

# Index-based blockchain

## Making the container industry smarter

Shipping special report

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Alexander Borulev

Alex Younevitch

Andrew Scorer



Colossal container ships represent a \$500 billion industry, which carries 90% of the world trade on its broad back. Its trade routes connect more than 150 countries, forming a logistical network that is staggering in its scale and complexity. But like any other old and big system, this industry has nagging weak spots – such as a lack of transparency and inadequate accountability between counterparties.

In a stable market, these flaws can be accommodated, but as soon as the threat of volatility presents itself, the feet of clay quickly begin to crumble beneath the container giant.

And as we've now seen, a spike in bunker fuels costs in 2017–18, driven by the rally in crude oil prices, has shaken the industry, challenging the viability of the existing system. For example, the average monthly price for Rotterdam delivered 380 CST fuel oil jumped by 46.2% from \$321.10/mt in October 2017 to \$469.50/mt in October 2018. Naturally, voyage costs for container vessels spiraled up along with fuel prices, turning freight trading between container carriers and their clients into a nightmare of bunker surcharge calculations, void sailings and increasingly strained relationships.

The ultimate result – a loss of time and money as well as growing uncertainty for almost everyone involved. And considering the upcoming IMO 2020 sulfur cap regulation, which may bring an extreme volatility in bunker prices in the new decade, current troubles may just be a warm up.

So, now could be the perfect time for industry players to look into alternative forms of shipper-carrier contracts. The ideal solution should provide transparency into voyage costs, managing exposure to bunker price volatility as well as ensure accountability via an efficient trade platform.

The best way to achieve that lies in the marriage of two concepts that the container market is yet to fully embrace – index-linked freight agreements and smart contracts<sup>1</sup> in the blockchain environment.

#### PRICE FOR 380 CST 3.5% BUNKER FUEL, DELIVERED ROTTERDAM



Source: S&P Global Platts

<sup>1</sup> Smart contracts are self-executing contracts with terms and conditions of the agreement between both parties involved being directly written into the code.

#### IMO 2020

In October 2016, the International Maritime Organization (IMO) announced that the effective date for the reduction of marine fuel sulfur content will be January 1, 2020. The new global sulfur cap will bring down the sulfur content cap in marine fuels from the current 3.5% to 0.5%. The Emission Control Areas (ECA) will remain at the current cap of 0.1%.

In simple terms, with the container fleet burning roughly 100 million mt of fuel annually, if it was to switch from 3.5% IFO 380 fuel oil to marine gasoil (MGO), the extra bunker costs could be very substantial. Currently, average gasoil futures in 2020 are priced at about \$339/mt over high-sulfur fuel oil. At this spread, the industry is facing extra costs of \$34 billion a year.

However, despite many projections and estimates being circulated, there is a lot of uncertainty around what the costs may actually be once the IMO 2020 comes into effect. They will also depend on the price and availability of 0.5% fuel oil blends, adoption of scrubbers and LNG as well as potential of non-compliance.

#### Riding with the curve

The IMO 2020 activation which seemed quite far away in the autumn of 2016 when it was announced is now closing in and everyone exposed to container freight is rightly starting to get somewhat anxious about it.

Of course, exposure to bunker prices is not fresh news to the container market. The industry has been dealing with it for years, using the method called the Bunker Adjustment Factor or BAF, which is a tool for carriers to pass on extra bunker costs or savings to their customers.

Typically, in an annual contract, every quarter the carrier and its customer would be negotiating a surcharge on the agreed annual dollar per box freight in line with changes in bunker prices.

In theory this works well. In reality, carriers and their customers, each have their own ideas on BAF calculation formulas, which are often held close to their chests and include different assumptions and variables, like the bunkering ports, size of the vessels, consumption of fuel and, of course, its price.

Given the lack of a standardized formula, it is hard for carriers to substantiate a surcharge to their customers, who have to deal with swings in freight and also justify them to other stakeholders in their supply chains. The recent rise in bunker prices has already made container freight negotiations a frustrating experience.

However, looking at the average spread between gasoil and 3.5% fuel oil in 2020, which on November 2, 2018 stood at \$339/mt in the wake of upcoming IMO 2020 storm, current troubles may seem like a picnic very soon. Container fleet burns around 100 million mt of fuel a year. This means



potentially factoring in as much as \$34 billion in extra bunker costs in freight contracts. A scary figure for a fragmented market, which has been lacking proper freight negotiation and hedging tools.

The first part of the solution is embracing index-linked contracts, with both overall freight and bunker surcharges following independent benchmarks.

For example, S&P Global Platts already publishes assessments, which reflect both all-inclusive freight and bunker surcharge prices on major routes, on a daily basis.

Platts Bunker Charges (PBC) prices are assessed on a \$/FEU basis and are aligned with Platts Container Rates (PCR) on the same routes to reflect the all-in freight per container. PBC indexes utilize our Low Sulphur Marine Gas Oil and HFO 380 bunker benchmark prices and include representative and route-specific ports along with other transparent variables. They will also include the new 0.5% low sulfur bunker fuel prices, starting January 1, 2020.

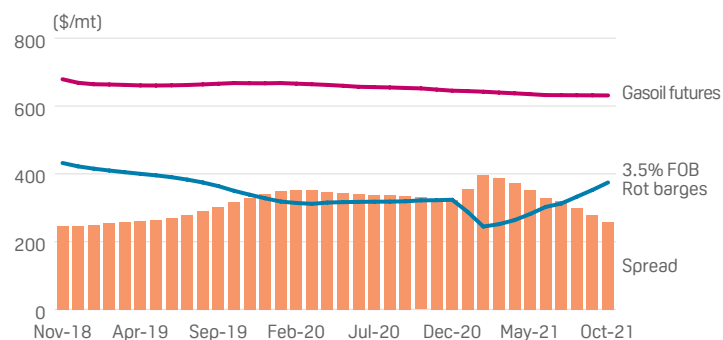
Linking bunker surcharge to indexes simplifies any BAF negotiations for market players, allowing them to agree on the price against an independent, standardized benchmark.

This way the strain of multiple BAF calculators is avoided and players may have an opportunity to hedge container freight directly. These are, in fact, simple tools that many industries, including other shipping markets, have been employing for years.

While the applications of dollar per container indexes are vast, they are only a part of the solution. There is still that matter of unwieldy container supply chains with mountains of paper trails, delivery and accountability hiccups. These things will not go away even if freight negotiation becomes easier. So, the next step is to create an environment in which transactions throughout the entirety of the supply chain area easily tracked and executed.

And that is where the famous buzzword “blockchain” comes into play.

### BUNKER PRICES: GASOIL FUTURES vs 3.5% FUEL OIL SWAPS



Source: S&P Global Platts

### Case study

Let's consider two points on 1 March and 1 July 2018 when Platts assessed freight container rate at \$1,500/FEU on both dates. It might seem that carriers are earning the same amount on both dates. However, if we assume an 18,000 TEU vessel carrying a full capacity of 9,000 40-foot containers, carriers may have been losing up to \$580,000 per laden voyage in July as the bunker prices were \$64/FEU higher than in March.

Once the sulfur cap is introduced in January 2020, losses might be substantially higher and both industry parties will be at risk losing their money.

The use of Platts assessments will increase the transparency in the market and help cargo and ship owners to use more accurate hedging strategies, mitigating their losses.

### PLATTS CONTAINER RATE 1 NORTH ASIA TO NORTH CONTINENT



Source: S&P Global Platts

### PLATTS BUNKER CHARGE 1 NORTH ASIA TO NORTH CONTINENT



Source: S&P Global Platts

### Get smart

Blockchain is essentially a decentralized digital ledger of transactions that can record everything of value, chronologically and publicly.

“The benefits of decentralization are about creating a trustless system. Once you have a trustless system then smart contracts can execute with absolute certainty” says Mark Gilleeney, a developer at S&P Global Platts.

And one of blockchain's most exciting applications is smart contracts, a computer code that verifies, facilitates and enforces the obligations stated in the contract.

Once the agreement is established, its terms and conditions are visible and accessible to all concerned parties and there is no way to challenge them. This promotes transparency of market prices, which the industry typically lacks as well as allowing open access to documentation for all participants, who can easily trace all transactions.

The distinguishing features of smart contracts, that they are self-maintained and self-enforced, might themselves be the solution for the many predicaments of the shipping industry. The autonomous and transparent nature of the contracts reduces likelihood of error, manipulation or bias.

Furthermore, they are governed by the pre-agreed terms and conditions that must be met for the execution of the contract. Under these virtual arrangements, rolled cargo and other unexpected difficulties will be resolved, thereby promoting trust between parties as well as increasing accountability within the industry.

According to Gilleeney, smart contracts will witness a bright future by penetrating into each aspect of our life from insurance claims to market purchases. "Smart contracts will take processes like these and reduce them from mountains of paperwork and weeks of processing to seconds with no paperwork needed" he adds.

If this seems an optimistic view, it tallies with what container market players think about the blockchain technology. On January this year, AP Moller Maersk, the largest shipping company by market share, announced a joint blockchain platform called TradeLens with IBM, aimed to digitalize supply chains and improve global trade. And more recently, in November Ocean Alliance partnered with CargoSmart to develop their own blockchain group called Global Shipping Business Network (GSBN).

### Intelligent evolution

The ship owners are currently using a Time Lagged<sup>2</sup> model for the contracts that proves itself inefficient and loss-making during surges in bunker prices as carriers are not able to recoup their losses. Smart contract with integrated indexes in them is a step towards Real Time pricing model.

These contracts would adjust the rate with changes in container index in real time with specific clauses for premiums or discounts to the index kicking in, depending on movements in the benchmark.

The index-linked contract period is typically one to three years to enable parties involved to gain the benefit of market volatility. Signing long-term agreements and enabling indexes to determine the price, cargo owners can lower their procurement expenses and ship owners their cost of sales.

Let's take an example where a logistics company under-delivers the number of containers stated in a normal contract. This causes it to default on terms and triggers losses for a carrier.

However, since the terms and conditions are not fulfilled, the cargo cannot be shipped. The shipper now faces two options: pay index-linked rates for each under-delivered container as a penalty, or sell them to another company. Such a high level of commitment could be further strengthened by the use of deposits.

When shipper and ship owner enter the smart contract, they will add some amount of cryptocurrency units into a deposit – Risked Fund. If one party fails to deliver its side of the agreement and the issue is not resolved, then the Risked Fund gets destroyed. As a result, cargo owners and carrier have strong incentives for proper commitment to the terms and conditions laid in the contract.

### The conditional money

All the features of the smart contracts are based on their simple conditional code – "if X occurs, then do Y". As well as improving the contract negotiation step, this concept can increase the transparency along the cargo journey.

A typical trip from North Asia to Northern Europe, utilizing 18,000 TEU container ships could make around 20 stops and take around 36 days to complete the voyage, according to S&P Global Platts analysis. Such long trips are very expensive for both supply chains and carriers and the failure to deliver cargo on time could cost carriers a lot of money.

In some cases terminal operators are the causes of these delays but the responsibilities lie with ship owners, which either have to pay penalty charges or increase their average speed to maintain the advertised schedule. In the latter case, carriers had to burn more fuel during the time increasing the bunker operating costs, thereby hurting the carrier's profits. The use of smart contracts will allow ship owners to transfer these additional costs to the parties responsible for them such as terminal operators.

All the data about the voyage will be uploaded to the central ledger and if the ship runs at the speed above the pre-determined one after being delayed in the port, the system will send the extra bunker costs to the terminal operators. The same concept will be applied if the carrier fails to deliver cargo on time after spending extra hours in a port somewhere on route. All the penalty charges will be levied on the companies in those ports, if at fault.

Full transparency of smart contracts combined with the "conditional" code provides a more accountable and reliable mechanism for the complex supply chain within which the containers industry operates. To take full advantage of smart contracts cargo and ship owners need to utilize

<sup>2</sup> Time Lagged contracts adjust the future contract rate based on a past change in the index.

the “if X occurs, then do Y” concept in various stages of the shipping process.

### What's next?

With the invention of the blockchain some technologies, such as the Internet of Things<sup>3</sup>, were able to come to life.

This technology enables a new level of real-time information exchange. Carriers could use the machine-to-machine concept to eliminate the spare container capacity on their ships.

Smart contracts embedded with IoT could send automatic emails to the carrier's customers about available container space if the owner of this smart contract failed to deliver the promised amount of cargo. In this case, the original customer could avoid paying the full penalty charge.

If the emergency customers buy containers with a discount

against a container index, the original cargo owner could have to pay only the discount instead of the penalty charge. Therefore, smart contracts may allow greater efficiency within the shipping industry, as well as potentially improve carriers' profitability.

The container market and shipping industry have several challenges ahead of them, such as volatility in bunker charges and pressure from the supply chains, so it may be a good time to accept changes.

Index-linked smart contracts do not try to completely change how ocean freight business is done, the money flow, delivery of containers and interactions between parties will be handled in the old, regular fashion. Blockchain technology simply proposes some improvements to the century-old industry through facilitating transparency of freight prices and improving accountability between all parties.

<sup>3</sup> Internet of Things is the concept of connecting physical devices over the internet, allowing them to communicate, exchange data and access applications.

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