



Industrial Energy Efficiency in Key Sectors

Task 2: Financial aspects of a national emissions trading scheme

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I. Introduction

At the heart of any successful cap-and-trade program is a well-functioning market for the trading of emissions allowances. One of the central features of emissions trading is that the buying and selling of allowances results in a price on emissions, which in turn provides information to regulated entities about whether it is cheaper for them to reduce their emissions or to buy allowances on the market. Ensuring that regulatory agencies, industry, and consumers see this price signal and factor it into their decision-making is essential to create the incentive to reduce emissions and to invest in low-carbon technologies. As both the cap and the number of available allowances are reduced over time, all else being equal, the price of greenhouse gas (GHG) emissions will rise and create a continuing incentive for firms to find new ways to reduce their emissions. This incentive to innovate and induce technological change also lowers emissions-control costs over time.

Emissions market can best achieve these results if it is designed to function efficiently from the beginning. A well-designed policy should include effective means to prevent excessively high prices and extreme price volatility. It should also include oversight provisions to prevent market manipulation, irresponsible risk-taking, and other problems.

Oversight is critical because emissions market will be intimately connected to other energy markets, including natural gas, coal, petroleum, and electricity. Because of these links, the potential manipulation of one or more of these markets would result in pricing issues in the others. Furthermore, while emissions market has many characteristics of a traditional commodity market, it also differs in two important aspects:

- First, the emissions market exists specifically to address an environmental goal—to reduce GHG emissions—and regulated entities will have no choice but to participate.
- Second, there is a limited supply of emissions allowances, determined by the government, which will decrease over time.

Thousands of businesses would be affected by a mandatory GHG emissions trading system, and a strong public interest in ensuring that the market functions efficiently and that allowance prices generally reflect the balance of supply and demand. The market should be fair to its participants and to the consumers and businesses affected by it. To the extent that the market cannot be manipulated or distorted, it can best be used for the purpose it was created—to reduce GHG emissions at the least possible cost to the economy. Yet, in order to understand the best way to design a new market, as well as how to ensure proper transparency and oversight, it is first necessary to introduce some of the basics of emissions markets and their key structural components. **It should be noted that this summary report focuses on allowances only, although it is likely that offset credits will trade in the market as well.**

II. Key Financial Components of Emissions Markets

Two primary types of financial tools, or instruments, are likely to trade in the emissions market: allowances and allowance derivatives. The following paragraphs highlight the fundamental differences between these types of emissions financial instruments, the ways in which they can be traded, and the alternatives for who may regulate them. To begin, an understanding of the differences between allowances and allowance derivatives, or the spot and derivatives markets, is necessary.

1. Spot and Derivatives Markets

The Spot Market

As mentioned above, tradable certificates to emit one ton of GHGs, also known as allowances, are the actual compliance instruments that regulated emitters will use to meet their obligations under an emissions cap. At the end of the compliance period, regulated emitters will transfer to a designated regulatory authority allowances for each ton of GHGs, measured in carbon dioxide equivalents (CO₂e), they emitted during the compliance period. The initial distribution of allowances by the government is referred in financial terms as the primary market, while the secondary market refers to the marketplace where allowances are traded among participants. This is similar to the physical exchange of any commodity, such as oil, metals, or agricultural goods. Secondary market trades are known as spot markets because the actual commodity – in this case, an allowance – is transferred from the seller to the buyer for cash “on the spot.”

The Derivatives Market

In contrast to a commodity that is physically traded between two parties, a derivative is a financial product that derives its value from an underlying commodity or asset. The primary purpose of derivatives is to allow those who buy and sell commodities to manage the risk of very high (or very low) prices by essentially guaranteeing, or “locking-in,” a price for future purchase. Emitters in a cap-and-trade system, such as utilities, will have concerns about both the volatility and the future direction of allowance prices, and some will likely look to derivatives as a way to minimize, or hedge, these concerns. Hedging is the process of reducing financial risk by taking two positions that will counteract each other if prices change. For example, if a firm believes it will need additional allowances in the future and the price at that time will be higher, it might want to purchase allowance futures. A futures contract is a standardized, transferable, exchange-traded contract that requires delivery of a commodity at a specified price on a specified future date. Purchasing allowance futures would be a way to minimize the risk associated with the expected price increase. If the price in the spot market does in fact go up, the firm can then benefit from taking delivery of the allowances in the futures contract that they bought at the lower price. This increased certainty about the cost of regulatory compliance in the future can also help firms analyze their emissions reduction options.

Based on experiences in other markets, a wide range of derivative instruments could be used by regulated entities (e.g., manufacturers and power generators) to manage the risk of higher (or lower) prices. Such derivative instruments include:

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- Forward contract – A privately negotiated, individualized cash transaction in which a commercial buyer and seller agree upon delivery of a commodity (e.g., an allowance) at a future date. A price may be agreed upon in advance, or there may be an agreement that the price will be determined at the time of delivery.
- Futures contract – A standardized contract involving an established quantity of an underlying asset (e.g., an allowance) that will be physically delivered or settled for cash at a known future date. The price is determined through bids and offers that are made on trading platforms such as regulated exchanges. The final price is established at the initiation of the contract. Futures contracts are cleared through a designated derivatives clearinghouse, which is described further below.
- Option contract – Gives the buyer the right, but not the obligation, to buy or sell a specified quantity of a commodity at a specific price within a specified period of time, regardless of the spot market price of the commodity at that time.
- Swaps – A transaction between parties that involves an exchange of allowances in order to minimize financing costs for each party.

Because derivatives can take several different forms and are not limited in number like the physical allowances themselves, the volume of derivatives that trade will very likely be higher than the volume of allowances. Commodity futures generally trade a multiple of several times the volume of the underlying commodity—for instance, corn and bean futures trade twenty to thirty times the global production of the physical commodities. Since allowances will likely be distributed for a limited number of years at a time (over various phases of the policy period), it follows that during the early years of a cap-and-trade system there will be a limited number of allowances in circulation. An even smaller number may actually be traded, particularly as new participants learn how to operate in a market-based compliance system.

Unless lawmakers decide to release more than one or two years of allowances at the outset, allowance derivatives may represent the majority of trading in the market, and as such could play a critical role in managing price volatility. To have an efficiently functioning market, the goal is to have enough units trading in the system (allowances, future, options, etc.) to allow large transactions to occur without causing a substantial change in the market price. If this goal is met, the market is said to be liquid, with the total amount of tradable units providing liquidity. While derivatives and market liquidity do not prevent price volatility, they can help to reduce it by providing an accessible means for market participants to hedge their price exposure in an efficient manner.

Derivatives also greatly contribute to identifying the price of a commodity, which is known as price discovery. Accurate price signals are the most efficient transmitters of economic information, as they indicate when supply is either low or high, when demand is robust or weak, and when firms should take notice of longer-term trends. When prices, trade volumes, and current offers to buy and sell are transparent, the accuracy of prices is enhanced and uncertainty is reduced. In some commodities where there are multiple delivery locations and types of

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product grades (e.g., grain), the price in the derivatives market serves as the benchmark, because it reflects both standardized terms and conditions for the commodity. This standardization provides a valuable economic service by providing companies the price information they need for planning and investment purposes. Having explained the spot and derivative markets it is important to next understand where trading takes place.

2. Where Trading Takes Place

As mentioned above, the government will first distribute a specific number of allowances (at least one year's worth) by auction, free allocation, or a combination of both in the primary market. These allowances and their derivative financial products will then trade in the secondary market either through bilateral contracts that occur directly between parties, often referred to as over-the-counter (OTC) transactions, or through contracts made through an intermediary, such as an exchange. Important differences exist between OTC and exchange-based transactions, and these differences, as well as the rationales behind each type of transaction, are explained below.

Exchanges

Trading on exchanges takes place in a centralized location. When negotiating a trade on an exchange, the product contracts are standardized for terms such as the quantity of the commodity and the date of its delivery (e.g. 1,000 barrels of light sweet crude oil delivered in June 2010). Exchanges are highly regulated, and market information, such as price and trading volume, are made available to members of the exchange, the government, and usually the public.

Transactions executed on an exchange go through a process known as clearing, which is done by a clearinghouse. Every exchange has a partner clearinghouse, which acts as the central counterparty to every transaction—meaning that it guarantees the financial soundness of both parties by acting as the buyer to each seller and the seller to each buyer. This process effectively eliminates the risk to both parties that the other might default (known as counterparty risk).

In order to trade on an exchange, one must be a member, or have an account with a member, and have an amount of cash deposited into its account to cover the maximum expected one-day loss (this is known as collateral, performance bond, or margin). If the value of the positions held by an exchange member goes down, the member must make a payment to cover this loss—sometimes the same day or at the latest before the market opens for trading the next day. If payment cannot be made, the member must sell the related position.

This system is remarkably effective. The clearinghouse associated with major exchanges that clears large portion of all futures and options in the United States, has neither seen a failure by a clearing member to meet its performance bond or delivery obligations, nor has there ever been a failure of a clearing member firm resulting in a loss of customer funds in many years of operation. It is this effective clearing function and standardization that makes exchange trading a popular and efficient market design feature.

Rationales for Exchange-Based Transactions

As noted, there have been increasing calls to move all transactions associated with a national emissions market to an exchange-based system. The major reasons often cited for this include:

1. **Transparency.** Exchanges post both the volumes traded and the prices at which the transactions occur instantaneously, ideally giving all market participants immediate access to the same information. This transparency ensures a level playing field for buyers and sellers alike. Exchanges also provide transparency to regulators and to the public, which is important given the public policy goals of a cap-and-trade program.
2. **Ease of oversight.** The centralized and transparent nature of an exchange makes it much easier for regulators to monitor and react to irregularities. It also makes it more difficult, although not impossible, for individual participants to “game” the system without being detected (e.g., insider trading).
3. **Absence of counterparty risk.** As described above, counterparty risk is the risk that either the buyer or the seller might default on a particular transaction. By requiring market participants to post margin (cash collateral) to cover their positions, clearinghouses have successfully created a system to mitigate counterparty risk and ensure that buyers and sellers are creditworthy market participants. This benefit is ensured by the clearinghouse, not the exchange itself, and thus is not exclusive to exchange-based transactions. Indeed, it is possible for OTC transactions to go through a clearing process as well.

At the same time, collateral that is readily convertible to cash is an essential element of a central counterparty clearing system, and the only means to avoid the creation of systemic risk. The clearinghouse must hold sufficient liquid collateral to enable it to immediately meet the obligations of a customer that defaults, since as the central counterparty it must immediately fulfill the obligations of the defaulting clearing member. There is no way to do this (without adding debt to the system) if the clearinghouse is holding illiquid assets, such as real estate, as collateral.

4. **Market liquidity.** Market participants are drawn to centralized marketplaces where they know they can trade a certain commodity. Market liquidity and the instantaneous public disclosure of prices together lead to greater price transparency.
5. **Expediency.** The standardization of contracts and the absence of counterparty risk (due to the clearinghouse function), along with the use of electronic platforms, allows exchange transactions to be executed in a matter of seconds and settled on a daily basis.

Over-the-Counter (OTC)

In contrast to exchange-based trading, OTC trades are executed directly between private parties, use typically less standardized contracts, and face less regulatory oversight. They are also characterized by a higher level of risk than exchange-based trades, where either the buyer or seller might default on the agreement (counterparty risk). The OTC market is very important in

the European Union Emissions Trading System (EU-ETS) as it has historically accounted for over half of all trades.

While there has been considerable criticism regarding the lack of transparency of the OTC market, certain OTC trades are often cited as playing a critical role in a carbon market system. For example, a utility building a new power plant might want to lock in (hedge) carbon allowance prices for a decade or more in the future. Yet most exchange-traded futures contracts trade only a limited number of years into the future, because beyond a certain point (typically 3-5 years) it is difficult to find counterparties to complete enough transactions for the market to be liquid.

As will be explained further below, OTC trades do not have the same cash collateral requirements as exchange trades, and as such, can be more cost effective for firms looking to hedge their compliance cost risk for large transactions.

Rationales for OTC Transactions

Failure to properly hedge a particular carbon risk can result in earnings volatility and an increase in the cost of capital. Thus, the flexibility of OTC transactions is an often-cited reason for allowing them to play a role in the emissions market. This flexibility comes in several forms, including:

1. Customization of contracts. In a variety of circumstances, a customized contract is essential, as the following cases illustrate.

- Contingent contracts, in which quantities of the goods or services exchanged are conditional, are typically difficult to standardize and to trade on an exchange. An example in the emissions market would be a transaction involving emissions reductions from an offset project. In this case, the purchaser is buying a stream of future emissions reductions, the volume and timing of which is uncertain due to many factors, including project approval, verification, and performance. Given these uncertainties, the buyer would ideally negotiate a non-standard contract where delivery was contingent on the project's outcome.
- Futures contracts with delivery in the longer term (e.g. 5 or more years depending on the commodity) are not typically offered by exchanges. Parties wishing to hedge long-term risk must generally conduct transactions outside of an exchange (forward contracts), even when standardized contracts would otherwise be suitable. Some market participants point out that impeding an entity's ability to hedge its exposure to long-term financial risk could have negative repercussions for its credit rating and ability to invest. Because standardized contracts can only be purchased in set volume increments (e.g. 100 or 1,000), proper hedging for very specific amounts requires that contracts be drawn up directly between two parties (bilaterally).

2. Flexible collateral requirements. Exchanges—or more specifically clearinghouses—require traders to post margin (collateral in the form of cash or government securities) for their transactions. Margins fluctuate on a daily basis in line with underlying asset prices and traders'

positions, and can require traders to have a great deal of cash on hand. This may be especially true with futures market positions that are financed through debt, as small fluctuations in price can correspond to large variations in a trader's position. Margin requirements also tie up a great deal of cash as collateral, which means the cash cannot be used for other investments. This can be particularly burdensome for smaller participants and for utilities that need to hedge their carbon risk while also investing cash in equipment and infrastructure. In addition, large companies can reduce collateral requirements by using their credit rating to their advantage.

If, for example, a power plant developer or financier were concerned about variations in the future price of emissions allowances and wanted to purchase a future long-term stream of allowances at a set price, this would be possible on an exchange only if: (1) futures contracts on an exchange were available for the desired time period; and (2) the developer had the cash collateral to cover the value of the allowances. Meeting both of these requirements may be difficult.

3. Ability to negotiate price. While exchanges (and clearinghouses) create a transparent price, some companies feel that they are able to negotiate better prices bilaterally. Large utilities, for example, might be able to use both their regulatory standing as well as their size to negotiate more favorable forward pricing of emissions on the OTC market than they could receive on an exchange. If this were true, the OTC market could help to lower consumers' costs.

4. Reporting obligations. While exchanges make transaction price and volume information available to regulators and the public, data on OTC transactions are not systematically collected. Recent proposals would allow limited trade in emissions derivatives to occur off-exchange without the intermediation of clearing services, but feature reporting obligations in connection with these trades. Parties to these transactions would have to report information on individual contracts to regulators, and the public would have access to aggregated data, which would increase overall transparency and may increase public confidence.

No matter the type of transaction involved, market oversight is a key component of any emissions cap-and-trade scheme.

III. Market Oversight

As with any financial market, the emissions market should reflect a balance between free market activity and regulation to enable innovation, market confidence, and ultimately a least-cost method to achieve an environmental outcome. Policymakers should encourage transparency and seek to prevent excessive speculation that drives price volatility beyond the normal function of supply and demand, as well as attempts to interfere with and manipulate the market.

At the outset, policymakers must identify a regulator to oversee the emissions market. Policymakers may opt to fit the emissions market into an existing regulatory structure, create a hybrid structure that draws on the expertise of multiple agencies, or create an entirely new agency. Other government agencies, such as Security and Exchange Organization (SEO), may also play roles in regulating the emissions market. In order to illustrate the information set forth

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above for an Iranian emissions trading configuration, we first need to consider the Iranian capital markets described below.

IV. Iranian Capital Markets

Please refer to Appendix A for a brief introduction on existing Iranian capital markets, specifically with respect to trading platforms and underlying structure.

V. Recommended Iranian Emissions Trading Configuration

Given the existing Iranian capital markets and the trading platforms described in Appendix A, the following table provides a suggested trading configuration as a starting point for establishing the Iranian emissions market. The initial distribution of allowances through auctioning (primary market), if auctioning is a preferred method of distributing allowances, should be conducted on a quarterly basis and limited to spot and salaf (delivery in the next compliance period) transactions and perhaps jointly conducted by the regulatory agency and the Iran Energy Exchange. Although the OTC market could play a part and complement the exchange-traded activities, the OTC market is not yet a developed mechanism in Iranian capital markets and is therefore not recommended in the initial configuration.

Proposed Iranian Emissions Trading Configuration

Oversight	Designated Regulatory Agency and Securities and Exchange Organization (SEO)
Exchange	Iran Energy Exchange (IRENEX)
Trading Platform	Tehran Stock exchange – Technology Management Co. (TSETMC)
Clearinghouse	Central Securities Depository of Iran (CSDI)
Type of contract	Allowance Contract. Standardized spot ¹ and salaf contracts with physical delivery
Contracts	Physical quarterly salaf contracts and weekly spot
Ticker Code	Iran Carbon Allowance (ICA)
Trade lot	1000 ICA=1000 tCO ₂
Minimum trading size	1 lot
Trading model	Discrete trading throughout trading hours
Trading system	Trading through the electronic trading system of TSETMC
Trading hours	As per IRENEX
Trading confirmation	As per TSETMC
Allowance Account in the Iranian Carbon Registry	Exchange transactions in allowance spot or salaf contracts requires establishment of a trading account in the Iranian Carbon Registry by the seller and the buyer. The account holder must add CSDI allowance account to its Trusted Account list.
Settlement	All settlements banks or financial institutions available in the energy market should also be available for the emissions market.
Settlement type	Payment first versus future physical delivery.
Delivery Schedule	T+3 delivery schedule for sellers of salaf contracts.

1. Spot contract is defined herein as a salaf standard contract with a seven day maturity. This is because there is no true spot market in the Iran Energy Exchange and therefore a short term salaf can possibly be used as substitute.

As the emissions market and the energy exchange develop further and become more mature, other products such as futures, options and swaps, as well as other environmental instruments such as offset credits, should be included and added. The OTC market through the Iran Farabourse Exchange should also be explored.

Appendix A

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Introduction of Iran capital market

Trading platforms and structure of Iran capital market

First of all, we describe the structure of Iran capital market and after that introduce a new financial instrument issued in Iran financial markets as “Standard Salaf Contract” that’s a kind of derivatives instruments but with some constraints.

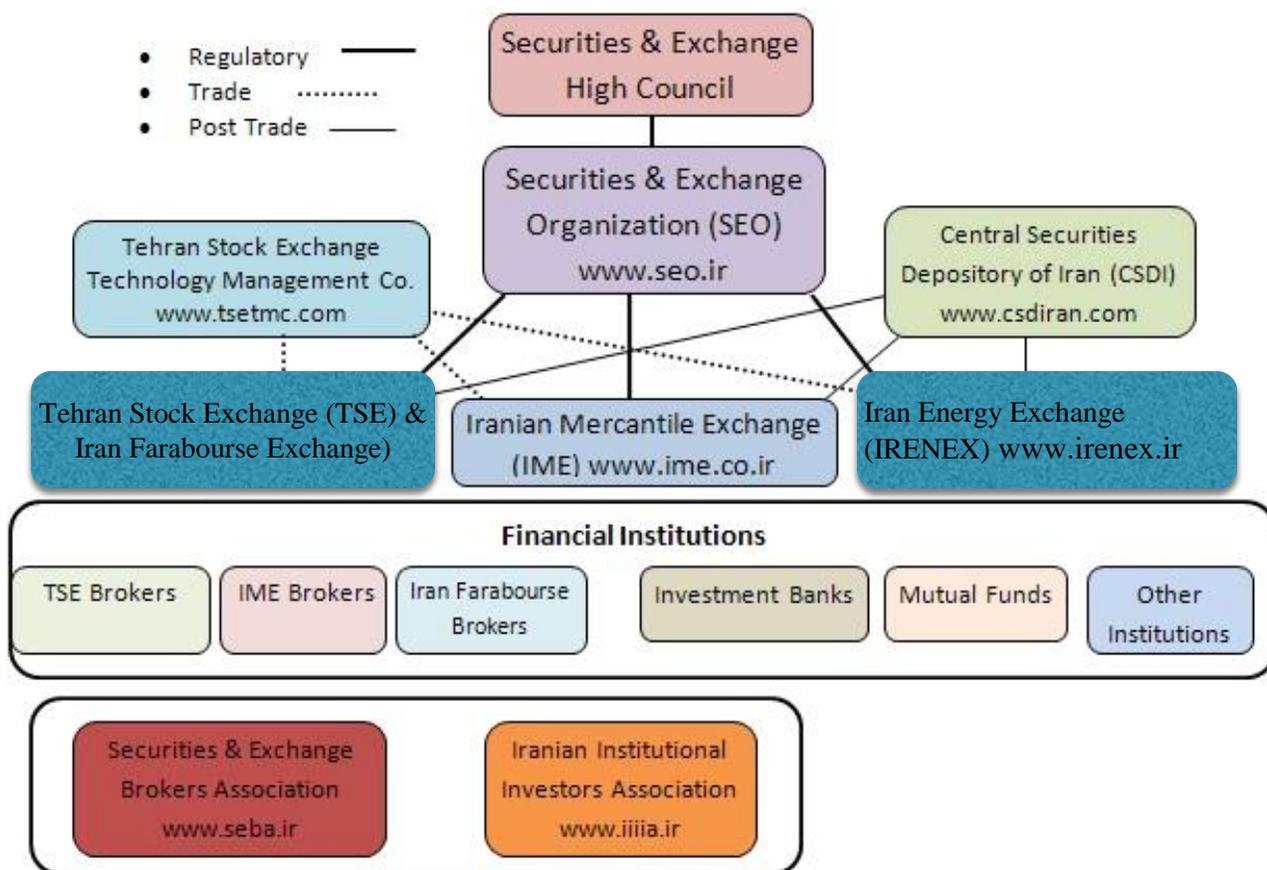
The regulator sector of Iran financial market is SEO, Securities and Exchange Organization, with the general purpose of providing a safe environment for investing in securities through supervising the participants’ activities in market and to ensure the efficiency. SEO is continuously monitoring the operational tasks and trading systems of four national exchanges of Iran (as mentioned below) through the approval and issued rules and regulations in the exchanges and other financial institutions.

The first and the oldest exchange in Iran is Tehran Stock Exchange (TSE), the second and the younger one is Iran Mercantile Exchange (IME) that’s the result of merging metal and agriculture exchanges. The third one is Iran Farabourse (SME’s Exchange) and the last one is Iran Energy Exchange (IRENEX) that’s launched about two years ago as a jointed exchange of two major fields, oil (oil products) and power (electricity) exchanges.

The structure of financial market of Iran is illustrated in the below figure. The only exchange has a separate trading system is IME, and all of the other exchanges using technology management electronic platforms.

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Also the only exchange has a clearing house by itself is IME, and the others interact with the central securities depository of Iran (CSDI), but in the near time IME is going to join to network like the others in figure 1.



1. Figure of capital market structure

Brokers' network and some back office software and programs are linked to exchanges and trading system core of exchanges. In fact trading systems designed

Introduction of Iran capital market

and launched in the technology management company, but they are in the exchanges layer as an electronic trading platform. So, at the level of brokers, broker's back office systems are linked to the trading systems core and furthermore the firmware of CSDI for post trade systems is connected to the trading system core too. It seems there is no limitation or restriction on electronic platform and requirements, and any development or customization can be easily performed. This view is created from experiences of different kinds of markets and trading floors in these four exchanges in Iran like spot markets, derivative markets i.e. futures contracts, some kind of options contracts and also other Islamic financial instruments like standard salaf designed for local and Islamic purposes. The salaf contract is a kind of derivatives like futures contracts with continuous trading session intraday but it has some differences. The first and most important difference is about risk management. In the standard salaf contract all of the valuation of contract in the scheme of T+3 clearing system, transfer from buyer account to seller account by CSDI. So there is no margining system and risk management system because there is essentially no credit risk. Furthermore in salaf only the original producer can sell the contract in the first market and after that in the second market people will trade the second had of contracts, i.e. if someone buys the contract can sell and buy the salaf contracts again. It means there is no short position for anyone except original producer in the first market and initial supply. The comparative advantage of standard salaf contracts is consistency to cultural and regional features and especially Islamic concerns. Although we have successful cases of futures contracts like gold coin, and there are enough requirements of performing carbon trading in the form of futures contracts,

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but in compare and contrast of salaf with futures contracts, I think still starting with salaf contracts is recommendable.

In the other hand, we have auction sessions in commodity exchange in Iran in the form of trading floor or in the electronically direct access from brokers' offices. So there is no worry about the requirements in this manner. Most of the trades in the spot market of commodities perform in the form of auctions. As I mentioned there is appropriate platforms in the electronic infrastructures, rules, regulations and institutional environment. Now, energy exchange on the offer of SEO has some plans to launch the carbon trading in the global strategic plan in long time, so because of its relative advantage of power section trading and business environment, I think it's appropriate to choose this exchange in this manner.