



Blockchain: Overview of the potential applications for the oil and gas market and the related taxation implications

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Introduction

Blockchain is sometimes likened to the internet in terms of its potential impact on the world. The cryptocurrency bitcoin, launched publically in 2009, is the most well-known use of blockchain, but this is just one of many potential applications. The potential uses for blockchain are growing, some of which could have significant implications for the oil and gas industry. This article offers a high-level summary of how blockchain works, its advantages over traditional systems, some of its potential applications, and how these can be applied to the oil and gas market, with a particular focus on taxation and compliance.

What is blockchain?

A blockchain is a “single source of truth” for shared information, such as financial transaction data (e.g., a quantity of bitcoins), legal contracts, deeds of ownership, and identity documentation. The information is recorded on a ledger that is distributed across every node (i.e., computer) in a network on the internet, and is structured and encrypted in such a way that it cannot be altered without agreement by a majority of the nodes in a network (which automatically and simultaneously check the change against the ledger). Any change, such as a payment from person A’s bitcoin wallet to person B’s bitcoin wallet, must be requested by the owner of the data (person A in this case), using a combination of private and public keys that validate the identity and legality of the transaction. The greater the number of nodes in a network, the more secure it is, since any attempt at fraud would require the corruption of the same chain in every node in a network simultaneously during the few seconds that the blockchain is processing a change. This process directly addresses the underlying issue of trust in society and business that creates the need for third-party validation (e.g., by banks or lawyers), since the network itself validates the change. When new information is added into the blockchain, a new block is created that is linked to the previous block (containing a related transaction or contract) and, therefore, the historic data remains in the chain and an audit trail exists.

As an example, in a relatively simple transaction such as buying a house, the seller currently would instruct lawyers to draw up the paperwork, terms are agreed upon, contracts are physically signed by both parties, proof of payment is provided, and the lawyers then arrange for the transfer of the title deed. Using blockchain, the seller could send the buyer the contract containing the digital certificate of ownership for the house in the blockchain. Once the buyer completes the terms of the contract by sending the payment, the contract is automatically completed and the digital certificate of ownership is transferred to the buyer. The nodes in the blockchain validate the transaction and simultaneously update the ledger. In this way, the updated ownership can be verified on any node. The transaction is completed quickly, without the need for third-party verification of signatures and payment, and the history of ownership remains in one secure and indisputable place—the blockchain.



Advantages of blockchain

Some of the main potential advantages of blockchain are the following:

- Cost and time savings;
- Increased transparency for individuals, companies, and authorities; and
- Mitigated risk of fraud and disputes.



Cost and time savings and increased transparency

In complex transactions for purchases of goods, for example, buyers issue purchase orders, shippers issue packing lists, sellers submit invoices, and banks release funds, all of which are wrapped up in agreements, contract terms, and numbering schemes that enforce tracking, delivery, and payment. The use of a blockchain for these activities would dramatically accelerate the process by cutting out the intermediaries that currently are needed to validate documents and release products and funds. It would create a clear audit trail of time-stamped documentation blocks that could be accessible to taxation and other authorities in real time, increasing transparency, and reducing the administrative burden on the parties involved.

Mitigated risk of fraud and disputes

Companies incur significant overheads assuring trust with counterparties and reducing the costs of eventual misunderstandings, disputes, and fraud. This includes writing and tracking all the contracts, compliance, reporting and monitoring, internally and in respect of service providers, along with all the associated paperwork. If the paperwork and the identity of participants, locations, asset type, and value were referenced and added to the blockchain, any dispute that arise could be dealt with by participants simply referencing this single ledger, rather than having to reconcile disparate databases and contracts.

Leading use cases of blockchain and potential applications for oil and gas companies

The oil and gas industry presents a particularly compelling opportunity to leverage blockchain technologies due to the high transactional values (and therefore risks) and economic pressures to reduce costs. A secure system that mitigates risk, increases transparency, provides an audit trail, and speeds up transactions at a significantly reduced cost may be appealing to oil and gas companies.

Taking some of the main applications of blockchain, we will now explore how these could be applied to the oil and gas sector.

Cross-border payments

One of the advantages of cryptocurrencies, such as bitcoin, is the significantly lower costs associated with cross-border payments, in addition to the instant transfer, cutting out the need for intermediaries and the time required for them to validate and clear the funds.

Oil and gas is sold in large volumes and as such entail significant value, not unlike the size and scale of transactions between banks. The frequency of transactions is also high; for example, a 300,000 barrel per day oil refinery will need to source a large crude carrier every week to maintain adequate volumes, and cargos can cost as much as USD 100 million (two million barrels at USD 50 per barrel). Oil companies also need to be aware of where crude is ultimately sourced. Some exporting nations are from time-to-time under sanctions to prevent trade in this commodity. Blockchain could provide a fully transparent and secure record of the entire supply chain.

Using a distributed ledger, digital tokens can be used to represent the asset being transacted. These tokens can be issued by a trusted authority for the needs of the companies or participating parties; for example, if oil and gas companies used a blockchain ledger to buy and sell barrels of oil, transactions could include digital tokens named Brent or WTI. These tokens would represent the underlying asset of a barrel of oil and would remain digitally attached throughout its supply chain journey. Currently, around nine percent of crude oil transactions are disputed, which equates to around USD 150 billion each year. By using tokens in a blockchain, payment could be processed more quickly, paperwork such as title transfers would be eliminated, and disputed transactions could be significantly reduced.

It is important to note that the token being exchanged will be subject to gains or losses based on the strength of the underlying fiat (local) currency. If 50 WTI tokens are purchased using US dollars, the value of these tokens are exposed to fluctuations in the US dollar. As the use of cryptocurrencies increases, governments are forming positions on the taxation implications of cryptocurrencies and their exchange for fiat currency.

Blockchain is already being used for gold trading, with companies and mints offering customers digital gold tokens to be used in place of the gold, which remains safely in their vaults. While gold trading is straightforward as compared to oil and gas, this initial step may be a catalyst for other industries, and the basic structure will be ready to duplicate and customize. As with many technological advancements, it takes time for people to become accustomed to the technology and adopt it, and the use of blockchain for cross-border payments is increasing rapidly as it becomes a more accepted transaction method.

Blockchain taxation legislation has yet to be drawn up by governments and is needed to determine, for example, when and where transactions will be deemed to have taken place for direct and indirect taxation purposes. If companies are required to include identification data in the blockchain, this could be easily addressed because their ownership structures, including beneficial ownership, would become more transparent. For example, the blockchain could evidence what is being supplied and to whom (e.g., a business customer or a consumer), which would determine in which location the transaction is subject to indirect taxes.

Indirect taxation, in general, could benefit greatly from the clarity that blockchain provides, but the taxation implications will be situation-specific and legislation will need to address this. Clear guidance will be needed to determine whether a cryptocurrency would be used in the same way as money (e.g., bitcoin) and, therefore, likely would fall outside the scope of a VAT system; or whether any restrictions relating to the redemption of the cryptocurrency would deem it to be a barter transaction or similar to a loyalty points system, both of which incur different indirect taxation treatment in most VAT systems.

Record management

In the above example relating to the sale of a house, the digital certificate of ownership is transferred to the buyer in the blockchain and a historic chain of ownership exists indefinitely. Property transactions provide an excellent example of how the use of blockchain can help business keep accurate and readily accessible records.

Oil and gas companies need to acquire rights to access land to prospect for, explore, appraise, and then produce oil and gas. Understanding land provenance and reported value can be difficult and multiple records of conflicting ownership and value can exist within independent silos of data. There is often no accurate

history of the transactions. In this mostly paper-based environment, land transactions are highly susceptible to fraud, especially in countries with higher levels of corruption.

Blockchain technology can be employed to resolve this problem and is being trialed in certain countries, such as Georgia and Ghana, which experience high levels of undocumented land ownership and land seizures. Applying the same model to the oil and gas industry by recording sales and transfers of land in a blockchain will create an immutable audit trail of land movement, value, and ownership. This will reduce the occurrence of lost or mismatching titles, ownership disputes, and provide tax authorities with transparency in respect of land transactions, recording accurate transfers of value as they occur in real time.

Supply chain management

Global supply chains in the oil and gas industry comprise a complex web of suppliers, shippers, and contractors. The complexity and scale of this network requires substantial administration and creates opportunities for errors. From the tax authorities' and customers' perspectives, there also is a concern that suppliers might manipulate invoice values, potentially avoiding taxes or inflating costs, as goods are sold and shipped around the world.

Utilizing blockchain technology to record and manage the movement of goods and related invoices will significantly mitigate the risk of errors and the opportunity to alter invoice values or recipients. Goods will be tracked from source to customer, reducing time and costs, and providing insight into the supply chain process that could be used to create efficiencies. Invoices will be recorded in the blockchain, creating an immutable record of its contents. The movement of invoices also can be addressed in the blockchain using public and private keys, preventing unapproved parties from accessing the invoices. This again could help to reduce the administrative burden on companies to report transactions to authorities and reduce the time taken by tax authority audits because of the reliability and transparency of data in the blockchain.

The issue of security in data transfer is important to both individuals and companies. Public and private keys allow data to be encrypted and sent to another party, so that only that party can access the encrypted data. In the case of an invoice, party A would encrypt the invoice using party B's public key. Party B can then decrypt the invoice using its own private key. Anyone in the network

could see that party A has sent data to party B, but is unable to decrypt the contents. Additionally, party A can sign the invoice with its private key before sending, and any subsequent alteration of the invoice would invalidate the signature and the fraud would be apparent.

Smart contracts

Oil and gas contracting can be complex, with lengthy contracts and agreements. A contract is often adjusted by a change order that needs to be tracked, and in some cases, contracts may be agreed some years before they are due to be completed.

Smart contracts are self-executing contracts based on agreed criteria and written in code, removing the ambiguity of terms and reducing the requirement for lawyers to draft and interpret. When the criteria of the contract are fulfilled, ownership or payment, for example, will be automatically transferred. A smart contract could be amended if the parties agree, and would maintain a record of all versions and amendments to the contract. It then would automatically complete once the criteria of the most up to date version are satisfied. Criteria could include payment or even government approval for the transaction. This may save time and costs for interpreting legal terms and tracking records, and government authorities could potentially access relevant parts of contracts to audit or pre-approve the taxation treatment.

Joint ventures are common in the oil and gas industry and generally require a suite of complex agreements (for example, relating to the sharing of costs or revenues), which could be implemented as smart contracts. Most contracts contain audit clauses giving the parties the right to audit each other to make sure that all parties are complying with the contract. Introducing a blockchain ledger to record joint venture transactions and using smart contracts to define, negotiate, and execute the contractual conditions will provide all involved parties, including the tax authorities, with transparency and consensus on what has occurred. This single audit trail, agreed upon by all participants, will significantly reduce

the effort needed to ensure timely tax compliance and reporting, as well as the effort needed by the tax authorities to understand tax positions.

As part of a global industry, oil and gas companies have to consider double taxation and transfer pricing implications. The use of smart contracts for transfer pricing profit allocation is another area of potential for simplification, increased transparency, and overall cost reduction.

Emerging markets

One of the most significant challenges of emerging markets is their ability to hire, train, and develop regulatory officials. In particular, finding and developing the officials to oversee and administer taxation affairs is a key concern. The application of tax laws to different pieces of the value chain is extremely complex and an overbearing burden for many developing countries. The application of blockchain can alleviate this acute pain point for developing countries and provide confidence in the application and regulation of their resource regime.

Further considerations

The potential uses of blockchain are wide and varied, and the technology is becoming more prevalent. In the oil and gas industry, like many others, companies may face the choice of deciding whether to pioneer new technologies and in the process disrupt their own business model and industry, or to continue to focus on their core business and wait for the market to be disrupted by others. The pace at which blockchain will be adopted and will disrupt markets is unclear, and may be decided, to some extent, by the largest companies that will need to work together to drive innovation and solutions due to the global and collaborative nature of blockchain. Potential considerations for oil and gas companies are to set up or join working groups to explore blockchain and its potential applications or to launch a trial with an existing trusted business partner to better understand blockchain and the value it could create.



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