Oil and Gas Supply Chain - White Paper v20.1

Purpose built protocol for supply chains in the drill waste management sectors of the oil and Gas industry based on blockchain

Putting oil and gas waste management and H2O recovery on the blockchain

2019 - v20.1 Oil and Gas Supply Chain

Abstract

Increased awareness and legal enforcement of the oil and gas industry's environmental responsibilities are creating a commensurate need for effective and efficient technologies that help the industry clean the waste products their activities invariably generate.

With their cooperation, Oil and Gas Supply Chain (OILSC) is moving the supply chains and contracts of many of the world's largest companies, government departments and organisations that specialize in the waste disposal sectors of the Oil and Gas industry onto the block chain. Using bespoke smart contract GUI's that conform to the current layouts on the Oil and Gas Supply Chain platform we will make this process more time and cost effective and move this process closer to worldwide compliance and a cleaner world.

The Oil and Gas Supply Chain (OILSC) token is designed to be the medium of transaction within a smart contract between the oil and gas company itself and all the drill management and waste disposal service providers. OILSC token will be supported by major companies and organizations with years of experience in providing full services in drilling waste management, solids control and complete 'backyard' solutions to required post drilling environmental protection regulations worldwide.

Drill management/solids control/'backyard' solutions includes pumping fluid, 'mud,' into the well hole to stabilize pressure, reduce friction and to remove drill cuttings. Once topside, the drill cuttings go through a three-stage environmental process to separate the cuttings into manageable waste including removing any naturally occurring radioactive material (NORM) through thermal desorption.

Any residual petrochemicals, up to 20%, are returned to the oil company as part of an Oil and Gas Supply Chain smart contract. Any remaining solid waste is recycled and, also through an Oil and Gas Supply Chain smart contract, can be used in both private and government construction projects, for example asphalt roads, schools, hospitals and housing. The final element is clean water.

This process is well established with blue chip oil and gas operators in compliance with required international health, safety and environmental standards.

Due to the nature of our affiliations/partnerships, the OILSC token, Oil and Gas Supply Chain smart contracts and applications are designed to address the specific issues and challenges within the oil and gas industry. However, we fully believe that these solutions will be adopted as the standard for many Supply Chain needs worldwide.

The global Oil and Gas drilling waste management market place

Rapid technological developments are improving the drilling and production capability aid exploration and production activities in the deep-water and ultra-deep-water areas across the globe. These factors are also boosting the drilling waste management market.

The global drilling waste management market is estimated to have been US$ 3.80 Billion in 2016 and is projected to reach US$ 5.08 Billion by 2020 at a CAGR of 6.0% due to stricter waste management regulations and high cost of the treatment.

The current increase in energy demand is creating a rise in oil and gas exploration and drilling activities from such regions as North America and the Middle East. This increase is causing a surge in drilling mud and cuttings waste and it is therefore very important to have suitable waste management applications for drilling purposes and safeguarding the environment. This increase in production and exploration activities provides opportunities in drilling waste management.

Drilling waste management contains three types of processes: solids control, containment and handling, and treatment and disposal. The market is further segmented by application and type of service and is again divided by onshore and offshore. The onshore application market occupies the major share of the application segment and is expected to grow at a steady rate during the forecast period.

Drill Waste Management Market, by Region 2020 (USD Billion)

Various players in the market are focusing on contracts and agreements for their geographical expansion and surge in the customer base. For instance, Halliburton Co. waste management services are provided under the product name Baroid, which gives solutions to waste handling & transport and waste treatment & disposal.

Oil and Gas Supply Chain - Smart contracts for the H2O sector.

Most people outside the energy industry don’t know that the average onshore oil well produces ten times the volume of water as oil, all day, and every day. In fact, the cost of dealing with this ‘produced water’ is the primary cost of operating an oil or gas well. Moving, treating and disposing of the water is half to two-thirds of the total cost of producing each barrel of oil.

While energy production requires water as an input, the industry is a net generator of surface water. By tapping into prehistoric water that has been trapped for eons below impermeable rock, the production process generates water without depleting groundwater stocks—something no other industry does.

In California, the production process creates a thousand times more water than the energy industry uses. Most of the produced water goes right back down the well for enhanced oil recovery. But it doesn't have to – it could be treated and reused on the surface. We are not the only ones to notice this: at the Global Water Summit in Abu Dhabi, the Executive Editor of The Economist, David Franklin, said that the world's largest company in 2050 could be "ExxonHydro."

Oil and Gas Supply Chain can implement smart contracts on its platform; an efficient water marketplace is going to lead to more recycling, more conservation, and more investments into water treatment technologies. Not limited to the energy sector, a marketplace model has the potential to improve sustainability for every major off-grid user including agriculture and industry. With an effective system in place, all kinds of water, not just freshwater, can be appropriately valued, traded, and put to its best use.

This will allow Oil and Gas Supply Chain great opportunities to scale into other industries.

The Oil and Gas Supply Chain block chain, smart contract and application adds value to all inter-dependent partners within the oil and gas Supply Chain by providing such benefits and efficiencies as:

Allowing IT providers within the oil and gas industry to easily set up blockchain supported data Enabling transparency and tracking beyond the "one step down, one step up" principle Protecting brands from fraudulent behavior Driving efficiencies for all stakeholders Connecting IT systems of different stakeholders in multi-organisation supply chains Ensuring integrity of data

Publicly decentralizing performance, cost and scalability

Providing a tailored system for Supply Chain data based on blockchain

Creating various Supply Chain applications using the described protocol

Incorporating third party technology providers (Supply Chain software companies, ERP providers, IoT providers, software development companies) or in-house Supply Chain technology teams

Authenticating product data

Establishing product journey visibility

Improving recall efficiency, custody and accountability

Supporting CSR activities

Mapping and optimizing the trading network

Managing inventory

Increasing alert systems

Assuring Supply Chain compliance

Optimizing the customs, audit and regulations process

Automating data connectivity and interoperability

Standardizing data formats Why the OILSC token?

For most people, the first introduction to crypto-currencies and its applications was the popularity of Bitcoin. OILSC tokens are similar to Bitcoin in that they are secure, instant and cost less compared to traditional payment processes. Oil and Gas Supply Chain smart contracts ensure automatic payments at time of delivery and are executed in an efficient and transparent manner.

The Oil and Gas supply Chain aims to operate on a smart contract hub, offering secure and thoroughly tested contract templates for companies that are tailor fitted for the oil and Gas industries and use cases, including Supply Chain management, telecommunications, IoT, social networking, sub-contracting and many more, this allows the supply chains and side chains in the oil and Gas sectors to operate more securely, efficiently and cost effectively on the Ethereum network using Oil and Gas Supply Chain tokens (OILSC) as the payment gateway.

It is now possible to execute smart contracts through an ecosystem for making fast and safe deals on the Ethereum blockchain. It requires no programming skills and features a user-friendly interface for creating complex smart contracts. In case of disputes, parties can have them resolved through qualified arbitration.

Oil and Gas Supply Chain is a unique solution allowing IT providers in supply chains to set up blockchain supported data sharing in multi-organizational environments. It helps them build transparency beyond the “one step down, one step up” traceability principle. Furthermore, it improves the integrity of product data and drives efficiencies for stakeholders. The Oil and Gas Supply Chain solution is being developed and tested by our Dev team. It is also being discussed regarding deployment with long established drill management companies such as DCDC in the USA and Oil and Gas supply companies including BDC and SADP in The Kingdom of Saudi Arabia. Please visit our website www.Oil-and-gas-supply-chain.com follow our telegram group https://t.me/oil_and_gas_supply_chain for further details.

Several major energy firms are already partnering on a new blockchain-based trading platform.

BP, Shell and Statoil are backing the platform which represents the latest application of the tech to the energy space. The consortium of firms built around the platform also includes ING, ABN Amro and Societe Generale, as well as trading firms, Gunvor, Koch Supply & Trading, and Mercuria.

(SOURCE Commodity Trading Consortium).

After the full development, deployment and implementation of the system in the Oil and Gas Supply Chain sector we will roll the system out into other sectors.

Table of contents

1. What is Blockchain Technology?

2. Supply chain challenges

2.1 Fragmentation of data in siloes and opacity of supply chains

3. Oil and Gas Supply Chain- Purpose built crypto currency for supply chains based on blockchain 3.1 Automatic data connection and interoperability beyond the “one step back, one step forward”

principle

2.1.1 Data interoperability format

3.1.2 Data consensus check as a tool for trustworthiness 3 2 Oil and Gas Supply Chain Decentralized Network

4. What is a smart contract?

4.1 Why trust an Ethereum Smart Contract?

4.2 Blockchain Technology = Perfect for Supply Chain Management

4.3 Smart Contracts and Using Blockchain Supply Management

5.4 Integrating Payment with Blockchain Technology

5. 5 Engagement / development of the App / Platform

1. What is the Blockchain Technology?

Blockchain – a term that has been growing in use for a while now. Blockchain technology and is

frequently described with words like ‘game changer’ or ‘revolution’. But what is Blockchain exactly, and what role will it play in the future logistics or Supply Chain management?

Blockchain is a technology for decentralized storage of transactional data. The storage of a transaction is organized in so-called blocks, while following transactions are stored in new blocks, the sum of several blocks makes up a chain; a logical sequence of transactions. Every transaction contains a timestamp and is secured by a cryptologic process. This chain works like a database which is updating information continuously, with the difference that the chain is stored on every hard drive or computer that is part of the Blockchain network. All changes are recorded and encrypted, in real-time and in an audit proof way.

Additionally, the changes are authenticated based on the consensus principle. This means that all members of the network can verify transactions at any time.

2. Supply chain challenges

With the globalization of trade there is increasing complexity in supply chains. This, in turn, increases the amount of information asymmetry - such that information is unevenly distributed among participating stakeholders within a supply chain. When these stakeholders have misaligned incentives, such as the case in which participating stakeholders are different companies, there is no incentive to provide complete information which contributes further to information asymmetry.

As a result, end-buyers of products have no economical way of authenticating what they are purchasing, which creates ideal conditions for moral hazard and fraudulent behavior.

2.1. Fragmentation of data and opacity of supply chains

The current state of Supply Chain data management solutions involves several localized information systems, ERP systems and custom solutions. For them to communicate, custom integrations need to be implemented. Often referred to as "data silos", these centralized systems lack a common technical environment, security, and exchange protocols to facilitate data sharing.

3. Oil and Gas Supply Chain- Purpose built cryptocurrency for supply chains based on blockchain Oil and Gas Supply Chain is a solution allowing IT providers to easily set up blockchain supported data sharing in supply chains. It enables building transparency and tracking beyond the “one step down, one step up” principle, protecting brands from fraudulent behavior and driving efficiencies for all stakeholders.

Oil and Gas Supply Chain brings:

1. Seamless and automatic data connection and interoperability between IT systems of different stakeholders in multi-organisation supply chains, with consensus mechanisms for ensuring integrity of data.

2. A public decentralized solution for performance, cost and scalability issues by providing a tailored decentralized system for Supply Chain data based on blockchain. Direct users of the Oil and Gas Supply Chain are therefore developers creating various Supply Chain applications using the described protocol. Users can be third party technology providers (Supply Chain software companies, ERP providers, IoT providers, software development companies) or in-house Supply Chain technology teams. Applications where Oil and Gas Supply Chain’s protocol delivers value are:

- Product authentication
- Product journey visibility
- Product recall efficiency
- Product freshness for perishables
- Chain of custody with accountability
- CSR activities support
- Supply chain mapping and optimization within the trading network
- Inventory management
- Alert systems (exception management)
- Supply chain compliance assurance
- Customs, audit and regulations process optimisation
- And any other Supply Chain application that requires transparent Supply Chain as a starting point

3.1 Automatic data connection and interoperability beyond the “one step back, one step forward” principle

Oil and Gas Supply Chain protocol enables exchange of different data sets between multi-organisation supply chains no matter its complexity while ensuring data quality and integrity. Input and sharing data with Oil and Gas Supply Chain is based on a common set of data standards which allow multiple organizations (companies involved in production, distribution of equipment and services) to exchange data beyond the “one step back, one step forward” principle.

3.1.1. Data interoperability format

In order to provide for uniform data flow, all information must be standardized within the ecosystem. While the XML with SQL support is a widely adopted file format for data exchange, content within the

file must be also standardized. Supply chain can span across the globe, where each member has its own local standards. For example, date and time formats are very different even in neighboring countries. Date 01/10 can be the first of October in one system, and the 10th of January in another. This defines the challenge that data sent to Oil and Gas Supply Chain must be standardized, and vice versa. This requires standardization not only the attributes and nodes within attributes of XML files, but also content.

Oil and Gas Supply Chain supports data such as, but not limited to:

- Master Data
- Transaction Data
- Visibility Data

3.1.2. Data consensus check as a tool for trustworthiness

When receiving information from stakeholders, Oil and Gas Supply Chain protocol performs a

“consensus check” that verifies there are no discrepancies between data provided by different stakeholders. The check is performed in several steps:

Step 1. Each stakeholder has to be approved by the previous and the following Supply Chain stakeholder, creating a chain of accountability.

Step 2. Matching of dynamic batch information is verified, including the crucial information of batch identifiers, appropriate timestamps and transactional data. As this step involves company private data (e.g. quantities of sales), a Zero Knowledge Proof6 mechanism implementation will provide a way to check that private information matching is provable without revealing the information itself. Other dynamic data may include data collected from sensors and compliance data.

Step 3. As an additional layer of credibility, auditing and compliance organisations can validate data by supplying their confirmations. In cryptography, a zero-knowledge proof or zero-knowledge protocol is a method by which one party (the prover) can prove to another party (the verifier) that a given statement is true, without conveying any information apart from the fact that the statement is indeed true. This ensures the entire Supply Chain is in accordance with that batch of products.

3. 2. Oil and Gas Supply Chain Decentralized Network

In order to provide the optimal solution, we implement the Oil and Gas Supply Chain protocol that runs on an off-chain decentralized peer to peer network, called the Oil and Gas Supply Chain Decentralised Network (ODN). It enables peers on the network to negotiate services, transfer, processes and retrieve data, verify its integrity and availability and reimburse the provider nodes. This solution minimizes the amount of data stored on the blockchain in order to reduce cost and inefficiency.

Oil and Gas Supply Chain supports many different blockchain implementations. The current version of Oil and Gas Supply Chain utilizes Ethereum blockchain to provide proof of concept and initial implementation. The fully developed solution will provide interfaces to many different blockchains.

There are multiple reasons for adopting this principle:

- Competing blockchain solutions will evolve in unexpected ways, which will influence the pricing of blockchain usage,
- More advanced blockchain solutions in the future could be integrated,

- Supply chain stakeholders already using blockchain solutions for various purposes will be able to use the same blockchain for Oil and Gas Supply Chain with an implemented method to use legacy chains

It is important to note that Oil and Gas Supply Chain uses a blockchain layer which presents an independent system and thus adds additional cost depending on the chosen underlying blockchain for some Oil and Gas Supply Chain functionalities. In case of Ethereum being the underlying blockchain, this means that a small amount of Gas (Ether) is also needed to store the necessary hashes on Ethereum for storage operations.

Read operations are also compensated with Oil and Gas Supply Chain TOKENs (OILSC). An exception where read can be free of cost is if certain conditions are met: if one has access to i.e. an Ethereum node for free reads from Ethereum (or another chosen blockchain from the blockchain layer), and if they hold a local Oil and Gas Supply Chain node which contains the necessary graphs.

The number of tokens to be awarded for the nodes providing the service is a function of supply and demand between nodes and users. Data creators will not be required to pay any additional arbitrary fees apart from what they agree to pay to the nodes. On the other side, nodes will receive full payment of what they have agreed with and provided to the user.

The OILSC TOKEN is implemented as an ERC20 compatible token on Ethereum. This ensures interoperability with wallets and other tokens on Ethereum. The Oil and Gas Supply Chain smart contract handles all transactions and balances in a secure and trusted manner.

4. What is a smart contract

A smart contract is a piece of software that contains rules and regulations for negotiating the terms of a contract. It automatically verifies the contract and then executes the agreed upon terms.

And when this smart contract's centralized code is made decentralized for execution purposes on the

Ethereum blockchain, it becomes a smarter contract.

Coding and executing smart contracts on the Ethereum blockchain make them immutable and independent from centralization.

Smart Contract's Characteristics on Ethereum

A smart contract has the following characteristics:

- Self-executing
- Immutable
- Self-verifying
- Auto-enforcing

- Cost saving
- Can remove third parties or escrow agents How Do Smart Contracts Work on Ethereum?

Developers write the code of smart contract using the native language of Ethereum called Solidity. These contract codes can be of many forms, such as the transaction of money when certain conditions are met, or the exchange of goods between parties.

Once the code is written, it is uploaded on the EVM- Ethereum Virtual Machine, which you can say is a universal runtime compiler or browser to execute the smart contract's code.

Now once the code is on the EVM, it will be same across each Ethereum node. And each node will try to run and see whether the conditions are met or not.

A contract of Ethereum will involve two or more parties which will be fueled by the digital

asset (Ether). Once the contract is executed successfully, the digital asset will be distributed or re-distributed according to the logics defined in the code.

4.1. Why Trust an Ethereum Smart Contract?

As every transaction history and history of every executed code is stored on the blockchain, you can trust and verify everything when needed.

Even in the case of Harry's smart contract, Harry can't cheat Bob. Because once Bob has done his work, it will be verified by the blockchain and recorded onto it. Anyone, including Harry, can inspect the blockchain, hence resolving the conflict or protecting against cheating.

Moreover, Harry can't stop or manipulate this contract as the execution of this contract is no longer dependent on one single party or node. As Harry's contract is running on an EVM of the Ethereum blockchain, it is resistant to damage caused by a single point of failure. On the other hand, if these conditions are not met, then Bob will need to continue the work until the appropriate result is met.

4.2. Blockchain Technology = Perfect for Supply Chain Management

Blockchain technology is all about the distributed public general ledger. This is what makes it perfect for

Supply Chain management. In a recent article for Harvard Business Review, you can read about how well blockchain works when it comes to the supply chain.

One of the biggest problems faced by companies with complex supply chains is a lack of transparency. Sometimes, if you have multiple suppliers across multiple states and countries, it can be hard to keep track of everything. Pinpointing issues can be difficult because of all the moving parts. This is where something like blockchain can shine.

Because of the way transactions are recorded and tracked using blockchain technology, it makes it much easier to see everything happening in real time. It's possible to monitor transactions, and the distributed ledger means that you get updates and see what's happening every step of the way.

Members of the network can see what's going on as it happens. Plus, this system helps keep all those involved accountable for their end of the bargain. It's a great way to get the whole picture, as well as drill down to individual aspects of the supply chain.

4.3. Smart Contracts and Using Blockchain Supply Management

One of the reasons blockchain technology is so great for Supply Chain management has to do with the fact that smart contracts are a major part of the system.

With smart contacts, all the interested parties can see the terms of the agreement. On top of that, the agreements enforce themselves. In order to move forward, certain expectations have to be met. When the signatories meet those expectations, the contracts can be fulfilled.

This is a great way to enhance your Supply Chain management. With the use of smart contracts, you can make sure different suppliers are meeting their obligations. You can see deliveries at multiple locations, and track shipments based on the fulfillment of smart contract terms.

And, because it's all managed with a public distributed ledger, it's easy to see what's going on. In many

cases, current supply chains still operate using reams of paper.

While some things are tracked in computers, you often need humans to go in and update systems before you can see what's happened. The combination of paper and the need for someone to update information in a system can mean that you might not have the most recent transactions. It might take hours — or even days — before a system is updated.

Smart contracts help eliminate some of that uncertainty and lag. Smart contracts are autonomous and automatic. That reduces the potential for human error and increases your access to timely and valuable information.

4.4. Integrating Payment with Blockchain Technology

For most people, the first introduction to blockchain applications was the popularity of Bitcoin. And financial transactions are still one of the bonuses of working with blockchain technology.

Blockchain transactions are secure and instant. On top of that, they often cost less. Traditional payment processors charge fees and it can take multiple business days to complete a transfer of funds.

It's possible to upgrade Supply Chain management with the help of blockchain. Smart contracts could be arranged to take care of payment automatically, at the same time deliveries are made. The whole thing becomes part of the same transaction that is executed in an efficient and transparent manner.

If required, you can create a distributed ledger that is more private. You still have access to the information and can make smart contracts, but the distribution is limited. You only have it sent to the interested parties.

ENGAGEMENT MODE

5.5 Engagement / development of the App / Platform

Development of the Oil and Gas Supply Chain App and platform for the Oil and Gas supply chain sector

Table of Contents

DEVELOPMENT DEVELOPMEN PROCESS PHASE 1: WIREFRAME

PHASE 2: UI DESIGN PHASE 3: SPRINT DEMOS PHASE 4: DEPLOYMENT PROJECT CHARTER

CLIENT - TEAM COLLABORATION

COLLABORATION TOOLS

Envision Zoho PMS

Testflight, Crashalytics, Fastlane Bitbucket

REPORTING

Project Plan Weekly Reports Release Notes

Project Documentation POST GO LIVE SUPPORT

Maintenance Contract

CURRENT DEVELOPMENT PROCESS IN GENERAL

PHASE 1: WIREFRAME

Wireframe is an essential step to start any project as it is the foundation for the end product. Wireframe is developed to make sure that we cover all the features and do not miss out anything before we move forward.

Project manager will analyse the requirements and will identify each screen as well as features to be shown on that screen. AXURE or BALSAMIQ tool will be used to create wireframe for each screen. These wireframes will be grey scale and will NOT be polished in terms of UI.

PHASE 2: UI DESIGN

When the wireframes have been finalized, we'll use the updated visual identity as a jumping off point and begin to flesh out the overall look of the App.

Our background colours, and created styles for paragraphs, headers, links, and any other visual information will be consistent throughout the App.

PHASE 3: SPRINT DEMOS

Once the design mock-ups have been completed, the Project Manager will divide the development phase into multiple parts called Sprint demos and create a plan which will include the required number of sprint demos, features to be implemented in each.

We use AGILE Development methodologies so that the users are active participants during each development sprint.

PHASE 4: DEPLOYMENT

Once we're sure all is as it should be, double-checked everything, and we have the final build, we will upload the site/app for its official launch.

PROJECT CHARTER

CLIENT - TEAM COLLABORATION

1} iOS, Android and Web developers will work concurrently to ensure quick development 2} We use the following tools for collaboration during project ACTIVITIES

TOOLS
Project tracking and management - Zoho PMS

Design & Wireframes
Invision, Photoshop, Sketch, Balsamiq, Axure

Testing - Appium

Build Release - Testflight, Crashalytics, Fastlane

Source Code Management - Bitbucket

Other Communication - Skype, Slack, Email, telegram, github

Summary:

Using blockchain technology can directly assist supply chain management, providing traceability, data accuracy, and security throughout the supply chain process. A distributor that handles items can use blockchain technology to create a secure, immutable and interactive supply chain application that streamlines business and reduces operating costs.

Blockchain in Oil & Gas suggests that oil and gas companies are in the process of adopting advanced technologies to improve workflow management and reduce operational losses. One such technology is

blockchain, which came to prominence with crypto currencies and is now gaining acceptance in mainstream transaction processing across several verticals

Blockchain technology can also help the industry improve their operational performance and service delivery. One major area in which blockchain can be applied is supply chain management. Blockchain technology can be used in tracking and identifying raw materials based on their source to improve quality control. The distributed ledger system can track and identify the complete supply chain of the raw materials from place of origin to end user. Detailed information of the supply chain can give a better overview of the usage of the product. Blockchain can preserve digital data of every action by the stakeholders in the network from sourcing to trading to reselling of products. It also reduces the potential for data to be tampered with or damaged.

Blockchain technology can play a vital role in asset management as well. One of the key features of blockchain is easy and secure data tracking. Manufacturers can use this to trace regular maintenance updates. Also, compliance and regulatory matters can be detected by analysis of data. Blockchain can provide quick and easy extraction of information and assure authenticity of data.

The Abu Dhabi National Oil Company (ADNOC) collaborated with IBM to pilot a blockchain-based automated system to integrate oil and gas production across the full value chain. It provides a secure platform for the tracking, validating and execution of transactions at every stage, from production well to the end customer.

ADNOC expects this technology to reduce the time it takes to execute transactions between ADNOC’s operating companies and says it will increase operational efficiency across its value chain. It will also enable greater transparency in transactions.

“Blockchain is a game-changer," said Abdul Nasser Al Mughairbi, ADNOC's digital unit manager. "It will substantially reduce our operating costs by eliminating time-consuming and labor-intensive processes, strengthen the marketing and trading of our products, and create long-term sustainable value that will ensure that ADNOC delivers on its 2030 smart growth strategy.”

The pilot developed a single platform to track the quantities and financial values of each bilateral transaction between ADNOC’s operating companies, automating the accounting process. For example, as crude oil makes its way from the production well to the refinery, or the export terminal, all quantities are accounted for daily along with the associated monetary values. Other products included in the blockchain application are gas, condensates, natural gas liquids and Sulphur.

"With this pilot, ADNOC takes a massive leap forward in asset provenance and asset financials, which, in its simplest terms, enables the ability to track irrefutably, every molecule of oil, and its value, from well to customer," said Zahid Habib, IBM's vice president of chemicals and petroleum solutions. "This unlocks the potential to digitally reinvent ADNOC's hydrocarbon value chain, adds a unique dimension to their data visualization in their Panorama Digital Command Center, and accelerates ADNOC towards their 2030 Vision."