



**CARBON MARKETS:**  
**OPPORTUNITIES & CHALLENGES**  
**FOR MOBILITY PLAYERS**

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Drive TLV creates effective collaborations between handpicked startups and our corporate partners, leading to commercial agreements. Our partners rely on Drive TLV to bring top, emerging technologies to their doorsteps – and tailor solutions to their particular needs. We build a close relationship with each partner, gaining an understanding of their needs and innovation interests. We are able to create effective matches between partners and startups, based on real market needs.

This report was written as part of our ongoing research efforts, our goal is to support our partners, startups, and ecosystem and provide them with knowledge, insights, and our view of the industry.

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# Executive Summary

In a world increasingly affected by climate change, radical action is needed to create a sustainable future. The net-zero equation remains unsolved at present as GHG (greenhouse gas) emissions continue unabated and are not being offset by removals<sup>1</sup>. In a typical year, the world adds 51 billion tons of GHG emissions to the atmosphere, with 16% of those emissions coming from the mobility sector<sup>2</sup>. To this end, several mechanisms such as carbon tax, carbon fines, carbon offsets, carbon insets, and carbon credits, have been designed as a result of multilateral agreements with an objective to create an international consensus around reducing global carbon emissions.

In this report, we will cover these four mechanisms with an emphasis on the carbon credits mechanism. Carbon reduction mechanisms are getting stricter with time, pushing the market to reach net-zero eventually and gradually. As such, market standards are still new and evolving and what exists today in the markets may not be suitable for the future. This report provides an introduction and an in-depth view of the carbon credit markets and their implications on the mobility industry. By providing a better understanding of the market's unique opportunities and challenges, we hope to provide the players within the automotive industry with insights and new possible directions to thrive in this new challenging environment and to contribute their part in the global effort of fighting climate change.

## Preface

The physical effects of climate change, and their socio-economic impact, are becoming increasingly evident throughout the world. In the meantime, if the world does not adapt to a changing climate, these effects will continue to grow, until the world achieves a net-zero economy with a balance between the GHG gasses put into the atmosphere and those taken out. However, the net-zero equation remains unsolved at present: GHG emissions continue unabated and are not being offset by removals. Globally, 51 billion metric tons of pollution are produced every year, with 16% of those emissions coming from the mobility sector<sup>3</sup>.

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<sup>1</sup> [The net-zero transition: What it would cost, what it could bring](#)

<sup>2</sup> <https://www.ebooks.com/en-us/book/209803910/how-to-avoid-a-climate-disaster/bill-gates/>

<sup>3</sup> <https://www.ebooks.com/en-us/book/209803910/how-to-avoid-a-climate-disaster/bill-gates/>

According to research conducted by McKinsey & Company, as of December 2021, less than 75 countries account for more than 80 percent of global CO<sub>2</sub> emissions and about 90 percent of global GDP have put net-zero commitments in place, as have more than 5,000 companies, as part of the United Nations 'Race to Zero' campaign<sup>4</sup>. These commitments are intended to prevent global warming from exceeding 1.5°C above preindustrial levels. Under a scenario with 1.5°C of warming above preindustrial levels by 2030, almost half of the world's population could be exposed to a climate hazard related to heat stress, drought, flood, or water stress in the next decade. As severe climate events become more common, even in a scenario where the world reaches 1.5°C of warming above preindustrial levels by 2050 rather than 2030, nearly one in four people could be exposed to a severe climate hazard that could affect their lives or livelihoods<sup>5</sup>.

Current estimates are that even if all existing national climate pledges were implemented, the global average temperature would exceed 1.5°C above preindustrial levels, increasing the chances that the most catastrophic impacts of climate change would begin, despite the many commitments made by countries and businesses. Furthermore, most of the pledges have not yet been executed or backed by detailed plans. Implementation would also be challenging: solving the net-zero equation cannot be separate from pursuing economic development and inclusive growth. This would require balancing short and long-term risks. In the short term, complying with environmental regulation requires tremendous effort from an organization, changing operations, behaviors, and tracking and reporting emissions, which all demand extra financial resources. However, in the long term, research shows that being more eco-friendly means being more efficient and profitable<sup>6</sup>.

Despite these gloomy forecasts, several mechanisms have been developed for accelerating the net-zero transition. These mechanisms, including carbon taxes, carbon fines, carbon offsets, carbon insets, and carbon credits, were all designed as a result of multilateral agreements with the objective to create an international consensus around reducing global carbon emissions. The goal of this research is to provide stakeholders with an in-depth understanding of the carbon credit markets and to discuss these four mechanisms for reducing emissions that we've identified. We

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<sup>4</sup> [The net-zero transition: What it would cost, what it could bring](#)

<sup>5</sup> [Protecting people from a changing climate: The case for resilience](#)

<sup>6</sup> <https://www.mckinsey.com/-/media/McKinsey/Business%20Functions/Sustainability/Our%20Insights/Profits%20with%20purpose/Profits%20with%20Purpose.ashx>

hope that this analysis will shed some light on these new and evolving markets while providing background information about the opportunities underlying the carbon markets. The report explores the key challenges and opportunities the participants in the mobility ecosystem will be facing in the upcoming years, namely related to the carbon markets, but also in a broader carbon-emissions-reducing ecosystem; and will offer a view on how to get a head start in adopting innovative approaches and solutions to help thrive in this new reality.

## A Brief history of the international efforts for reducing emissions

Several efforts have been made in the international community in which various incentives and mechanisms have been developed to reduce the level of greenhouse gas emissions globally. This process has evolved through three central committees, which had the goal of defining climate targets and formulating mechanisms that would enable them to be met. In this context, carbon credits markets have been created around the world, and they operate similarly to an economic marketplace. In this section, we will refer to the Kyoto Protocol, the Paris Agreement, and COP26 which took place in the summer of 2021 in Glasgow.

## Summary of international activities to reduce emissions

	Kyoto Protocol	Paris Agreement	COP26 - Glasgow UN Climate Change Conference
<b>Objective</b>	Original commitment to decrease overall emissions by 5% by 2012 from 1990 levels. The Second commitment is to decrease an additional 15% by 2020.	The Overall goal is to limit global temperature to 1.5 degrees Celsius	Cut GHG emissions in half by 2030 and reach net-zero carbon emissions by 2050, Keep 1.5 degrees within reach.
<b>Participants</b>	192 parties have ratified the protocol (191 countries including China and Russia, and one regional economic integration organization). The United States has not; it dropped out in 2001 <sup>7</sup> .	The Agreement was signed by 175 parties (174 states including China, Russia, The U.S., and the European Union). As of March 2021, 194 states and the European Union have signed the Agreement <sup>8</sup> .	EU representatives from the 27 member states, US, Australia, Canada, France, Argentina, Colombia, Ghana, India, Israel, Italy, Nigeria, Scotland, South Korea, Sweden, Switzerland, and the Democratic Republic of Congo are all the countries that attended COP26.
<b>When</b>	Was created in 1997 and ratified in 2005.	Signed in November of 2016. New commitments are every 5 years	26th annual summit that occurred in November 2021
<b>Timeframe of targets</b>	The first commitment period was between 2008 and 2012. The second commitment period was between 2013-2020.	A new set of targets was declared after 5 years (these are now due in 2020)	Five year pledges every five years starting with pledges in 2025 <sup>9</sup>
<b>Contribution to global efforts for emission reduction</b>	First international carbon market system	Requiring all countries to set emissions-reduction pledges by introducing NDCs (nationally determined contributions).	Progress toward an international carbon-trading system and finalizing the rules needed to implement the Paris Agreement called the 'Paris Rulebook '
<b>Degree of commitment</b>	Legally binding agreement to decrease GHG emissions. Only required developed nations to reduce emissions.	Voluntarily and non-legally binding commitment to reduce emissions, meaning that countries that have a specific emission target and fail to achieve it, are not penalized. Asked all nations to reduce emissions.	Developed and developing nations participated in the conference voluntarily.

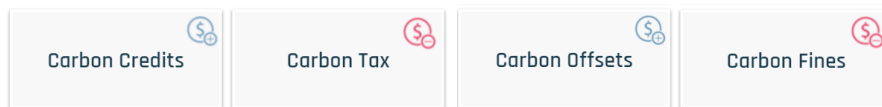
<sup>7</sup><https://edition.cnn.com/2013/07/26/world/kyoto-protocol-fast-facts/index.html>

<sup>8</sup>[https://en.wikipedia.org/wiki/Paris\\_Agreement#:~:text=The%20Agreement%20was%20signed%20by,Union%20have%20signed%20the%20Agreement](https://en.wikipedia.org/wiki/Paris_Agreement#:~:text=The%20Agreement%20was%20signed%20by,Union%20have%20signed%20the%20Agreement)

<sup>9</sup><https://www.carbonbrief.org/cop26-key-outcomes-agreed-at-the-un-climate-talks-in-glasgow>

# Incentives Mechanisms for Emission Reduction

Four key mechanisms aim to encourage the reduction of carbon emissions. In this section, we will describe them and provide examples while focusing on the carbon credit mechanism.



## Definitions

**Carbon tax** is a tax levied on firms that emit carbon dioxide (CO<sub>2</sub>) through their operations.

**Carbon offset** is an action or an activity that compensates for the emission of carbon dioxide or other GHG in the atmosphere. The actions or activities associated with carbon offsets are quantifiable amounts so that they can be used in the carbon market to be bought, sold, and traded as a carbon credit. *Carbon inset* is a carbon offset that is implemented by an investment made by a company in emissions reduction projects within the supply chain.

**Carbon fines** are penalties for polluting more than the cap that is set by governments and/or international institutions.

**Carbon Credits** refer to any tradable certificate or permit representing the right to emit one tonne of carbon dioxide or the equivalent amount of a different GHG.

## Carbon Tax

A carbon tax is levied by national or regional governments on firms that emit CO<sub>2</sub> through their operations. It is used as an incentive to reduce the economy-wide use of high-carbon fuels and to protect the environment from the harmful effects of excessive carbon dioxide emissions.

Regarding the actual rates of different carbon taxes, there are large differences among tax rates across different jurisdictions. For example, Sweden currently has the highest tax rate at €116.33 (\$137) per ton of carbon emissions, whereas you can find the lowest carbon tax rates in Poland, €0.07 (\$0.08) per metric ton of CO<sub>2</sub><sup>10</sup>. The policy guiding jurisdictions in setting tax rates depend

<sup>10</sup> <https://taxfoundation.org/carbon-taxes-in-europe-2021/>



on what outcomes they are trying to achieve. Higher rates are applied when attempting to infuse behavior change while low rates may be appropriate to generate funds for carbon mitigation problems [1].

## Carbon Offset

A carbon offset is an action or an activity that compensates for the emission of carbon dioxide or other greenhouse gasses in the atmosphere [1].

Compensation activities generally can take two main forms of carbon offsets<sup>11</sup>:

1. Avoidance offsets are generated by activities that reduce future emissions through prevention — for example, by building a wind farm instead of a new natural gas energy plant.
2. Removal offsets extract carbon from the atmosphere or ocean. These are divided into two types of solutions, nature-based solutions that manage ecosystems like forests, mangroves, kelp beds, and soils that naturally sequester CO<sub>2</sub>, and mechanical removal of CO<sub>2</sub> with direct capture technologies that use machines to extract CO<sub>2</sub>.

The projects or activities using these technologies and are associated with carbon offsets are quantifiable amounts so that they can be used in the carbon market to be bought, sold, and traded. Each tonne of CO<sub>2</sub> emissions reduced or removed from the atmosphere by an offsetting project creates one carbon credit. Companies, nations, and individuals can invest in these projects directly or buy the credits. Carbon offsetting projects are overseen by validation and verification bodies (VVBs) that help companies design, document, review, and measure the impact of their efforts<sup>12</sup>.

There are a variety of regulatory bodies that assess and measure carbon offsets. Because there is no global carbon credit market, the offset market, and the regulation that comes along with it, are largely dependent on local and regional laws. Subsequently, the regulatory agencies are as well.

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<sup>11</sup><https://am.jpmorgan.com/us/en/asset-management/adv/insights/portfolio-insights/sustainable-investing/the-global-carbon-market/>

<sup>12</sup> <https://www.stealth-power.com/blog/how-fleet-decarbonization-leads-to-financial-opportunity>

The American Carbon Registry is one such agency.<sup>13</sup> This Carbon Registry standardizes the process that oversees companies offering carbon offsets. These carbon offsets can be used as credits in the carbon credit markets. In regards to carbon offsets, all regulatory agencies effectively serve the same purpose: to properly and impartially assess the functionality of carbon offsets.

## Carbon Insetting

Carbon insetting mechanism involves CO<sub>2</sub> emissions being retained within the upstream or downstream value chain of a company.<sup>14</sup> Carbon offset programs differ from carbon inset programs as offsetting occurs when a company invests or buys an offset from a different organization; without reducing the company's emissions. In contrast, Insetting programs happen when companies take actual steps to offset their emissions and are focused on tackling the difficult-to-measure Scope 3 emissions that occur throughout companies' supply chains. Scope 3 emissions account for the majority of a company's emissions<sup>15</sup> (See left box for more information about Scope 3). One potential issue with carbon insets is that there is no required certification of the carbon benefit. Hence, it is not eligible for being traded as credits in the carbon markets yet. However, several carbon inset organizations work with third parties to verify and audit their projects for companies that want to use this mechanism without the financial benefit of credits. Using the carbon insetting strategy can benefit companies with an integrated approach of using carbon offsetting within their value chain instead of investing in external sustainability projects. It also enhances partnerships between the company and its suppliers, accelerating a more transparent process and building trust with joint projects. Another benefit is adapting to disclosure regulations expected in the future of scope 3 emissions, which include supply chain emissions.<sup>16</sup>

Deutsche Post DHL Group and Smart Freight Center serve as an example of a partnership implementing carbon insetting as they are investing in various lighthouse projects to accelerate decarbonization through fostering biofuel for aviation, shipping, and ICE (Internal combustion engine) vehicles, and green energy for electric vehicles.<sup>17</sup>

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<sup>13</sup> [American Carbon Registry](#)

<sup>14</sup> <https://www.weforum.org/agenda/2022/03/carbon-insetting-vs-offsetting-an-explainer/>

<sup>15</sup> <https://www.myclimate.org/information/faq/faq-detail/what-is-carbon-insetting/>

<sup>16</sup> <https://www.insettingplatform.com/insetting-explained/>

<sup>17</sup> <https://www.dpdhl.com/de/presse/pressemitteilungen/2020/carbon-insetting-beschleunigt-dekarbonisierung-der-logistik.html>

The GHG [Protocol corporate standard](#) describes three levels of analysis of companies' impact on the climate, scope 1, 2, and 3 emissions.<sup>18</sup>

Scope 1: direct emissions from company-owned and controlled resources, in terms of production.

Scope 2: indirect emissions from the generation of purchased electricity consumed by the company. Scope 2 emissions physically occur at the facility where electricity is generated.

Scope 3: are all the wider-reaching emissions that occur in the value chain of business operation, including both upstream and downstream emissions. This level is more extensive and involves assessing the so-called carbon footprint of suppliers as any assets a company leases. Counts as 65%-95% of a company's carbon impact, and is considered the most complex to measure.

## Carbon Fines - Penalties for polluting more than the cap

For a CO<sub>2</sub> cap system to work, there needs to be penalties in place that will deter actors from polluting. As part of EU ETS (the European Union's Emissions Trading System), regulated entities are required to pay a penalty of EUR 100/tCO<sub>2</sub> (USD 114.22/tCO<sub>2</sub>) for each tonne of CO<sub>2</sub> emitted for which no allowance has been surrendered, in addition to buying and surrendering the equivalent amount of allowances. Member States may enforce different penalties for other forms of noncompliance. Carbon fines can be in place also for carbon tax systems. Similar to the cap and trade system, in a carbon tax system, you could get fined for polluting over a certain amount of emissions that have been set by the regional government or for reporting your pollution incorrectly.

## Carbon Credits

### Introducing the concept of carbon credits

Through a capped limit on the amount of carbon dioxide a country can emit, governments require businesses to obtain carbon credits, which are essentially regulatory permits to emit an allotted amount of greenhouse gasses per year (usually one ton of CO<sub>2</sub> per credit). Over time, this limit is reduced, and when companies have unneeded credits, they can sell those credits to other companies at a profit. This is the basis of the "cap and trade" system, which provides companies with an added incentive to find ways to reduce emissions so that they can earn revenue from the

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<sup>18</sup> [Sustain Life Explanation on GHG Protocols](https://plana.earth/academy/what-are-scope-1-2-3-emissions/); <https://plana.earth/academy/what-are-scope-1-2-3-emissions/>

sale of their extra carbon credits. *This accomplishes three goals: 1. reducing a country's negative impact on the global climate, 2. establishing a price on carbon dioxide, and 3. furthering progress toward a sustainability-focused market in the future.*

## **Carbon credits markets - Compliance and Voluntary**

Currently, there are generally two different types of carbon markets - mandatory and voluntary. Mandatory carbon markets are used by companies to offset emissions levels to be compliant with regulated emission targets. So far, about 64 carbon compliance markets are now in operation around the world, the World Bank reported in May 2021. Examples of such markets are the EU Emissions Trading System (EU ETS) and the Regional Greenhouse Gas Initiative (RGGI) in the U.S. The EU ETS is one of the largest trading schemes and has been successful in its goal of decreasing emissions. Since 2005, emissions have been cut by 42.8% in the main sectors covered, power and heat generation and energy-intensive industrial installations<sup>19</sup>. On the other hand, voluntary carbon markets, as the name implies, are where carbon credits are purchased without the intent to be used to stay compliant. These types of markets are becoming increasingly active as the awareness of global warming is also increasing and private entities desire to be part of the goal set by the Paris Agreement. Although the size of the voluntary offset markets has only just reached 1 billion USD by the end of 2021, compared to a massive 27.8 billion market size of the compliance markets in 2020, it is growing significantly faster<sup>20</sup>. The voluntary market saw a near-60% increase in value in the first 8 months of 2021 compared to the previous year, and now represents 70% of all carbon credits generated in 2019 versus only 15% of those generated in 2015<sup>21</sup>. In terms of trade volume, the voluntary carbon market reached a historical 298.4 million mt CO<sub>2</sub>e in 2021<sup>22</sup>. Nonetheless, the voluntary markets cover less than 0.5% of the total global GHG emissions, whereas the compliance markets cover around 5.5% of total global GHG emissions (see figure 1)<sup>23</sup>.

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<sup>19</sup> [https://ec.europa.eu/commission/presscorner/detail/en/ganda\\_21\\_3542](https://ec.europa.eu/commission/presscorner/detail/en/ganda_21_3542)

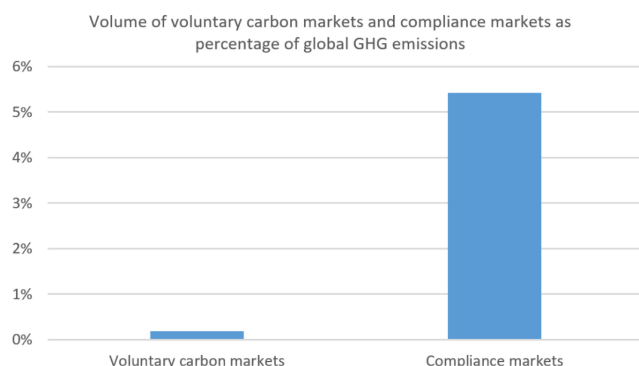
<sup>20</sup> <https://www.ecosystemmarketplace.com/articles/press-release-voluntary-carbon-markets-rocket-in-2021-on-track-to-break-1b-for-first-time/>

<sup>21</sup> <https://blogs.iadb.org/sostenibilidad/en/are-carbon-markets-a-solid-mechanism-to-ensure-the-paris-agreement-success/>

<sup>22</sup> <https://www.spglobal.com/platts/en/market-insights/blogs/oil/123021-platts-infographics-data-visualization-energy-commodities>

<sup>23</sup> <https://economics.rabobank.com/publications/2021/march/can-voluntary-carbon-markets-change-the-game-for-climate-change/>

**Figure 1: trading volume of compliance markets is significantly larger than voluntary markets as of 2020**



Source: Ecosystem Marketplace (2020) and World Bank (2020)

Source: <https://economics.rabobank.com/publications/2021/march/can-voluntary-carbon-markets-change-the-game-for-climate-change/>

## Issuance and enforcement of allowances

Carbon caps are issued and enforced by governments or international institutions. Based on the metric they set, these entities will allocate allowances based on the current carbon usage of companies. To meet their target emission level by a certain year, these allowances are decreased over time. To enforce compliance with the carbon cap and trade market, these governing bodies have produced detailed legislation describing penalties for noncompliance. For example, California's greenhouse gas emission cap for 2021 is around 330 million metric tons of carbon dioxide, and this target is expected to be declined by five percent from 2021 through 2030<sup>24</sup>. California's Cap-and-Trade system, which operates under the California Air Resources Board (CARB), includes mechanisms to monitor for and prevent market manipulation.

## Market dynamics

As more countries and regions have adopted carbon credit regulations, the market for carbon credits has significantly developed over the past few decades; a 2021 report from McKinsey & Company suggests that the voluntary markets could grow from \$6.7 billion today to more than \$50 billion by 2030<sup>25</sup>. In terms of total trading volume, the value of the global carbon market increased by 20% in 2020 to \$272 billion<sup>26</sup>. Furthermore, 45 countries use a form of carbon trading, and

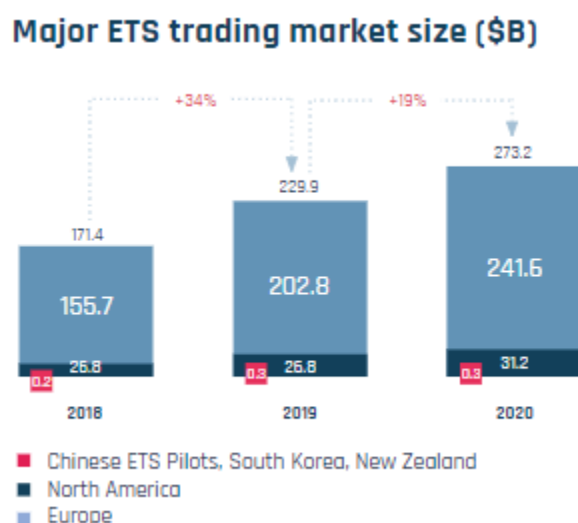
<sup>24</sup> <https://www.c2es.org/content/california-cap-and-trade/>

<sup>25</sup> [A blueprint for scaling voluntary carbon markets to meet the climate challenge](#)

<sup>26</sup> [Global carbon market grows 20% to \\$272 billion in 2020: Refinitiv | S&P Global Commodity Insights.](#)

these countries make up 21.5% of greenhouse emissions as more and more companies are joining the market leading to increased demand for carbon credits<sup>27</sup>. Demand for carbon credits could increase by a factor of 15 or more by 2030 and by a factor of up to 100 by 2050<sup>28</sup>.

**Figure 2: Major ETS trading market size (\$B)**



Source: <https://www.gfma.org/wp-content/uploads/2021/10/unlocking-the-potential-of-carbon-markets-to-achieve-global-net-zero-full-report-consolidated-vfinal1.pdf>

## Price for credit and fluctuation of price

The emission trade system is based on governments regulating the market to reduce total emissions over time. To reach the objective of emission reduction, governments set a cap on emission allowances to the market. This cap decreases every year, ensuring that total emissions decrease over time. By creating a market dynamic of supply and demand for emission allowances, an ETS (emission trading system) establishes a market price for GHG emissions. Carbon credit prices of the EU ETS rose from €30 at the start of 2021 to over €95 as of February 2022.<sup>29 30</sup> With the EU striving to achieve its emissions reduction goals and carbon allowances becoming more scarce, prices are expected to continue to rise.

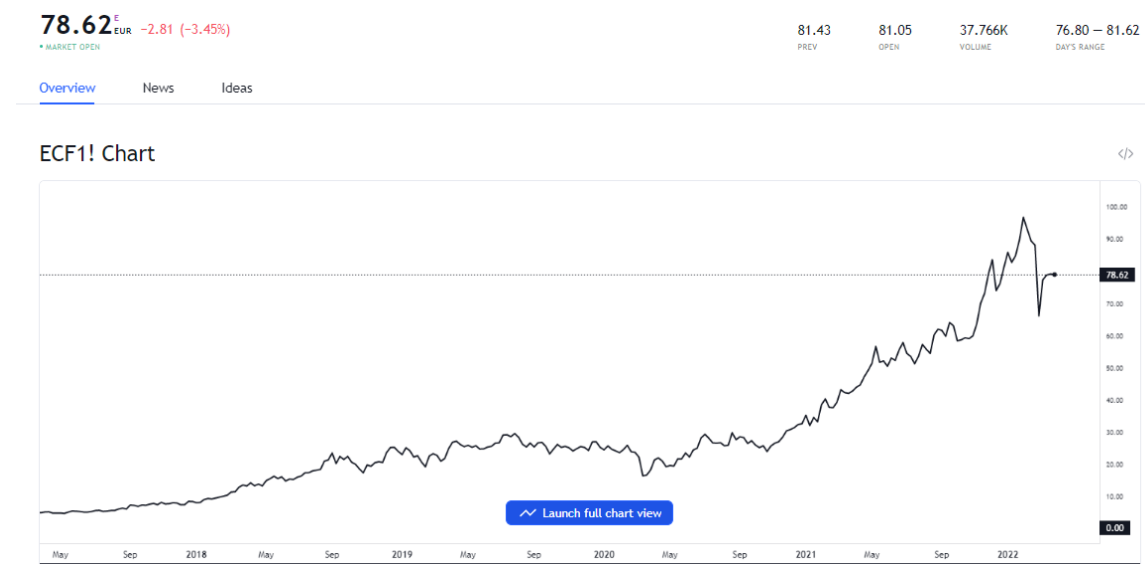
<sup>27</sup> <https://carbonpricingdashboard.worldbank.org>

<sup>28</sup> [https://carbonpricingdashboard.worldbank.org/map\\_data](https://carbonpricingdashboard.worldbank.org/map_data)

<sup>29</sup> <https://ember-climate.org/data/carbon-price-viewer/>

<sup>30</sup> <https://carboncreditcapital.com/value-of-carbon-market-update-2021-2/>

**Figure 3: EU ETS carbon credit price rose from €4.5 to €80 from April 2017 to April 2022**



Source: [https://www.tradingview.com/symbols/ICEEUR-ECF1!/?utm\\_source=carboncredits.com&utm\\_medium=widget&utm\\_campaign=chart&utm\\_term=ICEEUR%3AECF1%21](https://www.tradingview.com/symbols/ICEEUR-ECF1!/?utm_source=carboncredits.com&utm_medium=widget&utm_campaign=chart&utm_term=ICEEUR%3AECF1%21)

## Where are we today? Carbon credits in practical terms

### Results of international efforts

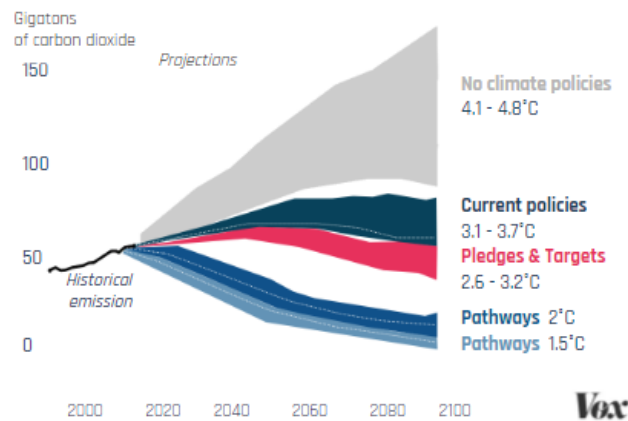
The mechanisms designed for emission reduction represent the fruits of international efforts to combat climate change. Without this global harness, global warming cannot be halted. Currently, the world produces 51 billion metric tons of CO<sub>2</sub> equivalent annually. According to Climate Action Tracker, by 2100 global average temperature is predicted to rise by 2.1°C (0.6°C more than the Paris Agreement goal) even if countries fully implement their pledges for 2030 and beyond, which were submitted in advance of the COP26 summit<sup>31</sup>. In the optimistic scenario, warming could be limited to 1.8°C, assuming full implementation of all announced targets (more than one hundred countries that have set or are considering net-zero targets)<sup>32</sup>.

<sup>31</sup> <https://www.cfr.org/background/paris-global-climate-change-agreement>

<sup>32</sup> <https://climateactiontracker.org/global/cat-thermometer/>

**Figure 4: Effect of current policies and pledges on global warming; even if global targets will be delivered global warming will still exceed.**

### Global greenhouse gas emissions



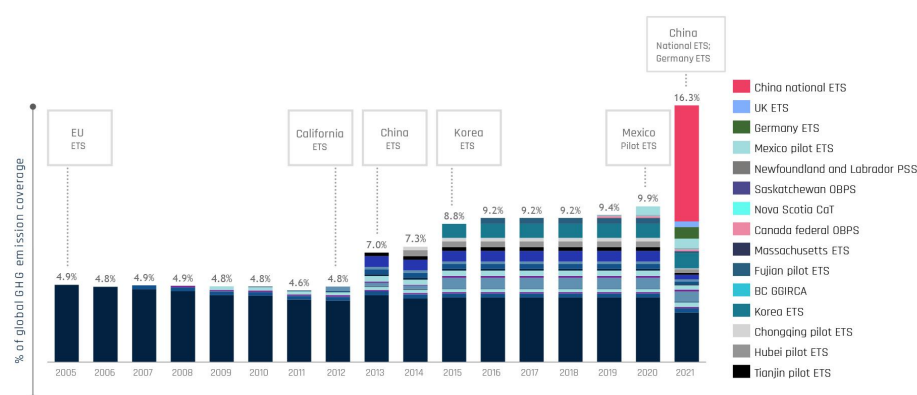
Source: Climate Action Tracker

Carbon trading is part of the efforts being made to mitigate, at least in part, the adverse effects of this upcoming global warming. Currently, it can be seen that carbon regulation in terms of emission trading systems is steadily increasing over time. The share of global emissions covered by ETS was roughly unchanged from 2005 to 2011. However, the share of global emissions covered by emission trading systems has grown sharply, to 16% globally in 2021 from 5% in 2010 (see figure 5 below). Regulatory coverage has risen steadily every year since the 2015 Paris Agreement. New carbon regulations (implemented and scheduled) jumped in 2021 as countries sought to show leadership in advance of COP26 in Glasgow. We can see that carbon emissions are now subject to regulation worldwide. In general, global participation in carbon emission trading schemes adoption is growing but uneven between different countries. Of all GHG emissions covered by emissions trading systems, China's national emissions trading scheme (ETS), established in 2021, holds the largest share of global greenhouse gas emissions (7%), followed by the EU's ETS (3.5%)<sup>33</sup>.

<sup>33</sup> <https://am.jpmorgan.com/us/en/asset-management/adv/insights/portfolio-insights/sustainable-investing/the-global-carbon-market/>



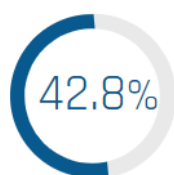
**Figure 5: Both numbers of ETS initiatives and ETS total coverage are increasing over time.**



Sources: <https://www.gtma.org/wp-content/uploads/2021/10/unlocking-the-potential-of-carbon-markets-to-achieve-global-net-zero-full-report-consolidated-vfinal1.pdf>  
[https://carbonpricingdashboard.worldbank.org/map\\_data](https://carbonpricingdashboard.worldbank.org/map_data)

There has been little information on the ex-post performance of carbon credits to date and the information is confined to a few jurisdictions. As the EU ETS is the oldest and largest mandatory carbon market, it has become a benchmark for global climate policy. Since its establishment in 2005, the system has led to a 42.8% reduction in GHG emissions from the sectors it covers, including electricity, heat generation, commercial aviation, oil refineries, steel production, and chemical products<sup>34</sup>. This emission reduction is aligning with the total emission reduction of 20% observed in Europe between 2005-2018<sup>35</sup>.

#### EU Emission Trading System as a use case



emission reduction between 2005-2021

#### EU Total emission reduction of



between 2005-2018

<sup>34</sup> <https://climatetrade.com/wp-content/uploads/2022/04/eu-ets-white-paper-en.pdf>

<sup>35</sup> <https://www.eea.europa.eu/ims/total-greenhouse-gas-emission-trends>

In California ETS, a decline has also been observed in the years 2004-2016, in which an overall reduction of 13% (1.08% per year)<sup>36</sup> took place in a rapidly growing economy.<sup>37</sup> Due to the lack of reliable data for the years after 2016, the research focused on the period prior to 2016.

Overall, these numbers show us that the cap and trade systems work, with a significant impact on the environment. Carbon trading regulation is steadily increasing and it is implemented worldwide, but it is only one tool under a package of tools designed to incentivize the fight against climate change. Every action is needed, and even a minimal impact can be viewed as vital given the gloomy forecasts of global warming. There is still immense work that needs to be done to fight climate change. In the next sections, we will attempt to address the question of how this mechanism affects Mobility players, and how they should engage in the markets.

## Carbon Credits and Mobility

Transportation is one of the most polluting sectors among all industries. Using carbon credit markets to reduce emissions from the transportation sector will have a substantial impact on global warming. With a 71% increase since 1990, transport is one of the fastest-growing sources of global emissions, accounting for 16%<sup>38</sup> of global emissions<sup>39</sup>. In the United States, the transportation sector generates the largest share of greenhouse gas emissions<sup>40</sup>. According to a report published by McKinsey & Company, to reach zero GHG emissions in the 27 European Union members alone, €28 trillion will need to be invested. The domestic transportation sector produces 21% of European GHG emissions and represents 40% of the total investment need (€12 trillion), making it a crucial sector for abatement<sup>41</sup>. When it comes to manufacturing, the mobility sector operates similarly to other polluting industries and trades on recognized carbon markets. However, for the vehicles that car manufacturers sell, there are different credits traded in designated markets. The next sections of this report will review key issues regarding carbon reduction in this sector from

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<sup>36</sup><https://bppj.berkeley.edu/2020/04/10/californias-cap-and-trade-program-has-proven-effective-now-lets-make-it-equitable/>

<sup>37</sup> <https://iopscience.iop.org/article/10.1088/1748-9326/abdae9#erlabdae9s5>

<sup>38</sup> <https://www.ebooks.com/en-us/book/209803910/how-to-avoid-a-climate-disaster/bill-gates/>

<sup>39</sup> <https://www.pwc.com/qx/en/sustainability/publications/assets/pwc-state-of-climate-tech-report.pdf>

<sup>40</sup> <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>

<sup>41</sup> [https://www3.weforum.org/docs/WEF\\_Unlocking\\_Large\\_Scale\\_Long\\_Term\\_Capital\\_for\\_Sustainable\\_Mobility\\_2021.pdf](https://www3.weforum.org/docs/WEF_Unlocking_Large_Scale_Long_Term_Capital_for_Sustainable_Mobility_2021.pdf)

the perspective of automakers and fleets, two major players when it comes to reducing emissions in this market.

## OEMs perspective

Just as other companies, OEMs are also able to buy, sell, and trade carbon credits in both voluntary and compliance markets. Part of the carbon credits issued by car manufacturers are unique and only can be used by car manufacturers. This uniqueness is reflected in the ZEV (zero-emission vehicles) credit program, which started in California and has been adopted by 12 US states. China and Europe also have such a credit scheme, which is a state-level incentive program to promote the production of Zero Emission Vehicles<sup>42</sup>. According to the EU, this regulation is known as fleet-wide CO<sub>2</sub> emission targets and since the 2020 target came into effect, the average CO<sub>2</sub> emission rate for new passenger cars registered in Europe has decreased by 12%<sup>43</sup>. Programs like this provide incentives for OEMs to achieve their climate goals and serve as a tool for the transition to zero-polluting vehicles. In general, ZEV credits are given by the government they are based on manufacturers that sell zero-emission vehicles depending on the type and range of the car<sup>44</sup>. These credits are typically purchased by other OEMs to avoid regulatory sanctions such as a fine, as they are required to produce Several ZEVs and plug-in hybrids each year, as a percentage of their total sales. That percent increases by 2.5% per year, ranging from 4.5% in 2018 to 22% by 2025<sup>45</sup>.

### Financial benefits of using ZEV credits for OEMs

ZEV credits are earned when manufacturers sell eco-friendly vehicles. Counterintuitively, one sale does not equal one credit. Instead, ZEV Credits are awarded based on the type and range of the vehicle sold. These credits have varying prices depending on where they are created. Toyota, for example, bought 88,000 zero-emission vehicle credits between 2017 and 2019. **These credits can** cost up to \$5,000<sup>46</sup>. One of the biggest sellers of ZEV is Tesla, which has gained revenue of \$518

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<sup>42</sup> <https://www.cnn.com/2021/05/18/tesla-electric-vehicle-regulatory-credits-explained.html>

<sup>43</sup> [https://ec.europa.eu/clima/eu-action/transport-emissions/road-transport-reducing-co2-emissions-vehicles/co2-emission-performance-standards-cars-and-vans\\_en](https://ec.europa.eu/clima/eu-action/transport-emissions/road-transport-reducing-co2-emissions-vehicles/co2-emission-performance-standards-cars-and-vans_en) ; <https://www.eea.europa.eu/ims/co2-performance-of-new-passenger>

<sup>44</sup> [Environmental Credits Powering the Rise of Zero-emission Vehicles 2020 Industry Outlook - Growth Opportunities in the Market Include Social Collaboration - ResearchAndMarkets.com](#)

<sup>45</sup> <https://seekingalpha.com/article/4393953-tesla-free-money-zev-credit-math>

<sup>46</sup> <https://www.businessinsider.com/tesla-emissions-credits-sales-profit-stellantis-fiat-chrysler-2021-5>

million over the first quarter of 2021 by selling ZEV credits. Since Tesla only produces EVs, it received credits from the governing body and sold them at a 100% profit.<sup>47</sup> One example of Tesla ZEV's former customer is Fiat Chrysler Automobiles which bought 2 billion euros (\$2.43 billion) of European and U.S. green credits over the 2019-2021 period due to its lagged development of electric cars<sup>48 49</sup>. Stellantis, the new entity formed after the merger of FCA with French automaker PSA, announced in May 2021 that they will no longer need to buy European environmental credits from Tesla any more thanks to the electric-car technology that PSA brought to the merger<sup>50</sup>. Tesla has traditionally been the go-to credit provider, due to its sales of only zero-emission vehicles without the need for credits to offset combustion-engined cars. Despite Tesla being the most popular example of this, there are other companies such as GM and Renault that have a decent market share of ZEV credits.<sup>51</sup>

## Cap and fines on OEMs

In the European Union, for every 1g/km of CO<sub>2</sub> that a manufacturer exceeds its average emissions set cap, it will be fined €95 multiplied by its volume of new-car registrations in the preceding year (unit sales).<sup>52</sup> Based on the top OEMs fleet emissions and unit sales in the previous year, the top 13 European OEMs were expected to face fines of more than €14.5 billion (£12.5 billion), according to an analysis by PA Consulting.<sup>53</sup> An example of a notable fined company from the automotive industry is Volkswagen, which has been hit with several hefty penalties for emitting above their set amounts. At the end of 2020, Volkswagen missed the target by 0.5%, resulting in a 100 million euro fine.<sup>54</sup>

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<sup>47</sup> [Is Renault Trying To Swipe Tesla's Critical Emissions Credits Cash Cow?](#)

<sup>48</sup> <https://www.cnn.com/2021/05/18/tesla-electric-vehicle-regulatory-credits-explained.html>

<sup>49</sup> <https://www.reuters.com/article/stellantis-environment-electric-idCNL8N2MR5D5>

<sup>50</sup> <https://www.fool.com/investing/2021/05/05/stellantis-will-stop-buying-eu-tax-credits-from-te>

<sup>51</sup> <https://seekingalpha.com/article/4394486-teslas-zev-credits-real-truth>

<sup>52</sup> <https://www.wardsauto.com/industry/missing-eu-emissions-targets-costly-automakers>

<sup>53</sup> <https://www.fleetnews.co.uk/news/manufacture-news/2021/01/28/most-car-makers-will-avoid-eu-emission-fines>

<sup>54</sup> <https://www.fleetnews.co.uk/news/manufacture-news/2021/01/28/most-car-makers-will-avoid-eu-emission-fines>

## Fleets perspective

There are two main reasons why fleets are an important opportunity to accelerate the zero-emission transition in transportation: by focusing on fleets, particularly those owned by larger operators, multiple vehicles can be converted to zero emissions simultaneously. Furthermore, most fleets consist of commercial vehicles, which typically have a higher vehicle usage rate than private vehicles, thus emitting more carbon dioxide than their non-commercial counterparts<sup>55</sup>. Electrifying urban fleets can reduce more than 70% of mobility CO2 emissions, remove 50% of city air pollution, and enable electrification for everyone - making the transition to electrification more effective and equitable. According to the World Economic Forum, two-thirds of new cars in Europe are bought for company fleets, which implies that businesses have a significant role to play in driving the electric vehicle market<sup>56</sup>. There are various benefits for companies that electrify their vehicle fleets. Electric vehicles are much more energy-efficient than ICE vehicles, along with economic profit resulting from tax rebates on the transition to electric vehicles that several countries provide<sup>57</sup>. However, companies that own car fleets do not receive carbon-credit compensation for fleet electrification, unlike other counterparts like OEMs that are rewarded for producing greener vehicles.

### Fleet-specific offset programs

Companies such as Shell, BP, and Aral have introduced carbon offsetting as an option with their fuel cards, making it easy to offset the total emissions produced by a company's entire fleet. Using these, you can calculate your fleet's CO2 emissions and offset them by funding nature-based solutions. BP, for example, offers a comprehensive carbon management solution for business drivers that can be fully integrated into the existing company processes of both large companies with a sizable fleet and smaller businesses with only a few vehicles. In the Netherlands, logistics firm Nedcargo distributes about 20% of the products on the shelves of supermarkets using the Shell scheme to offset the 10,000 liters of diesel it burns every day through its trucks. In 2017, the Hertz Corp. also began offering a carbon offset program exclusively to corporate customers with

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<sup>55</sup> [https://www3.weforum.org/docs/WEF\\_Unlocking\\_Large\\_Scale\\_Long\\_Term\\_Capital\\_for\\_Sustainable\\_Mobility\\_2021.pdf](https://www3.weforum.org/docs/WEF_Unlocking_Large_Scale_Long_Term_Capital_for_Sustainable_Mobility_2021.pdf)

<sup>56</sup> <https://www.weforum.org/agenda/2021/02/how-electric-fleets-can-fuel-decarbonisation-efforts-zeuf/>

<sup>57</sup> <https://www.etransenergy.com/Thought-Leadership/Enterprise-Level-EV-Financial-Incentives>

the opportunity to reduce the carbon footprints associated with vehicle rentals through the purchase of carbon offsets. Hertz has also partnered with TerraPass, which allows Hertz to provide carbon emission reporting to customers. The report feeds directly into a personalized platform, which allows corporate customers to then purchase carbon offsets, if desired, to neutralize their environmental impact<sup>58</sup>.

## Private consumer perspective

Private consumers are not required to meet certain carbon reduction targets through carbon reduction mechanisms, unlike countries and companies. However, there are different types of incentives, economic and personal incentives, which depend on the consumer's desire to adopt innovative carbon schemes.

### Financial incentives

The economic incentives are reflected in discounted taxes when buying electric vehicles<sup>59</sup> or in programs that try to make the carbon markets and their benefits accessible to the private consumer. One example of such a program is launched by BYD, a Chinese manufacturer of EVs and batteries, which launched a *carbon banking system* using a public blockchain owned by VeChain called VeChainThor. Working in conjunction with quality assurance firm DNV GL and VeChain, the three companies created a system that awards drivers based on the data of a car's performance (mileage, fuel/electricity consumption, etc.). BYD catalogs such data, assisting them in improving their cars; repair garages can also provide data to BYD that may help in identifying weaknesses in BYD cars. *When it comes to drivers, they can be rewarded with carbon credits based on vehicle performance.*<sup>60</sup> Credits could then be used to purchase goods and services through VeChain's Carbon Credit App with a QR code on the car.<sup>61</sup> **Unfortunately, it seems that**

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<sup>58</sup> <https://blog.autoslash.com/the-fee-detective-finds-enterprise-s-carbon-offsets-cost-more-than-expected/>

<sup>59</sup> <https://www.chargepoint.com/incentives/federal-tax-credit-home-ev/>

<sup>60</sup> <https://www.prnewswire.com/in/news-releases/byd-the-largest-chinese-car-brand-and-worlds-top-selling-plug-in-electric-car-manufacturer-is-further-tackling-carbon-emission-imbalances-by-partnering-with-dnv-gl-and-vechain-moving-from-proof-of-concept-to-product-ion-ready-692497561.html>

<sup>61</sup> <https://www.ledgerinsights.com/blockchain-carbon-credits-driving-byd-vechain-dnv/>

BYD is the only OEM that has a system of providing carbon credits to drivers based on the way they use their cars <sup>62</sup>.

## Personal incentives

Climate change is a matter that is of great importance to different people, who try to help build a greener future through their behavior. A new study across 24 countries conducted during the COVID-19 pandemic reveals that 58% of adults are more mindful of their impact on the environment, and 85% said they're willing to take personal action to combat environmental and sustainability challenges in 2021<sup>63</sup>. Private consumers have the opportunity for reducing their carbon footprint by making more informed decisions on their carbon-emitting behavior, based on transparency provided by carbon-emission calculators.

In the U.S., the EPA offers a calculator that can help quantify the carbon footprint of any household<sup>64</sup>. Initiatives such as these are commendable in the fight against climate change. Such tools inform individuals and households of their environmental impact, providing the much-needed information to reduce their carbon footprint. Given the likelihood of growing carbon regulation worldwide and cross-border carbon taxes, business managers would be inclined to begin monitoring CO2 emissions and budgeting for potential future costs<sup>65</sup>.

Some companies offer offsetting consumers' carbon emissions from different polluting activities related to transportation. Several aviation companies such as United Airlines offer a carbon offset program, which enables calculating the carbon footprint of air travel each quarter for passengers and offset them through a donation to carbon reduction projects. The program provides corporate customers the ability to fly carbon neutral while maintaining visibility into the emissions associated with their business travel<sup>66</sup>. Another example is Porsche, which has partnered with the South Pole, a Swiss carbon finance consultancy, to offer an Emissions Estimator, used for estimating vehicles'

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<sup>62</sup><https://www.capgemini.com/2020/08/how-oems-can-transform-plug-in-hybrids-from-ecological-cheat-packages-to-tools-for-sustainable-mobility/>

<sup>63</sup> <https://www.mastercard.com/news/media/gdvnaedh/consumer-attitudes-to-the-environment-2021.pdf>

<sup>64</sup> <https://www3.epa.gov/carbon-footprint-calculator/>

<sup>65</sup> <https://am.jpmorgan.com/content/dam/jpm-am-aem/global/en/insights/portfolio-insights/JPM53391the-global-carbon-market.pdf>

<sup>66</sup> <https://www.united.com/ual/en/us/fly/company/global-citizenship/environment/carbon-offset-program.html>

CO<sub>2</sub> emissions, and the respective offsetting value<sup>67</sup>. Then, drivers can use the South Pole platform to invest in sustainable projects to offset the emissions estimated.

## Challenges in the carbon credit markets

The carbon credits market, despite its promising potential in solving the net-zero equation, is currently limited by some key factors. For one, the market is fragmented and thereby very process-intensive and inefficient. This inefficiency also excludes small and medium-sized enterprises from benefiting from the market. Additionally, there is a lack of standardization in the measuring of emissions alongside a lack of regulation and transparency between different players. As the markets grow, these challenges, amongst others, need to be carefully considered to fully exploit the mechanism's potential. Here are some key challenges we identified as crucial for the market success:

### 1. Fragmented, inefficient and process-intensive market

The carbon credits market is inefficient in many ways, with a complex process that requires documentation, monitoring, and verification that can be both expensive and time-consuming<sup>68</sup>. The many steps in the value chain complicate the traceability of the original carbon reduction. Moreover, The market is fragmented with submarkets, without a single global market (neither voluntary nor mandatory). There are high entry costs that have deterred small-scale projects from accessing the voluntary market, contrary to large-scale projects that enable economic viability<sup>69</sup>.

### 2. No standardized carbon credit accounting rules and measurement process

- a. Non-standardized measurement process: The process by which organizations quantify their emissions, and measure the number of emissions that can be saved through different projects, includes within it ambiguity leading to each player measuring emissions differently. As a result of lacking global rules regarding measurement, many credits traded have been proved to represent questionable emissions reductions. Consequently, some offsetting projects are not "additives" to reducing global emissions, resulting in the market supplying

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<sup>67</sup> <https://www.porsche.com/uk/aboutporsche/responsibility/porscheimpact/>

<sup>68</sup> <https://nextbillion.net/innovations-and-challenges-in-carbon-finance/>

<sup>69</sup> <https://nextbillion.net/innovations-and-challenges-in-carbon-finance/>



credits for poor-quality activities. A recent academic study looking at the US Forest offset protocol in California found that more than 80% of credits generated were not likely to represent true emissions reductions.<sup>70</sup>

- b. Double counting: Double counting is a challenge the market faces where two or more parties claim the same emission reduction to comply with their mitigation targets. As a result, the credits do not represent an additional emissions reduction which poses a challenge in the form of double accounting. It often occurs when carbon credits claimed at the project level are being claimed again as national emission reductions.<sup>71</sup>

### 3. Lack of pricing information

There is a significant lack of information that leads to inefficiency in the market both in terms of supply and in terms of demand for carbon credits. Limited pricing data makes it challenging for buyers to know whether they are paying a fair price, and for suppliers to manage the risk they take on by financing and working on carbon-reduction projects without knowing how much buyers will ultimately pay for carbon credits<sup>72</sup>.

## Featured solutions

To face the aforementioned challenges, we identified several technologies and solutions that seem promising in solving some of the market's pain points:

### 1. Trading with Blockchain to create a unified marketplace

A blockchain is a decentralized, distributed, and oftentimes public, digital ledger consisting of records, called blocks, that are used to record transactions across a network. As a technology, it is characterized by transparency, data security, and system autonomy. It has been previously implemented successfully in a vast array of areas, where the main one is the bitcoin currency, and now it is poised to disrupt the carbon credits market.

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<sup>70</sup> <https://www.linkedin.com/pulse/disruptive-technologies-welcome-carbon-trading-edward-yardeni>

<sup>71</sup> <https://ecosphere.plus/2018/06/29/solution-for-double-counting-in-carbon-markets/>

<sup>72</sup> <https://www.mckinsey.com/business-functions/sustainability/our-insights/a-blueprint-for-scaling-voluntary-carbon-markets-to-meet-the-climate-challenge>

Implementing blockchain technology enables the carbon credits market to take advantage of autonomous trading as the chain arranges the trading route and completes the carbon emission transaction with the other party directly. The main value drivers for blockchain technology in this environment are to record and transfer information flow reliably and realize point-to-point transactions between suppliers and consumers to achieve “decentralization”. There are further benefits that are sorely needed in this market; illegal trading activity will be easier to detect automatically, the three current systems (registration, emission trading, and emissions management) will be able to function coherently on the same platform, and all parties with access to the chain will have transparency and visibility amongst each other, transactions between parties can be executed automatically without the presence of a middle man, and there will be far lower barriers to entry thus allowing small players to join the carbon credit market.

An example of a startup operating in this field is [Dragonchain](#), a hybrid blockchain platform that allows confidential information to be kept on a private chain while proof is decentralized to Bitcoin and Ethereum. Dragonchain can interact with IoT devices and sensors to monitor emissions, ensuring a safe and reliable issuance and tracking system for carbon credits. The measurable proof can be supplied to regulators, climate-aware customers, or the business's records.

Another example is [Nori](#), a Seattle-based carbon removal voluntary marketplace based on blockchain technology, which enables carbon removal suppliers to connect directly with buyers, improve efficiency, and reduce costs. The company has built an open-source market infrastructure to allow carbon removal projects to measure and monetize their activity. The company raised its A-round in February 2022 led by M13, along with Toyota Ventures, which also invested<sup>73</sup>.

## **2. Enhancing the carbon footprint measurement process with IoT**

Different measurement technologies and IoT devices try to address the challenges found in the emission measurement process. IoT capabilities can be essential to solving the emission measurement problem because the industry is in the process of digital transformation and these devices can modernize industry practices as well as improve the accuracy and transparency of measurements, and make the end-to-end process more efficient.

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<sup>73</sup> <https://www.geekwire.com/2022/toyota-invests-in-nori-a-carbon-removal-startup-trying-to-help-reverse-climate-change/>

An example of a company using IoT is the Israeli-based [Albo](#), which develops a SaaS solution for mapping, measuring, and monitoring carbon sequestration based on satellite imaging. The company's technology applies deep learning algorithms to satellite radar imagery intending to make it simpler for landowners to measure their carbon stocks and begin selling certified carbon credits and for companies to start purchasing trusted carbon credits<sup>74</sup>.

### 3. SaaS carbon accounting solutions

As companies scramble to track and measure their carbon emissions, the rush has generated a flood of new carbon-accounting startups that aim to position themselves as a company's external sustainability team. The startups, which typically operate a software-as-a-service model, help everyone from big corporations to small and medium-sized enterprises to get their house in order.

[Plan A](#) has developed a SaaS tool that offers carbon-footprint reporting and emission reduction as well as bespoke tools for more complex businesses. The company collates data from various business tools and presents it in a real-time dashboard. Behind the scenes, it cleans and processes data for carbon footprint ESG ratings and scenario planning. It also produces sustainability and ESG reports and a decarbonization strategy<sup>75</sup>.

Another company is [ECO-OS](#), an Israeli-based online ESG accounting software for manufacturers, suppliers, and infrastructure companies. ECO-OS cloud-based management platform provides a user-friendly, efficient system to send and receive data, provide regulatory and voluntary disclosures, generate insights, identify risks, and explore new, more sustainable business opportunities.

### 4. Carbon emission efficiency optimization

Although many solutions focus on consultation and green strategy advising, some go further and help with the implementation of such strategies. In addition, some companies offer another layer - the option to earn financial rewards for a green transition by engaging the carbon credits market.

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<sup>74</sup> [https://finder.startupnationcentral.org/company\\_page/albo-systems](https://finder.startupnationcentral.org/company_page/albo-systems)

<sup>75</sup> <https://www.businessinsider.com/hot-startups-helping-businesses-curb-carbon-emissions-vcs-2022-1>

[CO2Green](#) is an Israeli startup developing an innovative eco-mobility software platform and complementary dedicated Freight MarketPlace facilitating the freight industry shift to green transport modes and reducing its carbon footprint. The company enables companies to make intelligent data-driven environmental decisions, to measure, analyze, adopt optimization and monetize more eco-friendly freight and distribution operations through compensation of carbon credits for the green efficiency.

[Clearly](#) is focused on the management and reduction of mobility-related carbon emissions.

The company's end-to-end software platform automates the gathering and cleansing of data across the supply chain, quantifies emission reductions both in real-time, and future and allocates the saves across the supply chain. The efficiency of the supply chain can be translated into credits through the savings which account for the company's emission balances.

## 5. Pricing solution

As mentioned above when referring to challenges in the carbon credit markets, the carbon credits market is struggling from a lack of available information on pricing, project quality, and more for both suppliers and consumers. Some startups try to address this lack of information in different ways.

[Sylvera](#), for example, is a UK-based startup that rates the effectiveness of carbon-offsetting projects. The company uses imaging technology alongside machine learning to bolster transparency around carbon offsetting projects by providing satellite imagery among other intelligence including providing up-to-date pricing data from trusted sources.

## Future Outlook

The severe impact of carbon emissions on the environment requires fundamental and extreme action by all stakeholders. So far, the carbon credit market has been an effective framework used by governments and business entities to limit and reduce their carbon footprint. This may not be the case going forward as technology & manufacturing trends, market dynamics, and regulation change over time. We expect that the impact of the carbon credit market on the rate of carbon emissions will diminish during the next few years. The severe impact of carbon emissions on the environment requires not only a focus on offsetting and marginally reducing carbon emissions by avoidance but rather focusing on fundamental changes in manufacturing and carbon-emitting activities. Since mobility is the 4th most polluting industry and accounts for 16% of GHG globally<sup>76</sup>, mobility players have a massive role to play in humanity's fight against climate change<sup>77</sup>. There are several potential tectonic changes anticipated that industry players should consider:

**Existing mechanisms are becoming irrelevant or with minimal impact and will make room for new and more effective mechanisms.**

Due to changing regulations and market dynamics, many of the mechanisms currently in use will either be irrelevant or have a diminishing effect on the reduction of carbon emissions in the upcoming years. Main changes in regulation are likely to include reductions in emission caps, providing fewer buffers for companies to trade with carbon credits unless they change their carbon-emitting activities substantially. As a result, the impact of the carbon credit market as a mechanism for lowering carbon emissions will over time become less effective, and new mechanisms will evolve.

An example of a mechanism that may be irrelevant in the coming years is The ZEV credits mechanism. Today, an increasing number of automakers are producing eco-friendly vehicles such as electric and hybrid vehicles, which the sale of those rewards them with environmental credits that they can sell to other automakers that do not meet the production quota of their zero emission vehicles. This stream of value is indicated in the companies' annual financial statements, such as the compensation Volvo Cars has received from Ford for a pooling arrangement of environmental

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<sup>76</sup> <https://www.ebooks.com/en-us/book/209803910/how-to-avoid-a-climate-disaster/bill-gates/>

<sup>77</sup> [https://www.statista.com/topics/7476/transportation-emissions-worldwide/#topicHeader\\_wrapper](https://www.statista.com/topics/7476/transportation-emissions-worldwide/#topicHeader_wrapper)

credits accounted for as a part of revenue<sup>78</sup>. However, when all car manufacturers produce such vehicles in the future, the market for the sale of ZEV credits will be irrelevant. As regulatory requirements across the globe become increasingly stringent, OEMs will have to develop highly competitive EVs, since this current practice is not a sustainable strategy. Additionally, we can anticipate that new incentives will be offered for the sale of EVs with higher efficiency when most or even all vehicles on the road will be electric. Similar to the regulation the Chinese government implements in its incentive system, there can be incentives in the form of subsidy programs for more sustainable and efficient electric energy consumption per vehicle<sup>79</sup>. In general, corporations should avoid building their strategy on existing mechanisms, which may change in the future, as the main driver will need to be from changing core emission activities.

**Carbon credit markets are only catalysts for emission reductions, therefore the focus should be on reducing emissions, not on emission avoidance or offsetting.**

In light of the many problems that exist in the voluntary markets related to greenwashing and questionable quality of offset credits, companies should concentrate on lowering their emissions from their core business, before engaging in the voluntary carbon markets. In this context, there is a need for innovative technological solutions that would reduce emissions themselves rather than balance them. Moreover, today the voluntary market is too small to provide quality offsets to all companies wishing to do so with high-quality removal offsets such as carbon capture or sequestration, and not through avoidance offsets.

**On top of direct emission reduction, carbon removal is also essential for combating climate change.**

Although the majority of reduction activity will still need to happen through direct action and not through the use of carbon offsets, removing carbon from the atmosphere is crucial. Since 1850, the world has polluted more than 2,500bn tons of CO<sub>2</sub> - half just from the last 30 years - and we continue to pollute around 50bn tons of CO<sub>2</sub>e per year. According to Climate Tech VC, For most 1.5°C pathways, even with drastic decarbonization, we will still need to remove 6-10 Gt of CO<sub>2</sub> per

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<sup>78</sup> [https://investors.volvocars.com/annualreport2020/assets/pdf/VCG\\_ENG\\_2020\\_web\\_20210317.pdf](https://investors.volvocars.com/annualreport2020/assets/pdf/VCG_ENG_2020_web_20210317.pdf)

<sup>79</sup> <https://theicct.org/sites/default/files/publications/China%20NEV-policyupdate-jul2020.pdf>

year by 2050, which is equal to not only stopping GHGs emissions but also to removing around 10-20% of global emissions annually<sup>80</sup>.

Because of this, companies should consider participation in carbon offset removal markets, given that simply stopping emitting GHG emissions will not suffice. Several studies have predicted that the carbon offset markets are poised for huge growth - of at least 15x by 2030, as large corporations accelerate their net-zero commitments, and because it is vital growth to support the investment required to deliver the 1.5-degree pathway<sup>81</sup>.

The voluntary carbon markets can play a valuable role in encouraging companies to engage in setting more ambitious targets than they may otherwise have done. The way to incentivize using carbon removals is to increase the credibility of carbon offsets credits in the voluntary market so that large corporations can rely on such credits and use them to achieve their climate targets. Some companies are investing in carbon removals technologies such as Audi, which partnered with Swiss company Climeworks, a developer of direct air capture and storage facility for converting atmospheric CO<sub>2</sub> to rock in Iceland. The facility filters 4,000 metric tons from the atmosphere each year, and one-quarter of that is credited to Audi. The company has been supporting the development of CO<sub>2</sub> capturing technology of Climeworks since 2013<sup>82</sup>.

### **Quantifying the carbon footprint of an organization can serve as a strategic asset.**

The ability of companies to know their carbon footprint can serve as a strategic asset to the organization. Based on this data, companies can improve their positioning both towards authorities and investors. The ability to track and measure carbon footprint can provide a competitive advantage and options for leveraging the company as well as various other financial benefits. In the coming years, more companies that are not subject to regulation will have to provide investors with concrete strategic plans for achieving sustainable goals. Companies need to develop the right tools for measuring their carbon emissions along with setting strategic plans to reduce them. Innovative

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<sup>80</sup> <https://climatetechvc.substack.com/p/-giving-carbon-credit-where-its-due>

<sup>81</sup> <https://www.mckinsey.com/business-functions/sustainability/our-insights/a-blueprint-for-scaling-voluntary-carbon-markets-to-meet-the-climate-challenge>

[https://www.iif.com/Portals/1/Files/TSVCM\\_Report.pdf](https://www.iif.com/Portals/1/Files/TSVCM_Report.pdf)

<sup>82</sup> <https://www.audi-mediacycenter.com/en/press-releases/in-depth-audi-and-climeworks-store-co2-from-the-atmosphere-underground-13095>

technologies come into play here, as they can accelerate the bureaucratic and diffuse process of measuring emissions and setting effective plans to reduce them.

**When it comes to reporting and measuring emissions, companies must take into account the ever-tightening regulations.**

As of today, in countries where GHG emissions reporting requirements exist for certain companies, the disclosure requirement of only Scope 1 and 2 emissions predominates whereas Disclosure of Scope 3 emissions is only done voluntarily. Generally, carbon regulations are on the rise, and are expected to increase considerably in the coming years, affecting a large number of companies that need to prepare. As evidence, one can see the draft rule that was unveiled by the U.S. Securities and Exchange Commission (SEC) in March 2022, requiring listed companies to disclose, in addition to their scope 1 and 2 emissions, their Scope 3 emissions, if material, or if the registrant has set a GHG emissions target that includes this type of emissions. This came as a reason for investor demand for consistent information on how climate change will affect the financial performance of companies they invest in. In 2021, one year before the draft rule was published, the public was welcomed to give its input on climate change disclosures. A survey that analyzed the public input, found that 65% of the comments filed by investment firms called for companies to be required to include Scope 3 emissions<sup>83</sup>.

In terms of mobility players, it is important to note that Scope 3 emissions account for more than 80% of value chain GHGs of a company operating in the automotive industry<sup>84</sup>.

## Conclusion

The mobility industry can not stand on the sidelines in the efforts to fight climate change.

Carbon markets are effective and growing, and mobility players should participate in them, and adopt innovation to trade and play better. Being active in the carbon credits market can help support sustainability targets, but there is still a growing need for technologies that can scale up these markets and enable a more efficient way of participating in them. Alongside the financial benefit that underlies the carbon markets, there are several different and important motives for

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<sup>83</sup> <https://www.nytimes.com/2022/03/21/business/sec-climate-disclosure-rule.html>

<sup>84</sup> <https://cleanenergynews.ihsmarkit.com/research-analysis/life-cycle-approach-on-scope-3-emissions-key-to-auto-sector-de.html>



companies to participate in them in general. Among them are to strengthen their brand as sustainable, to increase customer demand as well as investors satisfaction, and to keep up with the expanding regulations.

However, although carbon credit markets pose great incentives to reduce emissions, and companies that choose to participate in them wisely could enjoy the financial benefits inherent in them, at the moment, it is not enough to only participate in them. Limiting global warming to 1.5°C is going to be difficult to accomplish; Regulatory compliance is not enough. Mobility players should take massive steps to reduce their carbon footprint from their core business first and foremost, and participate in carbon trading to mitigate some risk. However, this will not solve the net-zero equation by itself.