THE EVOLUTION OF DIGITAL BONDS: RECENT MILESTONES ON THE JOURNEY TO A DIGITAL BOND MARKET IN EUROPE

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Over the past few years, we have seen a sustained focus on the potential benefits of using blockchain or distributed ledger technology (DLT) in the bond markets and key milestones as individual jurisdictions adapt their legal frameworks, sandboxes are set up for experimentation and innovative issuances attract attention. We consider the current landscape and the legal and market developments we may see next.

Bonds which make use of DLT at all or certain points during their life cycle are known as "digital bonds". The term encompasses both native digital bonds, where the bonds are issued entirely and directly on a distributed ledger, and security tokens, where a traditional bond is issued off-chain and immobilised before ownership or beneficial interests in the bond are transferred on-chain. DLT, which can be used in conjunction with smart contracts (self-executing code which permits the automation of certain processes and obligations upon the fulfilment of predefined conditions), can be used in relation to any or all of the following:

- the issuance, transfer, custody and/or cancellation of bonds;
- communication between issuers and bondholders, including in relation to the passing of resolutions or the declaration of events of default;
- the settlement of net proceeds of bond issuances and payments of principal and interest; and
- real-time tracking of use of proceeds, key performance indicators and allocation reporting for both ESG use of proceeds bonds and sustainability-linked bonds (as applicable).

In addition, a number of important efficiencies relating to the issuance of digital bonds have been highlighted. Shortened settlement cycles (even instant, or 'atomic', settlement) may be achieved by issuing the digital bonds against other digital assets (such as central bank digital currencies (CBDCs), stablecoins or deposit tokens), or through other innovative solutions such as the trigger mechanisms developed by the German Bundesbank and the Bank of Italy. The shortening of the settlement cycle and these new settlement techniques can reduce counterparty and settlement risk. In addition, the automation of certain processes, such as the calculation and communication of coupon amounts due to bondholders through a combination of oracles (data providers that import data onto distributed ledgers) and smart contracts, as well as the benefits of using a shared ledger to reduce manual reconciliations, may reduce overall costs for issuers, intermediaries and investors alike. This automation also alleviates execution risk by reducing the number of manual interventions required to complete such processes.

Key take-aways

- The legal framework for digital bonds continues to evolve in key financial centres across Continental Europe and the pathway for digital bonds in the UK is clearer than ever.
- Whilst issuances of digital bonds remain infrequent in number compared with traditional bonds, the issuances undertaken in the past few years have been ambitious, testing a wide range of innovations and bringing greater sophistication to the nascent market.
- The future of digital bonds will depend on a wide range of factors but the provision of clear and attractive legal frameworks will be key.

DLT - a primer

DLT is a technology which permits cryptographically secured data to be recorded on a distributed ledger which is held by participating computers (known as nodes) in multiple locations simultaneously via a peer-to-peer system. This can make a DLT-based system resilient as it eliminates the risk of a single point of failure. With DLT, if one of the nodes holding a copy of the distributed ledger has a technical issue, the fact that other nodes also hold a copy of the distributed ledger means that there is no system failure and the data recorded on the distributed ledger remains accessible. DLT also has other advantages. It offers transparency as data recorded on the distributed ledger can, subject to the type of DLT network being used and the permission settings employed, be visible to all or at least those connected to the relevant DLT network. In the context of digital bonds, the DLT network can show the time stamp and size of every trade in a bond, as well as the public address of each holder (which the entity acting as registrar (or equivalent) can reconcile with its records to identify the relevant custodian or investor). It also offers security as the use of cryptography and sophisticated consensus mechanisms for the validation of the recording of data means that data recorded on the distributed ledger is extremely difficult to manipulate.

Whilst this briefing is focused on the primary issuance of digital bonds, there is also significant interest in the benefits that DLT may bring in the context of secondary trading. Potential benefits include:

- facilitating the real-time movement of securities and the ability to conclude transactions 24/7;
- improving collateral mobility, particularly in emerging markets and for less liquid collateral;
- reducing risk (liquidity, settlement and counterparty) via atomic delivery versus payment;
- enhancing product functionality such as the ability to trade on an intraday basis to the nearest minute; and
- realising operational efficiencies by eliminating reconciliations and streamlining processes.

DLT is being deployed and tested at every level of existing intermediary chains (by depositaries, registrars, custodians, third-party service providers such as tri-party agents etc.) and could rationalise such chains. Therefore, in the next few years we are likely to see DLT used more frequently across the whole bond ecosystem, comprising both primary issuance phase and secondary market trading, as well as related activities such as settlement, custody and collateral management.

THE DEVELOPING LEGAL FRAMEWORK

The European level

Key activities in relation to bonds, such as (i) facilitating the buying and selling of securities, (ii) facilitating the transfer of payments and (iii) providing settlement services, recording securities in a book-entry system or maintaining securities accounts, are regulated by EU-level legislation that was drawn up long before DLT was considered for use in the capital markets.

Some of the EU's key financial services legislation, such as Regulation (EU) No 909/2014 (CSDR) and Directive 2015/65/EU (MiFID II), contains provisions that potentially preclude or limit the use of DLT in the issuance, trading and settlement of DLT-based financial instruments such as digital bonds.

The classic example is Article 3 of the CSDR, which provides that transferable securities admitted to trading on a trading venue have to be recorded in book-entry form in a Central Securities Depository (CSD). The impact of this rule is that it has not been possible to admit to trading on a regulated market the most prominent digital bonds issued in recent times. Instead, such bonds have been issued onto DLT networks that do not qualify as CSDs. This has significantly hindered the secondary market liquidity of the bonds, despite pragmatic efforts including the use of bulletin boards which facilitate OTC trading between parties by displaying of bid and offer interests, without matching orders, and do not require authorisation as a trading venue within the meaning of MiFID II. Some bonds have also been admitted to the Securities Official List of the Luxembourg Stock Exchange, which provides some transparency for investors with regards to the pricing of secondary market trades, even though they are not admitted to trading. Read more in our article on issuances of DLT securities in Luxembourg.

EU DLT Pilot Regime

Since 29 March 2023, Regulation (EU) 2022/858 (EU Pilot Regime) is up and running. This is an EU initiative to see whether the disapplication of certain pre-identified EU financial services legislation might encourage operators of market infrastructures to develop solutions for the trading and settlement of digital bonds and other DLT-based financial instruments.

For example, Article 3 of the CSDR can be disapplied by entities authorised under the EU Pilot Regime to operate DLT-based settlement systems (DLT SS) and/or DLT trading and settlement systems (DLT TSS). This means that digital bonds issued through DLT SS or DLT TSS can be admitted to trading on a regulated market in Europe and potentially benefit from greater secondary market liquidity.

The EU Pilot Regime is a three-year experiment which may be renewed once for a further three-year period. If the EU Pilot Regime is a success and the European Commission decides to modify or create legislation to make its provisions permanent, it would be a significant boost to the market for digital bonds. A permanent regime would allow for the full life cycle of digital bonds to be carried out in a fully regulated environment, using market infrastructures (DLT SS, DLT TSS and DLT-based multilateral trading facilities (DLT MTF)) that, at least initially, are likely to have been road-tested under the EU Pilot Regime.



Individual EU Member States

Individual EU member states have also been adapting their local frameworks to encourage or at least enable the use of DLT in the life cycle of bonds. The Netherlands is the only major market for bond issuance in Europe which has been comfortable using, or able to use, its existing securities law framework for bonds issued using DLT without additional legislation. While there were some issuances of digital bonds in Spain under the then existing securities law framework, subsequently there have been reforms to adapt the framework to account for DLT.

Progress has been uneven, with an initial wave of reform in Luxembourg, Germany and France enabling such jurisdictions to establish themselves as the flagbearers for digital bonds in Europe and attract innovative projects (see the case studies including transactions in Luxembourg and France below). In each case a different approach was adopted: Luxembourg adapted its existing regime for dematerialised securities, France adapted its regime for registered securities, while Germany passed a new law, the German Electronic Securities Act, setting out a new legislative framework for electronic securities

A second wave of reform followed in the first half of 2023 as member states sought to adapt their legal frameworks to ensure that they are compatible with the EU Pilot Regime and attractive to operators seeking to apply for DLT SS, DLT TSS or DLT MTF status. Importantly, in Italy and Spain laws were passed which expressly recognised, for the first time, the ability for digital bonds to be issued, whilst at the same time ensuring that their local regimes were compatible with the EU Pilot Regime.

More recently still, Poland has also amended its securities law framework (most changes were introduced to the Act on Trading in Financial Instruments of 29 July 2005) and adapted its existing regime for dematerialised securities, allowing them to be registered in DLT accounts or in a DLT register.

As a result, it is now possible to issue digital bonds in each of the major bond markets in Europe. Below is a summary of the different legal frameworks. The Netherlands has been excluded as it does not have specific laws relating to the use of DLT. Digital bond issuances under Dutch law can take place pursuant to the traditional Dutch securities laws.

Jurisdiction	Luxembourg	France	Germany	Italy	Spain	Poland
In what form can digital bonds be issued?	As 'dematerialised bonds', a separate and sui generis category of securities. The issuance of other forms, such as registered bonds, is not excluded under Luxembourg law but it has not yet been done due to the availability and attractivity of the dematerialised route which is even open to foreign issuers and foreign intermediaries (in the case of the central account keeper).	As 'registered bonds (au nominatif)', unless in the context of the EU Pilot Regime where digital bonds can take the form of 'bearer bonds (au porteur)'	As 'bearer bonds', without the requirement for a physical global or definitive note.	In "digital form", a new form of security.	As bonds represented by means of DLT systems.	As bonds represented in DLT accounts or in a DLT register.
Have changes to the legal framework been evolution or revolution?	Evolution. Luxembourg law has permitted the issuance of dematerialised securities since 2013 but DLT was only specifically covered, in order to give legal certainty, in 2021.	Evolution. French law has permitted the issuance of dematerialised securities since 1981 and in digital form since 2017.	Evolution. The new electronic securities regime supplements the existing regime for bearer securities by deeming electronic securities to be tangibles – and, therefore, subject to the existing statutory framework for tangibles.	Revolution. Before the changes earlier this year, the consensus in Italy was that it was not possible to issue digital bonds.	Revolution. Before the changes earlier this year, the consensus in Spain was that it was not possible to issue native digital bonds.	Evolution. Since 2019, the general rule is that all securities (including bonds) must be issued in dematerialised form. Exceptions allowing issuances in bearer form apply to some categories of securities.
Key features of the issuance process	The issuance of digital bonds is carried out exclusively by registering them in a single issuance account, which is held with a settlement organisation or a central account keeper. The issuance account may be held, and the digital bonds recorded therein may be effected, within or by virtue of DLT. Once registered into a securities account, the usual regime of transfer of bookentry securities applies. Such regime also includes (under the relevant statute) an express recognition of the use of DLT to operate securities accounts and record transactions.	The issuance of digital bonds is carried out by registering them in a distributed ledger (dispositif d'enregistrement électronique partagé) (DEEP). The issuer or the registrar appointed by the issuer as its agent (mandataire) has sole responsibility for registering the transfer of ownership of digital bonds in the DEEP.	The issuance of digital bonds is carried out by registering them in a central register or a crypto register. The crypto register may be maintained using DLT but does not have to be – the law refers to a "tamperproof system of record in which data is logged in time sequence and stored in a manner that is protected against unauthorised deletion and subsequent modification".	The issuance of digital bonds is carried out by registering them on a distributed ledger kept by an operator enrolled in a local register maintained by CONSOB (the Italian securities regulator) or, in the context of the EU Pilot Regime, a DLT SS or DLT TSS.	The legal regime for the issuance of digital bonds replicates the existing legal regime for bonds represented by means of bookentries. An entity (or entities) responsible for registering the securities in the relevant DLT (which shall be an entity authorised to provide the service of safekeeping and administration of financial instruments) system needs to be appointed.	The issuance of digital bonds is carried out by registering them in DLT SS or DLT TSS in DLT accounts (rachunki DLT) or (if given DLT SS or DLT TSS is exempted from maintaining DLT accounts) in a DLT register (ewidencja DLT). Once registered into a DLT account or DLT register, the usual regime of transfer of dematerialised securities applies, with certain exceptions determined mostly by the technical aspects of DLT.
Links to further in-depth analysis	Client briefing	Client briefing	Talking Tech	Client briefing	Client briefing	

The United Kingdom

The UKJT statement discusses three key potential structures for English law digital bonds: (i) digital bonds in traditional registered form (where the DLT itself constitutes a register maintained by the issuer or an agent on behalf of the issuer); (ii) digital record bonds (where the DLT provides a record of bondholders, and that record is maintained by a third-party platform operator acting as principal but not as agent on behalf of the issuer); and (iii) so-called digital bearer bonds (where the rights to the digital bonds are encapsulated in transferrable digital tokens). In addition, the Uncertificated Securities Regulations 2001 already provide a statutory avenue for issuances of digital bonds by UK companies in dematerialised form, although such bonds are only currently permitted to be transferred within an electronic system operated by a designated operator (and the only such current operator is Euroclear UK & International).

There are a number of legal issues relating to all of the above structures that require careful analysis and which are likely to impact on the likelihood of an issuer choosing one structure over another. For UK incorporated companies, one important issue relates to the formalities imposed by the UK Companies Act 2006 around the transfer and registration of bonds. Absent any changes to these statutory provisions, the digital record bond structure is likely to be the one which more easily navigates these formalities. The Law Commission has acknowledged the issues that are posed by such formalities and has recommended that a broad review of UK company law be undertaken to assess the merits of reforms that would confirm the validity of and/or expand the use of DLT for the issuance and transfer of debt and equity corporate securities.

UK FMI Digital Securities Sandbox

Drawing parallels with the EU Pilot Regime, in June 2023 the UK government published its proposal for a UK FMI Digital Securities Sandbox, which will be enacted pursuant to the powers given to the UK government under the Financial Services and Markets Act 2023. This sandbox will enable firms designated to participate in it to test and adopt new technologies and practices (such as DLT) by temporarily disapplying, modifying or even applying certain legislation for specific purposes. The proposal sets out a wide list of legislation that would be within scope of the sandbox, including the Companies Act 2006 and the UK-onshored CSDR and the Uncertificated Securities Regulations 2001. We note, however, that tax legislation is not within scope, and so it is important to

consider the UK tax implications (including stamp duty and stamp duty reserve tax) of a digital bond issuance governed by English law or by a UK incorporated entity. A key aspect of the UK government's powers under the sandbox is the ability to make permanent changes to legislation on the basis of what is learnt from the sandbox. A strong participation in this sandbox, therefore, has the potential to bring tangible positive changes to the UK regulatory and legislative landscape for the issuance of digital bonds.

CASE STUDIES: LANDMARK TRANSACTIONS IN 2022 AND 2023

Various market participants have sought to make the most of the reformed legislative frameworks to issue digital bonds and test different innovations. So far, these issuances have taken place outside of the EU Pilot Regime and the UK FMI Sandbox (which has yet to be implemented).

Whilst the market is still waiting for a high-profile issuance to take place in the UK and the new legislative frameworks in Italy and Spain have yet to be tested, the past couple of years have seen prominent digital bond transactions in Luxembourg, Germany, France and the Netherlands. There was also a high profile issuance under Spanish law by the International Development Bank, but before the recent legislative changes in 2023.

Below are four examples of market-leading digital bond transactions that Clifford Chance has advised on.

Case Study #1: Project Venus

In November 2022, the European Investment Bank (EIB) issued a digital bond under Luxembourg law for the first time (Project Venus), in the first use of the Luxembourg legislative regime. The euro-denominated digital bonds were issued onto Goldman Sachs' tokenization platform – GS DAPTM – in Frankfurt.

A major innovation tested on Project Venus was the use of CBDC tokens in the primary issuance settlement process. On the issuance date of the digital bonds the CBDC tokens were issued into an account belonging to the EIB on the Banque de France's DL3S Platform against the creation of the digital bonds on GS DAP. The CBDC tokens were then burned (permanently removed) and the EIB received the net proceeds in fiat money (euro) on the same date. The use of CBDC tokens therefore enabled settlement to take place on a T+0 basis, through a delivery versus payment process taking place across two different blockchain platforms connected via a hashed timelock contract, which ensured interoperability.



Case Study #2: Project Mars

The EIB issued its first digital bond in a denomination other than euro in February 2023 (Project Mars). Governed by Luxembourg law, these sterling-denominated digital bonds were issued by the EIB using a combination of private and public blockchains. Whilst the issuance of the digital bonds took place on a private blockchain operated and accessed via HSBC's Orion Platform, a public blockchain was used to mirror the records of ownership recorded in the private blockchain in order to provide greater transparency to investors, who were able to access information that would otherwise have been accessible only by parties with access to the private blockchain.

An innovative feature in this transaction was the use of smart contracts in the primary issuance process, linking the on-chain transfer of the bonds to off-chain payment to replicate the Delivery versus Payment (DvP) settlement method. This transaction was also the first instance of a digital bond under Luxembourg law being issued with a Luxembourg-based Central Account Keeper or CAK.

Case Study #3: Project Saturn

In June 2023, the EIB issued its inaugural green digital Climate Awareness Bond (Project Saturn). Issued under Luxembourg law, the krona-denominated issuance was the first digital bond issuance by the EIB in a Nordic currency and marked the inaugural use of the so|bond digital platform developed by Crédit Agricole CIB and Skandinaviska Enskilda Banken. A key aspect of this transaction was the use of a new innovative and green consensus mechanism on the blockchain called the Proof of Climate awaReness (PoCR) protocol. The energy consumption of this protocol is comparable to that of non-blockchain systems and it also incentivises participating nodes to continually improve the environmental footprint of their infrastructures.

Same-day settlement in fiat currency was also achieved on this transaction, albeit off-chain, demonstrating the potential for prompt and instant execution of trades when using DLT infrastructures for the securities leg. This was also the first digital bond to be displayed on the Luxembourg Green Exchange (LGX).

Case Study #4: Vesteda inaugural digital green bonds

In September 2023, ABN AMRO registered Vesteda's inaugural digital green bonds on Polygon's public blockchain. Governed by Dutch law, the eurodominated digital green bonds were the first of that type in the Netherlands. What made this transaction innovative is that the bonds were registered in a record on Polygon's public blockchain protocol, an existing permissionless distributed ledger using distributed ledger technology (DLT). The entire process of preparing, placing and documenting the bond was digital. Investors' ownership of the digital green bonds was recorded on the Polygon blockchain in the form of tokens that the investors acquired after they had paid for the bonds. To ensure custody and the security of the investors' unique keys, ABN AMRO uses a wallet for accessing the digital green bond.

WHAT DOES THE FUTURE HOLD?

Whilst the legal frameworks in key European jurisdictions do now permit the use of DLT in the issuance of digital bonds, the coming years will see further evolution. Luxembourg, for example, has been steadily improving its legislative framework over a number of years, even after high profile issuances such as the EIB transactions mentioned above. Other jurisdictions, such as Italy, may deem it necessary to make further changes once the newly established legal frameworks have been tried and tested.

If the EU Pilot Regime is a success, the European Commission may decide to modify or create legislation to make its provisions permanent. The same applies in the UK in relation to the UK FMI Digital Securities Sandbox. The creation of a permanent legal framework for DLT market infrastructures wouldgive the digital bond market every chance of developing into a more significant market.

If the EU Pilot Regime and the UK FMI Digital Securities Sandbox fail to attract applicants and the legislators decide no permanent changes to the legislative framework are required, it would not necessarily mean that DLT has no significant role to play in the future primary bond markets. Platforms operated by CSDs may allow for digital bonds to be admitted to trading. In addition, private placements of digital bonds continue to be an attractive option for investors and issuers alike in the context of short-term debt (i.e., commercial paper or bills with a maturity of less than 12 months), bespoke bilateral bond issuances by limited categories of issuer (such as development agencies), certain project bonds or club deals by institutional investors with high-value borrowers (e.g., financial institutions or financial investors), for which admission to trading would not be seen as a prerequisite for investing.

In addition, in relation to private placements in particular, should further solutions for interoperability between DLT platforms develop and be implemented, liquidity for digital bonds that are not admitted to trading could even be created through tri-party repo on such platforms.

The future of digital bonds is not solely dependent on decisions taken by the European and UK legislators. There are many other factors that could accelerate or slow down the development of the market, with the key one being efforts to develop a wholesale CBDC in Europe that would allow the cash leg of transactions involving digital bonds to be processed via a risk-free medium which is programmable through the use of smart contracts.

There are also developments wholly separate from the bond markets which could influence the prevalence of DLT in the financial sector, thus providing an additional driver for the digital bond market. For example, programmable digital cash (including CBDC, tokenised deposits and stablecoins) or other on-chain settlement instruments or solutions might be developed for other use cases (independently of digital bonds) but which have an added benefit for digital bonds, specifically the possibility of enabling a reduced settlement cycle (as discussed above).

In the journey to the creation of a digital bond market, significant progress has been made by both the legislators and the bond industry in recent years. We expect to see further milestones achieved in the near future.

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