

CarbonSim – Overview 27Nov2018

CarbonSim is an artificial intelligence-enhanced, multi-lingual, multi-user, software application that teaches the principles of emissions trading and brings markets to life. ETS program administrators benefit because it demonstrates that program results are driven by design choices made by policymakers. Industries benefit because it demystifies how to develop and implement a carbon portfolio management strategy. The use of CarbonSim serves to increase ETS literacy, foster collaboration amongst stakeholders, and, in so doing, improve the odds of the adoption of effective ETS systems.

CarbonSim has been road tested and improved with the help of 3000 players representing companies with over 3 billion tonnes of CO₂e emissions from 30 different countries.

More information about this capacity building tool can be found [here](#). A PowerPoint used in **CarbonSim** trainings can be found [here](#). Testimonials from environmental market experts can be found [here](#). Photos from a recent training in Chile can be found [here](#).

CarbonSim - Core Features and Specs

CarbonSim includes the following core features to simulate a real-time compliance market under a government-administered emissions trading system:

- Can run either onsite (via a LAN) or through the internet via desk/laptops that log into a remote website;
- Accommodate up to 200 users (38 of which are concurrent), some of whom may share accounts, and which may be placed into separate but contemporaneous exercises;
- Simulates select components of emissions trading, and which can be introduced in a phased approach, including:
 - allocation of emissions allowances
 - surrender of emissions allowances
 - compliance with a progressive emissions cap
 - participation in allowance auctions
 - trading of offsets
 - undertaking abatement measures
 - ability to participate in a secondary market (both an exchange and an over-the-counter) for spot products
 - application of penalties for non-compliance
 - implementation of price collars
 - use of allowance banking.
- Allows the administrator to change parameters of market components to simulate different market conditions during the different phases, each one which may last 10 weeks. These parameters include:
 - the number of participating firms
 - the emissions cap
 - auction price collars (floor and ceiling)

- noncompliance penalties
- limits for the use of offsets
- fraction of allowances allocated freely
- banking limits.
- Provides ready-to-use fictional firms with assigned emissions, abatement options and financial data;
- Features built-in AI capability that allows for the simultaneous market participation by firms by both human and AI players;
- Allows selection for facilities to be operated either by human players (carbon market exercise participants) or in AI mode;
- Provides for periodic evaluation of facility and system performance; and
- Allows for the simultaneous operation in English, Spanish, Chinese, Korean, Thai, and Japanese and multiple currencies.

Further, the platform includes the following features:

- Adjustable duration of virtual compliance periods and other time-based components, according to the needs of the simulation;
- Adjustable auctions parameters including the number of auctions, duration of auctions, type and amount of product to be auctioned, price collar, and interval between auctions, according to the needs of the simulation;
- Ability to incorporate real company emissions data;
- Ability for both humans and AI players to participate in the auctions and the exchange;
- Allow the development of distinct, sequential simulation periods with changing parameters;
- Accommodate the introduction of changes in the simulation parameters, otherwise known as “shocks” (e.g., changes in allocations, emission growth rates, offset use, etc.) within a simulation period; and
- Provide a continuous feed of real-time market information to simulation participants.

Summary of CarbonSim Specifications		
	Function	Comment
Core Functions	Abatement	Players can mitigate emissions liability using on-site abatements which include info re total reductions, cost, and efficacy
	Artificial Intelligence	Affords participation by both AI and human players
	Currency	Multiple currencies can be used simultaneously
	Company management page	Allows player to management multiple units of the same company
	Dashboard	Provides players with one screen to monitor all critical parameters
	Glossary	Players have access to hard and hover over glossary

Summary of CarbonSim Specifications		
	Function	Comment
Core Functions	Language	Currently can be simultaneously played in ES, EN, CN, KR, JP, and CN
	Abatement	Ranks player performance on the basis of marginal cost of control and compliance status in current year and overall years
	Messaging	Participants can message each other.
	Primary market	Allowances can be made available through auctions
	Rules screen	System allow players to see ETS configurations and rules
	Secondary market	An exchange and OTC market is provided through which participants can transact allowances and offsets
	System wide reports	Provides performance metrics that describe current year and overall metrics re emissions, market activity, monies raised, offsets used, penalties assessed, etc.
Administrative Functions	Abatements available	Type, number, cost, time to implement, reductions gained, etc.
	Artificial Intelligence trade assistance	Can set whether players can use AI to guide trading
	Allocations	Percent free as well as shortfall
	Allowance surrender	Automatic or manual
	Auction	Number, frequency, timing, amount/type of allowances, pause after each
	Banking	Limit and override
	Cap size	Both the quantity and percent free
	Duration of virtual years and simulation	From minutes to months
	Exchange market access	Yes or no
	Exchange price variation limit	Can be used to control volatility
	Fines	Can issue fines for illegal behavior
	Government reserve	Amount of allowances withheld
	Leaderboard	Visible to players or not
	Length of virtual years	From minutes to weeks
	Monitoring	Administrator can remotely access, monitor, and control the status and actions of players
	Multiple systems	Administrator can run multiple simultaneous sims
	Number of years in a simulation	Unlimited

Summary of CarbonSim Specifications		
	Function	Comment
Administrative Functions	Number of players	Up to 39 per game. Multiple simultaneous games can be run
	Offsets	Amount allowed from main and secondary system
	OTC market access	Yes or no
	Penalty multiplier	Cash debit and/or penalty
	Player ability to borrow money	And interest rate charged
	Player emission growth	By sector, low and high
	Price collar	Auction floor and ceiling price
	Rate of reduction	0 to >10%/year
	Relative number of human vs AI players	Admin can adjust the balance of AI vs human players
	Registration	Admin can monitor the registration status of players
	Sectors	Type, fractional emissions, maximum quantity of abatements, AI distribution, free allocations, min/max growth rate, etc.
	Stop trade warning	Warns players before trading is halted
Player Capabilities	Abatements	Players can view and select abatements, marginal abatement control cost curves, and implement abatements
	Carbon portfolio management	Participants can implement a dynamic carbon portfolio management that is tailored to each participant's carbon liabilities, options, and view of the market.
	Company and unit management	Participants can manage multiple liable units from one portal.
	Leaderboard	Participants can track their annual and overall progress on the leaderboard
	Primary market	Participants can view, access, and trade through a government administered auction
	Secondary market	Participants can view, access, and trade through an exchange and OTC market

More information about **CarbonSim** can be found [here](#), [here](#), and [here](#).