Convergence.Tech

To Excise and Beyond.

The National Blockchain Pilot Report

How blockchain can benefit regulators, industry and the economy

May 2022

Project
Partners

Convergence.Tech would like to express its gratitude to the following organisations for their close collaboration and support during this project.

All images in this report have been kindly supplied by the Australian Distillers Association.

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Foreword

The Australian spirits industry is an example of how hard work and ingenuity can create a thriving sector contributing to the economy through jobs, tourism and innovation. Over the past decade the number of Australian distilleries has increased from 30 to almost 400, and the industry now supports over 52,900 jobs contributing $11.6 billion in added value to the economy.

The Australian Distillers' Association and Spirits & Cocktails Australia together represent spirits producers involved in the manufacture, marketing and sale of spirits throughout the country. Our shared vision is to promote a safe and vibrant spirits sector, which supports Australia's mature drinking culture and creates opportunities for economic growth and industry development.

The National Blockchain Pilot has successfully demonstrated the potential of blockchain technology to improve tax revenues, combat fraud and enhance the productivity and competitiveness of the spirits industry on the global stage.

Importantly for our Members, once implemented, the capability will also help protect honest distillers from illicit competition selling spirits products at unsustainable price points or earning unfair margins.

We commend our Members, Government and Convergence.Tech for their close collaboration during the Pilot, demonstrating the benefits that public-private partnerships can achieve.

We encourage the Australian Government to move forward with a full implementation of this capability to deliver these significant benefits for our Members, taxpayers and the broader economy.

Greg Holland
Chief Executive
Spirits & Cocktails Australia

Paul McLeay
Chief Executive
Australian Distillers' Association

Spirits & Cocktails AUSTRALIA

Australian Distillers Association

Executive Summary

In 2020, the Australian Commonwealth Government's Department of Industry, Science, Energy and Resources (DISER) released the National Blockchain Roadmap.[1] It quickly became a catalyst for a national conversation about Australia's blockchain strategy, helping to highlight the enormous opportunities for the technology across the economy.

This report describes the results from the Food and Beverage Provenance Pilot focused on improving the controls and administrative efficiency of excise duty on spirits.The Pilot was funded by the Blockchain Pilot Grants Program established as a result of the Roadmap.

The Pilot's objectives were to demonstrate the potential for blockchain to reduce the regulatory compliance burden for business, develop blockchain solutions for government and showcase to industry the viability of the regulatory efficiencies.

Convergence.Tech, a technology company and leading blockchain solution provider, led the Pilot, working closely with the regulator (the Australian Taxation Office) and the spirits industry (facilitated by the Australian Distillers Association and Spirits and Cocktails Australia).

The Pilot assessed key administrative and compliance burdens impacting the regulator and industry. Convergence.Tech addressed these challenges through the design and development of the Blockchain Excise Platform (BEP). The BEP connects industry (i.e. distillers/producers, distributors/wholesalers) and the regulator via a private permissioned blockchain. The blockchain provides a real-time ledger, digitising and tracking the excisable commodity (alcohol) as it is produced, matured and distributed across the supply chain.

Whilst the Pilot focused on spirits, the capability can be extended and applied to other excisable commodities (e.g. beer, fuel, tobacco) and supply chains (e.g. hydrogen), delivering significant benefits for regulators, industry and taxpayers.

The Pilot was widely recognised as a success by government and industry alike, with significant interest from overseas regulators.

The opportunity for the Australian Government is to extend its leadership in accelerating modernisation of regulation through the implementation and roll-out of the Blockchain Excise Platform. As the benefits outline below, an implementation would be self-funding, and through extending the platform developed in the Pilot, delivered quickly, without major dependency on over-subscribed government technology teams.

[1] https://www.industry.gov.au/data-and-publications/national-blockchain-roadmap

The expected benefits from a full roll-out of the solution were estimated from modelling performed in collaboration with KPMG Australia:

For the government

- *Expected to generate an additional $45m[2] in tax revenue per annum by reducing illicit activity*
- *Creation of highly detailed commodity production and supply chain data improves detection of non-compliance*
- *Automation and reduction in manual compliance activities to enable more efficient use of tax compliance resources through data-driven insights and industry transparency*

For industry

- *Improved traceability of alcohol enhances provenance, brand protection, and levels the competitive playing field through reducing the ability for bad actors to evade paying excise*
- *Removal and automation of compliance processes reduces red tape*
- *The digitisation of assets on the blockchain creates new revenue opportunities*

The Pilot also demonstrated the potential of direct integration with a fiat currency stablecoin, ANZ Bank's Australian Dollar stablecoin (A$DC)[3], the first managed by a major Australian financial institution. This would enable the movement of a commodity to automatically trigger remittance of the excise duty liability to the regulator entirely on the blockchain. Injecting financial liquidity to digital assets on the blockchain will provide benefits beyond compliance, opening up new revenue streams and collateral for industry.

An implementation of the BEP would be a foundational element of the development of a Trusted Distiller program - similar to the Australian Border Force's "Australian Trusted Trader"; used to streamline trade for accredited businesses. In exchange for access to excise-relevant information in real-time on the blockchain, the regulator could convey BEP participants additional administrative privileges compared to non-participating entities.

A national blockchain could be interlinked with those of other countries, creating a global network of Trusted Distiller benefits, underpinned by rich data for regulators to lower the costs and administrative burden of exports and imports.

In summary, it's about fairness. For too long bad actors have competed unfairly by exploiting the gaps in compliance monitoring. By helping to close these gaps, a blockchain-powered solution levels the playing field, ensuring a fairer world for producers, wholesalers and consumers alike.

[2] See Appendix II for detail on estimated benefits and methodology
[3] https://www.digfingroup.com/anz-stablecoin/

TARE 13·1 kg
1100
TARE 13·2 kg
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"The Blockchain Excise Platform would transform the administration of Australia's complex alcohol excise regime. Through tokenisation and automation, it would make enforcement more effective and compliance less costly for industry. It would also create the opportunity for manufacturers to innovate using blockchain technology, such as in product verification and decentralised finance."

Mark Bland - Partner, Financial Services, Mills Oakley

"The prospect of being able to trace goods through the supply chain is very exciting for the ATO. We're finding goods in the marketplace where it's difficult for us to establish whether the excise has been paid.

The opportunity for this type of technology is that it allows us to focus our efforts and have a differentiated approach and hopefully reduce compliance costs for the legitimate operators."

Anthony Barnard - Director, Excise Centre, Australian Taxation Office

Infographic – Pilot Summary

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Blockchain Excise Platform

The Blockchain Excise Platform digitally links Industry to the Regulator, enabling excise liabilities to be traced automatically whilst improving compliance, efficiency and transparency.

Securely sharing relevant production and supply chain data with the Regulator creates a trusted ecosystem that can transform how excise obligations are managed - an approach applicable to other commodities and jurisdictions too.

$45 Million
Annual estimated tax revenue boost

$5.9 Billion
Australian alcohol excise paid annually

$580 Million
Estimated annual tax gap

Benefits

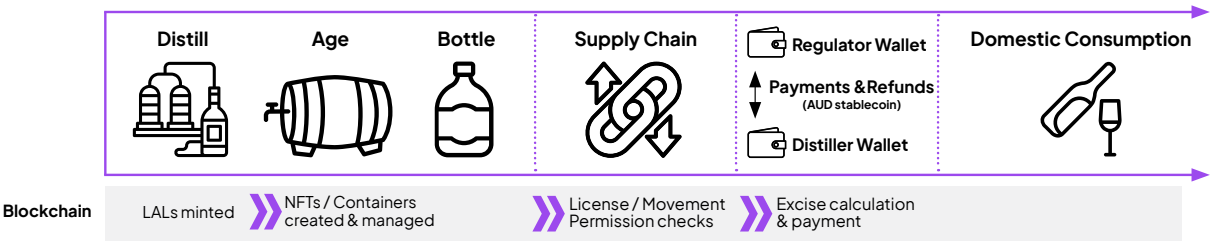
Regulator

- Real-time visibility of movement of commodities
- Removing / automating processes frees up compliance resources to focus on higher value activity
- Access to real-time data enables more accurate:
  - targeting of non-compliance
  - prediction of tax revenues
- Allows use of more sophisticated analysis tools to detect fraud and honest errors

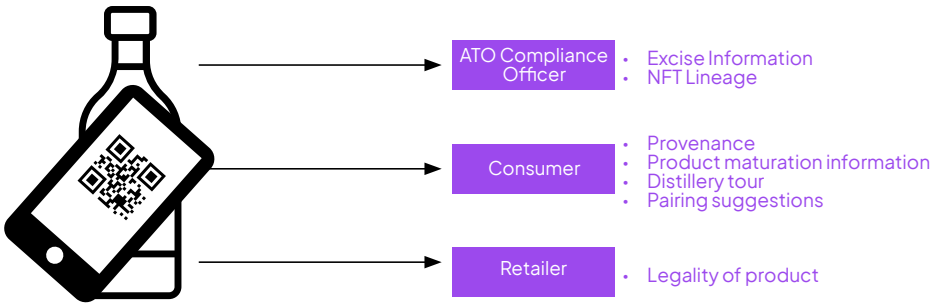
Industry

- Removal of cumbersome permissions and notifications relating to commodity movements
- Automated excise returns and payments, refunds and remissions
- Benchmarking information to improve business performance
- Levels playing field for honest players, by making it harder for others to illegally avoid paying excise
- DeFi opportunities incl. commodities trading and liquidity pools

How it works



One barcode, many uses



Introduction

Project Background

Blockchain is expected by 2025 to generate a global business value of more than US$175 billion per year; by 2030, that figure will reach at least US$3 trillion.[4] Australia is positioning itself to take full advantage of the economic benefits associated with blockchain by challenging researchers and companies to devise innovative applications and solutions as part of the National Blockchain Roadmap.

As part of this Roadmap, the Department of Industry, Science, Energy and Resources' Blockchain Pilot Grants program established the Blockchain Pilot led by Convergence. Tech. The Grant provided funding to demonstrate the potential for blockchain to reduce regulatory compliance burden for business. The Pilot sought to address the challenges of complying with excise tax regulations throughout spirit production and supply.

The objectives of this Pilot were to:

- reduce compliance costs for businesses
- ensure buy-in from regulators
- bolster blockchain literacy and contribute to the overarching objectives of the national roadmap
- develop blockchain solutions for government and showcase to industry the viability of the regulatory efficiencies of blockchain
- support the inclusion of blockchain in broader policy work to increase management capability around digital technologies.[5]

For the tracking and collection of excise duty on spirits, blockchains present a number of advantages. Most importantly they are immutable, which when combined with their end-to-end encryption and decentralised nodes, makes them much more resistant to hacking than traditional databases. This allows them to act as a trusted data source. This data can power automated, fully traceable smart transactions, opening many opportunities to reduce red tape, fraud, and improve efficiency for businesses and governments.

The Australian spirits industry is growing rapidly thanks to many new small-scale craft distilleries and the introduction of the Alcohol Manufacturer Remission Scheme in 2021.[6] There are now over 350 distilleries in Australia, up from just 28 in 2014, and more than the number found in traditional markets such as Scotland.[7] In Australia spirits[8] have the highest rate of excise duty of any category of alcohol, and approximately $3.6 billion in excise duty is paid on spirits per year.[9]

The spirits industry directly contributes over 52,000 jobs and adds $3.9 billion to the economy, with a further $7.8 billion added indirectly through financial, arts and hospitality services.[10] It is now large enough to be represented by two industry bodies - Spirits & Cocktails Australia, and the Australian Distillers Association.

Blockchains are a type of distributed ledger, where many participants can jointly store data in cryptographically secure "blocks".Information within a block can include all the items created, destroyed, and transacted upon, including extra metadata about the items and transactions. Once the blocks are written and confirmed, they cannot be changed, making the data on blockchains extremely reliable and accurate.Transactions are performed through smart contracts - agreements between participants that are written as computer code, and so can be executed automatically, on a schedule, or on demand.

[4] Department of Industry, Science, Energy and Resources 2020, National Blockchain Roadmap, available at https://www.industry.gov.au/data-and-publications/national-blockchain-roadmap
[5] Department of Industry, Science, Energy and Resources 2020
[6] The Alcohol Manufacturer Remission Scheme allows eligible producers to automatically remit excise duty to a maximum of $350,000 per year. Because of this, a significant proportion of small distillers will not be required to pay any excise duty. However, tracing production on a blockchain platform allows the ATO to audit producers under this cap, and allows producers to easily prove compliance and predict when they will exceed the threshold
[7] Spirits & Cocktails Australia and Australian Distillers Association 2022, 2022 *Pre-budget Submission - Unleashing the Potential of the Australian Spirits Industry*
[8] References to 'spirits' include references to ready-to-drink spirits ('RTD's')
[9] Spirits & Cocktails Australia and Australian Distillers Association 2022
[10] Spirits & Cocktails Australia and Australian Distillers Association 2022

Excise in Australia and the Case for Change

The fundamentals of Australia's excise system - like those in many other countries - have changed little over its 100 year history. With technological progress there have been practical changes - the days of "excise men" collecting tax at the distillery door are now over, for instance. However the regulations governing how excisable goods can be produced and moved have largely remained unchanged. While recently proposed administrative reforms will help smaller producers in particular,[11] the excise system remtains a complex world requiring specialised knowledge to navigate with potentially large penalties for mistakes.

The complexities of the excise system impose significant regulatory compliance costs, including the time and money that businesses spend on understanding their obligations, completing and lodging PDF forms, and complying with reporting requirements.

Illicit activities significantly contribute to an estimated annual net alcohol excise gap (the difference between the amount of tax the ATO collects and what it would have collected if everyone was fully compliant with excise law) of approximately 9%, or $582 million (ATO 2018–19 estimate).[14] [15] Internationally, distilled spirits make up more of illicit alcohol consumption than fermented beer and wine, due in part to their higher cost and alcohol content. [16]

An underlying cause of many of the inefficiencies of Australia's excise collection is a lack of visibility of trusted relevant data, which holds back regulatory progress. Regulators today have the statutory authority to collect granular data relating to the production and distribution of alcohol. But they are prohibited from doing so at scale due to manual and time consuming audit processes. Strict control and oversight over what alcohol producers and suppliers can do is needed to ensure a level playing field, which leads to stringent reporting requirements for production, storage and sale. This creates administrative burdens for the vast majority of excise licence and permission holders who follow the rules.

This Pilot explored the potential for blockchain technology to address these issues. Based on extensive consultation and collaboration with industry and government, Convergence.Tech has developed the Blockchain Excise Platform (BEP). This report outlines the process and technology used, the organisations involved and the potential benefits of a scaled implementation for taxpayers, business and government.

This report provides a compelling case for accelerating the benefits of modern regulation through leveraging blockchain capabilities. The Pilot has provided the opportunity and evidence to re-think how excise control and compliance can be transformed for regulators and industry. At scale, the BEP will reduce red tape for compliant businesses, improve tax collection and enhance detection of excise fraud. Whilst the Pilot focused on alcoholic spirits, the capability can be applied to other excisable commodities (e.g. beer, fuel, tobacco) and supply chains (e.g. hydrogen), with significant benefits for regulators, industry and taxpayers.

Like hydrocarbon fuel and tobacco, all beer, brandy, full-strength bottled spirits and ready-to-drink spirits product (RTDs) sold to the public in Australia are subject to excise duty[12] based on product category and the volume of pure alcohol (i.e. ethanol) they contain. Spirits, for example, are taxed at $90.78 per litre of pure alcohol as of May 2022.[13]

Spirits have varied production processes and supply chains, but generally have these steps in common:

1. *Raw spirit is created through a distillation process.*
2. *This is then processed in various ways. It could be matured, blended, mixed, flavoured, or any combination of these.*
3. *The output is a finished spirit, which is then bottled and stored for sale.*
4. *Sales can be direct from the distiller to the public, retailer or more often through a wholesaler or distributor.*

To improve industry cash flow and push the excise collection as close to the point of consumption as possible, excise is not payable when goods are sold "underbond" - that is, to another business with an excise licence. Excise duty is only payable when goods leave this underbond environment, usually when sold to a retailer. This is known as "entry into home consumption". The liability to pay excise duty can also be waived, or "remitted", in specific circumstances and on request - for example, where underbond goods are not destined for sale in Australia (e.g. exports or spoiled goods).

[11] A number of changes to excise payment and administration are proposed to take effect from July 2023. See https://www.ato.gov.au/General/New-legislation/In-detail/Other-topics/Streamlining-excise-administration-for-fuel-and-alcohol/
[12] References to 'excise duty' include references to 'excise-equivalent customs duty'
[13] Net alcohol tax gap is the ATO estimated (gross) tax gap less amendments from seizures and compliance activities
[14] https://www.ato.gov.au/About-ATO/Research-and-statistics/In-detail/Tax-gap/Alcohol-tax-gap/#:~:text=For%202018-19%2C%20we%20estimate,was%20paid%20in%202018-19
[15] See Appendix I for details
[16] Euromonitor International 2018, Size and Shape of the Global Illicit Alcohol Market, p7

> “From a distiller’s perspective, the Blockchain Excise Pilot has the potential to streamline excise administration, reduce counterfeit product and parallel importation risks, lay the foundations for a “trusted trader” style arrangement with the ATO, and simply provide confidence to producers, as well as their investors, customers, and other stakeholders, that their excise obligations are 100% accurate, compliant and up to date.”

William Edwards - Founder at Archie Rose Distilling Co.

Pilot Solution Overview

This section provides a brief overview of the Blockchain Excise Platform (BEP) as developed during the Pilot. More details can be found in the Solution Design and Architecture section below.

Pilot Platform Overview:

The BEP connects the industry (i.e. distillers/producers, distributors/wholesalers) and regulator via a private permissioned blockchain, a real-time ledger for excise duty liabilities. The regulator has access to all excise related data on the platform, industry participants can only view their own, ensuring privacy of commercially sensitive information.

The BEP creates digital tokens representing each excisable unit of the commodity (for the spirits industry, Litres of pure alcohol (LALs)). This enables unit level traceability from creation, storage and movement through the supply chain to domestic or export destinations.

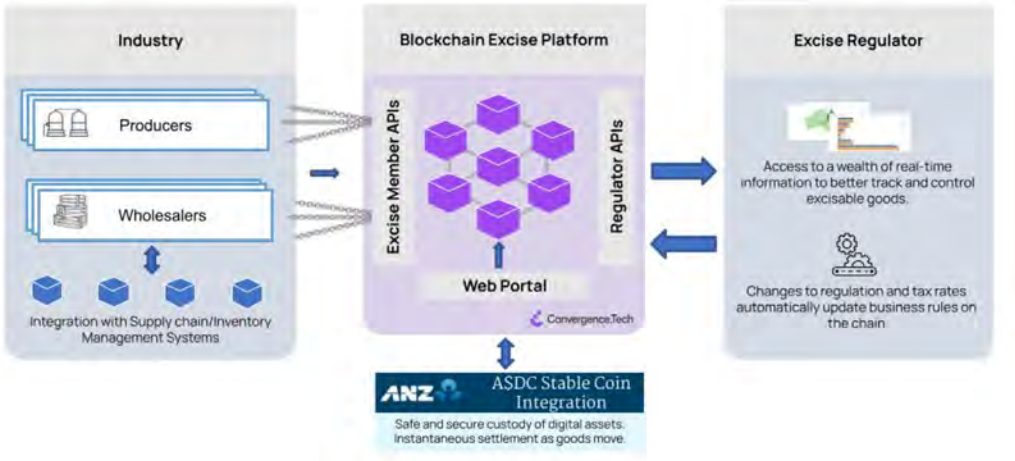


Figure 1: High-Level Solution Architecture of the Blockchain Excise Platform.

The heart of the BEP is its blockchain ledger, a system of record which holds information on the production and movement of alcohol. LALs are represented by digital tokens (commodity stablecoins) on the blockchain, while containers (such as bottles, casks or batches) are created as uniquely identifiable non-fungible tokens (NFTs).

With granular production and supply chain data on the blockchain, the platform can apply controls through intelligent business rules to enable the removal or automation of many current excise administration tasks.

A summary of the key capabilities of the BEP follows:

Data sourcing and integration

Data is sourced for the blockchain via one of two methods:

1. For larger distillers and wholesalers with an Inventory Management System (IMS), excise-relevant data is sourced directly from the IMS using an API connection, automatically recording to the blockchain in near real-time. The IMS integration provides high quality granular information for the regulator to access. The distiller/wholesaler doesn't need to learn and use a new system and that rather, after performing actions within their IMS such as a production order, the resulting LALs, product and container information are recorded on the blockchain.

2. Smaller distillers may lack the scale to have implemented an IMS, typically using spreadsheets or hand-written ledgers to keep track of their excise duty liabilities. The BEP provides an intuitive Graphical User Interface (GUI) to record key excise related information to the blockchain, aligned to the distiller and wholesaler's workflow. This gives smaller producers a better way to comply with their excise obligations, and a secure and transparent means to share data with the regulator.

Automation of Excise compliance processes and controls

Trusted organisations on the BEP are able to record the movement/sale of LALs and containers (NFTs) between them. The concept of 'Trusted' is enabled by the application of controls to check entities' license status and that necessary movement permissions are in place at the time of transfer. This level of automated control would significantly reduce the occurrence of non-compliant movement of goods.

The BEP also automates the transfer of excise duty liability to the receiving entity in an underbond transfer. For example when a distiller sells product to an underbond wholesaler, the excise duty liability and LALs automatically transfers to the wholesaler entity on the blockchain. When an entity sells the product into home consumption (out of bond), excise duty liability falls due. The out of bond transfer triggers automatic calculations and population of an Excise Compliance form, compliant with regulatory requirements, for review and submission. Form submission can be scheduled automatically by the BEP.

The regulator is able to update tax rates on the blockchain, which will automatically update calculations of excise duty liability applicable to LALs. This will save participating distillers/ wholesalers significant administrative time by removing the current process of needing to manually update their systems each time the tax rate changes.

Unit level traceability will also provide the ability for compliance spot checks to be undertaken at any point across the supply chain. For example, a Regulatory Compliance Officer could visit a retail store, scan the barcode of a bottle of spirits to check excise compliance. The Officer's device would link to summarised information from the blockchain showing the excise status and lineage from production through the supply chain. If the barcode did not link to the blockchain, the excise status was not appropriate or the bottle should be in a different location, the Officer would be able to investigate how the product was sourced. This would drastically cut the cost of proving excise non-compliance, as well as allowing random audits of retail shelves. Additionally, by using GS1 technology barcodes, excise status and provenance of the product can be conveniently displayed to consumers and retailers. More information on this technology can be found in the Comparison of Tracking Technologies section of the report.

Near real-time access to granular data and insight

The volume and granularity of production and supply chain unit level data captured from all participating organisations will provide significant benefits for the regulator and industry.

The BEP provides data at scale in near real-time, enabling a significant uplift in the regulator's analytical capability. The regulator has the statutory authority to collect granular data from licensees by way of manual audits. Audits are labour intensive, cannot easily scale and impose administrative burden on industry. The automated provision of granular data from the BEP will improve the regulator's forecasting and analysis. This will enable more effective allocation of investigative resources to identify illicit activities and non-compliance.

The data will also provide insight for industry. Participating companies will be provided with benchmarks for key metrics, identifying where they may be lagging or demonstrating best practice. They can also view their own current and historical transaction and container data, with the ability to search and export for deeper analysis. Insight will be provided for Industry Associations showing the growth in volume of spirit types by geographic area, over time. The data will be provided in aggregate, to prevent the ability to infer an individual distiller's commercially sensitive information.

Financial liquidity for digital assets

As part of the pilot, the BEP was integrated with ANZ's **fiat-currency stablecoin.**[17] This integration enables automatic scheduling and remittance of payments triggered by the movement of goods. It also injects financial liquidity to the commodity stablecoins providing industry with new revenue streams, collateral, and safe and secure custody for their digital assets.
For more details, see ANZ Bank's Australian Dollar Stablecoin section below. The widespread adoption of automated stablecoin payments may not be imminent, due to legislative change required (see Legislative Landscape section). In the meantime, the BEP integrates with traditional payment mechanisms.

[17] Fiat currency-pegged stablecoins are cryptocurrency blockchain tokens whose value is based on the value of the backing national currency. For example ANZ Bank's stablecoin has a value pegged to the Australian Dollar

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The Future of Alcohol Excise

The Pilot has identified significant improvements to business processes and regulatory oversight. The following section fast forwards a number of years after a full-scale implementation of the blockchain platform, describing how life will be easier for businesses and regulators alike.

A Day in the Life - Deakin Distillery

The Pilot has identified multiple opportunities for distillers to benefit from a trusted blockchain platform, including streamlined compliance and new revenue streams. The scenario outlined below is intended to paint a potential future for staff in a fictional distillery.

Lindsay Smith logs into her work computer early this morning. It is May 1 and she is starting another day as operations manager of Deakin Distillery, a rapidly growing gin and whisky producer based in rural Victoria.

An alert shows in her inventory management system (IMS) about an upcoming shipment to Barton Bottle Shop. The Blockchain Excise Platform (BEP) has instructed Deakin's IMS to cancel the shipment, as Barton has been placed in receivership and cannot receive any excisable products. Lindsay sighs in relief at narrowly avoiding an unpaid bill.

She reviews yesterday's production of raw gin and whisky spirits. The BEP has recorded what Deakin produced, privately and securely. She compares the production losses to industry-wide benchmarks, noting with satisfaction that her high-tech setup is paying dividends by keeping losses well below the industry average. Until last year Deakin had been using the BEP as a basic ***inventory management tool,*** a free service provided by the government to help small distillers automate record keeping, excise compliance and returns and avoid the frustrations of spreadsheets. But as Deakin grew and needed more sophisticated tools, the ability to directly integrate with an IMS has saved her staff much time.

She then reviews today's shipments. Deakin's May Day special is due for bottling at 10am, she sees that many bottles have already been assigned for immediate shipping to Wentworth Wholesaler, a new customer who first placed an order only yesterday. Thanks to the BEP, the ***necessary licence checks and movement permissions have been automatically approved,*** and the shipments can immediately be sent. Some of the new bottles will need to be warehoused for a short time in Deakin's temporary storage across the street. Thankfully no extra licences or approvals were needed to move alcohol here, as Deakin is a *Trusted Distiller* [18] thanks to its participation in the BEP. She also checks that all ***exports for today are pre-approved*** by the Australian Border Force's (ABF) automated checks on the blockchain's data. Most of these exports are heading to Europe, where they will be easily cleared for entry as the destination governments operate compatible blockchains that share data seamlessly. This data can be trusted across borders as regulators can trace every bottle back through the international supply chain to its original source.

The phone rings. It's her boss, wanting her to share current production data with a potential investor. As the data is stored on the blockchain, it can be relied on for the investor's financial analysis. She obtains the investor's email address and adds it to the "approved investor" list in the BEP, knowing they will receive an email shortly granting access. She is a bit of a data nerd and this easy sharing of information is one of her favourite features of the BEP. She has already used it to ***share data on upcoming production with her supply partners,*** cutting time to market for newly bottled products by over a week.

[18] See Benefits for Industry section for details of a conceptual *Trusted Distiller* programme

She then checks the latest data on fraud. The 2D barcode on each bottle's label links consumer smartphones to a web page ***proving the bottle's authenticity.*** Fake lot numbers and barcodes have always been an issue in the alcohol industry, but fraud is on a steep decline thanks to individualised barcodes on each bottle. Overseas consumers can now be confident that they are buying a legitimate Deakin product because the international network of excise blockchains verifies the product was produced by Deakin, imported and taxed correctly, and sold in the correct retail shop. Scans of duplicate barcodes are recorded and analysed to find where fake Deakin products are being sold.

The same web page also promotes Deakin's loyalty programme. Already many customers have signed up for this using a blockchain-powered identity service, choosing to share information such as city, hobbies, age. She makes a note to send them all a message later to gauge the interest in several new products Deakin is exploring.

She then looks at the payments from customers last week and sees that all were settled using the ***Australian Dollar stablecoin*** linked to Deakin's BEP wallet. This has allowed both the invoice payments to occur on receipt of goods, and for the excise payments to be executed automatically on Deakin's next excise return date. Increasingly Deakin is using its BEP wallet to store all its digital assets safely and securely, allowing the distillery to access both traditional short-term money markets as well as more experimental financial products.

She's due to meet Deakin's CFO in a few minutes, so she takes the opportunity to review the latest figures from Deakin's ***BEP-linked marketplace***. The latest offering of newly casked whisky has been fully bought out by a Decentralised Autonomous Organisation (DAO) - something that's been happening a lot lately. This DAO plans to mature the whisky for 10 years before selling the cask on the open marketplace, all the while using the collateral as a loan for Australian Dollar stablecoin to invest in other markets. Deakin will store the cask securely and share sampling data with the DAO until the product is mature.

Lindsay looks at Deakin's own commodity investments on the marketplace, and makes a note to chat to the CFO about increasing their investment in the various liquidity pools for whisky. Many of these have earned a good return so far this month, especially the pool pairing 20-year whisky with certified green hydrogen tracked on a separate blockchain platform.

A Day in the Life - Excise Compliance

The Blockchain Excise Platform also provides new opportunities for the Regulatory Authority responsible for monitoring, controlling and collecting the appropriate excise from the production and sale of a commodity, in this case, spirits. The scenario outlined below is intended to paint a potential future for the regulatory compliance teams. Naturally it will be under the purview of the Government to determine exactly how the BEP is implemented.

Compliance officer David Scott is looking into suspected tax evasion in central Melbourne. The Blockchain Excise Platform recently sent an alert for the area, as there have been several bottle scans by consumers of Deakin Distillery's whisky that were claimed as exported by a wholesaler suspected of excise fraud. Analysing data from the BEP, he has narrowed down the retailer where these bottles were sold to the two most likely candidates in the area.

Entering a store, he picks up a bottle and scans the barcode with his phone. The ***Regulator App*** on his phone loads an information page linked to the data on the blockchain showing the history of the movement of the LALs and bottle.

Ah, interesting, he thinks!

The page clearly shows the history for the bottle's contents, from distillation through maturation and bottling, through to a legitimate sale by Deakin to the suspect wholesaler. The trail ends here, with the wholesaler claiming these bottles were exported and therefore no excise was payable.

Using his phone, David quickly sends an infringement notice to both the retailer and wholesaler. As it's not a first offence, the BEP will temporarily ***block all shipments*** from this wholesaler until the ATO can discuss the problem with the owners, and all the bottles claimed as exported now must have excise duty paid on them. David makes a note to analyse all the data from this wholesaler to identify more potential export fraud, as well as all transactions with similar patterns across the industry.

David smiles, thinking back to the days before the BEP and the tracking of individual bottles on it. Back then, compliance activities could only be loosely targeted. Automated algorithms that run in the background looking at the rich transaction data from the BEP have significantly r***educed the time to complete audits and identify illicit activity.*** These algorithms also allow crowdsourcing of ***compliance at scale*** by leveraging customers themselves - a customer scanning a bottle for marketing information also alerts the ATO if the bottle should or shouldn't be for sale in Australia.

Most distillers and wholesalers - then as now - follow the rules and it's great that the compliance team can now focus so much more precisely on likely fraudsters. It's a smaller team now, more specialised, but the tax gap is much smaller because the BEP ***makes the supply chains so much more visible.*** This levels the playing field for distillers and wholesalers that follow the rules. For too long bad actors often got away with higher margins or revenues by illegally evading excise duty.

An alert pops up on David's phone from the Regulator App. A nearby liquor store employee has scanned a bottle that should have been exported to France last week, according to the data and export declaration stored on the blockchain. The owner has just reported this to the ATO. With a few presses, David flags the exported bottles as suspect, and France's own excise blockchain will pick up the alert when the goods arrive. He heads out the door to thank the owner in person and investigate other bottles from the same wholesale shipment.

All of the above is possible through a full-scale rollout of the BEP; the following sections of this Report detail how the Pilot developed the capabilities that will deliver these benefits.

"The Australian distilling industry will benefit from better protection from illicit competition through the scaled uptake of blockchain technology, improving outcomes for manufacturers, distributors and consumers."

Greg Holland - Chief Executive Officer, Spirits and Cocktails Australia

Benefits Summary – Automation, Compliance and Insights

KPMG Australia has estimated that a comprehensive, industry-wide blockchain implementation with end-to-end traceability for all excisable and excise-equivalent alcohol beverages would reduce the net alcohol tax gap by at least $45 million per year.[19]

Benefits for Regulators

Data provided by an industry-wide blockchain excise solution allows much more efficient and scalable compliance. Staff can be freed from simple enforcement of compliance processes on honest actors, and can instead focus on businesses at high risk of committing excise fraud, using sophisticated algorithms over the rich data stored on the blockchain.

Having better visibility over the production and supply of alcohol allows regulators to better understand the industry and predict future tax revenues. While automation will save costs for the regulator, it would also mean excise rates can be more easily changed and additional categories more easily applied to excisable alcohol, [20] so excise rates can better reflect the social harm caused by each product.

The BEP would allow the excise status of the contents of any bottle in the supply chain, including on retail shelves, to be viewed on demand. This has the potential to drastically reduce the cost for the Regulator to prove non-compliance. In addition, the ability for revenue agencies, consumers and retailers to do this would significantly improve the ability to monitor sales channels for illicit activities, effectively crowdsourcing some aspects of compliance.

Benefits for Industry

Beyond the straightforward automation of existing excise administration, a blockchain implementation supports the development of a Trusted Distiller program - similar to the Australian Border Force's "Australian Trusted Trader" program used to streamline trade for accredited businesses. In exchange for access to excise-relevant information in real-time on the blockchain, the regulator could grant BEP participants additional administrative privileges compared to non-participating entities.

Being a *Trusted Distiller* could unlock administrative savings to businesses by automating or reducing manual activities, such as for:

- licence renewals; [21]
- movement permissions; [22]
- refunds;
- remissions;
- drawbacks;
- samples;
- losses; and
- destruction.

[19] See Appendix I for details of this calculation
[20] In Australia, all excisable alcohol products are categorised into tariff items which determine their excise rate. For a full list of current tariff items, see https://www.ato.gov.au/business/excise-on-alcohol/lodging,-paying-and-rates---excisable-alcohol/excise-duty-rates-for-alcohol/
[21] Removing licence renewals is part of a set of changes proposed to take effect from July 2023. See https://www.ato.gov.au/General/New-legislation/In-detail/Other-topics/Streamlining-excise-administration-for-fuel-and-alcohol/
[22] Movement permission requirements will be reduced as part of a set of changes proposed to take effect from July 2023. Currently permission is required for movement between locations for the first time. Proposed amendments would cover all locations controlled by a permission holder. See https://www.ato.gov.au/General/New-legislation/In-detail/Other-topics/Streamlining-excise-administration-for-fuel-and-alcohol/

“By making sure there is compliance it means we won’t have rogue operators, creating a level playing field for everyone. And that’s probably the most exciting thing – the transparency and dynamism of the technology. It’s this capability and opportunity to unlock more significant improvements that will drive strong uptake of the technology throughout the industry.”

Paul McLeay - Chief Executive Officer of the Australian Distillers Association

Most of these benefits would also be welcomed by wholesalers and distributors with excise licences and permissions, as well as distillers.

A *Trusted Distiller* approach may also ease another key industry-wide problem. Industry consultations suggest that excise duty liabilities are sometimes due before invoices are paid, due to delays in receiving payments for sales of goods into home consumption. This creates significant cash-flow challenges for business. The BEP's smart contracts could link payment of excise to the payment of related invoices, so that excise on delayed payments is paid when the business' own invoice is paid. Legislative amendment is likely required to enable such a transition.

A national blockchain could also be interlinked with those of other countries, creating a global network of Trusted Distiller benefits, underpinned by rich data for regulators to guarantee compliance.

The web interface for the BEP could also be adapted to be used by smaller producers as a basic Inventory Management System. Today many rely on spreadsheets to track production, orders and payments. These are prone to human error and cause double entry of tax information. By recording this data directly into the BEP, both of these could be reduced.

Convergence.Tech envisages that distillers' data stored on the BEP could be shared in many ways, such as:

- with underbond supply partners to improve distribution efficiency;
- with outside parties for insurance, finance or investment purposes. For example, automated approvals for loans could be granted after a bank is given instant access to high quality production data;
- export data to run more sophisticated analyses on their production and supply chains; and
- with industry bodies to supply industry benchmarking data.

Tokenising real-world assets opens up new revenue streams for distillers as well. This goes beyond pre-selling maturing spirits, to a range of novel financial products. See Beyond Excise section below for details.

Illicit products have serious implications for consumer safety, result in loss of consumer confidence in trusted brands, create an uneven playing field in the industry, and can negatively impact a company's reputation. Increased compliance and a reduction in illicit activities through a comprehensive blockchain implementation with end-to-end traceability will also benefit Australian distillers by increasing consumer confidence in the authenticity and provenance of each product sold on Australian retail shelves. The BEP could also be used to monitor the legal maturation requirements applicable to some spirits.[23]

Furthermore, some black-market products on retail shelves are not sold at a lower price than their legitimate competitors who have earned a higher price point because of the value of their product or service. These black-market products earn substantially higher margins as a result. The BEP can help to level the playing field for honest distillers and wholesalers by making this unfair activity much harder.

[23] Whisky, rum and brandy must be matured for 2 years in order to be legally named as such in Australia. See https://www.ato.gov.au/law/view/document?LocID=%22SAV%2FALCOHOL%2FFT12.3.3%22&PiT=99991231235958#:~:text=Maturation%20requirement,is%20made%20entirely%20of%20wood

Beyond Excise – A Flexible Tool for Tokenising Value

Opportunities Beyond Alcohol

Convergence.Tech's Blockchain Excise Platform uses many concepts and approaches applicable beyond Australian alcohol excise.

The ability to track both LALs and their various containers through different production and supply processes makes the platform an attractive option for environmentally and socially friendly policies. Using the BEP's approach, regulators and consumers can verify products meet claims for organic, carbon-neutral, or ethical sourcing.

However, the most significant innovation in the Pilot is the successful tokenization of real-world commodities into the realm of decentralised blockchain smart contracts. The Pilot has proven the ability to mint reliable, traceable commodity-based stablecoins and NFTs into a system that can update them in real time, and assign and change ownership of these now digitised commodities. The Pilot has successfully integrated with ANZ's Australian Dollar stablecoin, enabling fiscal value to be assigned to any tokenised commodity tracked on the blockchain.

This doesn't just need to be one commodity either. Whilst extending to other alcohols is a natural next step, the platform could also be used for tracking most types of commodities, such as hydrocarbon fuel, hydrogen, water, timber, or precious metals. It could also be extended to any other trackable resource such as real estate, medical devices or automotive parts. All of these commodities can be digitally tokenized and entered into this traceability and ownership tracking solution. If there were a government and bank-backed fiat-currency stablecoin available for these tokenized commodities, then any of these could be leveraged within the Decentralised Finance (DeFi) platforms mentioned above.

By its very nature, this decentralised blockchain platform can extend to other nations and support international trade. International trade can be based on these commodity tokenizations and international agreements can be used to form bridged smart contracts between regulatory authorities, much like how multiple cryptocurrencies are transitioning across multiple blockchain platforms in the public decentralised domain today. Sharing key data between governments internationally means the Trusted Distiller concept could be extended between nations to lower the costs and administrative burdens of exports and imports.

New Revenue Opportunities for Distillers

The BEP provides a very detailed and reliable digitised commodities environment that is completely compatible with the latest and future developments in the DeFi ecosystem.

This capability will empower distillers with a complete digitised inventory representing their product in stills, casks, bottles, and any other container type. This means that they can enter this product into a decentralised commodities marketplace where potential uses go far beyond pre-selling alcohol while it's maturing. Here financial institutions, distillers and other authorised and approved investors can purchase maturing alcohol or leverage stock for capital-raising activities.This can occur whilst ensuring tax obligations are met and digital representations of goods are legitimate.

The rich nature of the metadata that accompanies each NFT representation of a commodity allows for the creation of a robust futures and options contract marketplace and even the bundling of differing financial assets into vehicles more attractive to institutional investors. For example, NFTs representing options, futures, physical commodities and loans collateralised by real-world assets could be bundled and sold as a single package with lower risk than the individual components.

The decentralised nature of this ecosystem could also lend itself to the creation of more exotic trading platforms including commodities liquidity pools or the creation of decentralised autonomous organisations built to democratically leverage a treasury of digital commodities. These can create bond and lending opportunities for distillers, financial institutions, workers, and the government itself to raise capital based on the value of the tracked commodities, both fungible and non-fungible.

"We have an exciting vision for the future of excise and other duties. We imagine a world where, through implementation in countries of origin, transit and destination, products can be tracked and traced from distilleries in Scotland to the marketplace here in Australia – or vice-versa from our own amazing whisky distilleries in Tasmania to around the globe. This technology makes it achievable."

Warwick Ryan - National Public Policy Advisory Lead, KPMG

A Potential Rollout Plan

Figure 6 shows a possible roadmap to productionise the Pilot BEP. After a launch for tracking spirits excise, the platform should then be extended to cover all other excisable alcohol (beer and brandy) to complete this ecosystem.

The launch of a marketplace for selling LAL and NFT tokens should come next to open up new revenue streams for producers and accelerate the financial and brand innovation that will set Australian producers apart on the global stage.

The next logical steps are to extend the platform beyond alcohol excise to track excise for petroleum fuel and a non-excisable fuel commodity such as hydrogen, to improve traceability for both fuel types, before adding the final product excisable in Australia, tobacco.

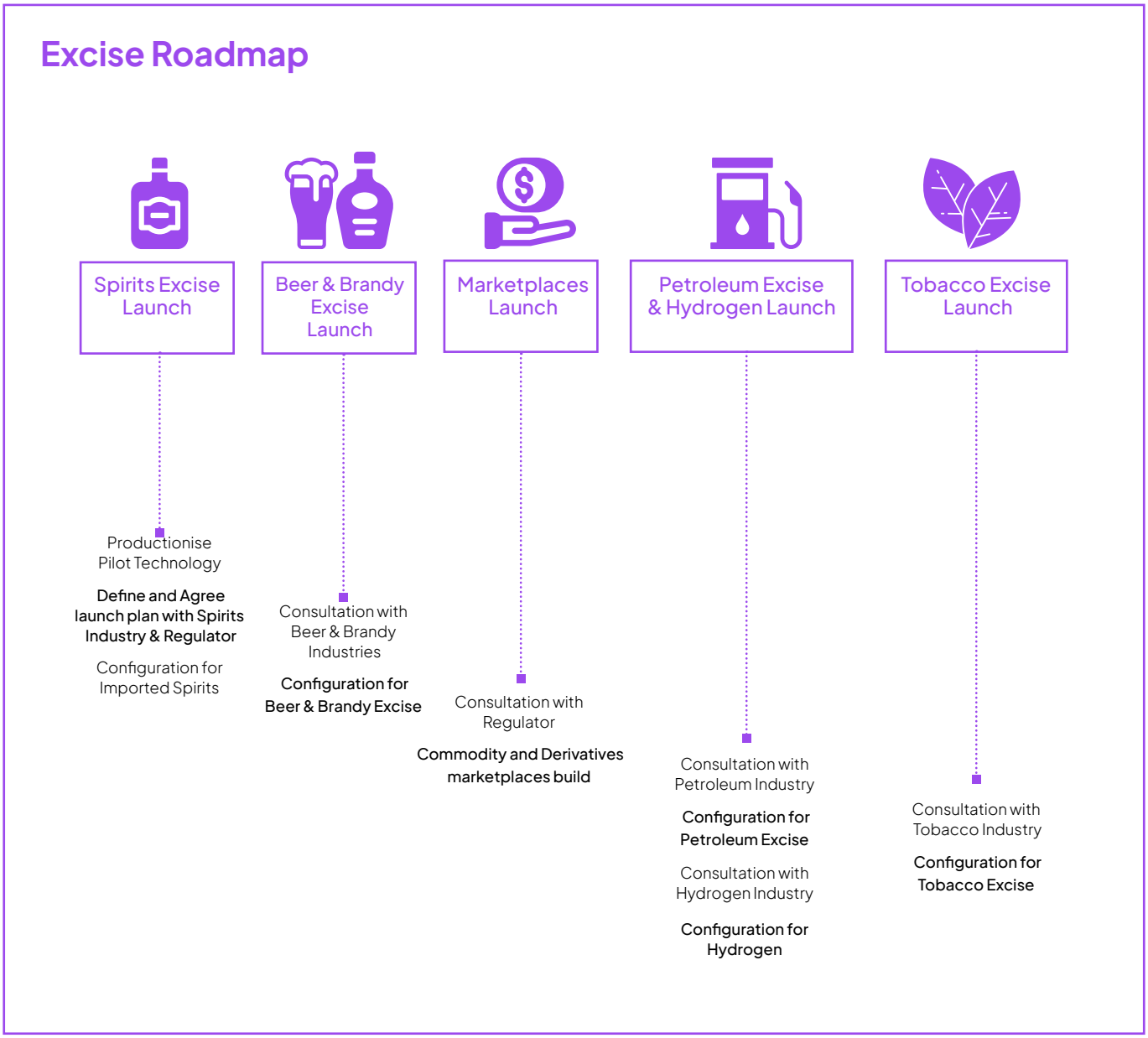

Figure 6: Potential Future Roadmap for the Blockchain Excise Platform.

Showcase Event

Event Summary

To showcase the Pilot's capability, the National Blockchain Pilot event was held at the National Press Club in Canberra on the 28th of March 2022. The event aimed to educate interested parties on the capability developed, demonstrating its functionality and outlining the benefits achievable from a scaled implementation for both industry and government.

John Pollaers OAM - Chair of Convergence.Tech and Chancellor of Swinburne University - gave the opening address for the event.

John Pollaers

Capability Demonstration

Figure 2: Convergence.Tech Australia's General Manager Doug Campbell speaks at the National Blockchain Pilot event.

Event Attendees and Panel Members

Figure 3: The panel discussion at Convergence.Tech's National Blockchain Pilot event.

The event was well attended with approximately 60 guests, including several high profile government and industry stakeholders. In addition to the solution demonstration, a panel discussion was held with key partners and government representatives. The panel members were:

- Anthony Barnard - *Director, Excise Centre, Australian Taxation Office*
- Emma Davine - *Head of Public Sector, Institutional, ANZ*
- Jason McDonald - *Chief Economic Adviser, Head of Deregulation Taskforce, and First Assistant Secretary of the Regulatory Reform Division in the Department of the Prime Minister and Cabinet*
- Paul McLeay - *CEO of the Australian Distillers Association*
- Warwick Ryan - *National Public Policy Advisory Lead, KPMG*

The panel was moderated by Jon Stone, Managing Director, Digital Transformation, Convergence.Tech.

Figure 4: Convergence.Tech's National Blockchain Pilot event was attended by more than 60 people.

"A future comprehensive blockchain solution could completely overhaul and totally automate many of the existing processes that require interaction with the ATO including full automation of the complex and burdensome calculation of excise liability."

David Sofra, Partner - KPMG Australia

Media Coverage

On the morning of the event, the Pilot was covered in The Australian by journalist Cliona O'Dowd (Blockchain set to combat tax fraud). A range of other media coverage of the Pilot included:

- 29/3/2022 - Digfingroup.com - ANZ puts its new A$DC stablecoin to work
- 29/3/2022 - The National Tribute - World-1st Aussie blockchain pilot revolutionises 100 y-o tax system
- 29/3/2022 - cointrust.com - Convergence Trials Blockchain Solution for Recovering Lost Tax Revenue
- 20/7/2021 - Food & Drink Business - Federal grant to simplify excise taxes
- 31/3/2022 - Publicaccountant - World-1st Aussie blockchain pilot revolutionises 100–y-o tax system
- 8/4/2022 - Startup Daily - Revolutionizing excise tax

Legislative Landscape

Excise Legislation

To fully realise the benefits of the BEP, legislative change is likely needed in several key areas. See Appendix II for KPMG's detailed analysis of these, of which a summary is below.

Overall, the existing legislative framework of the Excise Act 1901 would likely enable implementation of the Pilot BEP solution. For example, it could be used to prescribe the use of a blockchain like the BEP for businesses wishing to be treated as Trusted Distillers, businesses who pose a high compliance risk, or even all excise licensees.

Currently the excise system requires permission from the ATO before goods can be moved between specific locations, enter for home consumption or exported.[24] Permission may be granted for a single movement or on an ongoing basis.[25]

To realise the full benefits of the BEP however, it would be best to require a notification of movements as they occur, instead of up-front permissions. This would allow all BEP participants to trade with each other more easily, and the ATO would have access to underlying data to guarantee excise compliance. Legislative amendment is likely required to enable such a transition.

Parts of the streamlining and alignment of licensing requirements across the excise system [26], announced in the 2022–23 Federal Budget, will require amendments to similar sections of the Act. This could present a unique opportunity to concurrently future proof the Act for foreseeable innovations such as blockchain integration.

Fiat Currency-Pegged Stablecoins

The Pilot also explored the future of payments and how this could link into a blockchain-powered excise solution. The BEP's close integration with an Australian Dollar stablecoin presents many novel opportunities for improved automation and new financial instruments. However, several key legal issues must be resolved before fiat currency-pegged stablecoins can be used in such use cases.

A key legal barrier to exploiting the full opportunities of the BEP is the legal requirement that a tax-related liability must be paid in Australian currency.[27] This highlights the broader question - still very much open - of whether fiat currency-pegged stablecoins can be characterised as currency for legal and tax purposes, and if not, how to categorise them appropriately. See Appendix IV for a detailed analysis of this topic.

Note that the issues raised in Appendix IV only apply to stablecoins pegged to fiat currencies such as the Australian Dollar. The same concerns do not apply to tokenised commodities such as the LAL commodity stablecoin which is the core of the BEP's functionality, and as such do not affect the core benefits provided by the BEP.

[24] Proposed amendments would cover all locations controlled by a permission holder, due to take effect in July 2023. See https://www.ato.gov.au/General/New-legislation/In-detail/Other-topics/Streamlining-excise-administration-for-fuel-and-alcohol/
[25] From July 2023 permission will be needed only before moving goods between businesses, covering all locations owned by a business in one permission, as announced in the 2022–23 Federal Budget
[26] For details, see https://www.ato.gov.au/General/New-legislation/In-detail/Other-topics/Streamlining-excise-administration-for-fuel-and-alcohol/
[27] Regulation 21(a) Taxation Administration Regulations 2017

“Stablecoins are the next sensible step for developed economies to experiment with programmable money and programmable assets. The learnings from stablecoin usage will be critical to inform the initial and ultimate designs of a central bank digital currency (CBDC). They will also inform digital asset policy, which developed economies like Australia will need to remain competitive in a global digital economy. The Convergence.Tech pilot demonstrates the efficiency dividend and economic opportunity available from blockchain, an Australian dollar pegged stablecoin and a commodity stablecoin (pegged to the duty of a litre of alcohol) to manage inventory and tax compliance obligations.”

Joni Pirovich - Principal, Blockchain and Digital Assets - Services + Law

“Digital assets and blockchain technologies create real benefits for our customers and they will more so in the future as well. What we’re seeing already is that there’s a huge increase in efficiency and reduction in transaction time, but also an increase in security which is as we know so important in this area.”

Emma Davine - Head of Public Sector, Institutional, ANZ

Solution Design and Architecture

Discovery Phase

Using a human-centred design approach, Convergence.Tech worked closely with the ATO, industry bodies and distillers of varying sizes in four different Australian states to identify key use cases and problems that the Pilot build should target. This approach was effective as it educated the industry and government about what blockchain technology can achieve as well as determined the types of problems that blockchain platforms are good candidates to solve.

Convergence.Tech conducted in-depth research involving a number of distillers to understand their existing technology and processes to manage their excise obligations, including record keeping, reporting and remittance. This knowledge of process and technology was fundamental to the BEP solution design.

The feedback from participants highlighted several key requirements the Pilot must meet:

1. Any solution needed to be as automated as possible, with no extra manual steps or additional administrative burdens on business.
2. The privacy of data was paramount, both in terms of tax payments as well as closely guarded production processes. While the ATO should be able to see data industry wide, distillers should only have access to their own data.
3. Lowering the cost of compliance was key. The platform should provide rich data for analysis, reduce the burden of audits on industry, and allow spot-checks in the supply chain and retail stores.
4. It had to be immediately applicable to the current excise system, but flexible enough to show the potential of a future with fewer excise compliance requirements and more automation.
5. Allow LALs to be traced back through the supply chain at a product level (eg 400 LALs of Deakin Signature Gin sold to Wentworth Wholesaler), as well as support the tracking of individual bottles
6. The technology must be robust and reliable. Excise is an important revenue source for the government, and an important obligation for industry.

Technology Selection Process

In October 2021, the project team analysed 24 potential blockchain technologies to find the best candidates for Australia's excise system (for details see Appendix V - Technology Protocol Selection Report).

It was imperative that the blockchain could keep data secure and private - the opposite approach to most blockchains today which pride themselves on being open and transparent to everyone. The platform also needed to support proof of authority validation, a much more efficient, environmentally friendly way to create new blocks than the proof of work validation used by Bitcoin and Ethereum at present.

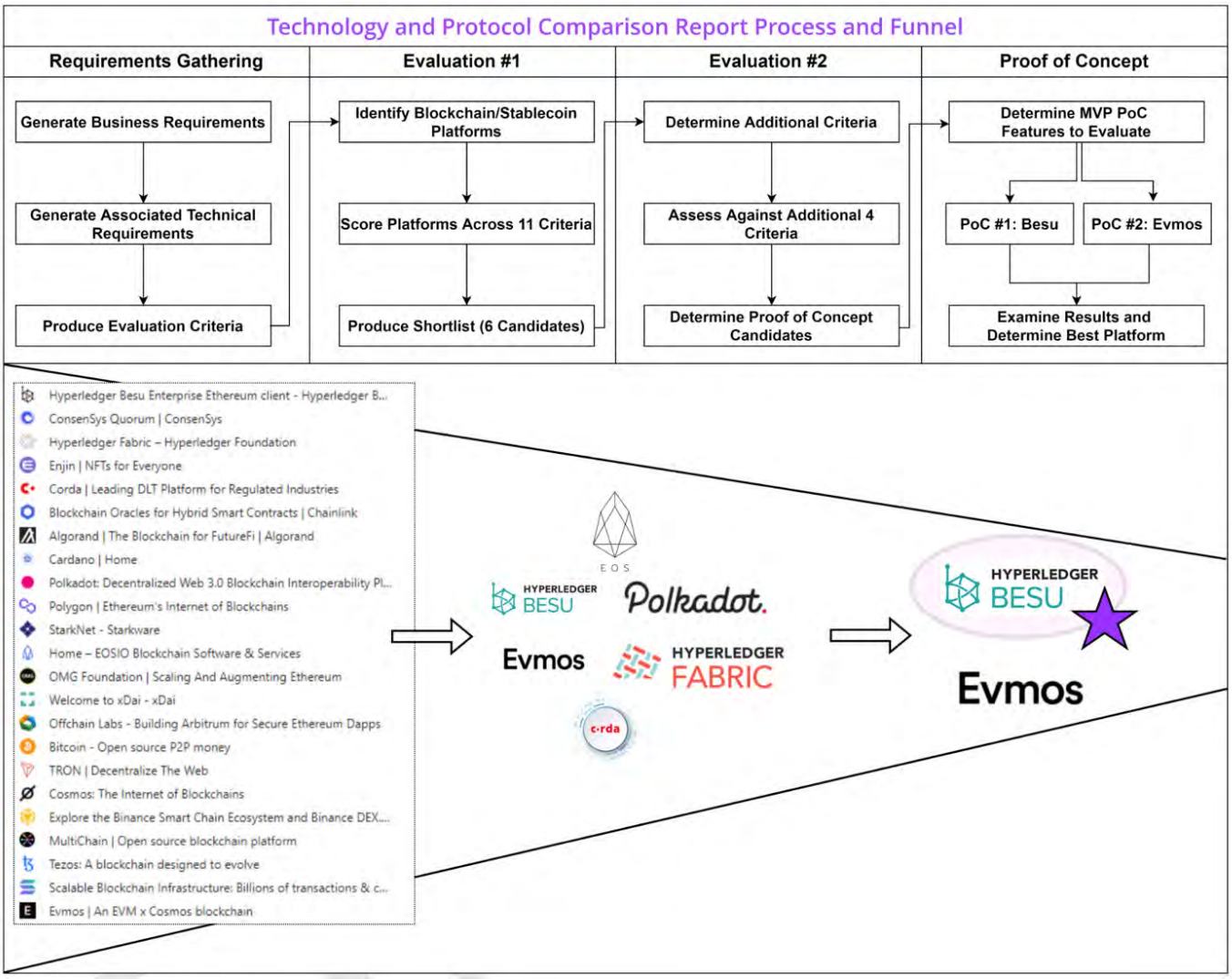

Figure 7: Technology & Protocol Comparison Process.

Today's blockchains work using two kinds of token standards. Fungible tokens (FTs) are fully exchangeable with each other, like currency - for example any Bitcoin is the same as any other. Non-fungible Tokens (NFTs) are unique objects on the blockchain, digital artwork for example, so they can't be replaced with any other NFT. Fungible and Non-Fungible tokens allow a blockchain like Ethereum to be used to buy, sell, and trade in fully traceable ways, using smart contracts. Unlike a legal contract written in text, these smart contracts are written in computer code, and can be executed on demand or automatically according to schedules, rules or other smart contracts.

To facilitate the project scope the BEP needed to support both FTs and NFTs, which eliminated some potential technologies. To ensure reliability and performance, the blockchain protocol also needed to be technically mature, have broad technical support and be proven to operate quickly at scale, which in the nascent world of blockchains eliminated many more. After extensive research, including building several proof-of-concept blockchains, Hyperledger Besu was chosen using open-source private transaction manager Tessera to enhance privacy and security.

> "The ability for revenue agencies to scan the excise status at the retail level and the potential for consumers and retailers to do the same will significantly improve detection of the illicit activity that accounts for over 70% of the alcohol excise tax gap currently."

David Sofra - Partner - KPMG Australia

Technical Design

Figure 8 shows how a generic alcohol supply chain relates to the BEP's blockchain activity. When a batch of raw spirit is distilled, LAL tokens are created to match the volume of pure alcohol contained in the batch. As the spirit is moved and processed, metadata on NFTs containing these LALs is updated to reflect physical containers and previous batches.

When these LALs are moved through an underbond sale between the distiller and a wholesaler, the platform records this as a transfer of containers and LALs. This moves the excise liability to the wholesaler's secure blockchain wallet. When the LALs are sold to a retailer or into home consumption by other means (e.g. direct to consumer sales), the BEP records the excise liability as now being due in the seller's next scheduled excise return.

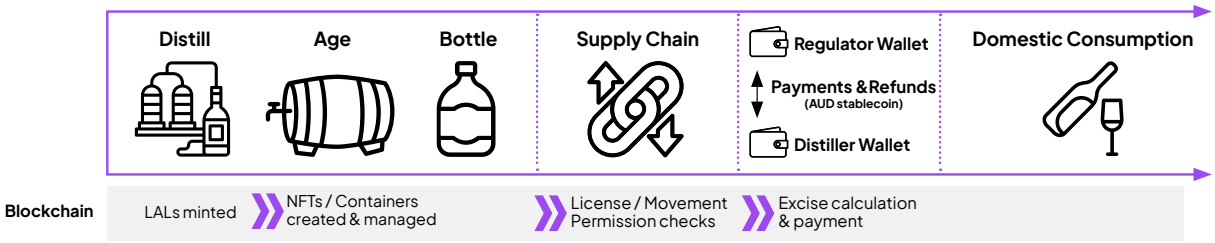

Figure 8: Generic Alcohol Production and Supply Chain, with Underlying Activity on the Blockchain Excise Platform.

Behind the scenes, the BEP uses two kinds of tokens to represent the excise duty liability:

1. LALs - Excise liability is calculated on every Litre of pure Alcohol (LAL, the unit of measurement) entered into home consumption. On the BEP LALs are fungible tokens that function as commodity stablecoins.

2. Containers - These are physical containers of the LALs, such as bottles and casks, as well as batches of raw spirit. These are represented by non-fungible tokens, so each container can be uniquely identified as it moves through the supply chain.

The BEP also provides a parent-child relationship, which can be used to "nest" NFTs within others - for example, a box NFT can contain many bottle NFTs, as a physical box can contain many bottles. When the platform sees a box has been sold, it records the sale of the bottles within it as well.

Normally NFTs cannot be changed, so creating an NFT with metadata such as excise status, location and product identifiers that could be updated as LALs and containers were processed or moved created novel challenges. See Appendix III for details of how these were solved.

A direct integration to distillers' Inventory Management Systems (IMS) provides a number of benefits, including:

- automated provision of high quality data, i.e. the same data distillers and wholesalers use to run their business;
- eliminates any manual re-entry of data; and
- distillers and wholesalers don't need to learn a new system to benefit from the improved compliance processes enabled by the blockchain.

The project team worked with Dear Systems, a leading IMS provider to the Australian spirits industry, and Waypoint Consulting to determine the most efficient integration pattern.

The IMS integration interacts with the blockchain via a middleware layer, enabling the IMS to operate independently of the smart contract logic. This allows any IMS to integrate with the BEP without requiring changes to existing production and supply workflows. It also allows more efficient and flexible use of the platform, as the middleware can provide complex logic and orchestration to meet business rules, and allows the blockchain to focus purely on core functionality.

This middleware contains a separate indexing engine which allows data from the blockchain to be queried quickly and scalably, so the data can be used to investigate any number of potential use cases easily. See Appendix III for details of this.

"The distinctly Australian flavours that distillers capture in their spirits is what sets them apart on the global stage. If you're capturing the excise transaction data on these products, there's an opportunity to tell the story of Australian provenance as well."

Paul McLeay - Chief Executive Officer of the Australian Distillers Association

The same middleware interacts with a graphical user interface (GUI) in the form of a React application. Designed for smaller producers who don't yet have an IMS, the GUI supports all functionality available in the IMS integration, including the creation and movement of LALs and containers. This gives smaller producers a better way to comply with their excise obligations, and a secure and transparent means to share data with the regulator.

The GUI is designed with four main components, as shown in Figure 9:

- Dashboard - Allows access to industry benchmarking statistics.
- Transaction History - Provides a searchable history of the distiller's blockchain transactions.
- Excise Obligation - Allows excise returns to be generated for any date range on demand.
- Forms - Provides web forms to create and transfer containers and LALs.

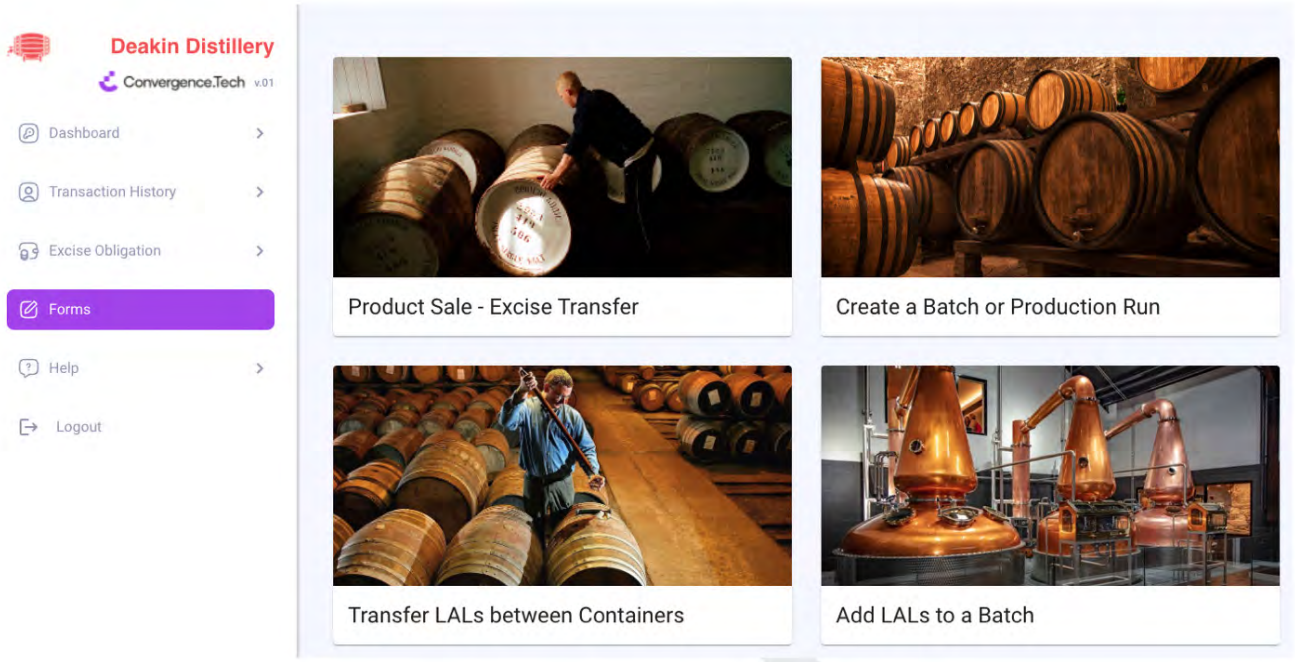

Figure 9: Screenshot of the Blockchain Excise Platform's Graphical User Interface.

The Pilot also explored the potential of flexible fungibility of tokens. In this concept, distillers can decide to provide additional data to the blockchain for their transactions beyond the data mandated by the regulator. The platform will track to the level of granularity that is provided.

For example, currently, individual bottles of spirits are not uniquely labelled in Australia. The BEP can still be used as a powerful tool to track the movements of LALs on a product-level - e.g. showing that Deakin Distillery sold 400 LALs of its Signature Gin to Wentworth Wholesaler on May 1, 2022 - provided this information can be shared via the IMS integration or GUI.

This level of tracking and the plentiful, rich data provided would allow regulators to use sophisticated external tools to identify patterns of activity that may indicate fraud, similar to those used to detect fraud in income tax returns.

If individual bottles or cases were identified in a shipment, this identifying data also could be recorded on the blockchain via the IMS integration or GUI. This would allow a bottle to be traced from a retail shop, back through the supply chain, to the original batch that created the LALs within it.

The traceability of a bottle could also change in the supply chain. For example, if a distiller recorded unique bottle identifiers in its shipments but its distributor did not, the regulator would be able to trace a unique bottle to the distributor, and thereafter still have product-level traceability as above.

This is a powerful approach that makes the platform able to handle both the current spirits environment in Australia as well as a future transition to more granular tracking.

Whilst the scope of the Pilot was limited to just Australian domestic production, the tokens representing LALs and containers can also be created when alcohol is imported, to allow for excise tracking across the entire industry. While the Pilot was limited to spirits, similar production and supply processes are used for beer and other excisable alcoholic products; the BEP has been designed to be configured to cater for these differences. The platform can also be extended to other excisable products, such as fuel and tobacco, or to other commodities such as hydrogen, water or food production.

Integration with Australian Dollar Stablecoin

ANZ Bank pioneered the use of Australian Dollar stablecoins in March 2022, when it successfully allowed Melbourne investment company Victor Smorgon Group to transfer $30 million to digital asset fund manager Zerocap.[28] Unlike traditional transfers, which take several days and incur costly currency conversion charges, this stablecoin transaction was complete in mere minutes at much lower cost.

While Australian Dollar stablecoins existed previous to this, the ANZ stablecoin (A$DC) is the first backed by a major financial institution, which is crucial to its potential. A blockchain token is only as valuable as the authority behind it. For example, the LAL commodity stablecoin created in Convergence.Tech's Pilot would have value because it would be backed by the ATO and the entire Australian spirits industry.

Similarly the A$DC is backed by one of the largest banks in Australia. More than just a coin, the A$DC represents ANZ's years of standards and stability. When ANZ authorises a transfer of the A$DC for a payment on a blockchain, both participants as well as the Government can trust that ANZ stands behind the real-world Australian currency represented by that transaction.

Combining the A$DC with the Pilot's LAL stablecoin establishes real fiscal value for every real-world object recorded on the Blockchain Excise Platform. When a digital transaction is made using both systems, it will be extremely trustworthy thanks to the decentralised, multi-validated confidence of government, financial institution, and industry.

[28] Eyers, J. (2022, March 24). ANZ the first bank to mint an Australian dollar stablecoin, the A$DC. Australian Financial Review. https://www.afr.com/companies/financial-services/anz-the-first-bank-to-mint-an-australian-dollar-stablecoin-the-a-dc-20220323-p5a743

Collaboration with the ANZ Bank

ANZ recently executed the first ever payment using an Australian-bank issued Australian dollar stablecoin (A$DC). Done on the Ethereum public permissionless blockchain, it used an audited ERC20 token (smart contract) which is Ethereum Virtual Machine (EVM) compatible.

The National Blockchain Pilot project enabled ANZ to showcase its capability by deploying the token on the Besu-permissioned blockchain for the purpose of linking the commodity stablecoin back to Fiat currency. This process demonstrated the ability for the movement of the commodity along the supply chain to trigger the settlement and scheduling of excise obligations between distillers and the government.

ANZ believes asset tokenisation could enable a new form factor for financial assets and associated underlying decentralised networks represent new financial market infrastructure. Digital assets and transactions using blockchain technologies offer new opportunities for customers to transact. There are also significant benefits in efficiency, reducing transaction times from days to minutes and increasing security.

> “ANZ’s Australian Dollar stablecoin offers a safe and secure way to transact in the digital economy. The pilot offers an encouraging step towards more process automation, with real – time and cost saving benefits to those involved.”

Nigel Dobson - Banking Services Portfolio Lead, ANZ

"The opportunity, as a regulator, to work with Convergence.Tech on this pilot was a fantastic experience for us. My team knew a lot about Excise but very little about Blockchain technology so it was a little daunting when the pilot commenced but I soon realised that the team at Convergence.Tech were excellent teachers and quickly helped us to understand and made us feel very comfortable throughout the pilot. This experience has really opened up our eyes to the myriad of possibilities that this type of technology could be used from the regulator and industry perspective."

Margaret Whelan - Acting Senior Director Excise Centre, Australian Taxation Office

Managing Private and Shared Data

The design of the solution will allow the BEP to restrict data to only those participants who have rights to view it. For example, a distiller could see its own data, but not those of rival distillers. The tax regulator could see only data relevant to all participants' tax obligations. There were a number of challenges the project needed to overcome to do this. See Appendix III for details.

Sharing excise-relevant data in this way provides benefits for the Regulator and Industry.

1. **For the Regulator** - Recording the LALs, containers and movements on the blockchain gives the ATO a near real-time view of the potential excise duty liabilities of all excise licensees, providing key insights and improving compliance targeting. Leveraging this volume of data, the regulator has more insight from which to take staff allocation decisions, improving efficiency, all the while reducing excise leakage. The data captured by the BEP will enable more sophisticated analysis, and more granular, rules-based permissions for transactions.

2. **For Industry** - Sharing data on the blockchain enables the removal or automation of existing manual compliance steps, providing productivity gains for Industry. Excise Returns are also prepared by the BEP and can be filed automatically (in real-time if desired), with scheduling of payments triggered through the tracking of product movements. In the Pilot, we showed the potential of enhancing this further with a direct integration with ANZ's Australian Dollar stablecoin, the first managed by a major Australian financial institution. This allows for the movement of the commodity to trigger payment of the excise duty liability entirely on the blockchain.

The BEP is designed so that data could also be aggregated and anonymised to provide insights at an industry level, while allowing an individual distiller more detailed insights into its supply chain. Data could also be shared with partners to improve supply chain efficiency. Outside parties could also access data permitted by the distiller, which could have many benefits, including:

- Reduced insurance costs, as asset types and locations can be easily traced and audited; and
- Improved access to loans and investments, as sales and stocks can easily be verified.

Comparison of Tracking Technologies

A key benefit of the BEP solution is its ability to provide a real-time, on-demand view of excise status of the contents of an individual bottle. As part of our Discovery process, we worked closely with global standards body GS1 to identify the best tracking technology for individual bottles. While almost all spirits are tracked via identified shipments in Australia, international markets are beginning to track identified cases of premium products in an effort to prevent brand fraud.[29] This allows distillers to better protect the authenticity of their product and reduce label fraud, a particular challenge in emerging markets. As the implementation costs come down, distillers in Australia will also likely adopt the technology.

There are several methods that can be used to individually track a bottle of spirits. None provide perfect end-to-end traceability, and all have their strengths.

We examined two methods in detail - serialised barcodes and RFID, selected due to their low per-unit costs. While RFID would allow quick scanning of a box or shelf to check excise on all bottles, it is not well suited to liquids. This, combined with its higher per-unit and implementation costs, and the need for specialised scanning equipment, caused us to disregard it.

Serialised barcodes present a number of advantages, such as:

- a lower implementation and per-unit cost;
- easier integration with existing bottling lines;
- uses label space already allocated for the barcode; and

GS1 provides a service to generate a unique barcode and serial number for each bottle's label, allowing each bottle to be uniquely identified on the blockchain.

We identified the GS1 2D barcode with Digital Link as the best currently available solution in Australia. This solution is in use now in Australian supermarkets and allows a single 2D barcode to be used for multiple purposes - e.g. at the checkout to be scanned for price, by staff to check for package freshness, and by consumers for product information and provenance.

Figure 10: GS1 Two-Dimensional Barcode with digital link

[29] The Drinks Business 2019, This Tech Company is Using Blockchain-based Technology to Trace Wine, available at https://www.the-drinksbusiness.com/2019/01/this-tech-company-is-using-blockchain-based-technology-to-trace-wine/

The Pilot examined the use case of an individually labelled bottle that could be tracked from the distiller through the supply chain to a retailer's shelf. There the same barcode could be scanned for many purposes, including for:

1. the consumer to use a smartphone's default QR code scanner to access product information and proof of authenticity;
2. the retailer to use a barcode scanner to ensure stock on shelves is legitimate and has had excise recorded; and
3. the regulator's compliance staff to use a secure smartphone app to perform on-demand spot checks for excise compliance and view the bottle's supply chain history relevant to excise tracking.

By linking a scan of the bottle's 2D barcode to the excise status on the blockchain, consumers and retailers could easily check that a particular bottle has had excise properly paid, exponentially scaling compliance through crowd-sourcing.

While uniquely identified bottles are not yet in use in the Australian spirits industry, the BEP is built to support tracking individual boxes or bottles automatically once a distiller can provide this information.

The BEP tracks the number and type of barcode scans providing the regulator with information as to the effectiveness of field and crowd-sourced compliance spot-checks. This information will empower the regulator to take action should the volume of compliance scans fall below an acceptable threshold to deter non-compliance (a challenge seen in other jurisdictions where tax stamps have been implemented).

> "There are real savings to be realised for businesses of all sizes if blockchain is widely adopted, and this includes greater compliance and benefits of stronger enforcement (against) underpriced, non-tax paid goods that compete with legitimate products on the retail shelf."

David Sofra - Partner, KPMG Australia

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Conclusion

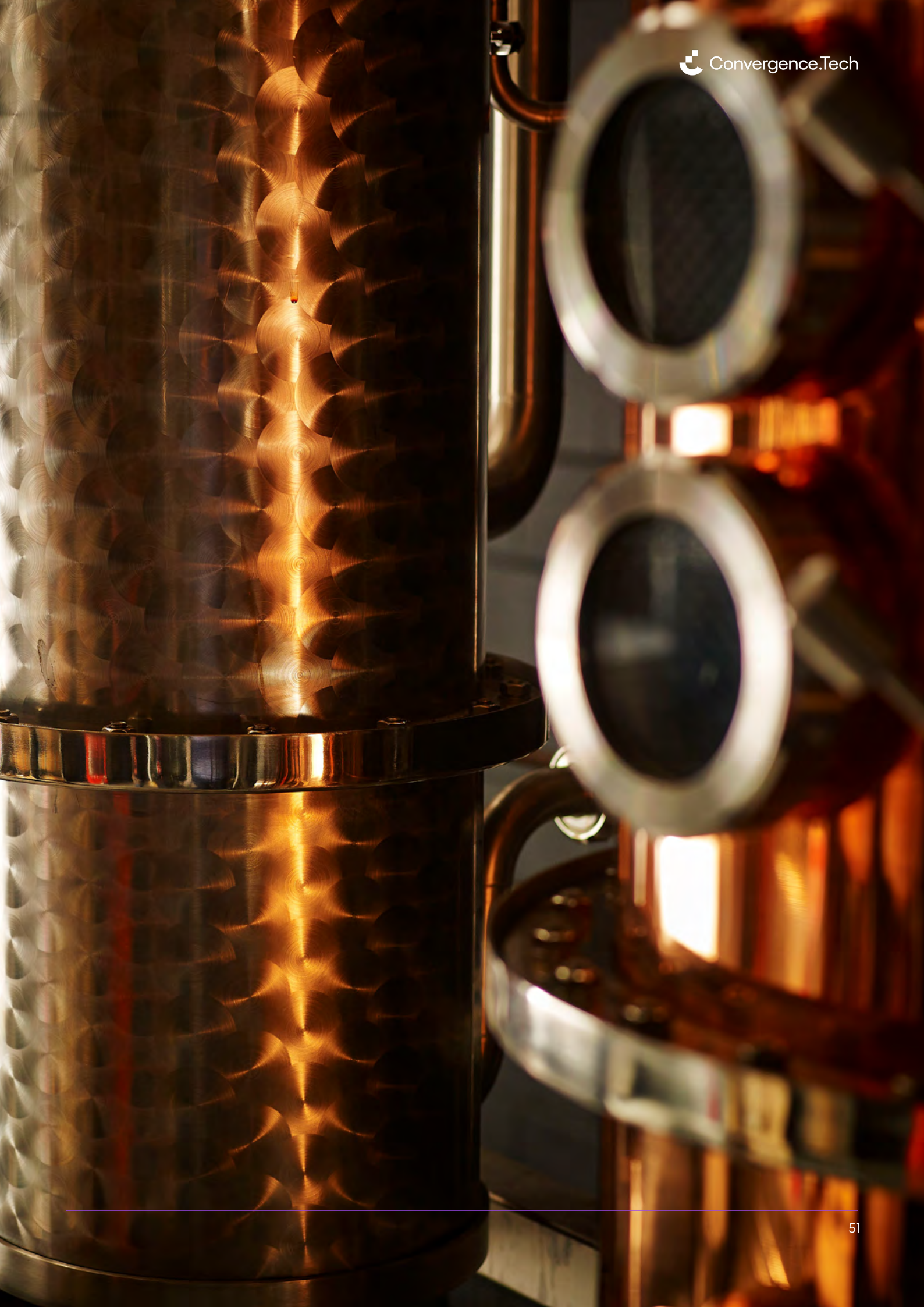
Convergence.Tech's Pilot Blockchain Excise Platform provides a good case study for how a single feature of blockchain technology - its ability to act as a neutral, trusted data source - opens the opportunity to fundamentally rethink how a tax system can operate.

The Pilot showed how using smart transactions linked to traceable real-world objects could boost Australian tax revenues by at least $45 million annually, as well as enabling regulators and businesses to run more efficiently.

Trusted traceability linked to the blockchain allows crowdsourced and on-demand retail compliance checks. Combined with real-time monitoring of production and supply data, this frees up regulatory resources to focus on finding and prosecuting illicit activity, instead of manual compliance checks of honest businesses, allowing scaleable compliance enforcement. With other jurisdictions adopting similar technologies, a Trusted Distiller network naturally emerges, paving the way for lower barriers on a global scale. This approach can be applied beyond spirits to other excisable goods, as well as other commodities.

Tokenising real-world assets and directly linking these with an Australian Dollar stablecoin opens the door to a much wider world too, with automated payments and new revenue-generating opportunities in the rapidly growing space of Decentralised Finance.

Finally, it's about fairness. For too long bad actors have competed unfairly by exploiting the gaps in compliance monitoring. By helping to close these gaps, a blockchain-powered solution levels the playing field, ensuring a fairer world for producers, wholesalers and consumers alike.



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Lark Distillery

Mills Oakley

Spirits and Cocktails Australia

Waypoint Consulting

Glossary

This section provides a brief description of some of the acronyms or technical language used within the report

API - An Application Programming Interface (API) is a software intermediary that allows two applications to exchange information between each other. API's can be public - open and available for use by any outside developer or business, or private - intended only for use within the enterprise to connect systems and data within the business.

DAO - A Decentralised Autonomous Organisation (DAO), sometimes called a Decentralised Autonomous Corporation (DAC), is an organisation represented by rules encoded as a computer program that is transparent, controlled by the organisation members and not controlled, managed or influenced by a central entity.

DeFi - Decentralised finance (DeFi) is an emerging financial technology based on secure distributed ledgers and using smart contracts on a blockchain. Its purpose is to offer financial instruments without relying on intermediaries such as brokerages, exchanges, or banks.

Distributed Ledger - A distributed ledger is a database or record of consensus with cryptographic audit trail maintained and validated by nodes. Its integrity and traceability are maintained through it being consensually shared and synchronised across multiple sites, institutions, or geographies and being accessible by multiple people.

GS1 - Global Standards 1 (GS1) is an international standards organisation with member bodies in more than 100 countries worldwide, including Australia. GS1 Australia is the country's leading provider of standards and solutions for barcodes.

Fungible Tokens - A fungible token (FT) is an interchangeable unit of data stored on a blockchain, that can be sold and traded. Fungible tokens or assets are divisible and non-unique and can be readily exchanged for another asset of like kind.

Non Fungible Tokens - A non-fungible token (NFT) is a non-interchangeable unit of data stored on a blockchain, that can be sold and traded. Non-fungible assets are unique and non-divisible.

IMS - Inventory management software (IMS) is a software system for tracking inventory levels, orders, sales and deliveries. It allows producers, wholesalers and retailers to track goods produced from one end to the other along their supply chain. An example of a popular IMS within the Spirits industry of Australia is DEAR Systems.

Stablecoin - Stablecoins are cryptocurrencies whose value are tied to real world assets such as fiat money or exchange-traded commodities, allowing for lower price volatility than traditional cryptocurrencies such as Bitcoin. Stablecoins make true peer-to-peer digital transfers possible without the need for third-party intermediaries to facilitate transactions.

Appendix I – KPMG Australia's Platform Benefits Analysis

Addressing the Alcohol Tax Gap

The ATO estimate a net alcohol tax gap of 9% for 2018–19. That is $582 million of alcohol duty due on alcohol (beer, spirits and ready-to-drink products (RTDs)) sold into the Australian market that is not recovered each year. This relates to excise and excise-equivalent customs duty (alcohol duty). It does not include revenue due on wine and wine products (which are subject to the wine equalisation tax (WET)). It also does not include goods and services tax (GST). The methodology for the estimation process is set out in the Alcohol Tax Gap Methodology publication.[30]

Large illicit activity is the key driver of the alcohol tax gap, accounting for over 70% of the gross gap (before seizures and compliance activity). The 2018–19 estimate of the tax gap for this activity group is $462m (slightly higher than the $440m in 2017–18).[31] The ATO makes this estimate based on case data and internal expert judgement. The ATO utilises a 'bottom-up channel analysis approach'.

The ATO has identified a number of known illicit alcohol activities and arrangements collated in this group, categorised into the following activities[32]:

- unauthorised manufacture and unpaid excise duty;
- authorised manufacture with underreported/unpaid excise duty;
- product diversion (concessional spirit used for non-concessional purposes, and goods reported as exported or sent for destruction and diverted back into the domestic market);
- cross border transactions (smuggling)
- deliberate fraud or evasion.

Over the past few years, the ATO has worked to develop data capabilities to monitor illicit activities. This is in addition to utilising various intelligence networks including linking across the Commonwealth through the Black Economy Standing Taskforce, state police, state-based liquor licensing, health authorities and community information.[33] [34] [35] Seizures and compliance activities, across all categories of activities, resulted in a $55m offset of the gross tax gap in 2018–19. This figure had increased substantially from $4m in 2016–17 to $47m in 2017–18.[36]

The retail avenue has been identified as the main pathway into the consumer market for illicit alcohol.[37] A Taxpayer Alert (Taxpayer Alert TA 2021/1 – Retail sale of illicit alcohol) was issued in 2021, focusing on arrangements where retailers are knowingly or recklessly purchasing illicit alcohol for the purposes of resale. [38]

[30] ATO 2021a, Alcohol Tax Gap – Methodology, Summary of the estimation process, available at https://www.ato.gov.au/About-ATO/Research-and-statistics/In-detail/Tax-gap/Alcohol-tax-gap/?anchor=Methodology1#Step6EstimateTheoreticalLiability
[31] ATO 2021a
[32] ATO 2021b, Alcohol Tax Gap – Trends and latest findings, available at https://www.ato.gov.au/About-ATO/Research-and-statistics/In-detail/Tax-gap/Alcohol-tax-gap/?anchor=TrendsandlatestfindingsTrendsandlatestfindings
[33] ATO 2019, Alcohol Stakeholder Group key messages 10 July 2019, available at https://www.ato.gov.au/misc/downloads/pdf/qc61403.pdf
[34] ATO 2020, Alcohol Stakeholder Group key messages 11 November 2020, available at https://www.ato.gov.au/General/Consultation/In-detail/Stakeholder-relationship-groups-minutes/Alcohol-Stakeholder-Group/Alcohol-Stakeholder-Group-key-messages-11-November-2020/
[35] ATO 2021c, Alcohol Stakeholder Group key messages 19 August 2021, available at https://www.ato.gov.au/General/Consultation/In-detail/Stakeholder-relationship-groups-minutes/Alcohol-Stakeholder-Group/Alcohol-Stakeholder-Group-key-messages-19-August-2021/
[36] ATO 2021a
[37] ATO 2021c
[38] ATO 2021d, Taxpayer Alert TA 2021/1 – Retail sale of illicit alcohol, available at https://www.ato.gov.au/law/view/document?docid=TPA/TA20211/NAT/ATO/00001#:~:text=This%20Alert%20focuses%20on%20arrangements,paid%20or%20otherwise%20properly%20acquitted

The blockchain Pilot implementation offers two significant benefits to this group that may improve compliance and reduce the tax gap:

- amongst program participants, enabling detailed, real-time analysis by the ATO to assess risk of product diversion and movement between legitimate and illicit channels; and
- in the long-term, enabling scanning of individual bottles through all levels of the distribution chain, including the retail level, for excise payment status.

The ability or revenue agencies to scan for excise status at the retail level, and the potential for consumers and retailers to do the same, would significantly improve the ability to monitor sales channels for illicit activities (assuming the integrity of the implementation). This stepwise improvement is conservatively estimated to have at least the same magnitude of revenue impact as recent data capability developments.

This figure is consistent with an analysis based on a 20% reduction in large illicit activity amongst spirits (applied to the ATO tax gap estimate proportional to an assumed equal revenue share of the tax gap between beer and spirits) that results in an estimate of approximately $42m additional revenue, plus smaller revenue gains in the large producers and small illicit activity groups.

KPMG estimated that a comprehensive blockchain implementation with end-to-end traceability for all excisable and excise-equivalent alcohol beverages (spirits, RTDs and beer) would reduce the alcohol tax gap by at least $45m per year, if 100% blockchain implementation was achieved (or reduced proportional to excise liability tracked in the application).

The integrity of the blockchain implementation is dependent on fully compliant inputs into participant IMSes or direct input into a User Dashboard Interface. Consequently, even with full uptake amongst licensed producers, some potential for illicit activity, either through misreporting or non-reporting of activities, inevitably remains.

Benefits to Australian Distillers

The Pilot solution does allow for the calculation of excise payable and the export of data from the blockchain for the purpose of completing the 'Product details' and 'Excise duty summary' components of an excise return. This calculation will include an automation of the correct excise rate at the date of release and application of the alcohol manufacturer remission.

The blockchain solution has demonstrated automation of many of the existing processes that require interaction with the ATO including full automation of the calculation of excise liability, completion of excise returns, lodgement, and payment, as well as, where data must be collated for the purposes of an ATO audit.

In addition, a blockchain implementation supports a level of confidence trust framework through the development of a Trusted Distiller program that could unlock administrative savings to businesses in processes, such as:

- licence renewals;
- movement permissions;
- refunds;
- remissions;
- drawbacks;
- samples;
- losses; and
- destruction.

In particular, a future blockchain implementation facilitates a transition from the current system of single and continuous movement permissions to a system of notification. This would be consistent with the recent Budget announcement of blanket permissions to move goods between sites controlled by licensed businesses.[39]

Illicit products have serious implications for consumer safety and result in loss of consumer confidence in trusted brands and negative impacts on a company's reputation. Increased overall compliance and a reduction in illicit activities through a comprehensive blockchain implementation with end-to-end traceability will also benefit Australian distillers by increasing consumer confidence in the authenticity and provenance of each bottle sold on Australian retail shelves.

[39] Commonwealth Government 2022, Budget Measures Budget Paper No. 2 2022-23, 29 March 2022, pg. 7, available at https://budget.gov.au/2022-23/content/bp2/index.htm

Appendix II – KPMG Australia's Analysis of Excise Legislative and Regulatory Framework

The Excise Act 1901 (the Act) confers broad powers to the Commissioner of Taxation (also referred to as the CEO) or a delegate of the Commissioner (jointly referred to with the Commissioner as the Collector) for licensing, supervision and administration of duty payment. In some instances, the Act also establishes more specific requirements that must be adhered to, e.g., prescribed information required for forms, written permission and payment deferral periods.

Movement of Goods

All excisable goods, including Australian manufactured spirits, are subject to the Commissioner's control until delivered for home consumption or for exportation to a place outside Australia, whichever occurs first (s61 of the Act). Movement of goods under the Commissioner's control requires permission in writing that specifies the kind of good as well as the places of origin and destination (s61A).

This requirement is consistent with the Pilot project implementation that confirms permissions exist in relation to the kind of good, origin and destination before writing movement information to the Blockchain.

In the future, levels of trust/confidence between revenue agencies and participating businesses facilitated by a blockchain implementation may support a transition away from a permission-based framework for movements to notification only. Legislative amendment is likely required to enable such a transition.

Timing of Payment

Liability to pay duty to the Collector arises at the point of entry for home consumption (s54) but the Act allows the Collector to give permission (known as a Periodic Settlement Permission (PSP)) for the delivery of goods for home consumption without entering them for that purpose (s61C) - currently for a recurring 7–day period or calendar month - subject to application made in an approved form.

This requirement is consistent with the Pilot project implementation that calculates excise duty liability when goods are delivered for home consumption but can collate liabilities for payment consistent with a businesses' PSP.

Levels of trust/confidence between revenue agencies and participating businesses facilitated by a blockchain implementation may support alternative time of payment arrangements. For example, industry consultations suggest that delay in payments received from some out-of-bond customers results in excise duty liabilities sometimes being due before invoices are paid . This creates significant cash-flow challenges for business. Smart contracts within a future blockchain implementation could link entry for home consumption and payment of excise (for the purposes of s54 of the Act) to the payment of related invoices. Legislative amendment is likely required to enable such a transition.

Record Keeping

Under s50, licensed manufacturers must:

a) keep such records, and furnish to the Commissioner such returns, as the Commissioner directs;

b) retain any records so kept for such period as the Commissioner directs; and

c) on demand by an officer, produce the records to the officer.

The form in which records must be kept and retained is not prescribed. The Act does not establish the power of the Commissioner or delegate to require a specific form or technology for record keeping. However, excise licences may be made subject to conditions considered by the Collector to be "necessary or desirable for the protection of the revenue or for the purpose of ensuring compliance with the Excise Acts" (s39D(3)). This could permit revenue agencies to prescribe the use of a blockchain for:

- Licensees seeking certain Trusted Distiller benefits;
- High-risk licensees who pose a compliance risk; or
- All licensees in a comprehensive approach to the protection of revenue.

Amendments Required for Blockchain Implementation

Overall, the existing legislative framework of the Excise Act 1901 including the broad powers conferred upon the Commissioner and their delegate/s would likely enable implementation of the pilot project solution. More innovative benefits enabled by a future blockchain implementation, such as a transition to a notification-based movements system or changes to duty payment timing, may require limited amendment to the Act.

Parts of the streamlining and alignment of licensing requirements across the excise system, announced in the 2022–23 Federal Budget, will require amendments to similar sections of the Act. This could present a unique opportunity to concurrently future proof the Act for foreseeable innovations such as blockchain integration.

Appendix III – Technical Lessons Learned

Setting out to create a blockchain capable of scaling to support the enterprise needs of a regulator and entire industry meant applying theoretical concepts to real world rigorous testing. This allowed the project team to accelerate its understanding of the challenges of decentralised ledgers and to develop solutions to overcome them.

The first challenge was that a modern supply chain traceability solution needs to account for both fungible object definitions (e.g. liquid alcohol) and non-fungible concepts (e.g. bottles, casks, stills). Moreover these differing types of objects must interact with each other to reflect the nested relationships (e.g. liquid is stored in a bottle, which is stored in a case), and the LALs within may change over time.

Designing a solution that could incorporate those concepts into a tokenization format, compliant with open-source Ethereum standards was a challenge. It required utilising the ERC-1155 standard to its full capabilities, and truly defining the modern concept of a variable NFT - one where the metadata can change, unlike a traditional NFT whose metadata is immutable. Being able to create multiple fungible and non-fungible tokens that could nest within each other and change over time took advanced design and testing of multiple smart contract techniques. It also required combining them with middleware designs to ensure that the blockchain remained flexible and accurate to any of the possibilities of the real-world objects it was presented with.

The result of this testing process saw a successful representation of fungible liquid tokens within non-fungible bottles, including the ability to move these commodity stablecoins between accounts (businesses with excise licences). This method and process can be used to track many different production and supply chain use cases in the domestic spirits industry, and other use cases in Australia and abroad.

The next challenge was the performance of a blockchain capable of returning rich data proving how asset attributes changed over time, including journeys across multiple owners. While public blockchains have robust indexing and search capabilities, this open-source work had to be adapted to be able to read a private blockchain with much more stringent security and privacy requirements.

This meant re-envisioning how an indexer interacts with the nodes of a blockchain. This included where it stores its indexed records, and how modern data concepts can scale the responses to support the throughput of a robust enterprise supply chain. The project team was able to successfully re-engineer the modern subgraph open-source index and search patterns to work with private permissioned blockchain networks, preserving data privacy.

The project team then designed a new pattern for retrieving the indexed records. This pattern focused on the speed and stability for the exact needs of supply chain tracking. These enhancements will allow a blockchain to provide rich cross-entity business intelligence, scaling the ability to understand, predict, and enhance the way supply chains and excise compliance work.

The third and most complex challenge was that of private data on a shared ledger. The project team leveraged existing blockchain technologies to create secured block tracking to ensure participants could not see each other's transactions. It became clear that this is more than just a question of the block validation itself. The metadata of each token must be secured, and must work lockstep with the blockchain nodes themselves and the middleware that services the data layer of the blockchain solution.

Far more than just determining privacy groups within the blockchain, the Pilot needed to design a system of on-chain authorised validators and accounts, RPC and HTML API client securities based in decentralised identity authentication, and secured metadata storage.

These concepts became even more complicated when the Pilot introduced a secondary authority to the regulator, that of ANZ Bank, which provided the Australian Dollar stablecoin integration. Integration with a fiat-currency stablecoin provides many potential benefits for industry and regulators, such as:

- excise payments could be automatically triggered on a schedule or individual movement of LALs, with full traceability;
- providing a secure and trusted repository for digital assets, such as the BEP NFTs as well as other NFTs owned by the businesses; and
- increased liquidity for the commodity LAL stablecoins, opening new trade and financing options for distillers.

However, it also further complicated the platform's data privacy rules. For example, the ATO should not have access to the account information stored by the ANZ smart contract, nor should ANZ be able to see the ATO's record of client holdings. The Convergence.Tech project team learned through multiple designs and testing that the private and permissioned core of the chain requires a multi-layered approach from the validating nodes of the blockchain itself all the way through the decentralised stack of middleware, search, and metadata storage.

Appendix IV – Mills Oakley's Analysis of Key Legal Barriers to Enabling Innovation with Australian-Dollar Pegged Stablecoins

Note this Appendix provides detailed analysis as to the implications for widespread adoption of stablecoins pegged to fiat currencies (e.g. the Australian Dollar). The analysis does not apply to tokenised commodity stablecoins, e.g. the LAL commodity stablecoin, which are at the core of the Blockchain Excise Platform's functionality.

1. Executive Summary

There is a significant opportunity for Australia to transform its payments system, as well as the tax system. The key legal barriers are solvable in the short term, with our recommendations set out in this appendix.

A key legal barrier of the Australian Dollar stablecoin component of this blockchain excise platform (Platform) is the requirement in the tax law that a tax-related liability must be paid in Australian currency.[40] To the extent that the design of a stablecoin is such that it represents a digital version of Australian currency but is not actually Australian currency, innovation around payments and the payment of tax-related liabilities is stifled and constrained to messaging-based systems between financial institutions.

More broadly, a critical barrier to enabling the innovation possible with fiat currency pegged stablecoins is whether they can be characterised as currency for legal and tax purposes. If not, then from a policy perspective the question arises of whether 'currency status' or 'currency equivalence' should be granted for legal and tax purposes and based on what conditions. These threshold questions mean that the legal barriers related to fiat currency pegged stablecoins must be contextualised with an explanation of stablecoins and the key pieces of legislation that deal with 'currency' as well as the evolution of thought and work on central bank digital currencies (CBDCs) and the relationship between fiat currency pegged stablecoins and CBDCs.

Other legal and tax barriers to enabling the innovation possible from fiat currency pegged stablecoins stem from these threshold questions. If a fiat-currency pegged stablecoin is not a currency but is a financial product under the Corporations Act 2001 (Cth) (Corporations Act), a stablecoin issuer as well as any custodian, or platform or business seeking to integrate use of a stablecoin must consider whether banking and/or financial services and/or markets licensing obligations apply. In particular, the key licences would be an Australian Financial Services Licence (AFSL), a Purchased Payment Facility (PPF) Licence and/or an Australian Markets Licence. A related consideration is whether the designated service of a 'digital currency exchange' (exchange of money (Australian or not) for 'digital currency') is being provided, as defined in the Anti-Money Laundering and Counter-Terrorism Financing Act 2006 (Cth) (AML/CTF Act).

In addition, persons acquiring and using fiat-currency pegged stablecoins need to understand their legal rights and obligations, as well as the tax characterisation and tax implications, in respect of their stablecoin transactions. This is especially so if their acquisition and use is not 'currency' or 'currency equivalent' for legal and tax purposes. If a decentralised model of global governance is used to design, issue and maintain a stablecoin, there is the added complexity of upon whom the licensing and regulatory obligations, including disclosure obligations, fall if the stablecoin is characterised as a financial product in one or many jurisdictions.

The Australian and global policy environment around payments and financial services licensing is evolving. This means that capital is more difficult for start-ups to raise if it is for the purpose of applying for existing regulatory licences that may be relatively short-lived or a budget will be

[40] Regulation 21(a) Taxation Administration Regulations 2017

required for transition to a new regime. The Council of Financial Regulators (Council) considers that some stablecoin arrangements bear similarities with stored-value facilities (SVFs) and the Council is working on options for incorporating them into the proposed regulatory framework for SVFs.[41] The proposed regulatory framework for SVFs was published in November 2020 and is being implemented as part of the Government's reforms to the payments licensing framework as announced in December 2021.[42] Furthermore, Treasury has recently opened consultation to seek feedback on proposed licensing and custody requirements for Crypto Asset Secondary Service Providers (CASSPrs), which would not seem to capture a stablecoin issuer but would capture providers of stablecoin custody and platforms or applications that use stablecoins in the delivery of a service. So the uncertainty as to legal characterisation of a stablecoin continues despite the proposed CASSPr regime.

The Payments system review final report, delivered in June 2021, recommended a single, integrated licensing framework for payment services that scales up with businesses as they grow, provides clear consumer protection, and facilitates transparency in access to payment systems.[43] The Government agreed to this recommendation in December 2021. Finally, APRA advised that it is considering approaches to regulation of stablecoins, potentially under the proposed regulatory framework for SVFs and will be consulting on prudential requirements in 2023.[44] The multitude of policy proposals, whilst welcome, is disaggregated, which itself is an impediment to stablecoin innovation.

Each of the above are friction points that stifle more free flowing innovation with blockchain-based infrastructure and fiat currency pegged stablecoins. Convergence.Tech has faced into each of these friction points throughout the process of designing the Platform as well as in considering an appropriate structure to commercialise and operate the Platform. These learnings are summarised in this appendix. We note that this report does not deal with the legal and tax issues of tokenising litres of alcohol, where each token is a 'litre of alcohol'-pegged stablecoin, because the focus of this appendix relates to fiat currency pegged stablecoins.

The opportunity for Australia and the criticality of solving the barriers inhibiting innovation with fiat currency pegged stablecoins becomes even more stark against the key aims of the Platform design:

1. to ease the excise compliance burden upon government and industry; and

2. to simplify the operation of the excise system.

Easing the compliance burden is about automating the calculation, reporting and payment of excise obligations. Simplifying the operation of the excise system is about being able to realise the potential of blockchain, smart contracts and programmable stablecoins.

If the Australian Taxation Office (ATO) could receive excise revenue in stablecoins a smart contract could direct the stablecoins to meet government tax expenditure. In so doing, the administration of government, initially the excise compliance area of government, could become more efficient and transparent and perhaps predictable enough that economic growth from new financing and investment opportunities is unlocked as well as new sources of tax revenue. New sources of tax revenue could offset or replace the need for existing sources of tax revenue.

[41] Council of Financial Regulators, Quarterly Statement by the Council of Financial Regulators – March 2022 (30 March 2022), available at https://www.cfr.gov.au/news/2022/mr-22-01.html
[42] Australian Government, Transforming Australia's Payments System (December 2021), available at https://treasury.gov.au/sites/default/files/2021-12/p2021-231824_1.pdf
[43] Australian Government, Payments system review – From system to ecosystem (June 2021), available at https://treasury.gov.au/sites/default/files/2021-08/p2021-198587.pdf
[44] APRA letter "Crypto-Assets: Risk Mangement Expectations and Policy Roadmap, 21 April 2022, available at https://www.apra.gov.au/sites/default/files/2022-04/Crypto-assets%20-%20Risk%20management%20expectations%20and%20policy%20roadmap.pdf

Informative block explorers could be built out to make it easy and engaging for industry, government and taxpayers generally to see exactly how the tax is being applied. Eventually, the collection of tax revenue and application to tax expenditure may not be a process that taxpayers are disconnected from but which they are more democratically involved with. The ATO is already producing a 'tax receipt' that contains a table showing how taxes are allocated to key categories of government expenditure to increase transparency on how the government spends taxpayers' money. However, programmable stablecoins take the 'tax receipt' concept to its most genuine and transparent level.

Payments and financial services regulatory reform falls short if not also accompanied by appropriate tax reform. With blockchain-based infrastructure and programmable money that simplifies and automates compliance with tax obligations, opportunity is abound for industry and government to benefit from new and different ways to optimise latent capital. A relatively minor amendment to the applicable tax regulations to allow for tax-related liabilities to be paid in stablecoins that are designated as 'currency' or 'currency equivalent' would enable innovation in digital government to keep pace with innovation in the payments system. Ahead of the anticipated introduction of CBDCs around the world, such a forward step by Australia would remove a key legal barrier for the Australian dollar stablecoin component of this Platform and open up new economic opportunities and potential new sources of tax revenue.

2. Summary of Recommendations

a) APRA and the RBA should consider providing guidance to clarify whether a 'tokenised Australian dollar deposit' issued by an ADI can be interpreted as 'currency' or 'Australian currency' under the Currency Act and Reserve Bank Act, which may include specifying at least equal fiat currency must be held in reserve by the ADI to support this characterisation.

b) The Treasurer should consider signing an instrument under the Currency Act to specify a variation from the standard weight applicable to coins, that 'coins' issued as fiat currency pegged crypto-assets on a blockchain are a type of composition of coins, or stablecoins, accepted for circulation and that have the status of 'currency', which may include specifying at least equal fiat currency must be held in reserve by the ADI to support this characterisation.

c) The ATO should consider providing guidance regarding whether a tokenised Australian dollar deposit can be treated as 'currency' for income tax purposes when it represents the unit of account of each Australian dollar, which may include guidance regarding when a fiat currency pegged stablecoin should be treated as a CGT asset, trading stock or a Taxation of Financial Arrangement (TOFA) for income tax purposes.

d) The ATO should consider providing guidance to clarify whether payment of a tax-related liability with a tokenised Australian dollar deposit may be acceptable as 'currency' if the private-permission blockchain or control rights specified for the token contract deployed on a public blockchain is considered an 'electronic funds transfer system' under subparagraph 3(a) of Regulation 21(a) of the Taxation Administration Regulations 2017.

e) The Governor-General should consider amending Regulation 21(a) of the Taxation Administration Regulations 2017 to allow for tax-related liabilities to be paid in stablecoins that are designated as 'currency' or 'currency equivalent' would enable innovation in digital government to keep pace with innovation in the payments system.

f) The Government should consider amending the GST definition of 'digital currency' to permit characterisation as a 'digital currency' if a fiat currency pegged stablecoin is restricted but still intended to operate as digital currency by a platform or application.

g) The Government should consider amending the definition of an NCP facility to clearly exclude arrangements involving Australian currency pegged stablecoins and could use this amendment to specify the conditions of that exclusion. This could be done by way of regulations under the Government's regulatory modification powers under Chapter 7 of the Corporations Act.

h) The Government should consider amending the definition of a financial market to clearly exclude arrangements involving Australian currency pegged stablecoins and could use this amendment to specify the conditions of that exclusion. This could also be done by way of regulations under the Government's regulatory modification powers under Chapter 7 of the Corporations Act.

i) The Council of Financial Regulators, the ATO and the ACCC should consider defining the parameters in which a fiat currency pegged stablecoin can and should be given 'currency' status or 'currency equivalent' status, as well as the extent of existing licensing obligations that should apply to stablecoin issuers as well as platforms that integrate use of stablecoins until the SVF framework is finalised.

j) The Council of Financial Regulators should consider the issues raised in this report regarding the regulation of fiat currency pegged stablecoins under the proposed SVF framework, particularly those stablecoins that may be issued on public blockchains without control rights which allow use of the stablecoin beyond the anticipated use and jurisdiction of the issuer.

3. Stablecoins: An Overview

A stablecoin is a type of crypto-asset that is intended to maintain a stable peg to the value of an underlying or reference asset. Where the underlying or reference asset is fiat currency this report refers to the arrangement as a fiat currency pegged stablecoin.

The ability of a stablecoin to effectively maintain its peg is an evolving study, with a spectrum of conservative approaches of equal or overcollateralization to novel and risky approaches of algorithmic and crypto collateralisation where the latter generally seek to optimise the collateral or reserves rather than have the collateral sit as a dormant reserve. Since stablecoin arrangements can vary widely and have a multitude of uses globally, and as they can live on a number of different blockchains with different consensus mechanisms, the novelty and complexity around fiat currency pegged stablecoins and blockchain technology is a source of legal and regulatory uncertainty for both policymakers and innovators. Similar and additional complexities exist in relation to CBDCs.

Understanding the legal barriers to stablecoin innovation and adoption requires an understanding of the underlying nature and nuances of the technology that enables the issue and use of stablecoins. Below, we unpack the key components of stablecoins including what is a crypto-asset, the role of smart contract standards and specifying control rights, the impact of issuing a token on private-permissioned versus public blockchains, consensus mechanisms, and the ecosystem of blockchains in which stablecoins can circulate.

(a) What is a crypto-asset?

Broadly, crypto-assets come into existence when a smart contract is deployed to a blockchain to mint a supply of tokens. Throughout this report we use the words 'crypto-asset' and 'token' interchangeably.

A number of crypto-assets in circulation are issued according to standards. Herein lies a source of novelty and complexity – the standardised nature of a token means that a token can have use on a blockchain network (or other blockchain networks) beyond that initially anticipated or able to be effectively controlled by the token issuer, and beyond the jurisdiction of the issuer.

Crypto-assets can be issued on public blockchains or private-permissioned blockchains, the latter which can often be referred to as a closed-loop or restricted platform. Where control rights are specified for a fungible token contract deployed on a public blockchain, the circulation and use of the token may also be considered to be restricted.

Due to the proliferation of blockchains, there is an increasing trend to support the issue of crypto-assets across a number of blockchains. For example, USDC was launched on Ethereum in 2018 (as an ERC-20 token), expanded to Algorand, Stellar and Solana in 2020, and then to Avalanche, Celo, Flow, Hedera, Kava, Nervos, Polkadot, Stacks, Tezos and Tron by 2022.

Each of the factors discussed above are relevant to determine the legal and tax characterisation of a crypto-asset and are unpacked below.

(i) Crypto-assets based on standards

On the Ethereum blockchain, the ERC-20 standard contract is often used to bring a supply of fungible tokens into existence. The ERC-20 standard contract allows for standardisation but also specification of certain capabilities in relation to the token which can include, but on the public Ethereum blockchain often doesn't include, control rights over the token.

Most projects choose to build applications and issue tokens on the public Ethereum blockchain to enable access to the ecosystem of innovation, liquidity and users. As shown in Example 1 below, the innovation of the third project enables more utility for tokens issued and circulating on the public Ethereum blockchain whereas the utility, liquidity and users in a private-permissioned blockchain is limited to that which the operators are capable of building and supporting.

Typically, the issuer of an instrument is responsible for determining the legal and tax characterisation of the instrument at the time of issue and has the legal and functional ability to ensure the instrument is held or used for the purpose issued. This is not the case for crypto-assets issued according to standards on a public blockchain.

To illustrate, the legislative regime and the non-natively digital nature of a share in a company or a unit in a unit trust means that persons merely hold shares and units. If a share in a company is tokenised then it can be put to a functional use by the token holder, but this may be restricted by the company constitution and / or Corporations Act.

Whilst the terms and conditions of a fiat currency pegged stablecoin may prohibit certain uses of the stablecoin, if the stablecoin is minted using a standard such as the ERC-20 standard but no control rights are specified then the issuer cannot control the circulation and functional use of the crypto-asset.

(ii) Control rights

In a private-permissioned implementation of the Ethereum blockchain as is anticipated for the Platform, specification of control in the fungible token smart contract may not be required if only certain activity with the tokens is enabled on that private-permissioned blockchain. However, the limitation of the token to only certain activity inhibits the potential innovation, utility, liquidity and users on that private-permissioned blockchain.

Control rights introduce friction and can be set to completely limit a token holder's ability to choose the ways in which the token is used with various smart contract applications built on the public Ethereum blockchain. Control rights that restrict the circulation of a token can also mean that the crypto-asset does not satisfy the definition of 'digital currency' for GST purposes and give rise to adverse or non-currency equivalent GST treatment of the crypto-asset transaction.

A token issuer may decide to reserve their right to remove control rights and specify in the contract that tokens can be burned if another unrestricted token is minted in its place. Colloquially, this process is referred to as 'bridging' or 'wrapping' tokens from

one version to another version and can also be used to transition tokens from restricted circulation on a private-permissioned blockchain to unrestricted circulation on a public blockchain.

Example 1

If a developer uses the ERC-20 standard and specifies that 1,000 'A' tokens are to be created, each of those 'A' tokens is fungible in the sense that an 'A' token is treated as the same whether a person purchases the first or the last token. Another project may choose to mint 2,000 'B' tokens using the ERC-20 standard. A third project may create a smart contract that accepts ERC-20 standard tokens as collateral for a crypto-asset loan where the loan proceeds are provided in 'C' tokens and 'C' tokens are created using the ERC-20 standard. If the 'B' token issuer specified control rights, then before a 'B' token could be used as collateral in the third project the proposed transaction would need to be approved (or 'signed') by the approver or controller address designated in the contract.

(b) Stablecoin arrangments

Unlike crypto-assets such as bitcoin (BTC) or ether (ETH), which each exist purely online, a fiat currency pegged stablecoin relies on there being an arrangement and relationship between the crypto-asset recorded on the blockchain and the underlying asset.

The ability of a stablecoin to maintain a stable peg to the value of the underlying asset relies on the effectiveness of the collateralisation approach against market factors. The collateralisation approaches vary from:

- fully collateralised with fiat currency and/or other reserves;
- under collateralised with fiat currency and/or other reserves, usually with reference to data about the creditworthiness or wealth of the stablecoin user;
- over collateralised with fiat currency and/or other reserves;
- algorithmically collateralised, which may involve one or more crypto-assets; and
- hybrid collateralised which combines fiat, crypto-asset or other reserves as well as algorithmic programming.

To the extent that a fiat currency pegged stablecoin is not 'currency' then it is likely a financial product under the Corporations Act. As such, an issuer of a stablecoin is required by law to prepare disclosure documentation and apply for and comply with licensing obligations. In the absence of a clear issuer or operator of a scheme, such as in the case of a truly globally decentralised autonomous organisation (DAO), the onus of legal and tax characterisation of the stablecoin falls to the user.

(c) Private-permissioned versus public blockchains

Whilst a private-permissioned blockchain may assist with preservation of commercially sensitive information that businesses do not wish recorded on a public blockchain ledger, the immutability and trustworthiness of transactions settled on a public blockchain without intermediaries or authorities verifying transactions is an increasingly valued feature.

Privacy and shield functionality for public blockchain transactions is still considered early and experimental meaning that institutional applications of the technology will likely continue to commence on private-permissioned blockchains.

(d) Consensus mechanisms

Once the token contract is deployed, token transactions (which are interactions with the contract) are verified according to the prevailing consensus mechanism. For the public Ethereum blockchain, this is currently proof of work but it is moving to proof of stake. A private-permissioned blockchain may have a proof of authority consensus mechanism.

Under either proof of work or proof of stake, the 'miners' or 'stakers' respectively are responsible for verifying the transactions and not the person that deployed the contract to the blockchain. Herein lies a source of novelty and complexity – there is a disconnect between the issuer of the token (or method of payment) and the operators of the payment system or verifiers of payments / token transactions in a payment system. The miners or stakers could verify a transaction where the use of the token goes beyond the issuer's intention for use of the token.

With proof of authority consensus, the issuer of the token could be one in the same as the authority responsible for verifying transactions.

(e) Ecosystem of blockchains

Since there are a multitude of blockchains there is a case for stablecoin issuers to support issuances of the stablecoin on each of those blockchains so that their stablecoin is circulating and being used across the ecosystem of blockchains. This is a nuance of the emerging ecosystem of many blockchains (rather than one internet, or one payments messaging standard) which goes beyond existing principles of financial market infrastructure and the basis upon which the regulation of payments, financial services and markets is founded.

Users may be attracted to one blockchain over another based on differentiating factors such as stage of development of the blockchain, utility and applications available and being developed, speed of transaction processing, and perceived trustworthiness of transacting based on level of decentralisation of the blockchain or its consensus mechanism. The differing characteristics of each blockchain, particularly the consensus mechanism, could impact the legal and tax characterisation of the crypto-asset.

(f) US dollar pegged stablecoins

US Dollar pegged stablecoins on issue such as USDC, USDT and DAI have been created using the ERC-20 standard.

Using the USDC implementation of the ERC-20 contract as an illustrative example, the following capabilities were set in the source code of the contract at the time it was deployed to the Ethereum blockchain:

- Ownable: The contract has an Owner, who can change the 'owner', 'pauser', 'blacklister' and 'masterMinter' addresses but not the 'proxyOwner' address.
- Pausable: No token transfers can take place while the contract is paused, which may be desired if a serious bug is found or there is a serious compromise to security of keys. The 'pauser' address controls the pause functionality.

- Upgradable: Only the 'proxyOwner' address can upgrade functionality of the contract.
- Blacklist: The contract can blacklist certain addresses to prevent those addresses from transferring or receiving tokens. The 'blacklister' address controls access to the blacklist functionality.

In comparison to DAI, a stablecoin maintained by MakerDAO, USDC is ~40% more expensive for users to transfer because of the blacklist checking process undertaken by the contract before a USDC transaction is processed.[45] Since the tokens exist by reference to the contract that minted them, each token transaction is an interaction with the contract and that interaction is what is recorded to the blockchain (which is different in a purely account based blockchain like the Bitcoin protocol where the token transactions are between accounts (i.e. public addresses)).

Each check of the blacklist costs around 2,100 gas (around 58 cents based on gas price of 100 gwei, where a gwei is the smallest unit of ether, at $2,770 per ether). The blacklisting function was put in place for regulatory purposes however there is a proposal that suggests blacklisting is not actually effective if an address is associated with illicit or suspicious activity. Instead, there is a proposal to remove the blacklist checks from all transfer and approval functions and introduce a new function called freezeBalance. The freezeBalance function sets the account balance to zero, removes the balance from the total supply and updates a separate accounting mapping for frozenBalances to reflect the funds that are frozen.

[45] Alex Kroeger, 'A modest proposal: USDC v3' (25 January 2022), available at: https://alexkroeger.mirror.xyz/RJ1gZ8tAfqXOmfA3M-Jz0AkD082c-3hwr2lba-F1j3uw; Laszlo Dobos, Cryptoslate, 'USDC blacklist cost users and extra $3.6 million – per month' (2 February 2022), available at: https://cryptoslate.com/usdc-blacklist-cost-users-an-extra-3-6-million-per-month/#:~:text=In%20theory%2C%20the%20blacklist%20is,so%2C%20the%20transaction%20is%20blocked

4. Stablecoins vis-à-vis CBDCs

Why mention CBDCs in relation to stablecoins? A discussion about fiat currency pegged stablecoins is incomplete without corresponding reference to CBDCs because of their perceived or actual relatedness. Market innovation with stablecoins is a preliminary step and learning curve necessary to inform safe and sound CBDC design but it is unknown whether fiat currency pegged stablecoins would survive once CBDCs are issued.

If an Australian dollar CBDC was already issued, the legal and tax issues considered in this report with respect to the fiat currency pegged stablecoin component of the Platform would likely not be as critical to enabling the payments and tax innovation possible.

If stablecoins solve the short to medium term problem of turning fiat money into digital, programmable and censorship-resistant money, is there still a need for fiat-currency pegged stablecoins once CBDCs, i.e. natively digital money, are issued? There may be a continuing demand for stablecoins alongside CBDCs, albeit they would be CBDC-pegged stablecoins, if a person does not agree with the CBDC design choices but still desires the exposure to the stability that may be on offer by a central bank actively managing monetary policy.

Around the world, private issuers, central banks and governments are exploring different design considerations for stablecoins and CBDCs, such as whether the token is interest-bearing, the level of fiat currency reserves and quality of other reserves, asset versus algorithmic collateralisation, and what level of surveillance and control can and should attach to token transactions. The spectrum of design considerations makes it difficult for policymakers to define the parameters in which a stablecoin can and should be given 'currency' status or 'currency equivalent' status, as well as the extent of licensing obligations that should apply to stablecoin issuers as well as platforms that integrate use of stablecoins. In addition, there are questions around whether, in enabling innovation in payments, financial services, business and tax compliance, 'currency' or 'currency-equivalent' status of stablecoins should be reserved for stablecoin issuers that meet either minimum or very high standards.

Convergence.Tech would have been in a position to consider the merits of a privately issued stablecoin versus a CBDC if plans and proposed designs for an Australian CBDC were further advanced. However, due to the early stages of Australian CBDC work and thought, a comparative analysis between privately issued stablecoins and an Australian CBDC would be premature and so is beyond the scope of this report. Nonetheless, Convergence.Tech will continue to absorb the learnings from privately issued stablecoins, the variances in design approaches, and their use around the world, as well as advances in CBDCs, to provide input to evolving stablecoin and CBDC policy settings in Australia.

5. Key Legal Barrier: Payment of Tax-Related Liabilities Required in Australian Currency

The tax administration regulations state that a tax-related liability must be paid in Australian currency.[46] However, the Governor-General has the power to make or modify this regulation: [47]

Regulations may provide for methods of payment of tax liabilities etc

(1) This section applies to a liability to or of the Commonwealth arising under, or by virtue of, any of the following laws:

(a) this Act;

(b) any other Act of which the Commissioner has the general administration;

(c) regulations under the Act covered by paragraph (a) or (b).

(2) The regulations may make provision for and in relation to the methods by which the amount of the liability may be paid.

(3) Without limited subsection (2), the regulations may make provision for and in relation to the making of payments using:

(a) collection agents; or

(b) electronic funds transfer systems; or

(c) credit cards; or

(d) debit cards.

If the Governor-General were to make or modify the applicable tax regulation to allow payment of tax-related liabilities in Australian currency pegged stablecoins it would unlock and enable innovation at the intersection of payments and compliance with tax obligations and is strongly encouraged.

Arguably, as set out below at section 4(a), payment of a tax-related liability with a tokenised Australian dollar deposit may be acceptable as 'currency' if the private-permission blockchain or control rights specified for the token contract deployed on a public blockchain is considered an 'electronic funds transfer system' under subparagraph 3(a) of the abovementioned tax law. The ATO should issue as soon as possible to clarify this.

[46] Regulation 21(a) Taxation Administration Regulations 2017; Elizabeth F. Morton and Michael F. Curran, 'Technical and legal aspects of tax debt collection and cryptocurrency' (26 August 2021), Australian Tax forum 37(1)
[47] ss 16A and 18, Taxation Administration Act 1953 (Cth)

6. Key Legal Barrier: A Fiat Currency Pegged Stablecoin is not 'Currency'

(a) 'Currency' laws

The provisions of the Currency Act 1965 (Cth) (Currency Act) and the Reserve Bank Act 1959 (Cth) (Reserve Bank Act) do not support an interpretation of any Australian dollar pegged stablecoin as 'currency' or 'Australian currency'.

The Currency Act provides that:

> *Every payment that is made shall, unless it is made according to the currency of some country other than Australia, be made according to the currency of Australia provided for by this Act.*[48]
> ...
> *A person shall not make or issue a piece of gold, silver, copper, nickel, bronze or of any other material, whether metal or otherwise, of any value, other than a coin made or issued under the repealed Acts or under this Act or a British coin as defined by the repealed Acts, as a token for money or as purporting that the holder is entitled to demand any value denoted on it.*[49]

The Reserve Bank Act provides that:

> (1) A person shall not issue a bill or note for the payment of money payable to bearer on demand and intended for circulation.
> *Penalty: 50 penalty units.*

Note: Chapter 2 of the Criminal Code sets out the general principles for criminal responsibility

> (2) A State shall not issue a bill or note for the payment of money payable to bearer on demand and intended for circulation.

Arguably, a 'tokenised Australian dollar deposit' issued by an authorised deposit-taking institution (ADI) as a crypto-asset (which may be labelled a stablecoin) could be interpreted as 'currency' or 'Australian currency'. Cash or money as we know it now as being withdrawable for banknotes and coins feels instantaneous and digital when we pay for things online and through our smart phones. Behind the scenes however, there is a web of messaging that is sent between a buyer's bank and a merchant's bank to update the state of the buyer's bank account and the merchant's bank account, which is facilitated by payment intermediaries for a fee.

To the extent that tokenised deposits represent a form of messaging between financial institutions, they may be considered 'currency' or 'Australian currency'. However implementation of this would likely occur with private-permissioned blockchains or control rights specified in the token contract deployed to a public blockchain rather than minting of an unrestricted stablecoin on a public blockchain. Tokenised deposits on private-permissioned blockchains or with control rights specified in the contract on a public blockchain each may be a necessary and preliminary step, but it would prevent and stifle access to the programmability, innovation, liquidity and user networks being developed on other non-ADI platforms and applications around the world.

(b) Suggested amendment to 'currency' laws

The Treasurer is empowered under the Currency Act to specify the standard composition of coins by signing an instrument.[50] Under this power, the Treasurer can specify a variation from a standard weight applicable to the coin, which may contextually limit the Treasurer's powers to physical changes to only the weight of coins.

[48] s 11(1), Currency Act 1965 (Cth)
[49] s 22, Currency Act 1965 (Cth)
[50] s 14, Currency Act 1965 (Cth)

A broad interpretation of this provision could allow the Treasurer to specify that 'coins' issued as fiat currency pegged crypto-assets on a blockchain are a type of composition of coins, or stablecoins, accepted for circulation and that have the status of 'currency'. In a similar way that Schedule 1 of the Currency Act sets out the standard weight composition for each coin, conditions for designation of a stablecoin as 'currency' could be articulated.

(c) Tax laws dealing with currency

Income tax

The term 'currency' is not defined in the income tax law (i.e. the Income Tax Assessment Act 1997 (Cth) **(ITAA 1997)** and the Income Tax Assessment Act 1936 (Cth) **(ITAA 1936).**

The Commissioner of Taxation released guidance in 2014 that considers the interpretation of the word 'currency' in the context of the foreign currency rules in Division 775 of the ITAA 1997.[51] In that guidance, the Commissioner quoted Gummow J in Leask v Commonwealth (1996) 187 CLR 579:

> *…while 'coinage' and 'legal tender' involved quite specific and narrow concepts, the former being concerned with coins as money and the latter with the prescription of that which at any particular time may be a lawful mode of payment, 'currency' was a broader expression. This is exemplified by the provisions of the Currency Act to which I have referred earlier in these reasons. They illustrate the proposition that currency is a universal means of exchange, designated by a particular unit of account (169).*

Similar to the analysis above at section 4(a) and based on the extract from Gummow J, a tokenised deposit could arguably be treated as 'currency' for income tax purposes because it represents the unit of account of each Australian dollar. However, a fiat currency pegged stablecoin with a right to redeem the underlying fiat currency collateral is more likely a capital gains tax **(CGT)** asset or trading stock. Where rights to interest or other returns also attach to the stablecoin, the issuer may characterise the arrangement as a debt interest or equity interest, or a financial arrangement subject to the taxation of financial arrangement **(TOFA)** provisions, for income tax purposes.

GST

The GST law contains a definition of 'digital currency' for the purpose of treating crypto-asset transactions as equivalent to currency transactions if the crypto-asset meets the definition of 'digital currency'. [52]

Where a stablecoin issuer designs the stablecoin such that the value derives from or is dependent on something else or has substantial restrictions imposed (such as control rights), the stablecoin will not meet the GST definition of 'digital currency'. The stablecoin may be treated as an input-taxed financial supply which is not subject to GST, but it could be treated as a taxable supply of an intangible asset. In the absence of clear and prominent communication of the GST characterisation the everyday consumer and business would not ordinarily think to treat a stablecoin as anything other than currency. This could result in unintended and unfunded GST obligations for business users of stablecoins.

(d) Suggested amendment to tax laws dealing with currency

Arguably, no law change is required to achieve 'currency equivalent' treatment for income tax purposes for Australian dollar pegged stablecoins. If the stablecoin maintains its peg then there is no exposure to gain or loss when transacting with the stablecoin and the characterisation as currency, a CGT asset, trading stock or a TOFA financial arrangement does not bear any difference in the tax result.

We note that there is an arguable case for law change to designate 'foreign currency equivalent' status for foreign currency pegged stablecoins. This would allow foreign currency pegged stablecoins to be treated on par with foreign currency and prevent the tax law from operating to stifle or distort taxpayers' decisions to use foreign currency or a foreign currency pegged stablecoin. Where taxpayers are using foreign currency pegged stablecoins in the same or similar ways that they use foreign currency, existing elections available in the income tax law such as the functional currency election and limited balance election should be clearly available to those taxpayers.

Similar considerations apply to blockchain level tokens like BTC and ETH which are intended to function like digital currency when used on their own blockchain networks but further analysis regarding natively digital currencies like BTC and ETH is beyond the scope of this report.

[51] Taxation Determination TD 2014/25 Income tax: is bitcoin a 'foreign currency' for the purposes of Division 775 of the Income Tax Assessment Act 1997?
[52] s 195-1, A New Tax System (Goods and Services Tax) Act 1999 (Cth)

7. Key Legal Barrier: If Fiat Currency Pegged Stablecoins are not 'Currency', the Financial Services, Banking and Markets Licence Regimes Likely Apply and the 'Digital Currency Exchange' Regime Likely Does Not

(a) Non-cash payment facilities

Under the Corporations Act, a person makes a non-cash payment **(NCP)** if they make a payment or cause a payment to be made otherwise than through the physical delivery of Australian or foreign currency in the form of notes and/or coins.[53] The facility through which, or through the acquisition of which, a person makes such a payment is the financial product regulated under the Corporations Act.[54] The act of making a non-cash payment to the recipient is a 'use' of the NCP facility by the holder. For example, an instruction by a client to make a non-cash payment to a particular payee is a 'use' of the NCP facility by the client.

Under existing law, since fiat currency pegged stablecoins are not 'currency' a number of fiat currency pegged stablecoin arrangements would likely be regulated as an NCP facility which requires the operator of the facility to hold an Australian Financial Services License (AFSL and comply with the ongoing obligations of the AFSL.The non-cash payment facility definition may capture both the stablecoin issuer as well as a platform or application that integrates the stablecoin. A key requirement to obtain such an AFSL is professional indemnity insurance, the availability of which for crypto-asset products is severely lacking in the global market, practically inhibiting the ability of crypto-asset business to secure an AFSL.

There is a threshold question of whether the NCP facility characterisation and licensing regime is appropriate for fiat currency pegged stablecoin arrangements that are in substance meant to operate like currency. The characterisation of a stablecoin as an NCP facility distorts market activity away from blockchain-based and stablecoin innovation and towards existing payments providers because blockchain technology is inherent to the facility. Other payments providers and gateways benefit from the distinction between technology through which a NCP facility is made available and the NCP facility itself, whereas blockchain-based stablecoins cannot fulfil this separation and distinction. Per the Explanatory Memorandum that accompanied the introduction of the NCP facility provisions:

> *Who is the issuer of a particular financial product, including a noncash payment facility, is dealt with in proposed section 761E. In particular, proposed subsection 761E(4) makes it clear* **that the issuer of the product is the person who is responsible to the client or for the obligations owed under the terms of the product. In relation to noncash payments** *such as direct debit* **facilities, the issuer of the facility** *(who is subject to certain obligations under proposed Chapter 7, including financial service provider licensing and product disclosure)* **is the financial institution with which the account to be debited is held, rather than the person to whom payments can be made** *using the facility. Similarly, in relation to…ATMs it would be the financial institution with which the account being credited or debited through the use of the machine that would be the provider of the facility, not the supplier of the ATM.*[55]

Suggested amendment to or relief related to NCP facility provisions

Preferably, the Government should consider amending the definition of an NCP facility to clearly exclude arrangements involving Australian currency pegged stablecoins and could use this amendment to specify the conditions of that exclusion. This could be done by way of regulations under the Government's regulatory modification powers under Chapter 7 of the Corporations Act.

[53] s 763D, Corporations Act 2001 (Cth)
[54] s 763A(1)(c), Corporations Act 2001 (Cth) and ASIC Regulatory Guide 185: Non-cash payment facilities, at RG 185.58
[55] Explanatory Memorandum to the Financial Services Reform Bill 2001 (Cth), [6.59]

The Australian Securities and Investments Commission (ASIC) could modify ASIC Corporations (Non-cash Payment Facilities) Instrument 2016/211 to clarify that platform and applications integrating Australian currency pegged stablecoins are not to be treated as an issuer of an NFP facility.

(b) Purchased payment facilities

In October 2019, the Council of Financial Regulators published a report in following their review of the regulation of SVFs in Australia. The first recommendation was that stored-value facilities be introduced as a new class of regulated product to replace 'purchased payment facilities' in the existing regulatory framework. The Council of Financial Regulators have also recently indicated they see stablecoins as a type of SVF and that stablecoins will be incorporated in the proposed regulatory framework for SVFs.

Under the Payment Systems (Regulation) Act 1998 (Cth) (PSR Act), a purchased payment facility is defined as:

> (1) A purchased payment facility is a facility (other than cash) in relation to which the following conditions are satisfied:
>
> *(a) the facility is purchased by a person from another person; and*
>
> *(b) the facility is able to be used as a means of making payments up to the amount that, from time to time, is available for use under the conditions applying to the facility; and*
>
> *(c)those payments are to be made by the provider of the facility or by a person acting under an arrangement with the provider (rather than by the user of the facility).*
>
> However, a facility covered by a declaration under subsection (3) is not a purchased payment facility for the purposes of this Act.
>
> (2) The holder of the stored value, in relation to a purchased payment facility, is the person who is to make payments as mentioned in paragraph (1)(c).
>
> (3) The Reserve Bank may, by legislative instrument, declare that this Act does not apply to a specified facility, or to facilities included in a specified class of facilities, if the Reserve Bank considers that it is not appropriate for this Act to apply to the facility, or to each facility of that class, having regard to:
>
> *(a) any restrictions that limit the number or types of people who may purchase the facility; or*
>
> *(b) any restrictions that limit the number or types of people to whom payments may be made using the facility.*
>
> (4) In this section:
>
> *(a) a reference to a facility includes a reference to a right to use a facility; and*
>
> *(b) a reference to the purchase of a facility includes a reference to the payment of an amount for a right to use a facility.*

The Reserve Bank of Australia has granted relief (Declaration No. 2, 2006) from the requirement to have an ADI licence for a purchased payment facility where total obligations to make payments does not exceed $10 million.

Whilst a stablecoin issuer may be considered to be the holder of stored value in the form of the stablecoins, a user's transaction in stablecoins would be a peer to peer transaction unless the issuer had specified control rights to approve the transaction or was operating on a private-

permissioned blockchain. Absent control rights or restriction of use of the token with a private-permissioned blockchain, the stablecoin issuer would not be making the payments as required under the PPF definition, the user would. Accordingly, the application of the PPF licencing regime and proposed SVF regulatory framework each fall short if the stablecoin is minted on a public blockchain and without any control rights retained by the issuer.

If stablecoins are regulated as a PPF or are to be regulated as an SVF, this key issue of users being able to make the transactions without involvement of the issuer and in ways not anticipated by the issuer must be dealt with. The potential global circulation and use of Australian currency pegged stablecoins for payments and more poses a challenge to existing methods of observing monetary behaviour and informing monetary policy decisions. Policy makers may choose to limit Australian currency pegged stablecoins that can be given 'currency' or 'currency equivalent' status to those that can be controlled by an issuer; however, this could limit the utility and competitiveness of Australian currency pegged stablecoins and the ability of those stablecoins to be used in the newest forms of payments and financial services blockchain-based innovation.

(c) Australian Market Licence

In order for a person to operate, or hold out that they operate, a financial market in Australia a person must have an Australian Market Licence that authorises the person to operate the market or an exemption from the licensing requirement.[56]

The Corporations Act defines a financial market as a facility through which:

> *(a) offers to acquire or dispose of financial product are regularly made or accepted; or*
>
> *(b) offers or invitations are regularly made to acquire or dispose of financial products that are intended to result or may reasonably be expected to result, directly or indirectly, in:*
>
> > *(i) the making of offers to acquire or dispose of financial products; or*
> >
> > *(ii) the acceptance of such offers.*
>
> (2) However, the following conduct does not constitute operating a financial market for the purposes of this Chapter:
>
> *(a) a person making or accepting offers or invitations to acquire or dispose of financial products on the person's own behalf, or on behalf of one party to the transaction only, unless the regulations specify circumstances in which such conduct does constitute operating a financial market and the person's conduct occurs in circumstances so specified;*
>
> *(b) conducting treasury operations between related bodies corporate;*
>
> *(c) a person being the holder of a licence under an Australian law relating to the licensing of auctioneers, conducting an auction of forfeited shares;*
>
> *(d) any other conduct of a kind prescribed by regulations made for the purposes of this paragraph.*

If a fiat currency pegged stablecoin is characterised as a financial product, then a platform or application that integrates use of the stablecoin could require an Australian Market Licence to operate a financial market. This would discourage integration of fiat currency pegged stablecoins with platforms and applications, or perhaps drive innovation more towards 'tokenised Australian dollar deposits' to instruct the transfer of value from existing ADIs to the ATO rather than supporting real-time, immutable and programmable transfers of value through stablecoins.

[56] S 791A, Corporations Act 2001 (Cth); ASIC, 'Regulatory Guide 172 Financial markets: Domestic and overseas operators' (May 2018), [RG172.27]

Suggested amendment to or relief related to financial market definition

Similar to the recommendation in relation to NCP facilities, the Government should consider amending the definition of a financial market to clearly exclude arrangements involving Australian currency pegged stablecoins and could use this amendment to specify the conditions of that exclusion. This could also be done by way of regulations under the Government's regulatory modification powers under Chapter 7 of the Corporations Act.

(d) Digital currency exchange regime

Where the designated service of a 'digital currency exchange' **(DCE)** (exchange of money (Australian or not) for 'digital currency') is being provided, as defined in the AML/CTF Act, the DCE provider is responsible for registering with AUSTRAC. In addition, the DCE must meet ongoing compliance obligations such as adopting and maintaining an AML/CTF program which involves customer identification and verification and suspicious matter reporting to AUSTRAC.

If a fiat currency pegged stablecoin is not 'currency', then a strange result and potential regulatory arbitrage opportunity ensues because the exchange of the stablecoin for a digital currency is not captured by the existing DCE regime.

8. How the Legal Barriers have Impacted BEP Design

Design and operation of the BEP is on its own a significant commercial and technological exercise before any banking and financial services licencing obligations in relation to the fiat currency stablecoin component are considered.

Due to the potential onerous licensing obligations involved in issuing and supporting use of an Australian currency pegged stablecoin on the BEP, Convergence.Tech will likely rely on relationships with third parties to commercialise the BEP. Initially, integrations with third party providers will be necessary to assist business users to acquire, hold and deal with the fiat currency stablecoin component of the BEP so that each business user can more easily manage and meet their Australian excise obligations. One third party provider would be responsible for taking fiat currency deposits and minting Australian dollar pegged stablecoins (Stablecoin Issuer) on an Ethereum-compatible blockchain. Another third party provider would be responsible for managing custody of the stablecoins which includes setting permissions for signing where a number of signatories may be required before a stablecoin transaction is signed by a business (Third Party Custodian).

The first version of the BEP has been developed on a private-permissioned version of the Ethereum blockchain. Initially, proof of authority consensus will be used with only the BEP operator holding authority to operate a full node. This development approach allows for gradual onboarding of other full nodes once a process for designating and supervising the authority to verify transactions, as well as viewing authority, is determined based on the core stakeholders' and legislative requirements.

The proposed functionality of the BEP is set out from two perspectives:

> *1. Businesses without an ATO payment arrangement (who must pay excise each time they enter alcohol into the domestic market); and*
>
> *2. Businesses with an ATO payment arrangement (who pay all outstanding excise either weekly or monthly).*

For businesses without an ATO excise payment arrangement, a business user must log into their BEP account to record each 'out-of-bond' sale of alcohol, which triggers an automated process that calculates the correct excise to pay. The business user is then presented with an option to 'Pay with stablecoin' which if accepted takes the business user to a separate window to log into their account with the Third Party Custodian. Once the user clicks to confirm payment with stablecoin, the excise payment can be functionally transferred in stablecoins to the ATO's digital wallet address. However, due to the tax regulation that requires tax-related liabilities to be paid in Australian currency, the Stablecoin Issuer must be instructed to treat the payment instruction as a redemption so that Australian currency can be sent to the ATO bank account. If only digital wallets were able to be used, the Third Party Custodian and Stablecoin Issuer would each have visibility to see that the state of the stablecoins represented in the business user's digital wallet has decreased and the state of the stablecoins represented in ATO's digital wallet has increased as a result of the transaction. For businesses with an ATO payment arrangement, the same process as above would apply but on a weekly or monthly basis.

Innovation in the payments and financial system continues to evolve at an accelerated pace, including through the use of fiat currency pegged stablecoins and blockchain-based infrastructure. Meaningful and significant progress around easing and simplifying the tax compliance burden could be made with quite minimal reform to existing legal and tax rules. In addition, if the ATO could receive excise revenue in stablecoins a smart contract could direct the stablecoins to meet government tax expenditure. In so doing, the administration of government, initially the excise compliance area of government, could become more efficient and transparent. With blockchain-based infrastructure and programmable money that simplifies and automates compliance with tax obligations, opportunity is abound for industry and government to benefit from new and different ways to optimise latent capital.

Appendix V – Technology Protocol Selection Report

Technology and Protocol Comparison
Report for the Blockchain/Stablecoin
Excise Deregulation Project

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Abstract

This document describes the research and evaluation conducted to identify the most suitable blockchain / stablecoin platform for the Convergence led Food and Beverage Excise Blockchain Pilot project.

With many different blockchain platforms available, it is important to methodically research and evaluate the options based on the project's business and technical requirements. This research and evaluation included evaluating 24 different blockchain platforms, and conducting two proof of concept exercises.

The Discovery Phase's initial focus was to define the business requirements; the technical requirements were then produced and linked. A set of 11 different technical criteria was applied against 24 different blockchain platforms to evaluate their suitability for the project. This resulted in a shortlist of six platforms that through four additional technical criteria resulted in a choice of two platforms to conduct proof of concepts on: Besu and Evmos.

The proof of concepts included nine different technical features that were implemented and then tested. The results found that Besu is the most appropriate blockchain platform for the project at this stage and that Evmos, while inappropriate for now, should be considered again in the future giving it time to mature. Through this extensive evaluation process, the Convergence. Tech team has confidence that the Besu blockchain platform can satisfy the project's business and technical requirements.

1. Introduction – Purpose of Document

The DISER funded Blockchain Pilot Grant seeks to demonstrate the potential for blockchain to reduce the regulatory compliance burden for business. It specifically seeks to address the challenges of complying with excise tax regulations throughout spirit production and supply. The project will use blockchain, smart contract automation, and a digital bonding process that leverages stablecoin concepts and customised interfaces for industry participants and regulators.

The objectives of the Blockchain Pilot grants are to:

- Reduce compliance costs for businesses
- Bolster blockchain literacy and contribute to the overarching objectives of the national roadmap
- Ensure buy-in from regulators
- Develop blockchain solutions for government and showcase to industry the viability of the regulatory efficiencies of blockchain
- Support the inclusion of blockchain in broader policy work to increase management capability around digital technologies.

Blockchain and Stablecoin are evolving technologies with many different implementation options. This paper will describe:

- *The core business and technical requirements that were determined based on discussions with the ATO Excise department and Spirits Industry participants.*
- *An explanation of the Pros, Cons, and Tradeoffs associated with employing blockchain / stablecoin based technology.*
- *Subsequent Blockchain/Stablecoin platforms selected for evaluation based on those requirements.*
- *Results of individual Proof-of-Concept exercises with different blockchain platforms.*
- *Recommendation and rationale for the selected blockchain platform to be taken forward to technical development in the Pilot and Trial project phases.*

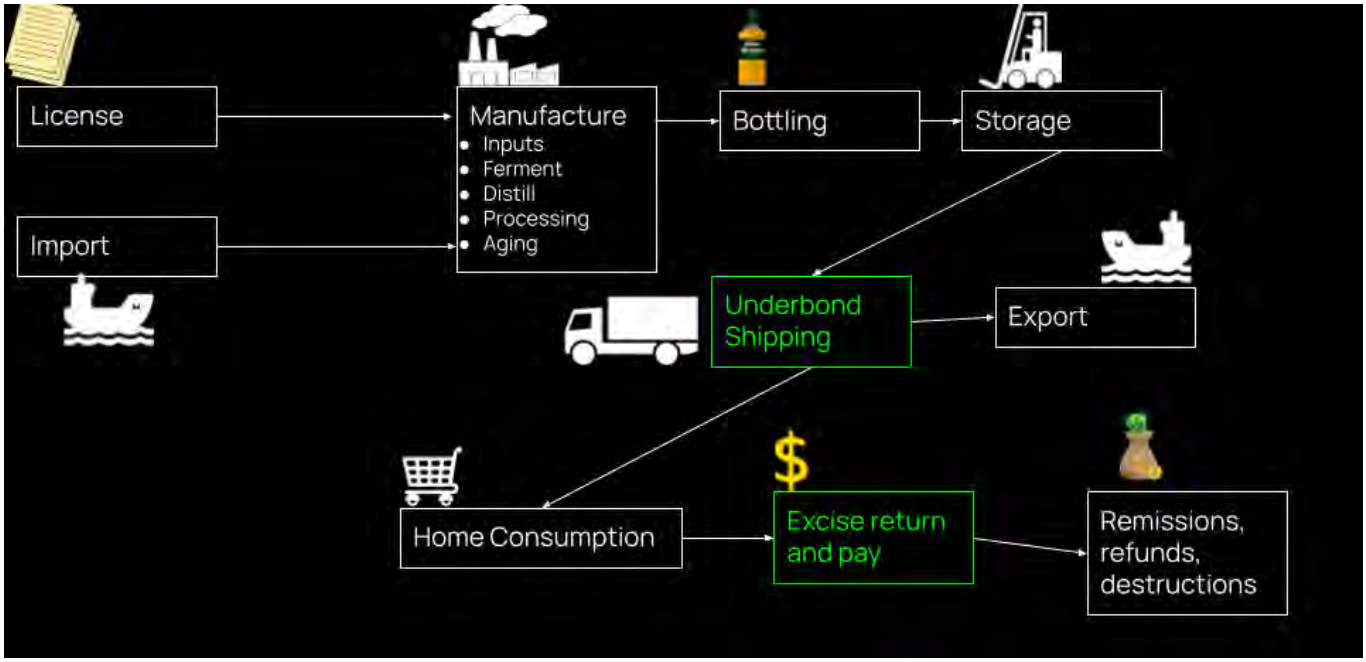
2. Core Business Requirements

There are many steps involved from the initial production of alcoholic spirits to the eventual consumption by customers. Spirits are both imported and produced domestically. Production involves multiple steps as well as ensuring that certain laws are followed for specific spirits that need to mature for two or more years before they can be sold.

Excise duty is payable when spirits are sold into home consumption. Currently the process to do this is quite manual and there is little information to confirm the volume of spirits sold.

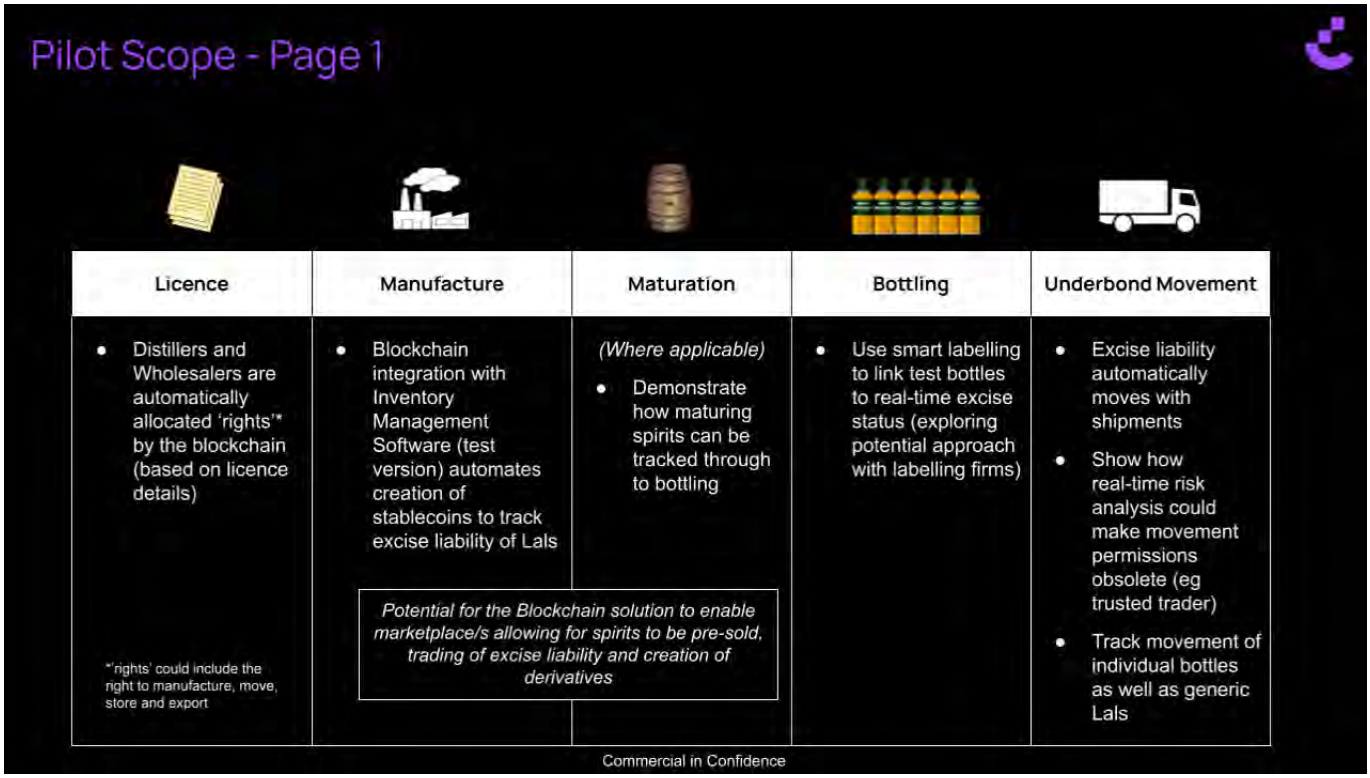
2.1 Overview of Spirits Movement

Below is a diagram of the typical flow of Alcoholic Spirits from the Manufacturer (Distiller) to the end customer:

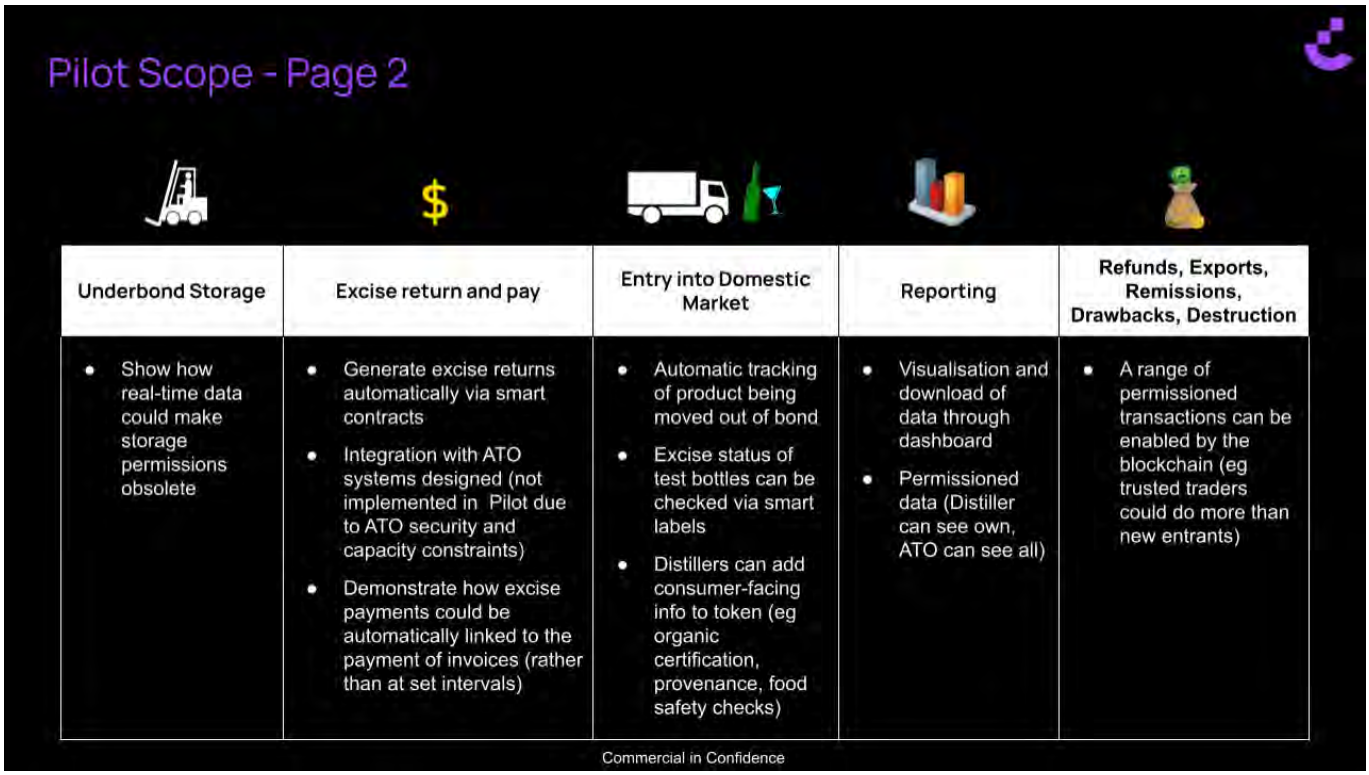


2 2 Pilot Use Cases

For each stage of the process of creating and selling spirits the following diagrams describe the intended pilot use cases for the blockchain. Please note, the stages of the process do not always occur in the order represented in the diagrams.



- Licence - refers to the ATO authorised permissions to move and sell alcohol, and that can be managed on the blockchain.
- Manufacture - a stablecoin representing the amount of alcohol in the spirits, along with their excise liability, can be created automatically via events that occur in the participant's Inventory Management System.
- Maturation - as spirits mature, typically in whiskey barrels, their location and status all the way through to the bottling phase can be traced on the blockchain.
- Marketplaces - potentially new marketplaces for the trade of derivatives and futures on spirits can be facilitated by trading these assets on a blockchain as the spirits mature.
- Bottling - smart labelling linked to smart contracts on the blockchain would allow immediate tracking of excise status on spirits at any time.
- Underbond Movement - Underbond refers to when spirits are in a location that is licensed by the ATO as eligible to store and mature spirits. As spirits move between warehouses and manufacturers they can be tracked, and excise status is always known.



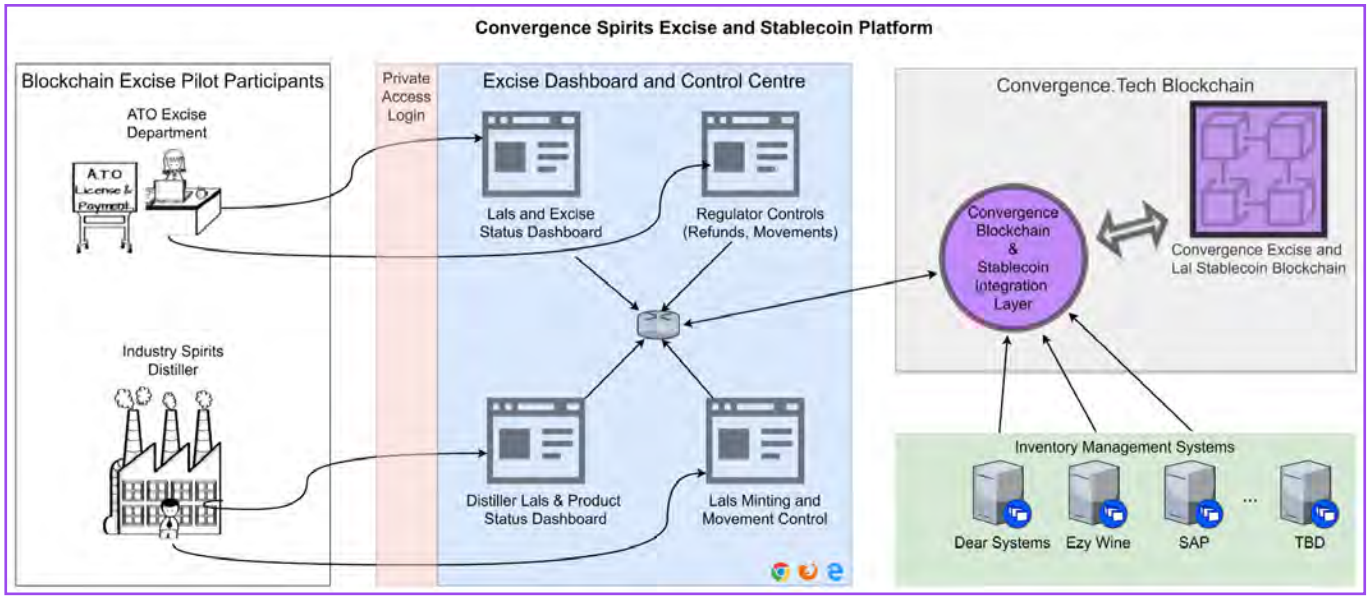
- Underbond Storage - storage permissions, typically an onerous process for both the producer and the ATO, can be eliminated if the required information is stored in the blockchain and available whenever needed.
- Excise Return and Pay - generating the returns automatically, integrating with the ATO, and facilitating excise payments so they occur automatically as part of the invoicing process are all potential improvements to the way they are handled today which is mostly manual.
- Entry into the Domestic Market - supply chain tracking is possible using this solution. Additionally smart labels can be used to retrieve origin and other useful information for particular bottles.
- Reporting - Visualisation of data that is permissioned can help provide confidence to the ATO that excise duty is correct, and can help producers better understand the flow of their product once it leaves their domain.
- Refunds, Exports, Remissions, Drawbacks, Destruction - special situations that could be facilitated via a blockchain solution.

3. Technical Requirements

The following diagram shows at a high level what the aspects to the technical solution would be. The client facing part of the solution will be web applications that are composed of dashboard views showing excise status and control modules where the ATO can perform regulatory actions, and the Distillers can mint LAL (litre of alcohol) stablecoins as they produce spirits. The web applications will include a security layer that ensures that the Distillers can only see their own data, while the ATO can see the Excise status across every Distiller.

The blockchain solution will be accessed via an integration layer that sits between:

- *Blockchain backend*
- *Inventory Management Systems (Dear, EzyWine, SAP, etc.)*
- *React based application and GraphQL serverless integration points*



3.1 Blockchain and Decentralisation Advantages

Outside of ad hoc demands for records, the ATO currently has very little real-time data that can validate the amount of alcohol that is produced for consumption and therefore should have excise duty applied to it. Additionally the Spirits industry would benefit from additional supply chain information regarding the production, movement, and sale of their products. A decentralised, shared, blockchain solution utilised by both the ATO and Spirits industry participants that shows the excise information the ATO needs and the supply chain the industry needs, while permissioning that data only to who needs to see it would be a significant improvement over the existing system. This system should be decentralised because the different participants in the system are all contributing their own data, some of which they want to share and some of which they don't. A trustless, decentralised system helps ensure no one party has centralised control over all the data. While the ATO could be considered the appropriate central authority here in a traditional, centralised, technology platform implementation it would potentially empower them with Distillers' proprietary information unnecessarily, as this solution has maximum benefit to Distillers if it includes not only excise status

but also supply chain information that the ATO does not need to track excise and the Distillers may not want to share with the ATO.

By sharing the status of alcohol production with the ATO, Distillers can be trusted more which means permissions can start to be automatically granted where appropriate and the concept of a "trusted trader" becomes feasible.

Additionally a blockchain solution using stablecoins helps to uncover latent value in the alcohol itself and potentially facilitates future marketplaces and other types of financial instruments and products that could be used in the future.

4. High-Level Evaluation of Blockchains

The first stage of determining the blockchain platform(s) we want to use for the pilot involves a market-scan of the industry to determine viable candidates for the solution. Blockchain technology has been rapidly evolving and there are many different platforms that should be considered for this solution.

The specific steps followed for this initial stage are:

1. *Produce a list of all the current blockchain platforms that are in use today and at a stage that they could be used to implement our own solution*
2. *Based on the business and technical requirements, list out all the main criteria we will evaluate these platforms with.*
3. *Summary of results that should get down to 2–5 platforms to be evaluated in further detail.*
4. *Add some additional criteria mostly around practicality, usability, and support to further refine the list.*
5. *Determine the final candidates for a 1–2 week Proof of Concept evaluation to enable detailed assessment and recommendation.*

4.1 List of Blockchain Platforms to Consider

Platform Name	Platform URL
Besu	https://besu.hyperledger.org/en/stable/
Quorum	https://consensys.net/quorum/
Hyperledger Fabric	https://www.hyperledger.org/use/fabric
Enjin on Ethereum	https://enjin.io/software/platform
Corda	https://www.corda.net/
Chainlink	https://chain.link/
Algorand	https://www.algorand.com/
Cardano	https://cardano.org/
Polkadot	https://polkadot.network/
Polygon	https://polygon.technology/
Starknet	https://starkware.co/product/starknet/
Eos	https://eos.io/
OMG	https://omg.network/
xDAI	https://www.xdaichain.com/
Arbitrum	https://offchainlabs.com/
Bitcoin	https://bitcoin.org/en/
Tron	https://tron.network/
Cosmos	https://cosmos.network/
Binance Chain	https://www.binance.org/en
Multichain v2	https://www.multichain.com/
Tezos	https://tezos.com/
Solara	https://solana.com/
Ethermint	https://docs.ethermint.zone/

4.2 Evaluation Criteria for the Blockchain Platforms

Criteria	Assesment Method	Criteria Description and/or Need
Private Node Abilities	Knockout	*Has the ability to run outside of a public chain environment*
Encrypted Transactions	Knockout	*Encrypted Transactions (e.g., sidechains) are needed to allow tokens and other digital assets from one blockchain to be securely used in a separate blockchain and then be moved back to the original blockchain if needed.*
Onchain Permissoned Accounts	Knockout	*Necessary to secure data between industry participants*
Support for NFT and FT	Knockout	*Has a predefined guidepath that supports both non-fungible and fungible tokens. Needed for use cases that look like they will need tokens that have transitioning states from NFT <-> FT*
Supports PoA	Knockout	*PoA is the best approach for a permissioned chain*
Oracle Compatibility	Yes, No	*Needs to support data lookups from an outside source (i.e., Excise Tax Rates)*
Language Maturity	L,M,H	*Need smart contracts that can support NFTs and FTs (Turing completeness?)*
Burnable Assets	L,M,H	*The ability to burn a token and assign permissions to who can do that*
Throughput	L,M,H	*Needs to support certain tx/sec requirement (TBD)*
Open Source	Yes, No	*To avoid vendor lock-in and potentially reduce costs and improve community support*
Platform Community	L,M,H	*Measure of how big the community is (and hence the support)*
Industry Usage	L,M,H	*Measure of how many implementations are out there for the platform.*
Enterprise Support	L,M,H	*Ability to have paid support from a platform expert (throat to choke)*
Data Visualisation and Searching	L,M,H	*Ability to easily visualise and search data*
Assessment Definitions:	Knockout	*If the platform doesn‘t have that ability then we can‘t consider it for the Pilot*
	L,M,H	*Measure of how well the platform supports this criteria*
	Yes, No	*Boolean measure*

4.2.1 Private Node Abilities

This solution as it stands today would only be used by the ATO and Spirits manufacturers. And we know that the ATO will have different permissions to view data than the individual Spirit manufacturers. Therefore the implementation needs to be on a private blockchain that can only be accessed by the ATO and Spirits manufacturers that have been authorized and licensed by the ATO. Eventually other entities could be allowed into the system as well as long as their rights are set and agreed upon.

4.2.2 Encrypted Transactions

Transactions that are encrypted, or located in permissioned side chains are necessary for this project. This is because while the ATO should be able to see excise liabilities for everyone, the individual spirits producers should be able to see their own internal transactions and possibly transactions when they sell to another spirits manufacturer.

4.2.3 Onchain Permissioned Accounts

Similar to the encrypted transactions, granular permissions are needed on accounts to control what transactions they can perform and what data they can view..

4.2.4 Support for NFT and FT

We will be utilizing a Fungible Token- the LAL (Litre of Alcohol) and Non-Fungible Tokens - Containers together. Thus we need a blockchain platform that supports both fungible and non-fungible tokens.

4.2.5 Supports PoA

Since this is a private permissioned chain the use of Proof of Work is unnecessary and wasteful of energy. While Proof of Stake is possible as well, ultimately the best solution for a private chain solution that needs granular access permissions is Proof of Authority. There are lots of new consensus mechanisms that may also be suitable, but none were found in a platform that could support the other required criteria.

PoA is also useful in terms of the smart contracts that could be quite high in gas costs if they were implemented in a public chain.

4.2.6 Oracle Compatibility

We know that certain lookups will be required from an outside source, otherwise known as an Oracle in blockchain parlance and thus the system will need that support. The primary example of this would be the Excise duty rate itself, that is indexed in line with the Consumer Price Index every six months. We want this rate to be changeable without having to change anything in the underlying contracts at the same time.

4.2.7 Language Maturity

Many of the platforms are very new and still evolving at a rapid pace. Some evaluation of how robust, mature, and popular particular languages are is an important criteria for implementation of the pilot. For example Ethereum with it's ERC standards is clearly a very mature language and thus gives more comfort that implementations can be built without as many defects or simply unimplemented or half-built solutions.

4.2.8 Burnable Assets

Once the Excise has been paid on LALs in the system we want to ensure that they can no longer be transacted on. Thus we need the platform to support burnable assets so that they can't be used again after Excise is paid.

4.2.9 Throughput

While this is a private chain with initially little expected volume this has the potential to increase dramatically after integrations with industry participants' different Inventory Management Systems. Thus one of our criteria is throughput to ensure that we have a system that we think can handle much larger volumes in the future.

4.2.10 Open Source

Open Source platforms tend to have better support and higher adoption. They also help avoid any usage costs. While this criteria is not a knockout one, it's definitely preferred that the platform be open source.

4.2.11 Platform Community

The community behind the blockchain platform is an important indicator for the future viability of the platform. The larger the number of forum posts and activity from the community the better chance that questions and issues will be resolved in a more timely manner.

4.2.12 Industry Usage

Industry usage is an important gauge of a platform's viability as well. If only proof of concepts and personal projects are being implemented on the platform this is a sign that it may not be viable for Enterprise grade needs. This project requires a platform that has at least some industry usage, especially in the supply chain and stablecoin areas.

4.2.13 Enterprise Support

Support from an organisation is important to ensure that any defects or other production issues have dedicated organisations that will look at them. This is similar to the Red Hat Linux model.

4.2.14 Data Visualisation and Searching

We know that we will be showing a variety of information to both spirits producers and the ATO that needs to be easy to understand and comprehensive. Thus the ability to easily create and display dashboards and reports, as well as the ability to search for certain values is crucial to this pilot.

4.3 Shortlist Results to 6 Platforms

The results were the following platforms for further consideration:

- *Polkadot*
- *EOSIO*
- *Cosmos (Ethermint)*
- *Besu*
- *R3 Corda*
- *Hyperledger Fabric*

Many of the platforms were knocked out due to the lack of Private Node Abilities, or lack of maturity in the private node abilities they did support. The following platforms were eliminated because of that:

> *- Algorand, Cardano, Polygon, Starknet, OMG, xDAI, Arbitrum, Bitcoin, Tron, Tezos, Solana, Enjin*

One platform was eliminated due to the lack of both NFT and FT support:

> *-Multichain v2*

4.4 Additional Criteria Determined and Results

Additional criteria was applied including:

- *Industry Usage - how much is the platform being used in real-world applications*
- *Enterprise Support - how much paid support is available for the platform.*
- *Data Visualisation and Searching - how much capability is there to explore and visualise the data contained in the platform.*
- *Skillset Available - how much experience does the existing Convergence team have with the platform, thus minimising the learning curve that could add significant delays to the project.*

Further evaluation can be referenced in the Knockout #2 tab.

4.6 Final Candidates

Ultimately the final candidates determined were:

- ***Besu** - in the Ethereum ecosystem, Besu has a robust industry around it, and mature support of NFT and FT standards, such as ERC-20, 721, and 1155. Additionally the Convergence team is familiar with the framework and has some libraries they may be able to leverage for the project.*
- ***Evmos (Evermint/Tendermint Cosmos)** - has the potential to run Ethereum based Solidity contracts in a ported EVM (Ethereum Virtual Machine) that has the potential to run better than on Besu's java implementation. Additionally with inter-chain support built in there may be additional capabilities realised in the solution as it potentially broadens past the alcohol spirits excise industry.*
- ***Hyperledger Fabric** - A distributed ledger technology that has been created with the intention of being used in large scale enterprise deployments. The Convergence team is also familiar with this technology.*
- ***R3 Corda** - A distributed ledger technology that has custom built APIs for many enterprise applications.*

4.7 Rationale for Private Permissioned Ethereum over Hyperledger Fabric or Corda

One of the earliest but most important design decisions for this project was choosing the base blockchain protocol to use. The technical requirements call for a distributed ledger that can be deployed non-publicly, can control and protect the transactions between nodes, and can easily support the concepts of tokenization, both fungible and non-fungible.

This last requirement at first appears to be the simplest, but is actually the most critical component and chief among our reasons for our final choice of Private Permissioned Ethereum. The goal of this project is to not just build out a decentralised distributed ledger that can approximate our current excise system, but to build a platform that will inspire innovation and growth beyond what our current system can envision. We want to build a platform that can allow for outside innovation to be easily and quickly integrated into our systems without the need for complex rewrites or redesigns.

After taking a deep dive into the many different developer ecosystems that have grown in the blockchain environment over the last five to ten years, and leaning on our own deep experience building and innovating on multiple platforms, we have come to the conclusion that the majority of innovation, growth, boundary pushing, investment, and developer excitement is in the Ethereum ecosystem, specifically the Ethereum Virtual Machine and the smart contract language of Solidity. Decentralised finance, the growing NFT markets, and most inter-chain development has focused on making the innovations compatible with or fully within the Ethereum ecosystem, whether it be the Ethereum mainnet itself, the growing number of side-chains, or the maturation of layer 2 solutions, most development takes into account how their innovation can be compatible with the Ethereum based smart contract protocols.

Focusing on the Ethereum protocol means we will be building a platform that is compatible with applications and logic that is built on the clear blockchain technology leader today. There are by far more developers, more interest, more investment, and more security reviews focused on the Solidity smart contract ecosystem. There are more standards pre built and audited for Ethereum, many more developers working hard to grow the Ethereum protocol, far more advanced scaling, testing and solution finding. By a large margin, there is far more material available for a new Solidity developer than any other blockchain smart contract language. All blockchain technologies are young, but one is clearly growing the quickest, and that is Ethereum. We believe that by building a platform that is compatible with all of the greatest decentralised innovation, we will ensure that we attract the best development ideas to rethink and grow our own system in innovative ways for the future to come.

5. Evaluation of Individual Blockchain Platforms

The "Proof of Concept" evaluation portion of the project was undertaken for two platforms:

- Besu
- Evmos

Since Evmos is a port of the EVM by Cosmos into a Proof of Stake model we started with Besu. We could then take the smart contract(s) that we develop with Besu and attempt to apply them to Evmos to see how they perform there.

For the individual evaluation of the blockchain platforms we utilised the following pieces of functionality, ordered by priority, to determine if the platform will be suitable for the business and technical requirements. The goal was to set up the environments and then build out each of these features to the extent that we know the platform is capable of supporting that feature. Thus it does not have to be a complete implementation, and just the bare minimum to prove that the feature is viable on the platform. With the lower priority items, an MVP approach was taken to at least determine if the platform was capable of doing this action, and understand the pros and cons as much as possible.

Proof of Concept MVP to be tried with each platform:

	Name	Priority	Description
POC-1	Token creation	1	Create a token with metadata
POC-2	Token movement	2	Transfer ownership of a token
POC-10	Token Type Support- SDs & Containers	3	Need to have multiple token types that can contain each other (e.g., pallet contains crate contains bottle contains LALs.
POC-7	Permissioned view (all, client)	4	User X can see all data, user Y can only see their own data
POC-4	Assign coins to movement by product type	5	When an entity moving alcohol, we need these subtracted from a pool of coins for a product name (eg Bundaberg spiced rum) automatically, or reportable as such
POC-6	Permissioned transaction	6	User X can do all actions, user Y can only do move actions
POC-5	Token destruction	7	Token can be burned
POC-3	Token metadata update	8	Change token metadata upon movement or other transaction
POC-9	Transaction risk	9	A transaction between User Y and User Z can be flagged as "high risk" based on external ruleset, and paused for approval by User X

Two other items were also investigated:

- Graph QL for Besu - investigating what querying options we have with Graph QL and Besu
- ERC-1155 Research - researching feasibility of using NFTs and FTs in the same chain and contracts.

5.1 Results on Besu POC Items

The following are the experiences with each of the POC Items that we worked on for the Besu POC

5.1.1 Token Creation

Status: Successful
An NFT Bottle containing an FT LAL was created successfully in Besu. Some additional work is needed to support NFT Containers that can contain other Containers, but this has been proven to be possible in Besu to create a contract that contains FT and NFT tokens together.

5.1.2 Token Movement

Status: Successful
An NFT Bottle was moved from one account to another. This is a vital requirement but not one that we anticipated would have any issue as all blockchain platforms support the transfer of value from one account to another.

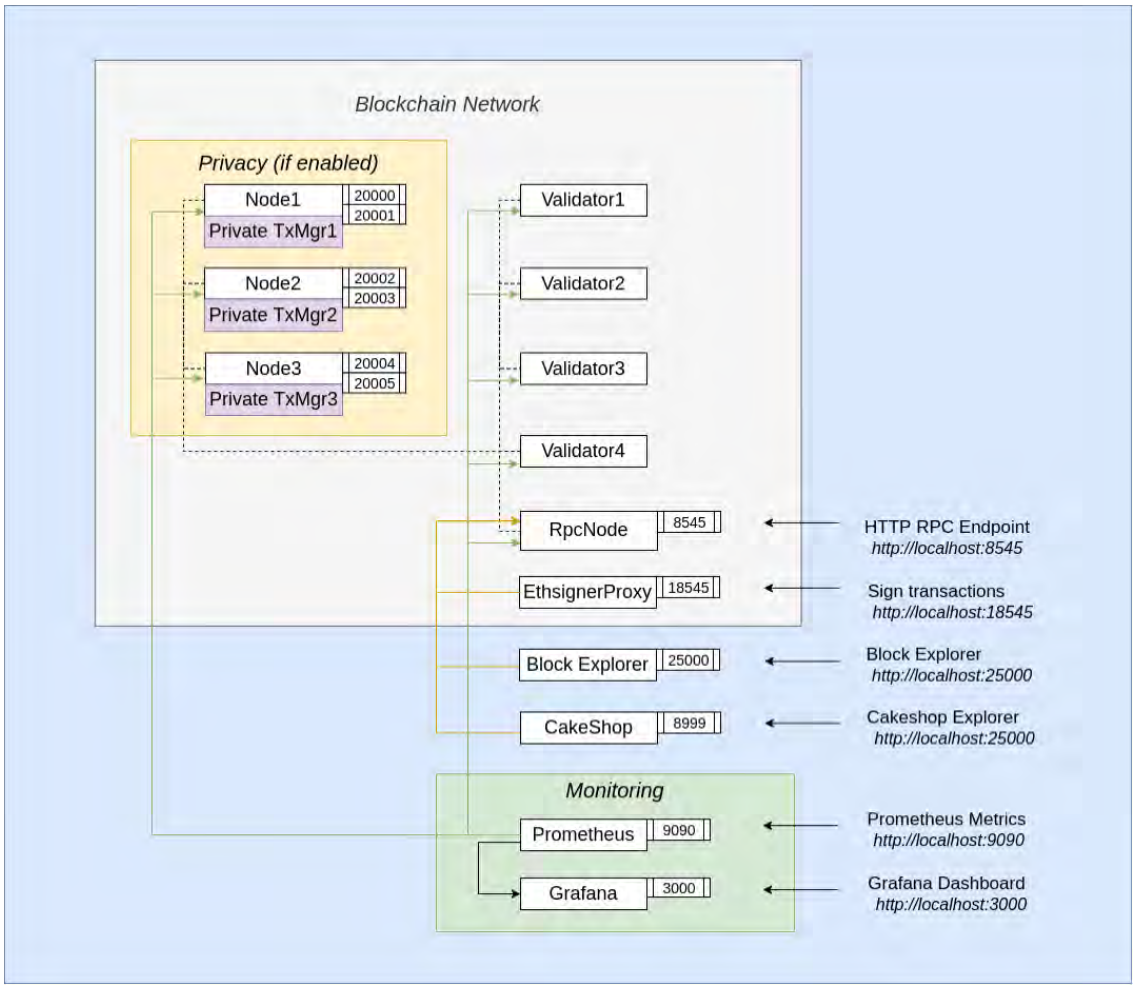
5.1.3 Token Type Support

Status: Successful
We built a data structure that is fundamentally recursive where a Container can contain other Containers (e.g., crate contains bottles). This is implemented in a smart contract.

5.1.4 Permissioned View

Status: Successful, with more development to come
The requirement is to have a permissioned view where while the ATO should be able to see data chosen to be shared by and from all Distillers, the Distillers themselves should only be able to see their own data. While this is possible on some platforms, it was one of the criteria that knocked out many of the initial platforms we were evaluating. Ultimately in order to do this in Besu we needed to use Tessera, an open-source private transaction manager. Tessera supports private nodes that allow you to specify who can view certain transactions.

Below is a diagram showing the typical setup. Additionally the setup of how data will be stored on the blockchain or elsewhere is more complex than traditional blockchain models. We have made great progress on this as well as integrating GraphQL to facilitate private data frontend access and querying. More core development on decentralised file storage will be required, however this is unavoidable due to the Permissioned View requirement and is a key innovation driver of this project.



(Source: https://raw.githubusercontent.com/ConsenSys/quorum-dev-quickstart/master/files/common/static/blockchain-network.png)

5.1.5 Assign Coins to Movement by Product Type

Status: Successful
We want to prove that when a container that contains other containers is moved that the underlying container and stablecoin LALs are transferred as well. This has been successfully completed utilising the ERC-1155 standard.

5.1.6 Permissioned Transaction

Status: Successful, with some limitations
Similar to 5.1.4 this functionality requires Tessera to implement. We have proven that we can enable permissioned transactions, but still have some details to work out regarding the metadata associated with these transactions. Especially in cases where the ATO entity can see transactions from multiple distillers, but the Distiller entity can only see their own.

5.1.7 Token Destruction

Status: Successful
This concept of burning Lals and Containers was completed successfully. Operationally this meant marking the Lals as no longer transferable and changing the "status" of the container to empty. Thus the tokens are not technically destroyed, but rather transformed into states where they either could not be transferred anymore (i.e., the Lal stablecoin), or marked as empty of Lals (i.e., the bottle). This preserves provenance of the system.

5.1.8 Token Metadata Update

Status: Successful
NFTs will need to have certain metadata updated with no changes to ownership, and the visibility of this change will vary as well. This was done via a transaction via a private node so the visibility is only to the party that owns that NFT.

5.1.9 Transaction Risk

Status: Will not do, but determined possible
The ability to flag certain transactions as high risk should be possible using graphQL or other integration layer functions. However there won't be enough time to implement a solution. Given the low priority of this item, and the confidence it can be done externally to the blockchain platform (i.e., via the integration layer) if needed this item can be marked as complete.

5.2 Results of Evmos POC

Evmos provides single and multi node localnet options along with a 4-node local testnet setup. The documentation explains how to set these up, but has many deficiencies where additional steps that were not mentioned were necessary. Ultimately while we were successful in creating a single node in a localnet, executing transactions of Photon, the Evmos standard token, was not possible. Additionally on the shared testnet there are still lots of questions and issues with deploying nodes and validators.

Evmos is still very much an evolving product that has not been officially released yet and still at the testnet phase with a mainnet (Production status for Blockchains) coming in the next three months or so. This level of maturity was evident in the evaluation of the platform. Ultimately while it initially appeared that our criteria for maturity, community, and industry usage were adequate for Evmos the PoC showed that this is not correct.

6. Final Comparison of the platforms based on POCs

Ultimately Convergence.Tech evaluated 23 different blockchain platforms, based on 14 different criteria, and performed two Proof of Concept evaluations. The results indicate that the best choice for Blockchain platform for this project is Besu.

6.1 Pros and Cons for Selected Platform

The following is a summary of the main pros and cons for Besu as a Blockchain platform for this project:

Pros

- Besu is an Ethereum based platform that is used in production-grade implementations across the globe. It has standards and proven deployments that utilise both NFTs and FTs together that are required for this project.
- Besu supports private blockchains, and has frameworks that enable fine-grained data access permissions.
- Besu employs solidity as a smart contract language that is the most mature, widely used, and supported in the world.
- Convergence.Tech has existing experience with Besu and developers skilled in implementing solutions.

Cons

- Besu is a Java implementation of the EVM (Ethereum Virtual Machine) that may not perform as well as other implementations of the EVM. Additionally the EVM is not as well performing with regards to transaction throughput as some other blockchain platforms.
- Besu lacks interoperability with other blockchain platforms from a Layer 2 perspective thus limiting potential interactions with other chains. While this is not a current requirement of the project, it may be desirable sometime in the future.

6.2 Final Recommendation

We recommend Besu as the best platform for this project given the business and technical requirements, the team that will deliver it, and the current state of the blockchain industry. However we do recommend that in the longer term Evmos should be reconsidered. Evmos has great potential to alleviate the cons of Besu with a faster implementation of the EVM and layer 2 interoperability with IPC and Tendermint support. However it's maturity at this time is lacking to the point that using it now would introduce too much risk that issues would arise in development and deployment of the Excise platform.

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