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Carbon pricing in the Ontario industrial market information session

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Introductions and housekeeping

- CIET introduction
- Housekeeping items (acknowledgements, recording, chat, questions, etc.)
- IESO programs for businesses
- Presenter introductions
- Agenda



Save on Energy programs for businesses

Save on Energy's business programs provide incentives to help Ontario businesses of all sizes implement retrofits and other energy-efficiency projects to lower their energy costs, including:

- Retrofit Program
- Instant Discounts Program
- Energy Performance Program
- Strategic Energy Management Program
- Existing Building Commissioning Program
- Training and Support





Save on Energy program support

Retrofit Program

retrofit@ieso.ca

Energy Performance Program

info@energyperformanceprogram.ca

Instant Discounts Program

info@instantdiscounts.ca

Existing Building Commissioning Program

EBCx@ieso.ca

Strategic Energy Management Program

SEM@ieso.ca

Training Opportunities

trainingandsupport@ieso.ca

Introduction

Emily Thorn Corthay, MASc., P.Eng, CEM, CMVP, Founder and CEO of Thorn Associates



Through her 20-year career in industrial decarbonization and energy management, she has assisted clients in achieving over \$100 million in energy savings and reductions with over 500,000 tonnes of CO₂e, acting as project manager, technical reviewer, and energy/sustainability engineer for over 80 energy and decarbonization projects in 15+ countries.

Robert Storey, P.Eng., CEM Energy Engineer, Associate at Thorn Associates



30 years of project and operations experience specializing in energy since 2001, ISO 50001, codes and standards, over 300 Save on Energy projects with Toronto Hydro, client projects under the former Industrial Accelerator and Northern Industrial Electricity Rate programs.

Information session objectives and agenda

- What carbon pricing is and why it is needed
- The different types of carbon pricing and the global view
- Canadian federal carbon pricing system
- Ontario carbon pricing system
- Internal carbon pricing
- Economic effects on industry



What is carbon pricing?

- An economic policy and accounting strategy used to recognize and reduce greenhouse gas (GHG) emissions by assigning a price to emissions of carbon dioxide (CO₂) and other GHGs, which can all be converted into CO₂ equivalent (CO₂e)
- Putting a price on CO₂e is widely recognized as the most efficient means to reduce emissions while also driving innovation



CO₂ and other GHGs

The Global Warming Potential of other GHGs is used to convert to CO₂e when reporting emissions

	Common name of GHG	Chemical formula	Global Warming Potential
1	Carbon dioxide	CO ₂	1
2	Methane	CH ₄	28
3	Nitrous oxide	N ₂ O	265
4	Sulfur hexafluoride	SF ₆	23,500
5	Nitrogen trifluoride	NF ₃	16,100
6	Hydrofluorcarbons (HFC-XX)	C _x H _x F _x	4 – 12,400
7	Perfluorcarbons (PFC-XX)	C _x F _x	6,630 – 11,100

Why do we need carbon pricing?

In economics, an “externality” is when the actions of one economic agent affect another economic agent outside the market mechanism. The negative externalities of CO₂e emissions can significantly impact economics at many levels.

The main reasons for having carbon pricing are:

- internalizing externalities
- market efficiency
- revenue generation for decarbonization
- to account for the social cost of carbon (SCC CO₂ for 2024 is CDN \$266/t)



What are the different forms of carbon pricing?

Carbon Tax: A price per tonne of CO₂e emissions (e.g. due to fuel combustion or produced during an industrial process). Price known, emission uncertainty.

Emissions Trading Systems (ETS): Market-based policies designed to influence emission reductions where they are most feasible. Emitters can invest in reducing their emissions or buy/trade excess emission allowances from other emitters. Emissions known, price uncertainty.

Which mechanism is used more across jurisdictions?

Both carbon taxes and Emission trading systems (ETSs) are used almost equally across the globe

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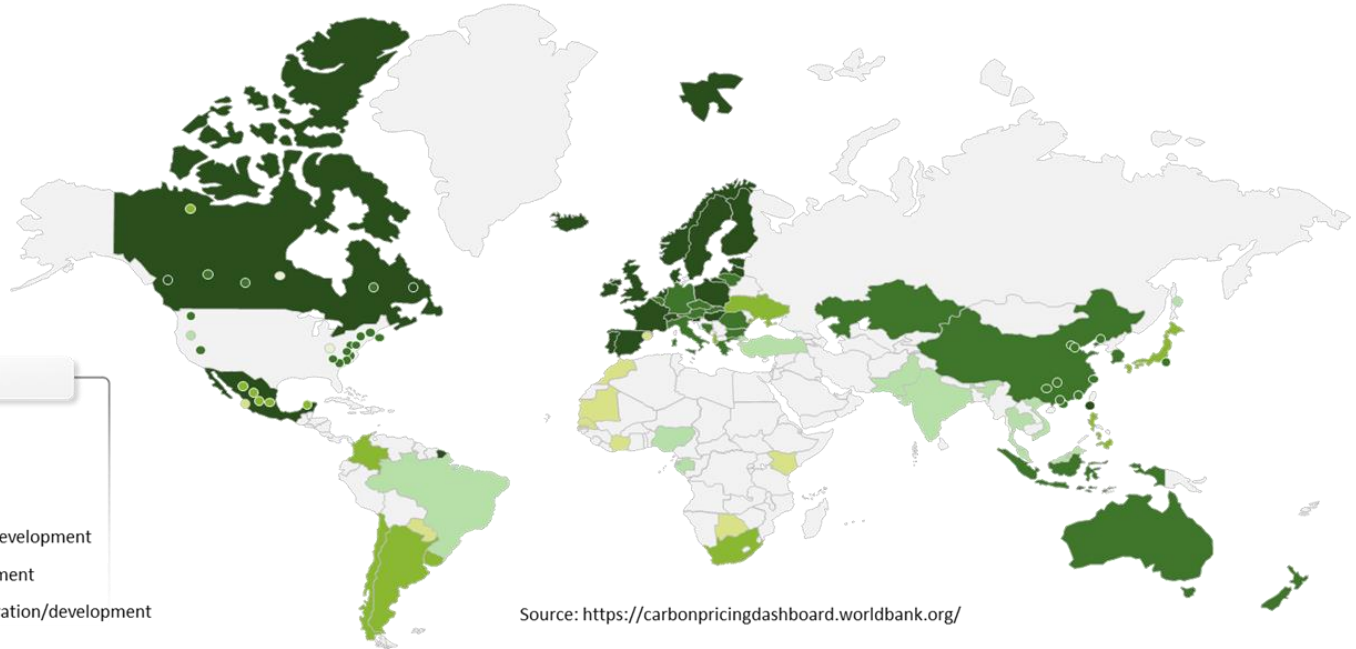
Total Carbon tax regimes¹

36

Total ETSs globally¹

INSTRUMENT TYPE AND STATUS

- Carbon tax implemented
- ETS Implemented
- Both Implemented
- Carbon tax under consideration/development
- ETS under consideration/development
- Both or undecided under consideration/development

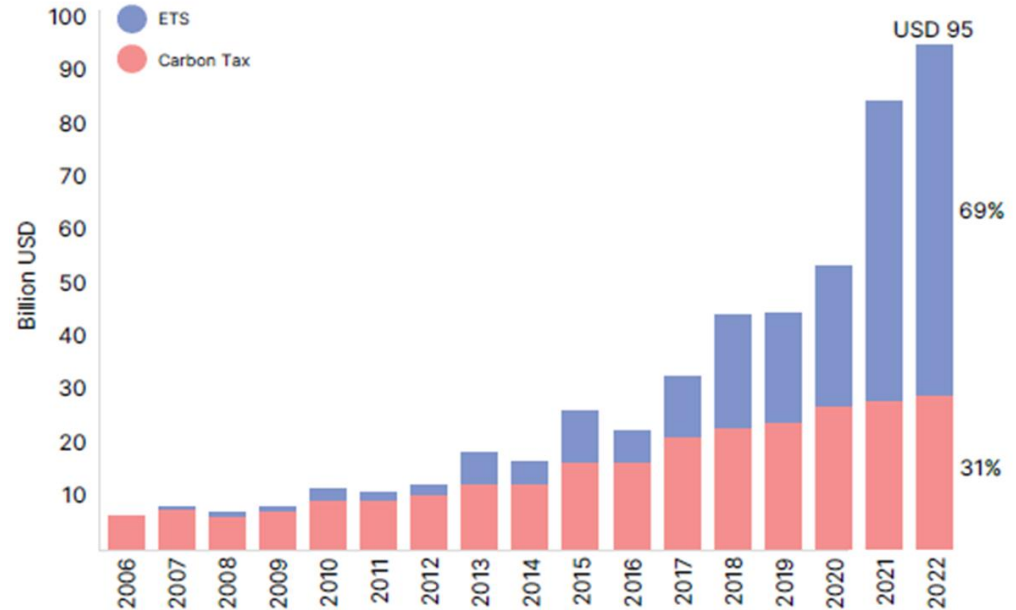


Source: <https://carbonpricingdashboard.worldbank.org/>

ETS vs Carbon Tax worldwide annual revenues

Well over US \$100B (in 2023)

- 70% ETS
- 30% carbon tax



Source: <https://openknowledge.worldbank.org/bitstreams/253e6cdd-9631-4db2-8cc5-1d013956de15/download>

Canada - federal carbon pricing system

The Federal Greenhouse Gas Pollution Pricing Act (GHGPPA) passed in 2018 establishes a set of minimum national standards for carbon pricing to help meet Canada's emission reduction targets under the Paris Agreement. The act has two carbon pricing mechanisms:

1. "Fuel Charges" (a form of consumer carbon tax)
2. "Output-Based Pricing System" (OBPS - a form of ETS)

Provinces and Territories must support these standards unless they have an acceptable alternative carbon pricing system. In Ontario, the OBPS is superseded by the Emissions Performance Standards (EPS).

Putting a price on emissions – federal “Fuel Charge”

- Applies to 21 fossil fuels including coal, coke, oil, gasoline, light fuel oil (e.g. diesel), natural gas, propane etc.
- Charges on fossil fuels are administered by the Canada Revenue Agency (CRA) and are applied to fossil fuel producers and distributors
- These charges are then passed on to fuel consumers and are set to increase by \$15/year on every April 1 until 2030
- Approximately 90% of Fuel Charge proceeds go back to individuals and families through the quarterly Canada Carbon Rebate (formerly known as Climate Action Incentive payments)



Source: <https://www.canada.ca/en/environment-climate-change/services/climate-change/pricing-pollution-how-it-will-work/carbon-pollution-pricing-federal-benchmark-information/federal-benchmark-2023-2030.html>

Fuel Charge applied to common fuels

Rates (in \$CAD) of the federal Fuel Charge on select fuels from 2021-2030 (starting April 1 of every year)

Type	Unit \$/per	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
CO₂e	tonne	40	50	65	80	95	110	125	140	155	170
Gasoline	litre	0.0884	0.1105	0.1431	0.1761	0.2091	0.2422	0.2752	0.3082	0.3412	0.3743
Diesel	litre	0.1073	0.1341	0.1738	0.2139	0.2540	0.2941	0.3342	0.3743	0.4144	0.4545
Propane	litre	0.0619	0.0774	0.1006	0.1238	0.1470	0.1703	0.1935	0.2167	0.2399	0.2631
Natural gas	cubic metre	0.0783	0.0979	0.1239	0.1525	0.1811	0.2097	0.2383	0.2669	0.2954	0.3240

Sources: <https://www.canada.ca/en/environment-climate-change/services/climate-change/pricing-pollution-how-it-will-work/carbon-pollution-pricing-federal-benchmark-information/federal-benchmark-2023-2030.html>

<https://www.canada.ca/en/revenue-agency/services/forms-publications/publications/fcrates/fuel-charge-rates.html#fcrts>

Carbon pricing systems across Canada

Federal Fuel Charge and federal Output-Based Pricing System for industries	Federal Fuel Charge and independent system for industries	Independent carbon pricing system (provincial fuel charge and provincial industrial system)
Manitoba	<u>Alberta</u>	<u>British Columbia</u>
Nunavut	<u>New Brunswick</u>	<u>Northwest Territories</u>
Prince Edward Island	<u>Newfoundland and Labrador</u>	<u>Quebec</u>
Yukon	<u>Nova Scotia</u>	
	<u>Ontario (EPS)</u>	
	<u>Saskatchewan</u>	

Source: <https://www.canada.ca/en/environment-climate-change/services/climate-change/pricing-pollution-how-it-will-work/putting-price-on-carbon-pollution.html>

How the EPS works for industry in Ontario

- The EPS (via [Ontario Regulation 241/19](#)) came into full effect on January 1, 2022
- Managed by the Ontario Ministry of the Environment, Conservation and Parks (MECP)
- Mandatory for facilities with emissions over 50,000 tCO₂e
- Optional for facilities with industrial emissions between 10,000 and 50,000 tCO₂e
- Uses same quantification methods of [O Reg 390/18](#) to determine Scope 1 facility emissions (i.e. from use of fuels subject to Fuel Charges as well as biomass fuels)
- Scope 2 emissions (e.g. from electricity generation) are not included as these emissions are captured as the Scope 1 emissions of electricity generators
- **Facilities enrolled in the EPS are exempted from federal Fuel Charges**

EPS performance calculations and reporting

- The Total Annual Emissions Limit (TAEL) for a facility is calculated using consumption and production data as well as facility-specific, sectoral, or historical baseline emissions (usually from 2015-17 or similar) as described in [GHG Emissions Performance Standards and Methodology for the Determination of the Total Annual Emissions Limit MARCH 2024](#)
- The calculation of the TAEL changes depends on the industry but often follows the generic formula:
$$TAEL_{Facility\ i} = Emission\ Intensity_{Facility\ i} * Production_{Facility\ i} * Stringency\ Factor$$
- Stringency Factors (SF) are applied every year to adjust the limits downward so that facility owners and managers must make annual improvements or will not meet the limits

EPS performance calculations and reporting (continued)

- If a facility emits more emissions than the TAEI, they have a compliance obligation:

$$\text{Compliance Obligation} = \text{TAEI} - \text{Facility Emissions}$$

- If the facility emits fewer emissions than the TAEI, they receive emission performance units:

$$\text{Emission Performance Units} = \text{Facility Emissions} - \text{TAEI}$$

Payment for excess emissions in \$/tCO₂e is only on emissions over limit

How carbon pricing impacts Ontario industry

- For many EPS participants, the value of compliance payments or credits is already or will become millions of dollars each year
- The Emissions Performance Program (EPP), launched on June 27, 2024, returns EPS payments to participants via funding for capital and study-based decarbonization projects such as fuel switching, energy efficiency, etc.

Example of annual EPS compliance costs

Facility producing 1,000,000 tonnes/year of product with baseline emissions of 100,000 tCO₂e/year

Year	Production (tonnes)	Baseline Emissions (do nothing) Annual tCO ₂ e	EPS Stringency Factor	EPS TAEI (tCO ₂ e)	EPS Emission Unit Price (\$/tCO ₂ e)	Do Nothing Compliance Cost (\$)	Scenario 4: 8% Improvement from Baseline in 2022, then 2% Improvement Annual (\$)			
							Scenario 1: 1% Reduction in Emissions Starts 2022 (\$)	Scenario 2: 2% Reduction in Emissions Starts 2022 (\$)	Scenario 3: 5% Reduction in Emissions Starts 2022 (\$)	Scenario 4: 8% Improvement from Baseline in 2022, then 2% Improvement Annual (\$)
2015-17										
Baseline	1,000,000	100,000	1.0	100,000	\$0	0	-	-	-	-
2024	1,000,000	100,000	0.886	88,600	\$65	\$741,000	\$547,944	\$358,748	-\$186,063	-\$15,808
2025	1,000,000	100,000	0.871	87,100	\$80	\$1,032,000	\$716,768	\$410,945	-\$451,950	-\$40,827
2026	1,000,000	100,000	0.856	85,600	\$95	\$1,368,000	\$902,405	\$455,248	-\$781,081	-\$70,502
2027	1,000,000	100,000	0.841	84,100	\$110	\$1,749,000	\$1,105,282	\$493,266	-\$1,164,989	-\$103,322
2028	1,000,000	100,000	0.826	82,600	\$125	\$2,175,000	\$1,325,817	\$526,569	-\$1,595,784	-\$137,813
2029	1,000,000	100,000	0.811	81,100	\$140	\$2,646,000	\$1,564,426	\$556,682	-\$2,066,114	-\$172,543
2030	1,000,000	100,000	0.796	79,600	\$155	\$3,162,000	\$1,821,517	\$585,090	-\$2,569,134	-\$206,119

Another perspective – internal carbon pricing

Some organizations use internal carbon pricing systems to consider different prices across jurisdictions and/or to factor in future increases in mandatory carbon prices or trading opportunities. There are three basic approaches to internal carbon pricing:

1. Internal carbon fee (15% of known users): A set dollar value on CO₂e is used as a dedicated revenue or investment stream to fund the company's emission reduction efforts
2. Shadow price (65% of known users): A set price on CO₂e is applied to a given investment/project to support long-term business planning and investment strategies
3. Implicit carbon price (20% of known users): A derived price on CO₂e is based on how much is spent to reduce emissions as well as on regulatory compliance and credits

Potential impact of carbon pricing on business

- Opportunities: Leverage carbon payment proceeds to improve productivity and competitiveness while decarbonizing, enhance resiliency
- Financial risk: Profitability
- Regulatory risk: Stricter regulations around ESG measurement, reporting and decarbonization
- Operational risks or opportunities: Higher or lower operational costs (decarbonization typically lowers operational costs)
- Legal risks: Litigation, contractual challenges
- Market risks & opportunities: Market positioning and competitiveness

To summarize

We have more than a dozen pricing systems in Canada itself.

Carbon pricing instruments can be broadly classified into two types:

- Taxes
- Emissions Trading Systems (ETSs)

Different jurisdictions have different systems in place based on their own economic and political needs.



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Appendices

- Acronyms
- Output-Based Pricing System overview
- History of Emissions Trading Systems in Ontario
- EPS – Baseline emissions intensity
- EPS – Stringency Factors details
- EPS – Pricing of excess emission units
- EPS – Timing for filings
- Carbon pricing and carbon credits
- Carbon credits vs. carbon offsets

Acronyms

- Independent Electricity System Operator (IESO)
- Greenhouse gas (GHG)
- Carbon dioxide equivalent (CO₂e)
- Social cost of carbon (SCC)
- Emissions Trading System (ETS)
- Greenhouse Gas Pollution Pricing Act (GHGPPA)
- Output-Based Pricing System (OBPS)
- Emissions Performance Standards (EPS)
- Canada Revenue Agency (CRA)

Acronyms continued

- Ontario Regulation (O Reg)
- Ministry of the Environment, Conservation and Parks (MECP)
- Environment and Climate Change Canada (ECCC)
- Total Annual Emissions Limit (TAEL)
- Stringency Factors (SF)
- Emissions Performance Program (EPP)
- Baseline emission intensity (BEI)
- Direct emissions released from onsite processes (Scope 1)
- Indirect emissions released offsite during generation of purchased electricity, steam, heat, or cooling (Scope 2)

Output-Based Pricing System (OBPS)

- A federal ETS that applies to facilities emitting more than 25,000 tCO₂e or more than 50,000 tCO₂e/year (varies by sector)
- Optional for facilities emitting above 10,000 tCO₂e
- Participants are exempt from the federal Fuel Charge
- Administered by the Environment and Climate Change Canada (ECCC) and establishes the minimum framework for a regulatory trading system for emission-intensive industries
- Facilities that emit less than their annual threshold earn surplus credits that they can sell, transfer or hold for future use
- Conversely, facilities with emissions above their annual threshold must provide compensation for each tonne of excess (i.e. purchase credits)

History of Emissions Trading Systems (ETSs) in Ontario

- Ontario's first ETS (2017-2018) was a cap-and-trade system similar to that used in Quebec
- Ontario switched to the federal baseline and credit OBPS system managed by ECCC in 2019
- In 2022, Ontario launched the current Emissions Performance Standards (EPS) in place of the OBPS

EPS - baseline emission intensity

Baseline emission intensity (BEI) depends on each industry subsector, typically expressed as:

- tCO₂e/t processed/produced (for most minerals, chemicals, materials etc.)
- tCO₂e/kg produced (for gold mining/milling)
- tCO₂e/GWh (electricity generation)
- tCO₂e/GJ (thermal energy)
- Custom metric if none of the above applies

EPS - Stringency Factors

- Stringency Factors (SF) are applied every year to adjust the BEI downward so that facility owners and managers must make annual operational improvements to match or exceed the SF or will not meet limits
- SF for fixed process emissions are more forgiving since they are linked to the limits of chemical reactions such as stoichiometric CO₂e emissions in steelmaking, base metal and other metal processing, hydrogen, ammonia, cement, glass and other processes where more significant research, technology changes and capital investment are required
- SF for non-fixed process emissions are typically the following (some exemptions such as dairy, power generation):

Period	2015-17 BEI	2022	2023	2024	2025	2026	2027	2028	2029	2030
SF	1.0	0.920	0.896	0.881	0.866	0.851	0.836	0.821	0.806	0.791

EPS pricing of excess emissions

Facilities enrolled in the EPS can purchase and surrender “excess emissions” compliance units (EEUs) at the fixed cost set out in regulation, which is harmonized with the federal minimum carbon price but trails by 9 months (i.e. Fuel charge changes April 1, 2024 and EEU changes January 1, 2025).

Excess Emission Unit (EEU) price schedule									
Period	2022	2023	2024	2025	2026	2027	2028	2029	2030
\$/tCO ₂ e	\$40	\$50	\$65	\$80	\$95	\$110	\$125	\$140	\$155

EPS – timing for filings

Obligation	Description	Due date
Monthly fuel usage and fuel tax report	Must file monthly with Canada Revenue Agency (CRA)	Each month
Annual GHG report	Each facility must submit an annual GHG report for the previous calendar year	June 1
Annual third-party verification	Verification statement and verification report on the GHG report	September 1
Annual compliance payment	Compliance obligations are due on December 15. Credits can be purchased from other facilities or directly from the Ontario government	December 15

Carbon pricing and carbon credits

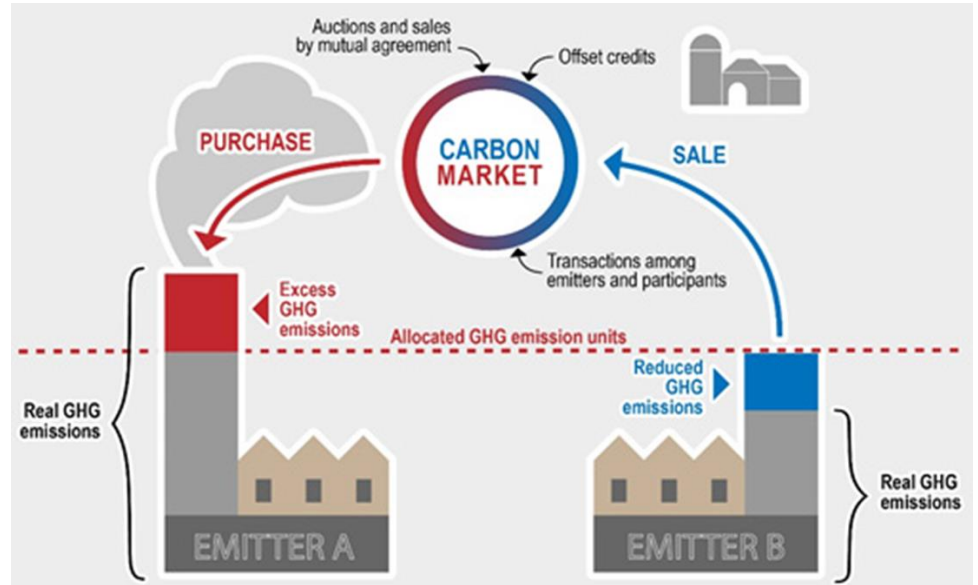
Carbon pricing is functionally equivalent but implemented differently in each province.

Quebec has a cap-and-trade (type of ETS) program. Emitters only pay on Scope 1 emissions.

Companies have:

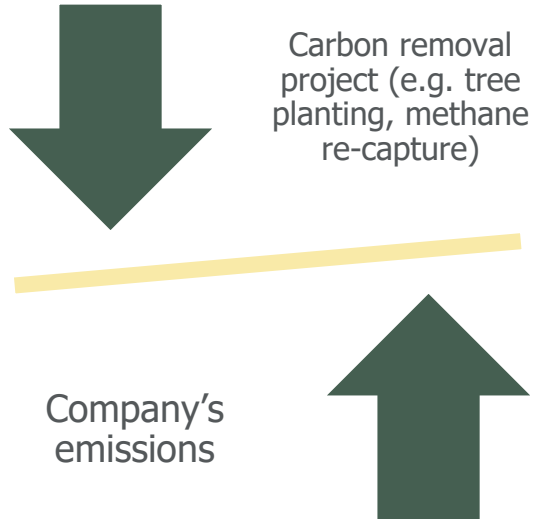
- (i) an emissions cap and
- (ii) free emissions allowances

Both are progressively lowered over time.



Carbon credits vs. carbon offsets

Both one carbon offset and one carbon credit represent one tCO₂e



Companies receive carbon credits, which **allow them to emit carbon dioxide**, as their allowance toward the cap, or they can sometimes purchase carbon credits at auction.

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