on hydrocarbon resources, promote cooperation with regional neighbors and foster stability and integration in the Middle East.

This policy brief explores the dynamics of the carbon market and the potential for Iraq to benefit from carbon markets and make use of carbon credits to tackle economic and environmental dilemmas within the framework of the Paris Agreement and international compliance regulations.

The Main Carbon Market Trading Elements



Credit: Daldarada Energy Services[10]

The Climate Convention

One of the earliest pivotal meetings where the consequences of climate change were acknowledged was the first World Climate Conference (WCC) in 1979. This scientific and technical conference was held to review the climate inconsistency caused by natural and anthropogenic causes. The conference was concluded with the urgent international attention to rising carbon dioxide levels causing long-lasting effects, acknowledging the profound impacts of deforestation and fossil fuel dependency, and ultimately the continuance of advanced research to understand future consequences through arranging global meetings and setting action plans.[11]

A major patron to the meetings was the Intergovernmental Panel on Climate Change (IPCC), which released its first assessment report in 1990 before calling for a global agreement on the second world climate conference initiating the United Nations General Assembly negotiations on a framework convention.[12] The United Nations Framework Convention on Climate Change (UNFCCC) secretariat was created in 1992, and 1994 marked its entry into force by the joined parties. UNFCCC became the parent treaty for the 1997 Kyoto Protocol at the third Conference of Parties (COP3) and the 2015 Paris Agreement at COP21.

The Kyoto Protocol called for industrialized countries to cut down GHGs emissions in accordance with the established targets, and only member countries are required to adopt the policies and report annually.[13] Thirty-seven developed countries, who are responsible for the current high level of GHGs in the atmosphere, were to meet the target of five percent reduction compared to the 1990s levels over the period of five years which started in 2008. The second commitment period started in 2013 following the Doha Amendment of the Kyoto Protocol in 2012 to reduce emissions to eighteen percent compared to the 1990s level by the members of the protocol.[14]

The failure in the first commitment of the Kyoto protocol led to a new climate agreement, hence the Paris Agreement. Unlike the Kyoto Protocol, both developed and developing forming 194 parties are committed to meeting a specific target of limiting global warming to only 1.5°C. For the sake of more inclusiveness, parties are allowed to set their own targets and there is not any legally binding contract or

document for joining the Paris Agreement, but it requires submitting plans (NDCs) for reducing GHGs emissions every five years.

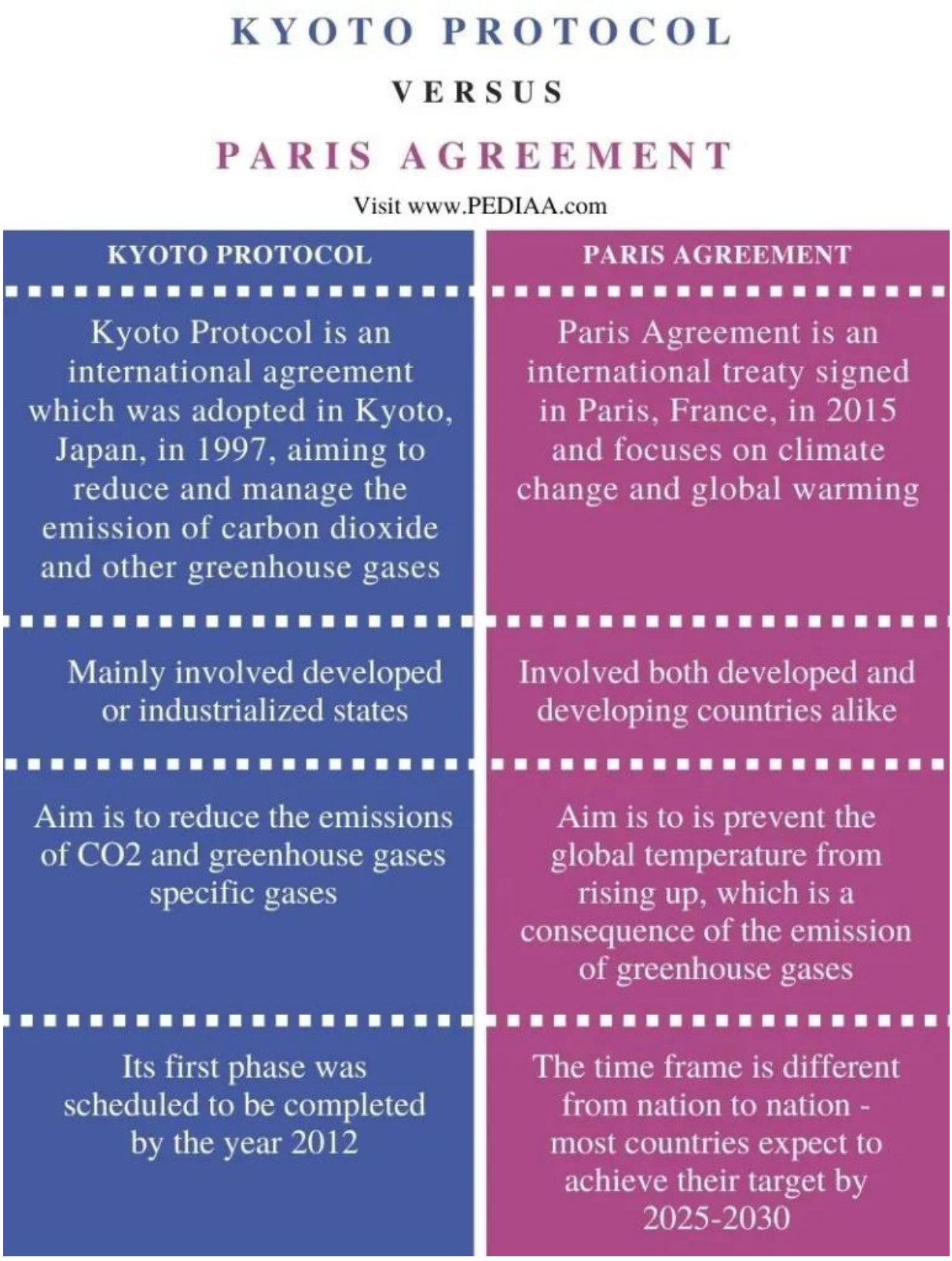


Figure 1: The UNFCCC Agreements **Credit:** PEDIAA

The framework of the Paris Agreement opens ground for financial and technological support from developed countries to the developing countries, and its implementation is based on the principles of equity and common but differentiated responsibilities (CBDR).[15] This means that the capacities of the parties are taken into consideration, where each party can set their own target with the existence of a series of both binding and voluntary measures.[16] For example, Iraq as a joined party is legally bound to the submission of the NDCs every five years, but the implementations and the taken measures are not specified, and there is no sanction for the parties who fail to meet the targets of their NDCs.

The Director General of Technical Affairs at the Ministry of Environment, Issa Al-Fayyadh, declared in a statement to the Iraqi News Agency that, Iraq and the other developing countries are most affected by climate and environmental pollutions, and the developed countries need to provide support and funds for Iraq and the other countries in accordance with the Paris Agreement.[17]

Iraq had finalized the final draft of the NDCs by 2021, and the critical goals include a 1-2% emission reduction from 2021 until 2030.[18]

Types of Carbon Markets[19]

- International Carbon Market: A nation or country in an international or sovereign market can fund carbon reduction projects in another country. In exchange, the funding nation counts the reduction achievements of those projects toward its NDCs under Article Six of the Paris Agreement.
- Voluntary Carbon Market (VCM): A voluntary buyer satisfies their voluntary carbon reduction commitment through a business-to-business transaction with a broker or a project developer for the rights to acquire carbon reduction offsets.
- Compliance Carbon Market (CCM): In a compliance market, a regulated firm or country aims to meet regulatory standards or obligations by using offset credits or pollution permits/allowances sold by regulators from approved decarbonization projects.

History of Carbon Offsets

The first carbon offset project was a joint venture for avoiding deforestation in Guatemala between the World Resource Institute (WRI) and an energy company by the name of Applied Energy Services (AES). AES was concerned about the emissions associated with the small coal-fired powerplants they were building at the time and sought WRI aid with minimizing their emissions. This project is considered the first Reducing Emissions from Deforestation and forest Degradation (REDD+) project of its kind.[20] REDD+ is a UNFCCC moderated process for reducing emissions through protecting forests from degradation and deforestation while the plus indicator stands for extra related activities such as the improvement of forest carbon stocks.[21]

In 1997, the carbon offset concept was introduced to the UNFCCC and later, the UNFCCC and Kyoto Protocol were looking for cheap solutions to meet their set targets through purchasing carbon credits from other places in the world where cheaper emission reduction is possible. In other words, the developed countries attempted to cut down emissions in developing countries which are looking for funds and revenues rather than zeroing in on their own emissions, as stated by Mark Texler who worked on the first ever carbon project by AES. Texler is an expert and climatographer that offered consultation and advice through the knowledge and experience he had been collecting for 30 years in climate mitigation science.[22]

Clean Development Mechanism (CDM) was the product of UNFCCC efforts, and it is the groundwork for today's Voluntary Carbon Market (VCM). But most of the CDM credits had no real decarbonization denotations, and other problems led to the price recession of the carbon credits in 2012, followed by the termination of this mechanism. According to Mark Texler, the VCM exists for two reasons: 1- to reduce compliance costs for countries to say they are taking actions at the lowest expenses, 2- for the actual mitigation of emissions. However, Texler emphasizes that these two grounds cannot be maximized together.[23] The first project proposed a lot of new knowledge that helped build more complex carbon offset projects in the future. Nowadays, there exists both regulated and voluntary carbon markets.

Carbon markets can provide finance for developing countries when insufficiency hits public and global climate funds. Most carbon credits from carbon projects arise in developing countries where reduction costs are lower. In fact, 2021 saw fifteen times more carbon credit being generated by developing countries than developed

ones.[24] This recommends that the VCM can spark the idea of the creation of carbon projects in developing countries like Iraq beyond regulatory frameworks, for private companies and individuals to seize the opportunity and support carbon offsets, bringing about voluntary cooperation.

2011 witnessed the first REDD+ project in developing countries, and as the demand for carbon offsets grew, various initiatives and verifiers emerged to provide an integral framework for the VCM.[25]

Carbon Offsets: A Stakeholder Perspective

Private capital must help with the preservation of the ecosystem through responsible carbon offsetting, especially when the necessary funds are not issued by the governments.[26]

Certain factors can affect the perception of the importance and the intention of having carbon offsetting in one's to-do list or a company's checklist. In a study by Karhunmaa et al., that was published in the international Journal of Environmental Policy & Planning, a survey was conducted in Finland to see the views and level of understanding of carbon offsetting in VCMs by the individuals. In the findings of the survey, the concept of carbon offsetting remains doubtful and enigmatic from the people's viewpoint, granted that there were different perspectives due to socio-demographic differences.[27]

As of today, nearly all airline operators offer an option to offset the carbon emissions associated with the flight when purchasing a flight ticket.[28] The choice of paying for the flight emission offset remains partially a question of one's income and the certainty and effectiveness of the offset program to make actual decarbonization values.

Nowadays, new entrants of the carbon market are companies that are utilizing advancement in the AI and blockchain technology to bring about new enhancement and accountability to the carbon market.[29] A lot of companies from various sectors have started to widen the scope of participating in carbon offsets and funding GHGs reduction projects, a few companies among these are Disney, General Motors, Shell, and Microsoft.[30] On a personal level, celebrities' private jet flights have become the focus of the ongoing discussion on environmental impact since private jets have a higher emission profile than commercial jets and majority of other transportation modes.[31]

Among the celebrities who acted is Bill Gates who wrote on his Gates Notes blog that he is spending 5 million USD annually to offset his family carbon footprint in the VCM.[32] Although Gates has not stated what projects this money is put into, he invested in some direct air capture projects in Canada and Iceland.[33]

The VCM is still filled with unreal carbon offset projects, the main reasons being the loose regulation and the non-uniform verification process. In an investigation by the Washington post, Verra and Cercarbono, which are two international verifiers, have certified more than 29 illegal projects in the Amazon rainforest.[34]

Voluntary Carbon Market Integral Framework

To help address the emission targets set by the Paris Agreement, a benchmark that enables countries and financial firms to set GHG reduction targets in line with climate science is developed by the Science Based Targets initiative (SBTi), which has started working on becoming a legal entity in 2023. SBTi can validate project targets and since 2022 over 2000 companies have acquired SBTi approved targets.[35] Scope three represents the trademark of the SBTi's actions for abatement of emissions. In April 2024, the inclusion of carbon credits as a tool for scope three abatement was announced, which could channel billions of dollars into the VCM according to Trellis, a group of experts focused on addressing climate change.[36]

The prospects for VCMs engagements are expected to be exceedingly high. According to McKinsey's estimates, 1.5 to 2.0 gigatons of carbon dioxide will be credited by 2030, with the possibility of reaching 7-13 gigatons by 2050.[37]

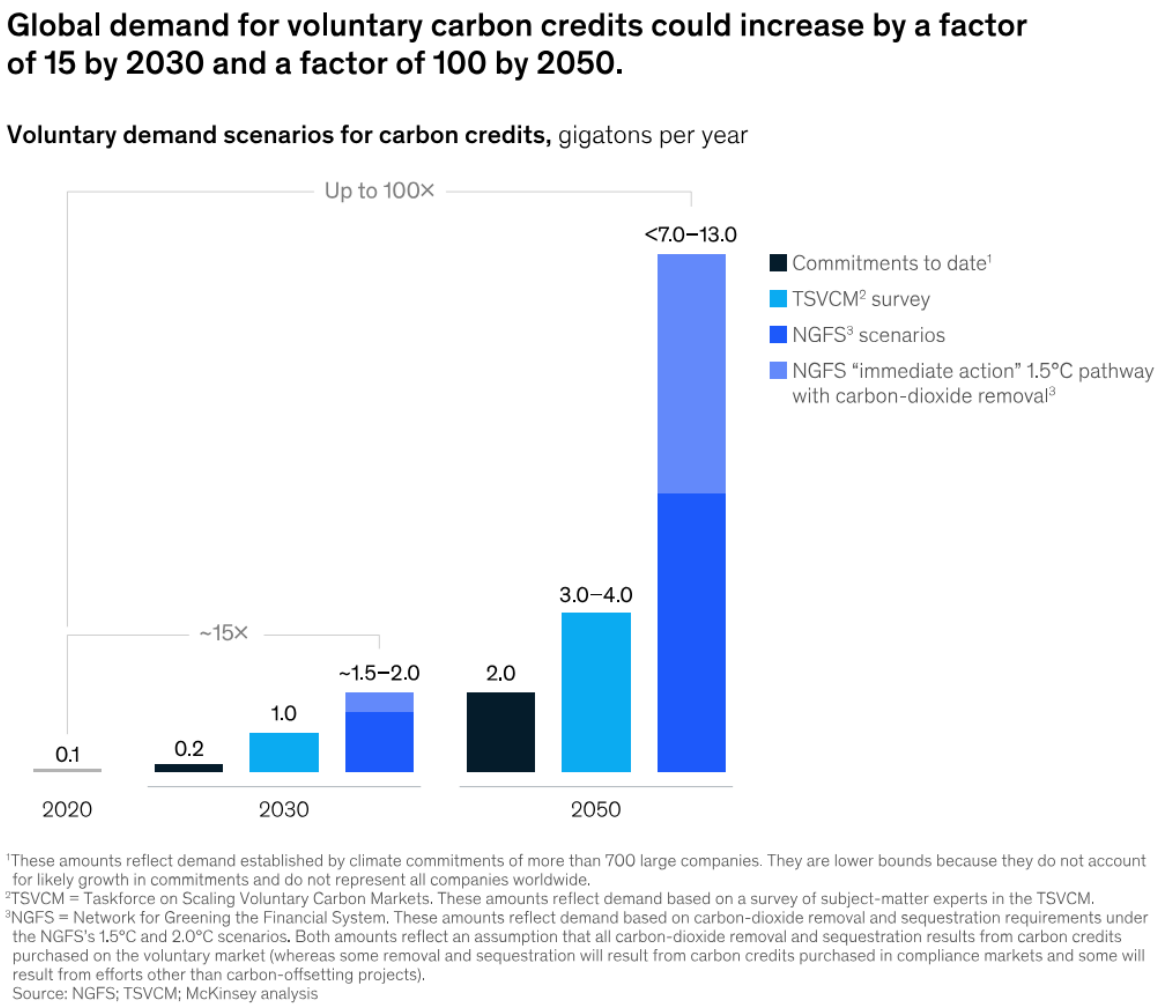


Figure 2: Gobal VCM demand for 2020-2050 **Credit:** McKinsey

Therefore, the VCM has gained public attention from people other than market traders and policy makers, and as the demand increased, many institutions started to bring about the best action to scale and structure the VCM such as the Integrity Council for the Voluntary Carbon Market (ICVCM), and the Voluntary Carbon Markets Integrity Initiative (VCMI) which are both endorsed by the United Nations Environment Programme (UNEP).[38]

VCMI and ICVCM work on the problems associated with the non-regulatory and inconsistent nature of the VCM. They announced a joint commitment to guarantee the VCM participant in financing high-integrity credits as part of a complete end-to-end model, guiding supply and demand. The joined agreement follows the VCMI claims code of practice that highlights a methodical process for investors to validate carbon credits in the form of VCMI claims through the Monitoring, Reporting and Assurance

(MRA) framework for third-party assurance. The purchased carbon credit then follows the ICVCM's carbon core principles (CCPs) in determination of its high quality.[39]

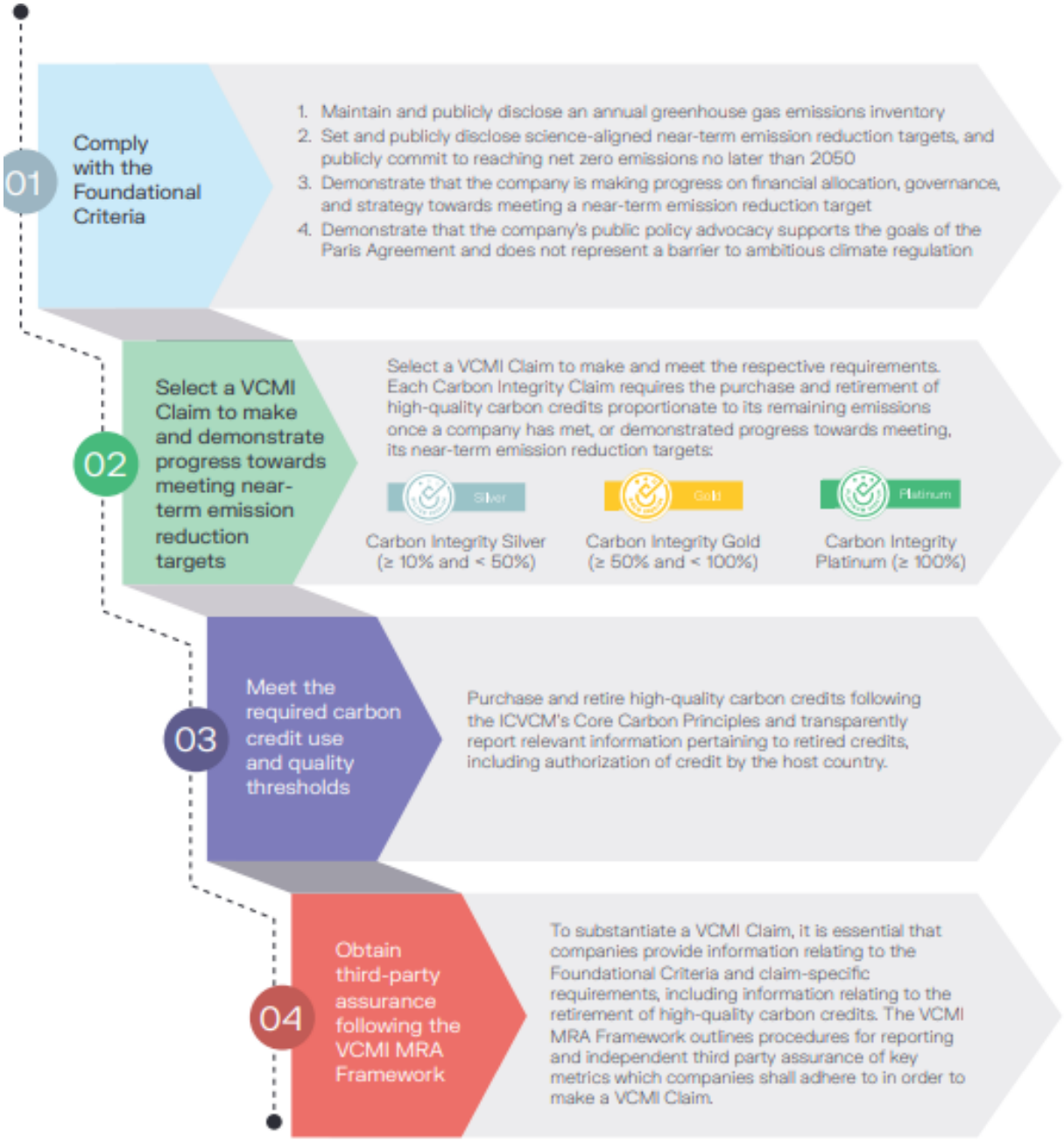


Figure 3 (a): VCMI integral approach for making claims. **Credit:** VCMI

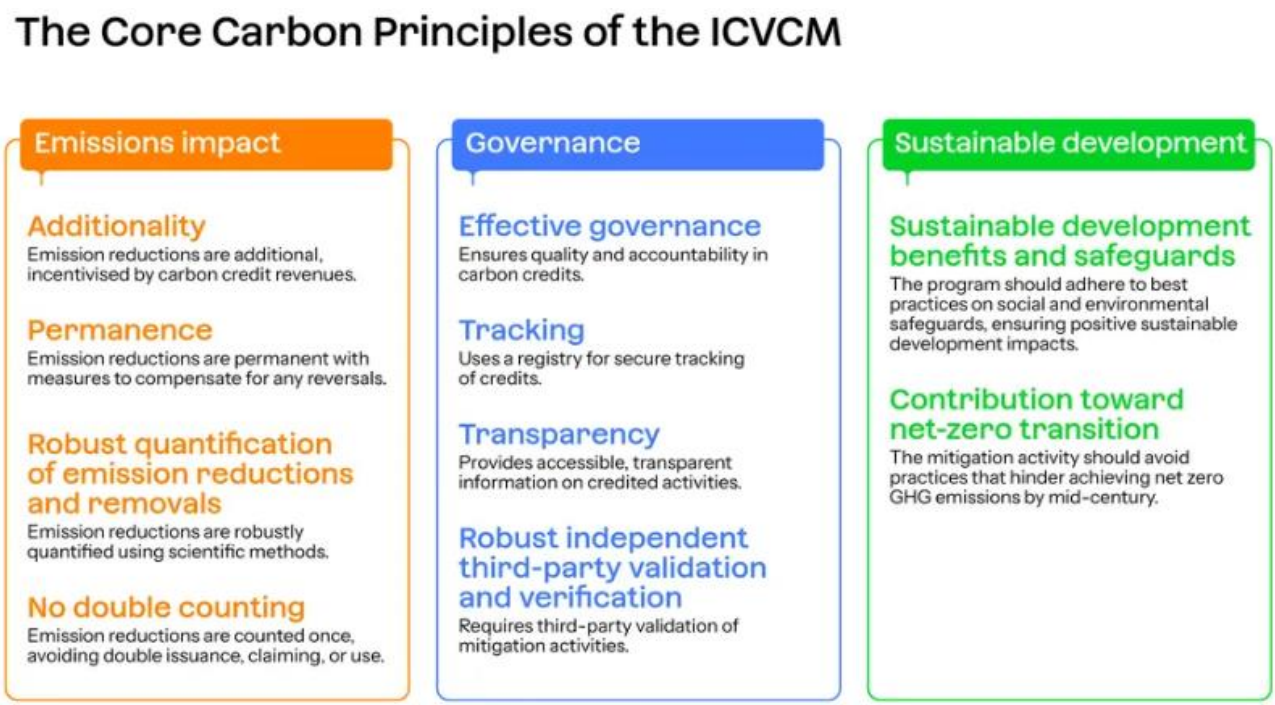


Figure 3(b): the ten carbon credit principles of ICVCM. **Credit:** BeZero.

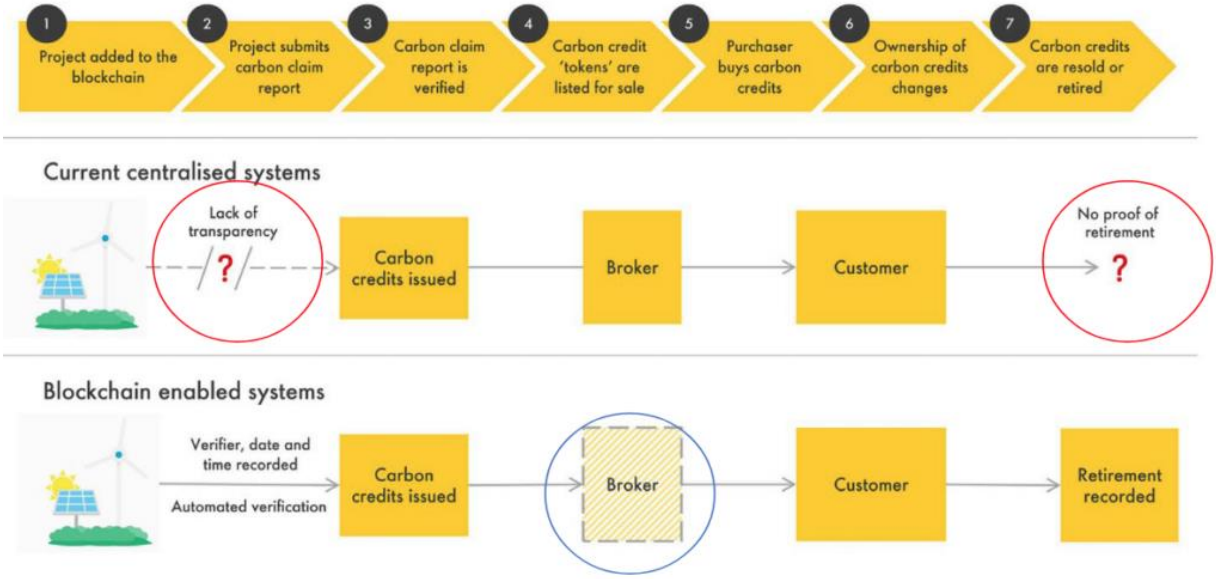
Other entities referred to as verifiers are also setting standards for validation of the carbon credits in the VCM, like Gold Standards and Verra, but more importantly, these verifiers provide a monetary registry that tracks and records the projects under these standards. There are two other standards among the four VCM registry in the world, one being the American Carbon Registry (ACR), which is the first VCM private registry. Other, being Climate Action Reserve, which is based in the State of California. Concurrently, the carbon credits of the Climate Action Reserve, Gold Standards and Verra registry are CCP approved by the ICVCM. The carbon credits traded in the VCM have different names based on the registry as shown in the figure below.[40]

Carbon Offset Program	Market Volume (in M)	Name of carbon credits issued	Project Locations	Projects Sector
Verified Carbon Standard (VCS)	746 M carbon credits (70% share)	Verified Carbon Units (VCUs)	Projects dominant in developing countries	Covers all sectors
Gold Standard (GS)	184 M carbon credits (17% share)	Verified Emission Reductions (VER)	Over 80 countries, mostly developing nations	Covers all sectors, excluding REDD+ projects
American Carbon Registry (ACR)	63 M carbon credits (6% share)	Emission Reduction Tons (ERTs)	United States	Covers AFOLU projects, industrial processes and wastes
Climate Action Reserve (CAR)	66M carbon credits (6.2% share)	Climate Reserve Tonnes (CRTs)	United States, Canada, Mexico	Agriculture, forestry, wastes, energy, and non-carbon emission reductions

Figure 4: Four most well-known Carbon verifiers **Credit:** Carbon Credits.com

Effective tracking helps with avoiding double counting to preserve the stakeholder's certitude in the transparency, integrity, and the green nature of the carbon market.[41] Double counting can happen during issuance, usage and claiming of the credits.[42] Additionally, tokenization of carbon credits of the VCM is seen as an essential step toward better transparency and easier tracking of the credits, with utilizing a blockchain for these transactions, albeit challenges like the lack of a framework currently made the concept undesirable.

Smart Contracts and Tokenization of The Carbon Credits



Credit: Yonsei University[43]

Compliance Carbon Markets and Regulations

Carbon Compliance Markets (CCMs) are regulated by authorities that set limits to each entity's carbon emission reduction value to create incentives for reducing emissions through carbon taxes or a carbon cap-and-trade process.[44] In CCMs, countries and nations make up the contributors of the marketplace and abide by contracts set by regulatory establishments, such as regional and national carbon trading platforms. In these platforms, governments put a threshold for the collective GHGs emissions stakeholders can emit within a period, and emitters must present an allowance for the carbon dioxide they release into the air. The platforms are either restricted to the geographic border of a country or have international links with other platforms like the European Union (EU).[45]

Regional CCMs allow for easier control and supervision compared to VCMs through having an authoritative regulator body with a smaller risk of overspreading and intervention from other authorities. Adding an international segment can complicate matters while potentially lowering compliance costs by exploiting cheaper mitigation options or through international agreements.[46]

CCMs consist mostly of allowance markets and some carbon credit markets, so the CCM platforms can be joined with carbon credits, these carbon credits created in

CCMs are called Certified Emissions Reductions (CERs) which, can be bought voluntarily, signifying interaction between CCMs and VCMs.

The world's first compliance carbon market formed in 2005 was the European Union Emissions Trading System (EU ETS). EU ETS uses the cap-and-trade mechanism to set a limit on the amount of anticipated GHGs emissions, and to reduce the net emission, the cap is lowered over time.[47]

Figure 5: Compliance carbon trading systems **Credit:** Refinitiv

EU allowances are traded in two markets as derivates and can be traded in spots and futures. A liquid primary market where a defined share of the allowances is issued to operators for free, and other allowances are either sold in auctions or allocated for distinct innovative projects. Once the EU allowances are in circulation, EU registered accounts can trade them in the secondary market by buying additional allowances or selling the excess ones.[48]

The UK has had its own CCM program since Brexit, that is called the UK ETS, while the United States of America (USA) has several state programs, but none at the federal level.

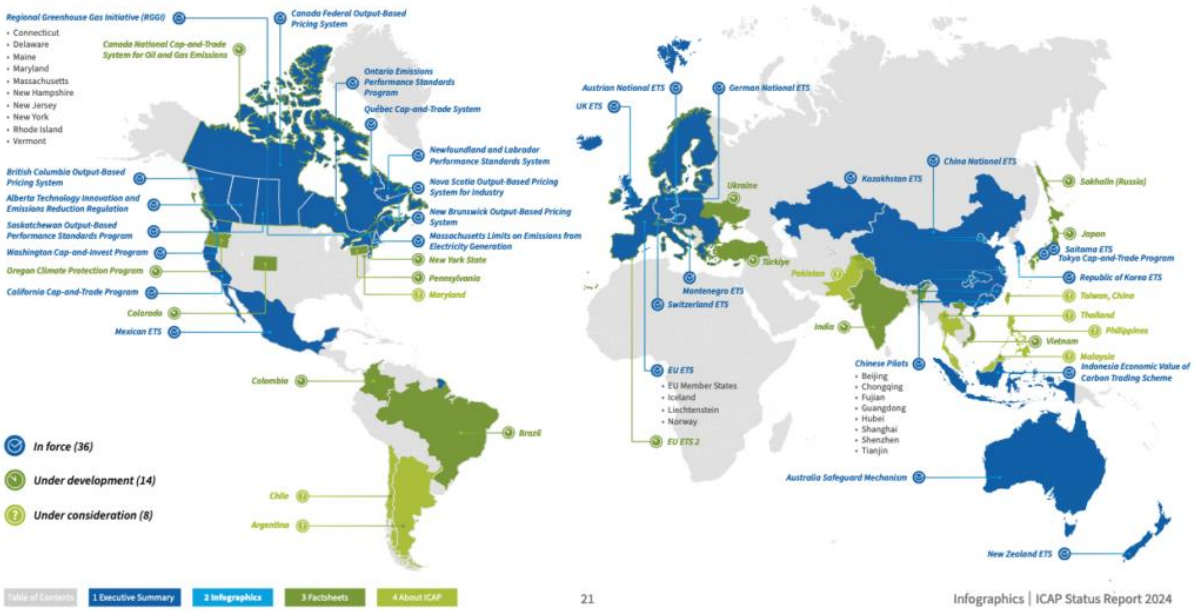


Figure 6: The status of the world ETS in 2024 **Credit:** icap

When it comes to regulations, some administrations such as the UK and the EU, treat allowances as financial instruments in regard to money laundering and market abuse. Market authorities promote transparency, oversight, and monitoring to prevent price manipulation.

Iraq and Article Six of Paris Agreement

The Paris Agreement calls all the joined parties and countries to propose plain actions and contributions that will be recorded in their NDCs to adapt to climate change. Embracing a compulsory carbon pricing mechanism is among the actions that countries will benefit from. Article Six of the Paris Agreement outlines strategies for the countries to meet their NDCs while also promoting sustainable development and securing voluntary financial support.

Iraq has committed to a 1-2% emission reduction from 2021 to 2030 as part of its NDCs, this commitment is crucial for fostering a greener economy and driving economic change through clean and renewable technologies.[49]

The Paris Agreement unveils a new model for trading collaboration through the sixth article. The carbon credit structure of Article Six can be valuable for developing countries like Iraq, if the high efficiency and quality of the carbon reduction project are achieved. Maintaining high carbon credit prices will help sustain continued support of revenues.

Nine short paragraphs make up Article Six that details principles on a voluntary basis for countries to meet their NDCs, investigating two of these sections (two and four) can be detrimental for an evaluation of carbon market participation by Iraq.[50] Article Six-Section Two of the Paris Agreement declares that the parties under the established counsel must corroborate environmental integrity and advocate sustainability while ensuring transparency when they voluntarily participate in cooperative methods by using internationally transferred mitigation outcomes (ITMOs) to meet their NDCs.

Another principal aspect of Article Six-Section Two is the metric measuring of the ITMOs instead of the old carbon dioxide equivalent measuring, for more specific and accurate measurements and calculations.

Iraq can establish bilateral agreements by taking advantage of Article Six-Section Two of the Paris Agreement. An example of such an agreement was formulated by Gailani and Al-Atta in a study that was published in the Cambridge University Press. The study makes an in-depth analysis of the Article Six and its prospect to help Iraq in meeting its NDCs and adapt to climate mitigation actions while also recommending some plans that can help the Government of Iraq (GOI) in this regard.[51] The example shows Iraq and the UK trading using ITMOs, in the case study Iraq is having 90 metric tons of carbon dioxide emissions as its NDCs for a given year with a baseline emission of 100 metric tons. Iraq then permits a project that has a 30 tons reduction target, to spend 10 metric tons toward matching its NDCs while selling the remaining 20 metric tons to the UK that will be used by the UK toward its own NDCs as ITMOs, meaning that the 20 metric tons will be counted toward the UK reduction goals and will not be counted in Iraq’s future emission limits.[52]

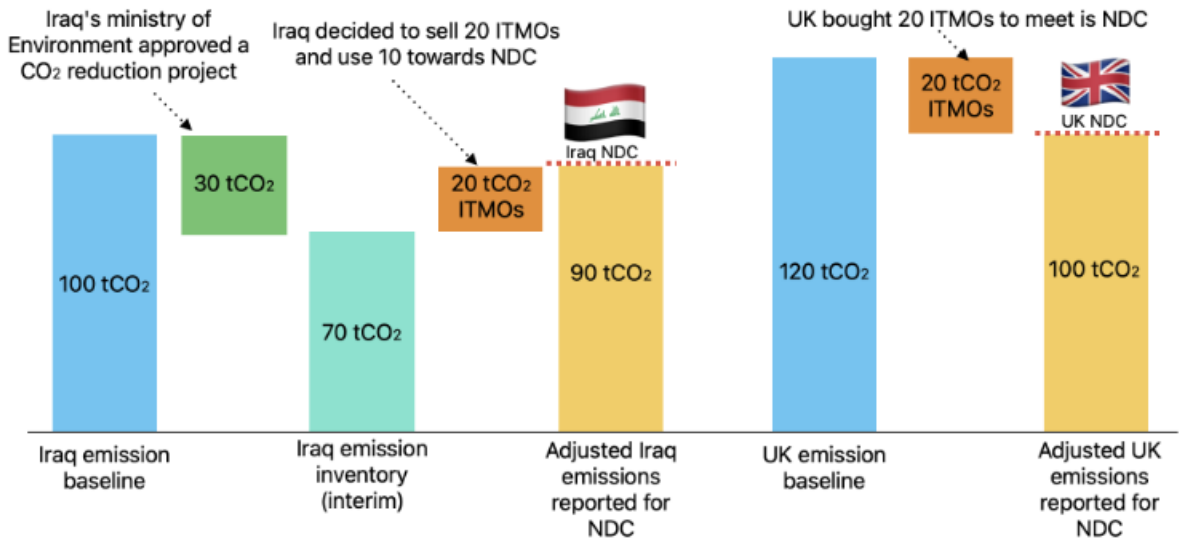


Figure 7: Bilateral agreement case: the UK and Iraq **Credit:** Cambridge Open Engage

While this example is just an arbitrary case for Iraq, some countries have already established bilateral understandings with each other.

Article Six-Section Four calls for an exclusive global market for the Paris Agreement parties regulated by a supervisory body established by the United Nations for trading CER or Emission Reduction (ER) credits. Both private and public sectors can voluntarily participate in this market, and the regulations will include new market-based approaches and methodologies and can adopt some existing ones used in CCMs.

Compared to Article Six-Section Two concepts, the UN will be supervising the registries when the ERs are issued. In this case, if a carbon reduction project in Iraq decided to sell its ER credits, then Iraq as a member of the Paris Agreement, can authorize the project to count the ERs in an international trade toward its NDCs when they are sold to another country as ITMOs. Alternatively, a private company can purchase the credits and use them to offset its carbon emissions. If Iraq did not license the ER credits for international trade, then a private company can acquire the credits and claim them for Iraq's NDCs, but the company will not be able to count them toward its own offsetting efforts. Another option is for Iraq to buy the credits and redeem them for its NDCs. Lastly, if Iraq did not recognize the project's credit at all, then the credits can be used in accordance with Article Six-Section Two in the VCM as ITMOs.[53] These possibilities allow the VCM trading opportunities to include private firms with or without Iraq's verification of the credits.

A Strategic Approach for Iraq and Future Commitment

As the carbon market and carbon credits progress, a systematic and consistent tool is needed to ensure the sustainable development of new projects that cut down further damage to the climate and the environment. To convince the public and private institutions to invest in greener technology and abate emissions through offsetting, the Natural Climate Solutions Alliance (NCS) was called together by the World Economic Forum (WEF) and the World Business Council for Sustainable Development (WBCSD).[54]

The NCS core idea is to have a plan compatible with the Paris Agreement through the climate mitigation hierarchy.

The mitigation hierarchy calls for an immediate reduction in the value chain before considering offsets, and upon reaching saturation, the option of offsetting kicks-in. The mitigation hierarchy require companies to have a sense of environmental awareness to reconceptualize the tangible impacts of trading on the atmosphere and to follow some sequential steps in the process.[55]

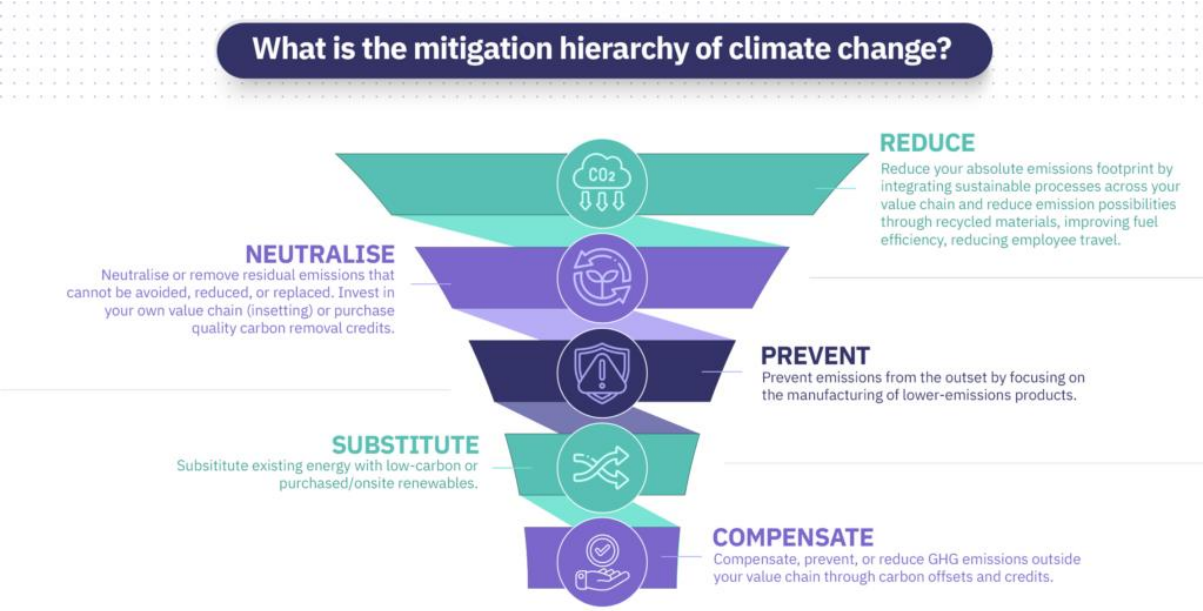


Figure 8: Mitigation Hierarchy gradual stages **Credit:** Terrascope

The last step of the mitigation hierarchy induces companies to compensate for their emissions through utilizing carbon credits. While this step remains optional and fragmented, following the mitigation hierarchy strategy can lead to aggregate emission reduction incentives.

In scope of the current phase of the net-zero scheme and carbon markets, WEF has investigated the status and involvement of the countries of the Middle East and North Africa (MENA) to be as follows:[56]

Country	Nationally Determined Contributions (NDC)	Net-zero target[16]	Intention to use Article 6 for NDC[17]	Bilateral agreements in place	Designated national authority[18]	Voluntary carbon market involvement
Algeria	7% GHG reduction by 2030	⊗	⊗	⊗	⊗	⊗
Bahrain	30% GHG reduction by 2035	2060 Pledge	✓	⊗	⊗	Ongoing with govt support
Egypt	**Sector goals for GHG reduction by 2030:** - Electricity 37% - Oil and gas 65% - Transportation 7%	⊗	✓	⊗	⊗	Ongoing with govt support
Iraq	Strategies described in different topics but no specific goals	⊗	⊗	⊗	⊗	CDM/VCM project experience

Figure 9: WEF finding of MENA countries' net-zero commitments **Credit:** World Economic Forum

While Iraq has put some strategies into action, a lack of a comprehensive framework like the mitigation hierarchy is seen, resulting in the lack of a systematic roadmap to achieve specific goals. This absence may hinder the effectiveness and coherence of its efforts, leading to incoordination.

Despite the lack of a clear vision, Iraq has nonetheless initiated important projects, and at COP28, Iraq highlighted its plan of achieving net-zero gas flaring, building a 12 GW renewable power generation plant and building carbon capture plants through utilizing carbon credits from the VCM.[57] During an international conference for Iraq Climate Change-Implications for Security and Development, the Deputy Minister of Oil, Mr. Abdul Ghani accentuated a gas capture project of 12 million cubic feet per day at the Baghdad oil field which will be funded by carbon credits.[58] Two local Iraqi companies and a Canadian group have already shown interests in partaking in this project, marking this as the first carbon market resolution by Iraq.

A study that investigates the impact of carbon markets on capture projects in the future for southern oil fields of Iraq was conducted by Mohammed and Farzaneh. The study explored the uncertainties in the oil and carbon prices in their respective markets and their impact on carbon capture projects for future policy making. The results showed a synergistic relationship where a carbon market is essential for the captured emissions in Iraq.[59] At times where the oil prices are low and oil production is at a halt, the companies can benefit from trading the captured carbon dioxide to minimize

financial drawbacks, and as the novel capture technology becomes more mature and abundant, the carbon credit prices will remain high.[60]

Carbon Credits for Afforestation in Iraq

Afforestation is the process of planting trees and creating forests in places that were not previously forested while reforestation refers to restoration of old forests. Afforestation initiatives present an excellent opportunity for companies and nations to offset their carbon footprint in the VCM. Like any other offset project, these afforestation projects need to be certified and recognized as high quality to ensure the consistent improvement in the value of the carbon credits. One verified quality is for the project to be additional. Fundamentally, a project is considered additional when the amount of the GHG emission reduction exceeds the amount of the GHG in the atmosphere when the project never existed.[61] Therefore, reforestation projects cannot earn premium carbon credits as they are not contextually additional. While afforestation projects can be additional because they contribute to new carbon sequestration activities.[62]

There is a high demand for certified afforestation carbon credits globally due to having other benefits such as supporting local communities and improving food productivity and water quality in addition to removing carbon dioxide from the atmosphere. Leveraging the carbon market is a starting point for efforts to restore food production and initiate afforestation programs in Iraq. A focus on planting native species like palm trees can provide shaded areas to tackle the problem with rising temperatures too. These trees can be exchanged for carbon credits, and the GOI can allocate lands to engineering institutes and energy companies for this purpose.[63]

Currently there are not any plans in Iraq and the Kurdistan Region of Iraq (KRI) for exploiting the carbon market through afforestation programs, nevertheless, the Mesopotamia Revitalization Project has proposed the Garden of Eden reforestation program. The program aims to replant palm and citrus in southern and western Iraq and Kurdish oaks and walnuts in the KRI. The goal would be to plant up to 20-30 million trees within two years, and one billion trees by 2030 in the longer term. The emission mitigation from planted trees can be converted into carbon credits for Iraq to sell on the carbon market.[64]

Conclusion and Recommendations

Along with the continuous growth of the population, the decline of oil and gas sales and productions and the exposure to the impacts of climate change, Iraq's environment is becoming more vulnerable and unsustainable. With the global movement toward reduced dependency on fossil fuels and adoption of environmentally friendly solutions, Iraq needs to follow the trend and turn climate change reaction into a national priority.

The World Bank issued propositions to engage the developing countries like Iraq to seek participation in an inclusive international carbon market, by providing assistance in the utilization and leveraging of the carbon credits.[65]

To align with international standards, it is recommended for Iraq to have models such as SBTi for calculating its NDCs taking into consideration the rising population and energy demands as approaching the disclosed targets of 2030. Considering this, the former president of Iraq, Barham Salih, has stated that Iraq needs to take action to enhance living conditions through having a broad and diverse economy in support of clean energy solutions and partaking in carbon markets.[66]

This sentiment is echoed by Ahmed Mufti, the Deputy Minister of Natural Resources in the KRI who asserted the urgency of carbon markets for Iraq. He spotlighted a project in the Garmiyan region of the KRI that produces electricity from flare gas through obtaining carbon credits while also calling for a national participation in the carbon markets.[67]

Consequently, it deems far more reasonable for the GOI to be cautious about participating in the VCM and defer engagement until better enhancements in the integrity of the credits are achieved, whether or not the market credits are tokenized. At that point, the GOI should appoint auditors to manage the investments, policies and regulations of the carbon credit projects, in addition to forming relevant bodies for tracking ITMOs and emissions reductions under Article six of the Paris Agreement with facilitating bilateral agreements.

It is imperative to preserve the local community through consulting the residents during the planning stages of the projects by the GOI and the project owners for enhancing social acceptability of the carbon reduction projects.

The carbon avoidance projects such as afforestation and reforestation are simpler projects but important for Iraq considering the decline in rainfall and agricultural

development. Therefore, the GOI can expedite the Mesopotamia Revitalization Project through legislative measures. Concurrently, the carbon reduction projects should be prioritized to ensure smoother capitalization of the carbon credits, by enacting new policies as a startup to improve the accuracy of GHGs emission reduction calculations by the companies in the oil and gas sector.

In summary, Iraq stands at a scathing moment where a decisive strategy for engaging in carbon markets and prioritizing advanced and clean projects is vital to pave the way for a sustainable future.

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CARBON CREDIT (CARBON OFFSET): CONCEPT AND APPLICABILITY TO IRAQ AND KRI

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