

The Blockchain Standard Infrastructure for Business

Bringing Blockchains into Mainstream Use

WHITEPAPER

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KEY HIGHLIGHTS

Lition is developing the world's first scalable public-private blockchain with deletable data features, made for commercial products. This state-of-the-art protocol enables blockchain-based applications to step out of their current niche into commercial mainstream deployment.

Blockchain development is co-innovated with SAP, whose chief innovation officer Dr. Jürgen Müller is also an advisor to Lition. SAP, a company with >400 million users and >10,000 developers, is developing the decentralized ledger and smart contract layer, while Lition is providing the open consensus layer. Lition will run the public mainnet using Lition tokens issued in an ICO for transaction execution, staking and sidechain creation.

Lition is well positioned to design a blockchain infrastructure for business use, as it launched the world's first P2P energy trading dApp that is commercially live in a mass market with real revenues and real customers in over 25 cities. In addition to this existing P2P trading dApp, there is a second use case in which Lition, together with a major Bank and a real estate company, has developed an MVP to syndicate loans, and later tokenize the loans as Security Tokens (STOs). Beyond this, there are many more use cases with the potential to disrupt not only the Energy and Banking spaces, but many others as well.

Furthermore, SAP can easily implement this blockchain into their existing products and services for their customer base of >400,000, making them immediately ready for blockchain use cases. It is therefore well positioned to become the standard mainnet for business applications.

LITION HIGHLIGHTS:

Offering all what businesses need: A public-private, legal and efficient infrastructure



Your data kept private

Sensitive data is stored on private sidechains. Quantum-compute safe



Regulation-proof & deletable

Store your private data only as long as you consent. Fully compliant with EU data privacy regulations



Built with SAP with Lition as their only co-innovator

Made possible through the invaluable expertise and support from key industry players



Infinitely scalable

Every new sidechain increases throughput. Cross-industry use cases and applications



Built on live P2P application

Our blockchain is informed by our own hands-on experience of Lition's live energy-trading dApp



Fast and low-priced

Smart contract execution for $0.01 and only 3 sec. block confirmation time

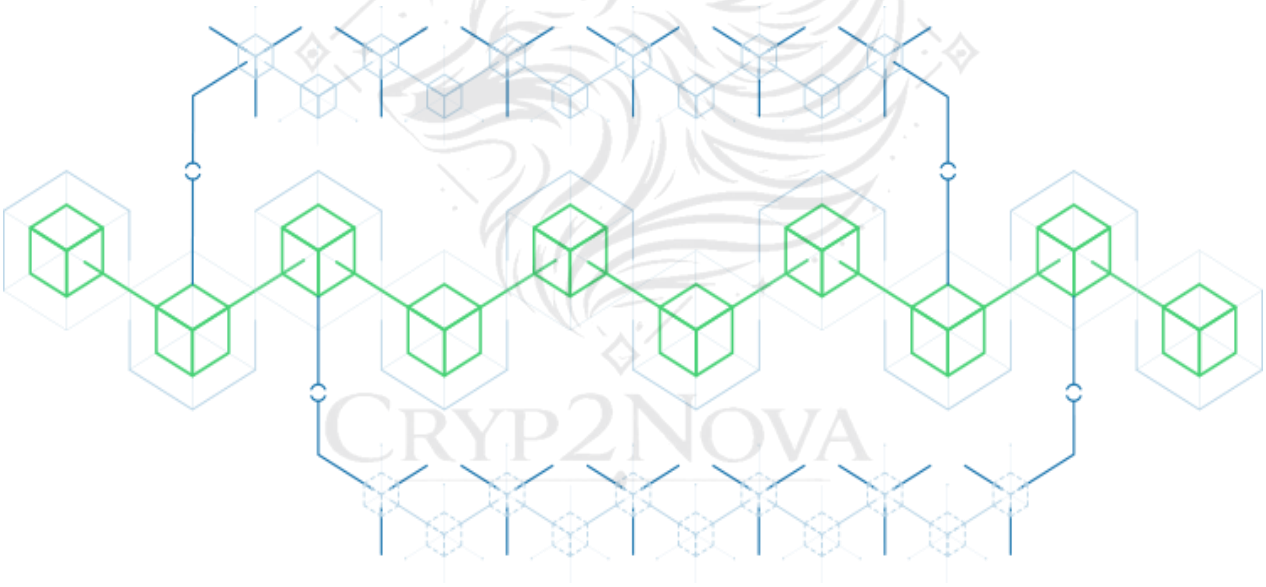
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LITION'S VISION

Our aim is to **bring blockchain technology** from its current hype-driven, speculation-fueled state with mostly pilot projects **into mainstream commercial use**. Blockchain technology should improve the everyday lives of the people.

> "Lition – bringing standard blockchain technology to business" - *Lition's vision*

In order to achieve this, our objective is to develop an easy-to-use and easy-to-develop infrastructure that fulfills the requirements of all businesses, from small companies to large corporations. Our blockchain should be the number one choice for any developer or company seeking to use blockchain technologies.



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THE BLOCKCHAIN INFRASTRUCTURE

WHY BLOCKCHAINS MISS MAINSTREAM ADOPTION

Even though blockchains are regularly praised as a technology with the potential to disrupt a wide range of industries like the internet did 20 years ago, we see limited mainstream adoption. Very few distributed applications (dApps) have made it into mass-market use, and large companies continue to shy away from the technology. Instead, we see many proof-of-concept or pilot projects that showcase the technology but never make it to the next step. Leading tech companies have not begun pushing blockchain into the market.

The reasons for this are both commercial/legal and technical.

COMMERCIAL / LEGAL REASONS

Large-scale adoption of new technical solutions comes primarily from established companies that already own the majority of customer interfaces across industry sectors like technology, automotive, healthcare, finance, etc. These are typically large corporations that use specific frameworks in order to decide whether or not to roll out a new technology to their customers.

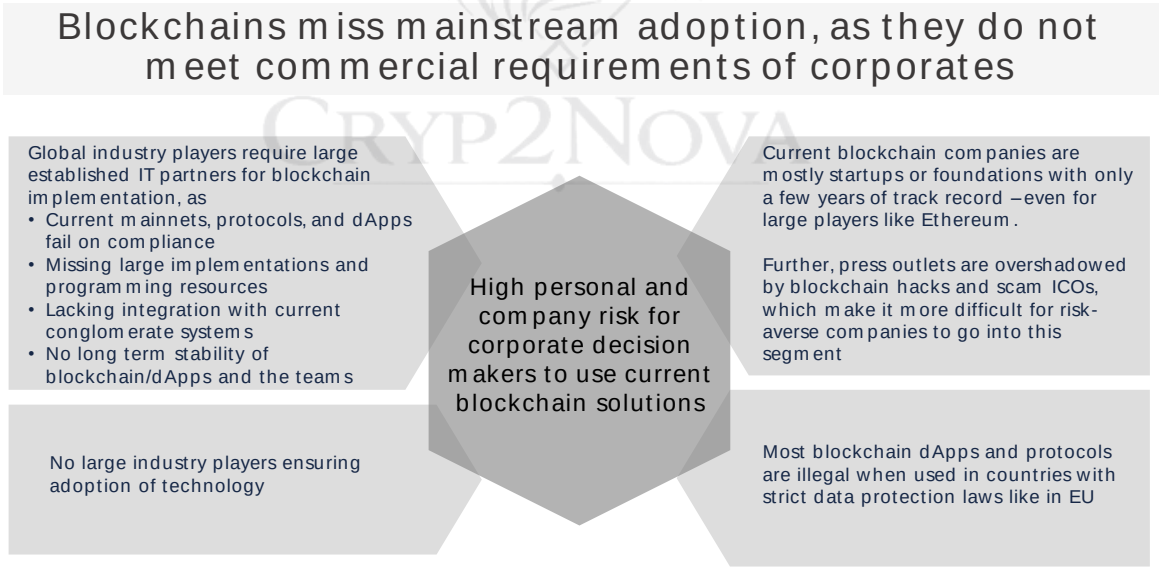


Figure 1: Commercial reasons for low mainstream adoption of blockchains

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Current blockchain solutions carry a high risk for corporate decision makers and their organizations, with 4 key reasons outlined in Figure 1. There has not been a solution that addressed these issues until now.

TECHNICAL REASONS

With the hands-on experience gained as one of the world's few mass-market blockchain applications in commercial production, Lition has experienced first hand that there is no blockchain infrastructure available that fulfills the technical requirements needed for mainstream adoption outside of very specific, niche use cases.

Instead, current blockchain technologies are designed for strengths in specific areas, as shown in Figure 2.

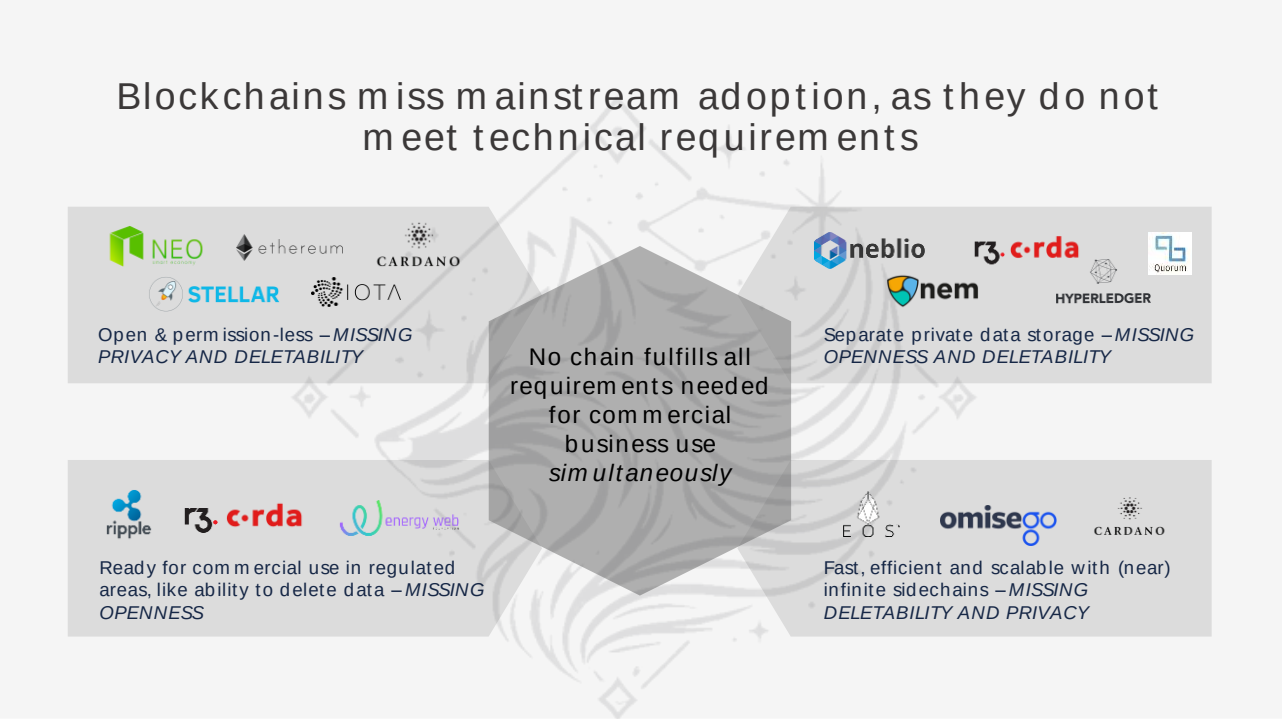


Figure 2: Technical reasons for low mainstream adoption of blockchains

These limitations largely explain why mainstream adoption of blockchains has been so slow, and why public attention has instead been driven by cryptocurrency price developments and speculative use.

LITION'S APPROACH TO BRING BLOCKCHAIN INTO MAINSTREAM USE

In order to bring blockchains into mainstream use, Lition needs to address the commercial and technical issues outlined above. As many commercial issues cannot necessarily be solved by innovative but inexperienced players, Lition has partnered with SAP. The software giant SAP is the worldwide leader in business software, with a market capitalization of $150bn, over 400mn users from their >400,000 customers and the power of >10,000 developers. With Lition's extensive IT knowledge and experience from launching the world's first blockchain-based peer-to-peer energy trading application in a mass market, we're working together on a next-generation blockchain infrastructure. The Lition/SAP blockchain is made specifically to be the standard blockchain infrastructure accepted by big industry players and used by any developer working on a dApp that serves a mainstream market in a legally compliant way.

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With the backing of a strong company like SAP, and innovative privacy and deletability features, our new blockchain addresses many commercial issues outlined in Figure 1, making it a lower-risk choice for corporate executives – in turn enabling mainstream adoption. A more detailed description on the partnership is outlined in a separate section on page 11.

In addition to the commercial purposes, the new blockchain is specifically designed to address the technical limitations outlined in Figure 2 in one integrated blockchain infrastructure. To be more specific, Lition addresses six core infrastructural issues outlined in Figure 3 along the existing live use case, as it shows the whole breadth of all improved features within a single customer journey. Depending on the use case of the commercial blockchain applications, some or all of these features may be needed.

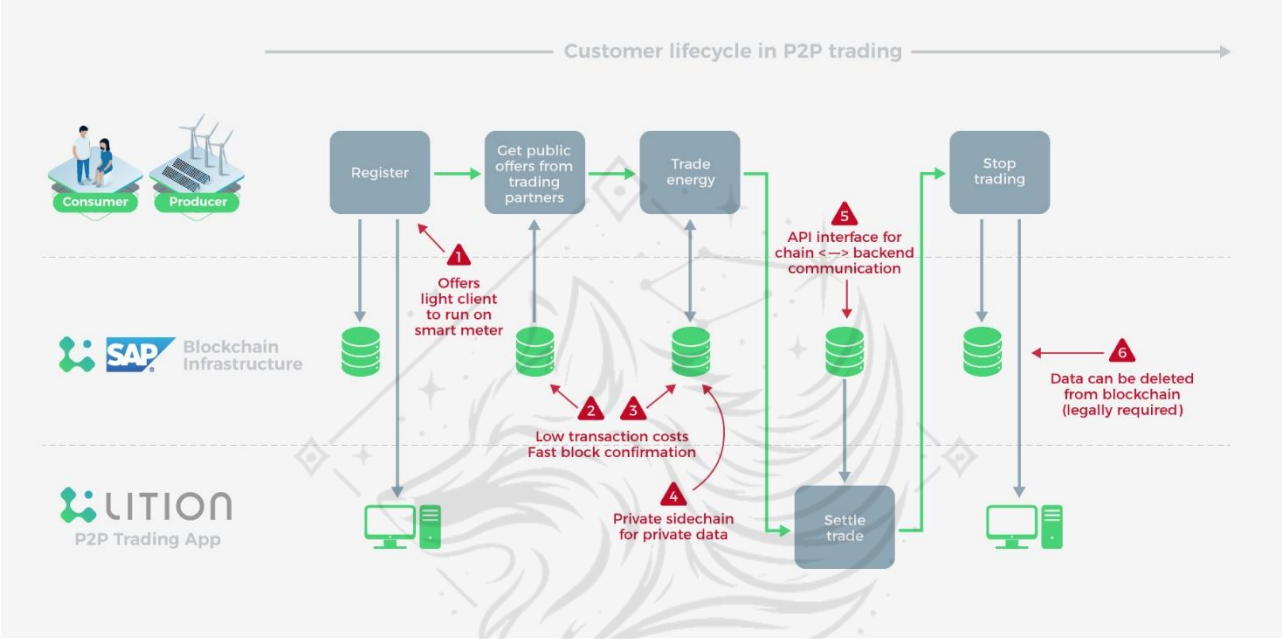


Figure 3: Improvements of new blockchain infrastructure, illustrated along existing peer-to-peer trading use case

Feature 1 – Light Client That Can Run on IoT Devices

Many use cases require IoT devices, e.g. sensors, appliances or Smart Meters, as used by Lition (see the Smart Metering section on page 40). Today's blockchain clients which participate in the network as nodes always require significant storage and processing capacity. Lition's current Ethereum client from Parity (parity.io), the most popular client in use, requires over 300 GB of storage. Even special clients like GETH[1] require 80 GB of storage in their fast modes, dropping as low as 40 GB for pruned (trimmed) clients if only the most recent blocks are stored. Pure light clients that only store block headers can go down to 40 MB, but just like remote clients that don't require any storage, light clients do not have access to the data of previous blockchain executions, which is needed to execute smart contracts and verify the correct execution of network nodes.

A blockchain built for widespread commercial use therefore needs clients that can run on thin hardware, such as Smart Meters or the control units of the distribution grid's voltage regulators, while still calling and verifying the smart contracts they deploy. Other industries face the same barriers with existing blockchains, for example banking with lightweight Point-of-Sales (PoS) devices or the automotive sector with connected cars, increasing relevance for such features beyond the energy space.

[1] See https://github.com/ethereum/go-ethereum/releases

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A promising solution could be provided by Slock.it, which is piloting a similar light client, but so far it is limited to the Ethereum network with its corresponding shortfalls.

Feature 2 – Low Transaction Costs

High transaction costs caused by low energy efficiency are a common drawback of typical blockchain implementations, with Bitcoin as the most prominent example. In the existing energy use case, before migration to Lition's own platform, smart contract executions can cost up to USD 0.60, depending on Ethereum's network congestion. This is caused by the high number of hash computations that are required by the network's Proof-of-Work (PoW) consensus algorithm, which results in extremely high energy consumption.

Bitcoin currently needs 60 TWh.[2] annually for its blockchain to operate, an amount of energy equivalent to the country of Colombia's annual energy consumption. At Lition, a core value is the sustainable use of natural resources, and therefore it is pivotal that we operate on the most energy-efficient platform available. In comparison, the Ethereum blockchain consumes 78 kWh/transaction[2], thus making it 12.2 times more energy efficient than the Bitcoin network, which uses 957 kWh/transaction[2]. These numbers will further improve once Ethereum developers switch from their current PoW solution into a Proof-of-Stake (PoS) algorithm and Vitalik Buterin's work on off-chain smart contracts with Plasma[3] is released into production state. To operate sustainably, Lition aims to reduce energy consumption, and thus cost per transaction, to less than USD 0.01.

Almost all modern infrastructure chains like NEM, Cardano, ZipChain, or Hashgraph have developed solutions to solve this issue with the many available open-source reference implementations. Therefore, this issue has been solved. However, none of these chains are additionally able to solve the other drawbacks that concern businesses, like delectability or storage of private data in separate but publicly verifiable sidechains.

Feature 3 – Fast Block Confirmation

Currently, customers need to wait well over a minute before their transactions are successfully executed on the Ethereum blockchain. The underlying reason is high block confirmation times of 10-20 seconds along with a block height of several blocks needed for certainty. As many use cases require transactions to be finalized in about 1-3 seconds, Lition is pursuing a protocol to massively improve the block times for smart contract executions.

As with the issue of high transaction costs, most modern chains have claimed to find solutions to this problem while staying permissionless. But as is the case with the transaction cost issue, they have not been able to do so while also addressing other shortcomings, like private data.

Feature 4 – Private Sidechains for Private Data

Today, typical permissionless blockchains store their data publicly, potentially allowing criminals to misuse this information, e.g. bank accounts or social security numbers. In the existing use case, this could be Smart Meter data, e.g. availability of electrical appliances, which could provide an indication of household income: a customer possessing 3 TVs, an energy-efficient dishwasher, a dryer and an electric floor heater is obviously wealthier than the average household. This is all data that Lition can already detect

[2] digiconomist.net/bitcoin-energy-consumption
[3] plasma.io

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today with its Smart Meter integration (see the use case section later in this white paper for details), but no customer would want this information to be publicly known.

This aspect applies to many industries, such as (a) banking with personal loans and account transaction data, (b) construction with historic property data, (c) healthcare with medical patient data, (d) supply chain management with product, contract and origin data or (e) social media with identity or personal (meta)data.

Typical solutions propose achieving privacy by putting private data on a public chain and encrypting it, as suggested e.g. by researchers Karla Kvaternik et. al.[4]. Lition is aware that these solutions have fundamental limitations, as the encrypted data is still publicly available and is therefore prone to hacking if vulnerabilities in the encryption are found or sufficient processing power is available. This is unlikely now, but as the data is stored permanently and publicly it will still be there in 5 to 10 years, when quantum computing is set to emerge and loopholes may be found. This has happened many times so far, e.g. for the widely used WEP encryption, which due to faulty design does not give reliable protection against hackers.

Instead, Lition knows private data needs to reside on private sidechains available only to trusted nodes. Furthermore, public sidechains are still needed for public data, such as the current energy prices of power plants that must be publicly available. Both the private and the public sidechains need to be embedded in a greater public, permissionless network so that new participants can easily join, ensuring easy and developer-friendly adoption of the chain. A solution is the utilization of probabilistic zero-knowledge-proofs as shown in the technical white paper. This would allow public nodes to verify the private transactions inside private sidechains, ensuring overall consistency.

Feature 5 – API for Chain ↔ Backend Communication for Easy Developer Access

During the development of the energy trading use case, Lition developers had to spend a great deal of time and resources to develop an API interface that enables communication between the blockchain and the Lition backend application. Blockchain nodes need a simple API interface to allow easy integration into non-blockchain applications. This is required by business blockchain applications in every industry that require integration into off-chain systems.

This issue needs to be addressed in order to allow a quick and easy rollout of the Lition blockchain solution into mass markets and additional use cases. Typical large industry players have a complex legacy IT landscape, making an easy and seamless integration even more important. These findings are not new, as corporate-targeted projects like NEM or SAP's blockchain-as-a-service solutions have also identified this pain point, which must now be addressed. However, neither NEM nor SAP's current solution is able to also solve the other issues that remain in regulated markets.

Feature 6 – Data Can Be Deleted from Blockchain

Currently, transactions on blockchains are permanently and irreversibly stored on the blockchain. While this is a precondition of any public chain, it is not necessarily in the customer's best interest. In an ongoing business relationship, a customer might accept that his social security number or bank account is needed, but want to make sure this data is deleted once the business relationship ends and the data is no longer needed. However, once a customer terminates his contract, there is currently no way to delete this sensitive data – blockchains are not designed for this. Most solutions today that support deletion of data only store the references in the blockchain, with the real data stored off-block. When private data needs to be deleted, the on-block reference is kept

[4] See Privacy-Preserving Platform for Transactive Energy Systems, Middleware'17, Las Vegas, Nevada USA, arxiv.org/pdf/1709.09597.pdf

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unchanged, but the off-block data is deleted. The problem with this approach is that any smart-contract execution requiring private data needs access to the off-chain resource, defeating the purpose of a blockchain.

In addition to customer issues, there are also legal requirements from the GDPR (General Data Protection Rules) effective throughout the EU, and many other national data-privacy guidelines. They enforce deletion of private data once it is no longer needed. In the EU, violations of this law can lead to fines of up to 4% of a company's global annual revenue, which can be hundreds of millions of dollars for large corporations. This has been the focus of several press articles[5].

While this might not be an issue for Proof-of-Concept blockchain applications, it will be once an application launches and is brought to commercial mainstream adoption. Therefore, any business desiring to share its blockchain application with on-block storage of private data to the masses needs to use an infrastructure supporting data deletion.

THE PARTNERSHIP WITH SAP

SAP, the world's business software leader with over 400,000 customers and >10,000 developers, has signed a co-innovation contract to work with Lition on solving the limitations of today's blockchain infrastructure, such as privacy, speed and transaction costs.

A summary of this cooperation is outlined by Dr. Jürgen Müller, SAP's chief technology officer (CTO) in the following interview:



Watch the interview with SAP's CTO explaining the cooperation at:

https://youtu.be/lXpBRHptyKk

SAP and Lition believe that a technical solution to the issues limiting mainstream use will spur adoption of blockchain and blockchain-influenced applications. This will benefit SAP's customers and Lition's public mainnet users alike. SAP and Lition are therefore cooperating to design a permissioned platform that focuses on data storage and exchange, with a layer for publicly verifiable claims, similar to concepts described commonly as zero-knowledge proofs. This will allow high throughput and low latency for the majority of private transactions and public validation capabilities for select records.

Based on this design, SAP would leverage their existing database & middleware expertise to explore a platform that incorporates a pluggable verification layer. Lition would provide a decentralized consensus and verification mechanism tailor-made to hold these publicly-verifiable claims, extending the capabilities to an identity-agnostic audience and thereby turning it into a public blockchain.

This allows SAP to validate the concept of backing records against a public blockchain. Meanwhile, Lition can run its ecosystem on the public segment of the solution, where miners execute transactions and are compensated by tokens similar to today's Ethereum

[5] See e.g. https://iapp.org/news/a/blockchain-technology-is-on-a-collision-course-with-eu-privacy-law/

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blockchain. SAP can further integrate the blockchain into their existing product portfolio and offer it to their over 400,000 customers.

COMPARISON WITH EXISTING CHAINS

Lition has conducted extensive discussions with leading experts in order to overcome the issues outlined in the previous section. After researching dozens of different chains, Lition found many solutions to almost every individual issue, but no integrated, coherent solution:

Comparison of blockchain infrastructure solutions

	Lition	Ethereum	EOS	NEM	Cardano	NEO	ICON	Hyper-ledger	EWF	Polkadot
Functionality										
Provides VM to execute smart contracts	✓	✓	✓	-	✓	✓	✓	✓	✓	n/a
Public	✓	✓	✓	✓	✓	✓	-	-	-	✓
Private	✓	-	-	✓	-	-	✓	✓	✓	✓
Ability to delete data	✓	-	-	-	-	-	-	-	-	n/a
Consensus mechanism	PoS	PoW	dPoS	PoI	PoS	dBFT	LFT	RBFT/Akq/ PoET	PoA	PoC
Productive	2019	✓	✓	✓	tbd	✓	✓	✓	Q2-2019	Q3-2019
Efficiency										
Average block time	<3sec	10-20 sec	0.5 sec	60 sec	-	15 sec	-	-	-	n/a
Cost/transaction (average),USDct	<0.0001	34	-	-	-	-	0.12	-	-	n/a
Max tx/sec		25	100k	3k	ND	10k	9k	3.5k	-	n/a

Figure 4: Comparison of blockchain infrastructure solutions

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To provide a background, the six underlying features can be segmented into the following groups:

- Light-client (#1), Costs (#2), Speed (#3), Accessibility (#5): As described in the previous section, there are many chains or workarounds to address these issues. With the currently ongoing Hyperledger-implementation, Lition already addresses many of them. As many open-source implementations exist with a license allowing code re-use for commercial applications, these concerns are less critical.

- Private sidechain for private data (#4). Many purely public (e.g. Ethereum) and purely private (e.g. Hyperledger) chains exist. When both private and public data need to be stored, three potentially relevant options exist for a commercial implementation. However, they all exhibit other concerns (see below), and none of them provides a solution for deleting data (#6):

    - ICON, a chain to connect public and private blockchains, was the prime candidate as a foundation for the existing Lition use case, but in intense discussions with numerous blockchain specialists including a joint discussion the founders had with ICON's Lead Blockchain Architect in Seoul (see Lition's twitter account for pictures and more information), we could not apply the finance-oriented nature of the blockchain to the smart-contract-oriented nature needed by the decentralized applications of the use case.

    - Polkadot is technically not a blockchain, but rather a method to connect blockchains. The concept is very close to Lition's, as they plan to connect private/consortium chains and public/permissionless networks. However, due to a faulty implementation by their developer Parity Technologies, USD 150m of Ether is frozen forever[6]. This is the majority of their funding, making it unclear if they have sufficient funds to ever make it to production as planned for Q3 2019. Also, reputational risks make it difficult to recommend a solution with this track record to the risk-averse companies in regulated markets.

    - Energy Web Foundation is an open-source blockchain designed for the energy sector with support for light clients and confidential messages. It is driven by large corporations such as E.On, PG&E and Shell, and caters to the needs of these large conglomerates, therefore prolonging the shortfalls of these inefficient markets and leading to excess profits and continued market domination by these corporations. EWF relies on a Proof-of-Authority consensus mechanism (with authority given to the conglomerates), which defeats the open nature of a blockchain. As it is a fork of the Ethereum mainnet, it also has many Ethereum-related shortcomings, such as the inability to have both public and private sidechains and to delete data. Also, unlike Lition, it has no use cases that have been brought to commercial production, let alone mass markets.

[6] https://www.trustnodes.com/2017/11/07/ethereums-parity-hacked-half-million-eth-frozen

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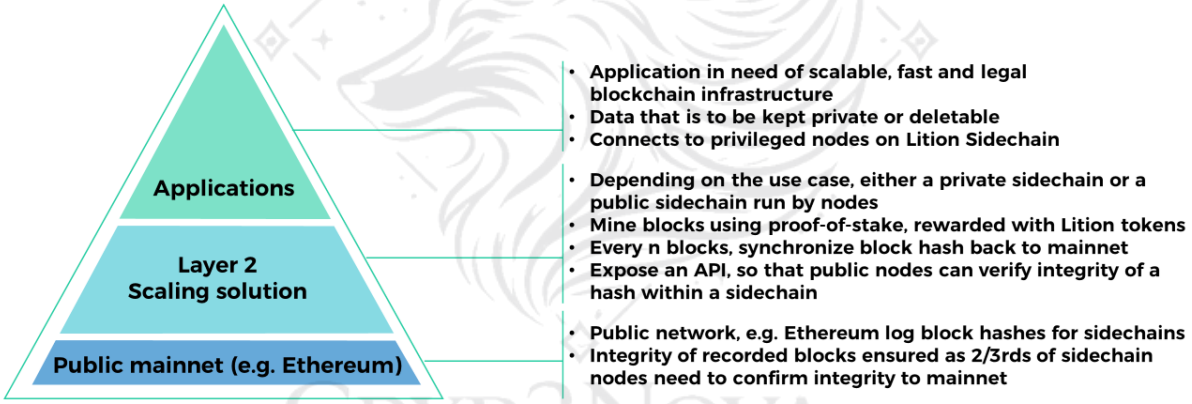
ARCHITECTURE

Applications need scalable, fast and legal blockchain infrastructures in order to find a context where it makes sense to approach the business arena. As of the time of writing, such a context does not exist. Current solutions are unable to keep data private and lack deletability features. The three keywords of our solution are sidechains, permissioned nodes and permissionless nodes.

Lition is developing a solution that will assure data privacy while being permissionless. This is made possible by connecting a permissioned sidechain to a public mainchain.

THE LAYER 2 STRUCTURE

Lition's Layer 2 solution consists of permissioned nodes that run a privileged blockchain network, which becomes a sidechain once the mainnet sync happens. The nodes run the network with the Lition Proof of Stake (LPoS) consensus algorithm, making it an extremely fast chain. Every n blocks, depending on the industry requirements, the side chain will synchronize to the public mainnet. Only the hash of the last block is published and saved on the mainnet, assuring the integrity of all previously validated transactions. At the same time, an API is exposed so that public nodes have the opportunity to verify the integrity of a hash within a sidechain.



As a public network, Lition will use the Ethereum blockchain. However, if technology advances and interoperability between different blockchains becomes feasible, it is Lition's goal to develop a "universal" layer 2 solution for all Public blockchains. The role of a public mainnet is to store sidechains' hashes as proof of their historical integrity. The integrity of recorded blocks is ensured as two thirds of sidechain nodes need to confirm integrity to the mainnet.

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DATA SEPARATION AND DELETION CONCEPT

Separate storage of private and public data is core to Lition's blockchain architecture. In a nutshell, we split between:

- Sidechain block hashes and management: Stored in the mainnet (currently Ethereum)
- DApp data and smart contract executions: Stored in the sidechains (public or private).

The blockchain network's design covers minimum requirements for a governing agreement among a privileged subset of the nodes' operators, ensuring that private, sensitive data can be handled and securely deleted on demand - even connected to smart contracts for deletion. The guiding design criteria are post-quantum security for data integrity, a path towards post-quantum security for data privacy, data minimization under the constraint of providing fault tolerance, privacy of sensitive data, a provision to delete all occurrences of sensitive data, and the freedom to join as a (non-privileged) node without any special provisions or legal obligations.

Technically, private data is only stored on privileged nodes that are mining private sidechains. The data never leaves the sidechain, only the hashes do. This allows public nodes to verify the integrity of the sidechain transactions. The mainchain therefore acts as a "notary" for the private data stored only in the sidechain.

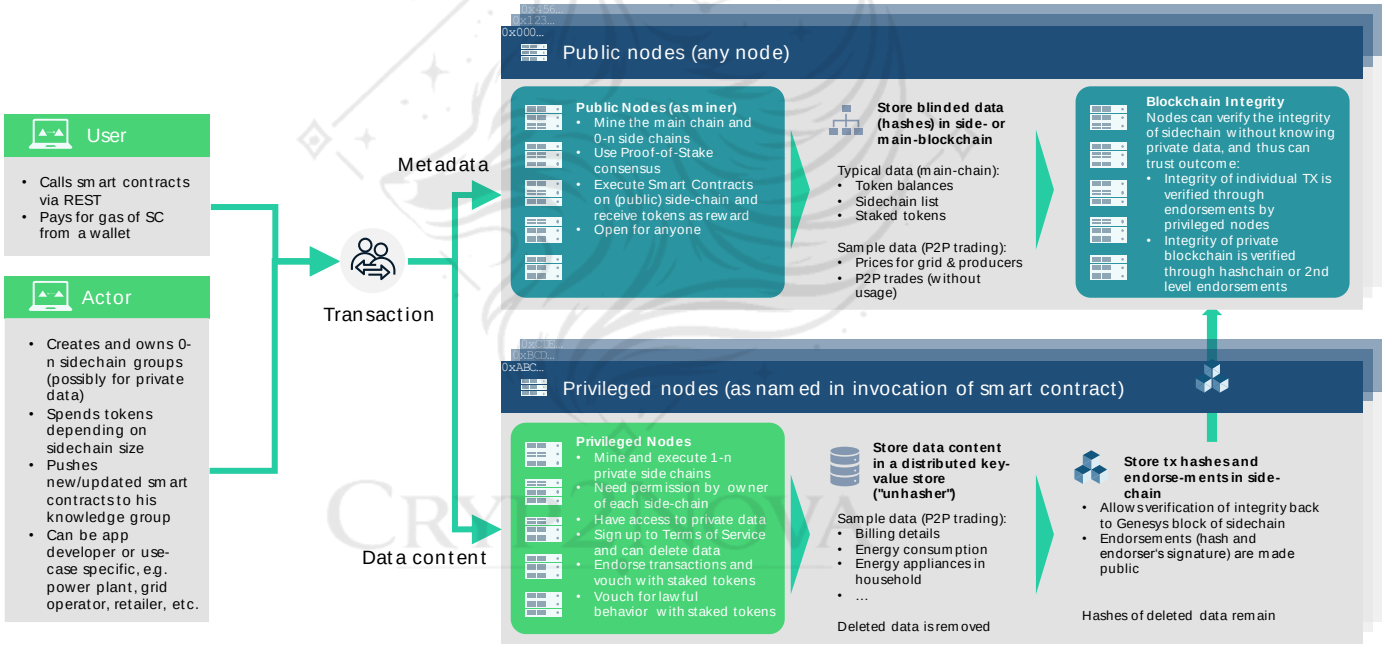


Figure 5: Lition blockchain data separation and deletion concept

Private sidechains also have the ability to delete data. Privileged nodes have to agree to Terms of Service (ToS) upon joining the sidechain, which can include a requirement to delete data upon request. This gives the sidechain owner (who is legally obliged to guarantee data deletion) the ability to, in a legal and contractually confirmed way, guarantee that every data holder will delete the data when asked to do so.

Technically, a deletion request is a transaction signed by the original data owner with the data hash that should be deleted. Upon receipt, all nodes will delete the data of the requested transaction, but the transaction hash stays intact. Therefore, the Merkle tree of the block remains intact, and an unobstructed trail from the most recent block all the way to the sidechain's genesis block is possible.

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While the functional requirements addressed by this blockchain are derived from the shortcomings described earlier in this chapter, Lition provides the technical description in a separate, technical whitepaper. It caters to the technically interested reader, and also provides the fundamentals from current research.

The technical white paper is available at www.lition.io in the Downloads section.

STEP-BY-STEP DESCRIPTION OF CORE PROCESSES

In this chapter we provide the reader with detailed step-by-step explanations on how transactions are processed, how nodes can join the network and how they can stake and validate new blocks.

STEP-BY-STEP DESCRIPTION: TRANSACTION PROCESSING AND MINING

Observing Lition's blockchain from a high level, we see that six main stages are needed to complete the transaction (=Tx) flow. They are, in this order: *Put Gas on Sidechain, Create Tx, Process Tx, Propagation within sidechain, New block creation (Sidechain)* and *Mainnet synchronization.* For a better understanding of the following explanations, please refer to the architecture table below.

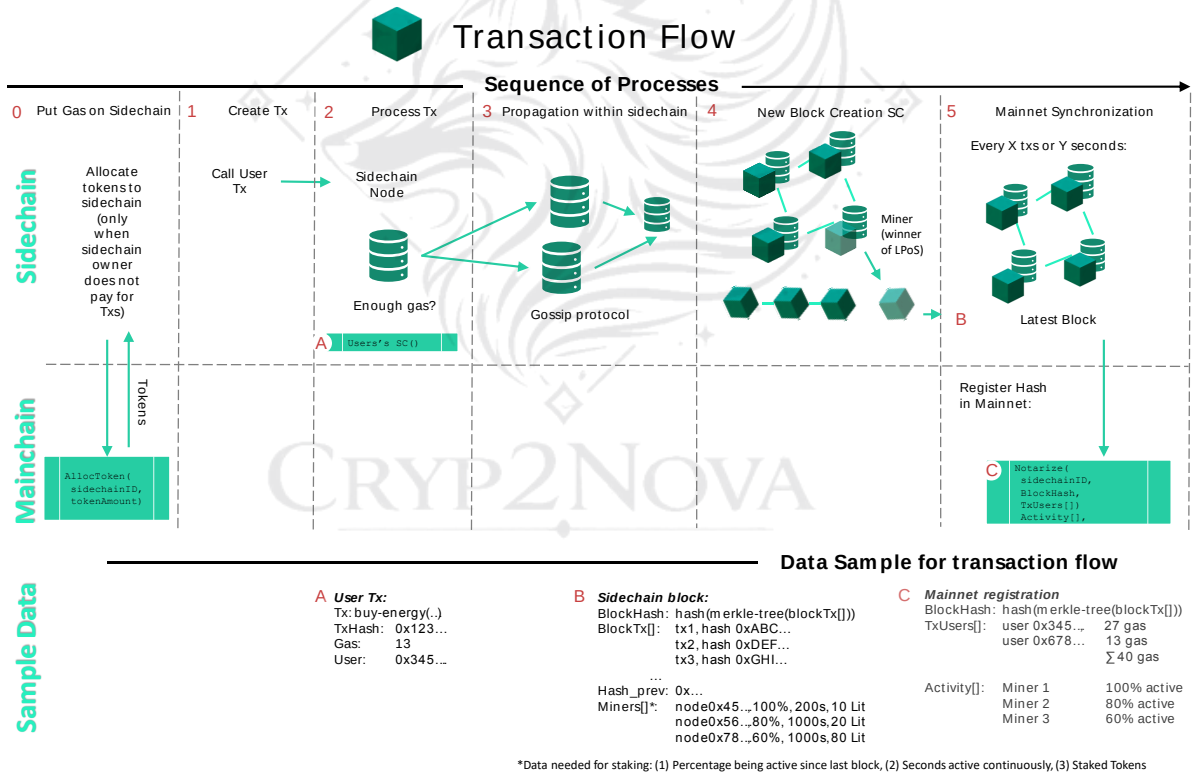


Figure 6: Transaction Flow in Sidechain

Step 0: Put Gas on Sidechain

In order to guarantee that a certain network user will be able to pay for transactions, he or she needs to allocate tokens to the specific Sidechain. This process requires a smart contract execution on the mainchain called *AllocToken(sidechainID, tokenAmount)*. As is evident, the amount of tokens and the ID of the sidechain are required. This ensures that the solution is protected against double-spend attacks on multiple sidechains.

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Step 1: Create Tx

This step refers to the event in which a given user utilizes Lition's blockchain and triggers a transaction, which implies a cascade of events as described below. Transaction deployment is compatible with today's Ethereum blockchain, so developers have no migration effort allowing a fast growth of the blockchain.

Smart Contracts: If dApp developers use Truffle, for example, they just need to pinpoint the deployment to a different network in the Truffle configuration file. Solutions allowing upgradability of contracts such as OpenZeppelin can be used.

Clients: The Lition blockchain client is fully compatible with the Web3.js and RPC interconnection capabilities of Geth or Zeplin. Users can continue to use plugins such as Metamask, and dApp developers can reuse their existing Ethereum applications.

Step 2: Process Tx

During this process, the transaction is received from the node, which in turn ensures that if enough gas is owned by the user, the user's smart contract containing the following information is triggered:

Tx:	The smart contract name. For example in the case of energy, buy-energy()
TxHash:	Transaction data are hashed so that a unique hash is created
Gas:	Gas used for the transaction
User:	User's wallet

Unlike existing blockchain implementations, a user gets an instant (<3 seconds) response if a transaction was processed successfully, i.e. if the smart contract code was executed without errors and if the user had sufficient gas. This ensures a convenient experience for the customer and meets expectations for mass market use cases.

Step 3: Propagation within the Sidechain

Once the transaction is processed, it is propagated throughout the network of nodes in the sidechain previously specified by the user using a gossip protocol. At this point, the transaction is in a pre-validation stage waiting to be mined by Lition's Proof of Stake (LPoS) consensus algorithm.

Step 4: New Block Creation within the Sidechain

During this stage, the transaction triggered by the user, together with a variable number of other transactions, undergoes a process that validates this bundle of data and transfers it to the blockchain in an irreversible way. This is similar to existing blockchains, but we introduce finality, ensuring consistency between sidechains and the anchored mainchain hashes. Each new sidechain block contains the following information:

MerkleRoot:	The root hash of the merkle-tree of the block
BlockTX[]:	The hashes of each transaction, needed for the merkle-tree
Hash_prev:	Hash of the previous block, going back all the way to the genesis
Miners[]:	Pool of miners that were active and contributed to this block. The LPoS mining reward is then calculated and transferred by calculations within this mainnet smart contract upon mainnet anchoring. The latter three sets of information (Tokens_N, %_active, Sec_active) are the core variables of the algorithm which decides the node that is going to be the validator at any given block creation time.

This process is done by nodes that are therefore not only carrying all the historical sidechain data, but also function as authorities that guarantee correct behavior within the network by

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staking their own tokens as “collateral”, meaning that in the case of misbehavior, tokens are going to be lost. Lition’s consensus mechanism that will assure the integrity of sidechains can be seen as a pure Proof of Stake (Pos). Each and every sidechain has its own network of nodes. Each node has to subscribe to a particular chain by filling in some parameters in a sidechain-specific smart contract to the backbone mainnet. The function to call is `StakeTokens()`, which can be called by any mining node of the sidechain, and it is a prerequisite for miners to receive their mining reward. The details of the smart contract are described in the process flow for sidechain creation.

To ensure the ability to delete data within a private sidechain, participating privileged nodes need to agree to Terms of Service (ToS) that require them to delete data once the properly signed request arrives. However, they only delete the data while keeping the corresponding hashes. This allows the underlying Merkle tree of the block to stay intact and thereby ensures traceability all the way to the genesis block.

Step 5: Mainnet Synchronization

During this stage, the transaction (which is now already an integral part of the sidechain and is therefore irreversible in its specific allocation) will be validated by a public mainnet. The communication frequency with the backbone blockchain is industry specific. For example, energy transactions need to be synced frequently, while notary contracts need to be synced less often.

The synchronization parameters of each sidechain are decided during the sidechain registration process. The parameters to set are the number of transactions that must occur before the synchronization happens, the time interval between synchronizations, or both. This particular process will be explained in more depth in the next chapter of this document.

For the purpose of synchronization, only the hash of the last block is required to be stored on the Public Chain, as that assures the integrity of the whole interval of blocks. For example, the tiniest change in the data saved in previous blocks of the given interval will affect and change completely the hash of the last block. That occurs because every new block uses the hash from the previous block as part of the data to be hashed with the Merkle tree of the specific block. Thus, the load of data to be stored on the public chain is almost irrelevant, but the results are the same.

Once the time of synchronization arrives, the following smart contract function is called in order to anchor the sidechain data in the mainnet, thereby making it immutable: `Notarize(sidechainID, BlockHash, TxUsers[], Activity[])`

`BlockHash:`	`The hash of the most recent sidechain block header`
`TxUsers[]:`	`The wallets of users, indicating aggregate gas costs per wallet based on the transaction usage`
`Activity[]:`	`The activity record of mining nodes. Together with the LITION tokens staked through the StakeTokens() mainnet smart contract, the Notarize() function knows to whom to distribute the users’ gas.`

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Step-by-Step Description: Sidechain Management

Use the table below to follow and better understand the process by which a new sidechain is created and reported to the mainchain, and how nodes are added and removed.

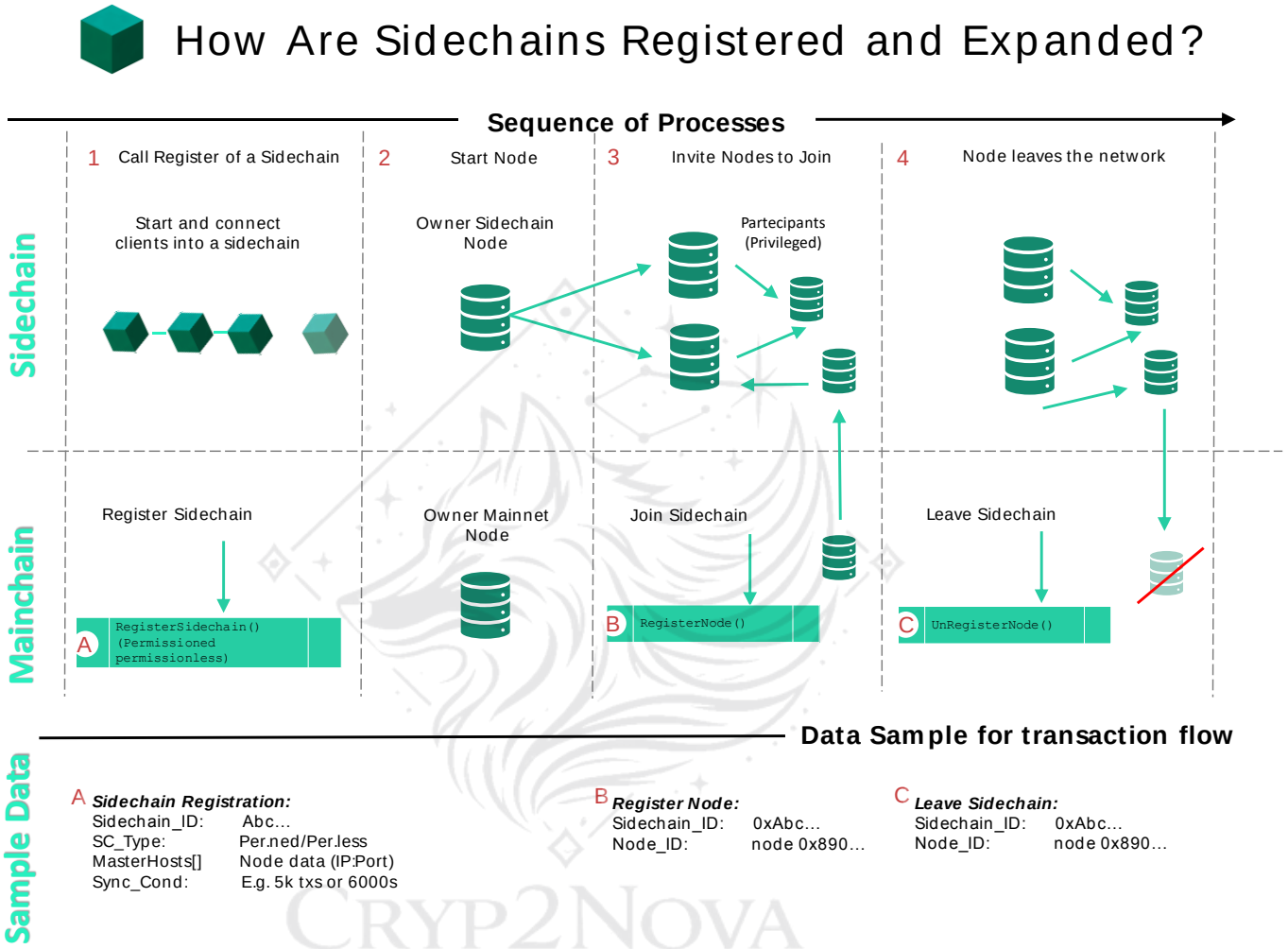


Figure 7: Sidechain registration and expansion

Step 1: Start and Register a Sidechain

Every developer or company that decides to join the network has to register its sidechain to the mainnet, calling the smart contract `RegisterSidechain()`. The following data is required:

`Sidechain_ID:`	`This ID is referred to during staking and synchronization. Can be set to NULL, in which case the mainnet creates an ID and returns it as return value.`
`Permissioned:`	`Defines the nature of the sidechain (boolean yes/no)`
`Sync_Cond:`	`Defines the parameters of mainchain sync interval length`
`MasterHosts:`	`Array of IPs and ports of the set of initial sidechain nodes, both for miners to connect to, and separately a Website URL that users can use to query for information`

Step 2: Start Node

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The owner or initiator needs to run a node on the mainnet as well as on the sidechain. On the sidechain, a master host will provide new clients with a list of bootnodes to connect to.

Step 3: Invite Nodes to Join

The node that initiated the sidechain can then invite new nodes to join the network. Depending on the configuration of the sidechain, which can be public for non-sensitive data or private for confidential data, new nodes must accordingly be either public or privileged.

To mine a sidechain, miners need to become nodes and mine blocks. Should they want to be a publicly announced entry point to the sidechain, they can advertise themselves to the public using the function RegisterNode() on the mainnet registration contract. The more sidechain nodes advertise themselves on the publicly visible mainnet, the more nodes a new miner has to initially connect to. Technically, new hosts are added to the MasterHosts variable initially set during the RegisterSidechain() smart contract call.

Respectively, the following data sets need to be included:

```
Register Node:
    Sidechain_ID:       This is the ID created from the sidechain initiator
    Node_ID:            This code makes each node unique & identifiable
    Challenge:          (Optional) A challenge that can only be solved by nodes being
                        granted access to the sidechain. Only needed for private
                        sidechains
```

Additionally, nodes mining the sidechain may want to stake tokens in order to receive mining rewards, which they can do using the `StakeTokens()` smart contract outlined in the upcoming Step-by-Step description.

Step 4: Node Leaves the Network

At any given point in time, nodes can leave the network. The user might leave this side, and therefore needs to inform the mainnet. This is only needed when nodes have previously called the function `RegisterNode()` on the registering smart contract.

To cancel a node and therefore leave the sidechain, the user needs to call the `UnRegisterNode()` function. Respectively, the following data sets need to be included:

```
UnRegisterNode:
    Sidechain_ID:       This is the ID created from the sidechain initiator
    Node_ID:            This code makes each node unique & identifiable
```

A call to `UnRegisterNode()` automatically unstakes any tokens a miner might have staked on this sidechain, as staking rewards can only be received when mining.

Step-by-Step Description: Staking

Every blockchain needs a fuel to run. Lition's Proof of Stake (LPoS) is the consensus algorithm which validates the blocks and decides which miner receives the reward. A step-by-step explanation is outlined below.

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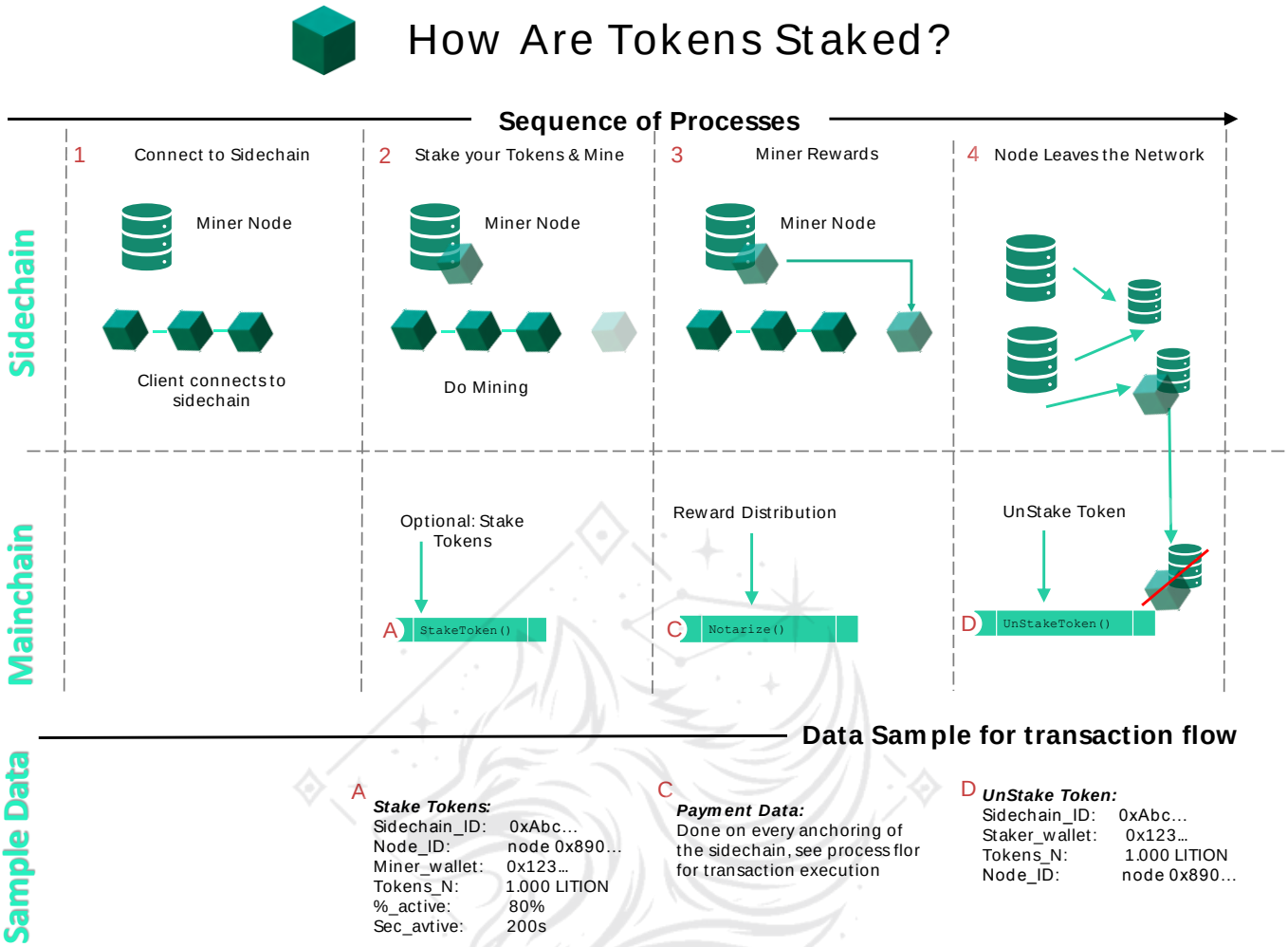


Figure 8: Staking of tokens

Step 1: Register as Node in Sidechain

The first step for a user to join the network is to become a node by connecting the client to a sidechain. Once the node is up and running, the block verification process starts automatically, and the user becomes a functioning validator in the system. Since there is little incentive to operate a full node, node operators receive mining rewards in the form of tokens. The token distribution happens once each time the blocks are synchronized with the mainchain. Nodes therefore not only carry all of the historical sidechain data, but also function as authorities that guarantee correct behavior within the network by staking their own tokens as "collateral", meaning that in the case of dishonest mining, tokens will be lost.

Step 2: Stake Tokens & Mine

Lition's consensus mechanism will assure the integrity of sidechains and belongs to the family of Proof of Stake (PoS) protocols. Each and every sidechain has its own network of nodes. Each node must subscribe to one or more particular chains by filling in parameters in a sidechain-specific smart contract to the backbone mainnet. The function to call is `StakeTokens()`, where the following data needs to be delivered:

```
Sidechain_ID:       Sidechain the tokens should be allocated to
Node_ID:            Identifies the Node mining the sidechain
Miner_Wallet:       Wallet where rewards for staking are being transferred
```

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`Tokens_N:`	`Amount of tokens to be allocated to specific SC. These tokens are then unavailable for transfer to the mainnet until retrieved again using the UnstakeTokens() smart contract.`
`%_active:`	`Percentage being active since the last block. Mining rewards are multiplied by this figure.`
`Sec_active:`	`Seconds continuously active. Nodes mining for a long time receive a mining premium.`

The latter three sets of information (Tokens_N, %_active, Sec_active) are the core variables of the algorithm which selects the node that will be the validator at any given block creation time. Hence, the Miner_Wallet that receives the rewards.

Step 3: Miner Rewards

The miners are rewarded every time the sidechains sync with the mainchain. The smart contract that handles the transfers of staking tokens from the user wallets to the miner wallets is called `Notarize(sidechainID, BlockHash, TxUsers[], Activity[])`, as was described in the first step-by-step process description.

Step 4: Node Leaves the Network

Once a node decides to stop staking, e.g. because the user wants to use the tokens on a different sidechain or the mainnet, the following smart contract needs to be called: `UnstakeTokens()` where the following parameters must be provided to the system:

`Sidechain_ID:`	`Identifies the chain where the node will stop staking`
`Miner_Wallet:`	`Wallet where rewards for staking were being transferred`
`Tokens_N:`	`Amount of tokens to be allocated away from a specific SC. NULL for all.`

Now the tokens are available to join other sidechains.

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LITION'S PROOF OF STAKE CONSENSUS ALGORITHM

Necessity for Tokens

Lition itself does not charge for the infrastructure in terms of licensing, but the actors that are part of the validation system are not doing the validation task for free. Therefore, the whole system needs a fuel to run, an incentive. This incentive is achieved by rewarding validators in native tokens. At the same time, from a developer perspective, the system needs to be free from bugs, and potential downtimes or destruction of the system must be disincentivized. In some cases, that is assured by staked tokens that validators would lose in the case of misbehavior.

Validators' Consensus Algorithm Types

There are several logics/processes (algorithms) to reach a consensus on which participant of the network (node) gets to add/confirm the newest block and at the same time validate the integrity of its contents.

Blockchains using Proof of Stake (PoS) require nodes to hold a certain amount of native tokens in order to be eligible to participate in the validation system. If the validators misbehave, some or all of their tokens will be lost. In order to determine the validator that will be rewarded with tokens, an unpredictable random function is utilized, which according to specific variables determines the probability that a validator node will be chosen.

Blockchains using Proof of Work (PoW) choose their validator as follows: the winner of a high energy-consuming mathematical task competition is rewarded with native coins. In contrast, Lition's layer 2 solution uses a self-developed Proof-of-Stake protocol. The Lition Proof of Stake (LPoS) mechanism functions as a consensus algorithm with three variables to determine which is the next block to be added to Lition's private or public sidechains. The first variable is the number of tokens that are owned by the node. The second variable is the age of the staking wallet and the third is the uninterrupted runtime as an active node since it went online. By this mechanism, the commitment of validating nodes in the Lition network is rewarded and thus honest behavior is incentivized.

Proof of Stake (PoS) and Proof of Work (PoW) in One Solution

In the case of Lition's layer 2 solution, the transactions are validated once by the sidechain on which the block is mined (LPoS). Since sidechains are again pegged to the backbone mainnet (such as Ethereum), the whole security of Ethereum's proven Proof of Work (PoW) system ensures sidechain transactions cannot be changed. As the load on the mainnet is minimal, and only non-time-sensitive transactions are carried out there, the disadvantages of PoW to Lition are relatively small.

Sidechain Creation

Lition's solution is designed so that any developer can quickly launch an application on the network and create its own sidechain(s) to store any public or private data a developer may need. Nodes can then subscribe to the sidechain and therefore mine it. Once a sidechain is created, the transaction fees will provide an incentive for nodes to keep mining it. Additionally, every sidechain owner must pay a "rent" in tokens that increases with storage size of the sidechain. This gives an extra incentive to the nodes mining it and ensures that even low-transaction chains will still continue to operate. Otherwise, these low-transaction sidechains would eventually starve due to too few incentives.

Communication with the Backbone Mainchain

Lition's infrastructure can be thought of as a system that is composed of two core engines. One of these is Lition's EVM-compatible virtual machine, which executes smart contracts on its sidechains, and the other is the link to the Ethereum mainnet, where block hashes are periodically notarized for every sidechain.

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Once a sidechain is registered, to stimulate participation, Lition will reward and allocate tokens to each node taking part in that specific chain's network. This is part of an initial scheme called the Genesis Phase (see the section on page 27 for more information). On top of this, the revenue flow from transaction costs is divided among the staking nodes. This way, the blockchain's usage costs are transferred from the end user of the application to Lition for the initial period, making the system initially more customer-friendly.

The sidechain blocks are then validated on the Ethereum blockchain through a smart contract that executes either once every certain number of sidechain transactions or after a predefined period of time, giving each side chain the flexibility to decide depending on the industry.

As shown in the table below, the process of Mainnet Sync from the sidechains to the Ethereum mainnet produces negligible costs per transaction ($1.40/100,000):

Gas cost for Mainchain sync	Today's Use Cases	Upcoming Use Cases	Growth Plan 2020
Use Cases	2	8	30
Lition Trx/Day	100,000	400,000	1,500,000
Eth Average Trx Costs	$0.07	$0.07	$0.07
Assumed Average Sync Frequency	1/5,000 txs	1/5,000 txs	1/5,000 txs
Average Cost per Day for Sync	$1.40	$5.60	$21.00

Table 1: Costs of Mainnet synchronization

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Transaction Costs

This can be best compared to "Gas", meaning any transaction or smart contract execution requires a specific amount of tokens. The amount of tokens needed is deterministic, similar to Ethereum's Ether-Gas function. Due to the Proof-of-Stake (PoS) consensus mechanism, the overall costs of transactions and smart contract executions are set to USD 0.01. Potential fluctuations in the LITION/USD exchange rate are accounted for through periodic gas modifiers. This allows DApp users to calculate with fixed transaction costs, which is crucial especially for large corporations.

The transaction costs are distributed upon mining of a block, similar to Ethereum. However, no new tokens are spawned upon mining, leading to a constant and limited total amount of tokens.

Rewards for Users Holding Lition Tokens

Lition's consensus mechanism which will assure the integrity of sidechains can be seen as a pure Proof of Stake (PoS) system. Each and every sidechain has its own network of nodes. Each node has to subscribe to a particular chain by filling in some parameters in a sidechain-specific smart contract to the backbone mainnet. The function to call is StakeTokens(). It is thereby assured that an X amount of Lition tokens are being used to stake exclusively for one sidechain. As mentioned above, to incentivize good behavior in the network, nodes have to be economically involved. As collateral, 20,000 Lition tokens are required to enter the network. This amount is adjusted continually according to the USD market value of Lition tokens. The goal is to keep the network accessible over time, meaning that if the market price of Lition is doubled and sustains for a certain amount of time compared to its ICO price, the tokens required to run one node are halved and so on. The staking nodes will be rewarded by 2 token streams:

1) **Mining Rewards for Processing Transactions**

   Lition's layer 2 solution is conceived as a scalable layer. Therefore, two main points must be tackled: costs and speed of transaction execution.

   To lower costs, Lition decided to develop a system in which the transaction costs are constantly low, capped to a max of USD 0.01. The problem with other blockchains such as Ethereum is that the market determines the transaction fees, which means that if the system gets congested, costs rise significantly.

   The staking revenue stream for staking 1000 LITION is presented below. The equivalent of USD 100 in LITION tokens is the minimum amount needed to be eligible as a staking node. As the transaction costs depend on the LITION/USD exchange rate, this amount can also change. This is needed to ensure network security should LITION prices drop, but at the same time gives business users security on their transaction costs.

   The first scenario called "Today's use cases" refers to the Lition Network once our energy and banking use cases have been migrated onto our system. It is a conservative projection, since it takes into account that 1000 customers utilize our use cases, as is already the case today.

   E.g.: **Energy Use Case**: every 15 minutes, a buy order is triggered on the blockchain to sync the energy demand with the supply. Every day (24h=1,440min), for each customer we will have 1,440 min / 15 tx/min = ~100 transactions. Meaning that for 1000 customers * 100 transaction/ day / customer = 100,000 tx/day.

   In the *Upcoming use cases* scenario, we show how many other use cases we plan to launch in the near future and how this would proportionally affect the transactions per day, following the above logic. The same applies to the *growth plan 2020* scenario.

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At the bottom of the table the *annual interest rate* is shown, which will be as high as 34% once more use cases are launched. The transactions per day are assumed by observing today's use cases. Though already appealing, it is a very conservative estimate. If, for example, the energy use case scales to 100,000 customers, the transactions and therefore the revenues will be factor 100.

	Today's Use Cases	Upcoming Use Cases	Growth Plan 2020
Use Cases	2	8	30
Tx/day	100,000	400,000	1,500,000
Lition Tx Cost	$0.01	$0.01	$0.01
Total Tx Cost/Day	$1,000.00	$4,000.00	$15,000.00
Investment at Minimum Stake	$100.00	$100.00	$100.00
Lition Total Supply	176,000,000.00	176,000,000.00	176,000,000.00
Min Token for Stake	1,000.00	1,000.00	1,000.00
Max. Number of Stakers	176,000	176,000	176,000
Average Earnings for Staking 1000 LITION			
- Day	$0.01	$0.03	$0.09
- Month	$0.19	$0.75	$2.81
- Annual	$2.28	$9.13	$34.22
- Annual Interest Rate	2%	9%	34%

Table 2: Example of staking revenues under different scenarios

During initial adoption, the transactions per day will not be attractive enough for the nodes to stake. Therefore, Lition will go through an initial period of incentivized adoption called the Genesis Phase. During this phase, tokens are distributed each year to the holders of Lition tokens that decide to stake. This solution makes it very attractive for Lition token holders to stake even if the network is not yet adopted in a significant manner.

2) Additional Staking Reward During Genesis Phase

The Genesis Phase will be in place for the first two years following the launch of the Lition layer 2 blockchain. In this phase, the initial functioning of the network is ensured by Lition, which will distribute tokens for each staker regardless of transactions in the network. However, the variables that determine the staker that wins a specific block are still in place, meaning that the rewards are distributed proportionally to three criteria. The first is the amount of token that are owned by the node, the second is the age of the staking wallet, and the third is the uninterrupted runtime as an active node since it came online. This rewards commitment of nodes in the Lition network. As the table below shows, it assures a constant LITION token inflow during the Genesis Phase.

Lition will use a maximum of 31% of all tokens during this Phase. It is a maximum because during the Genesis Phase, the inflow of external tokens to the staker will diminish proportionally to the number of transactions in the network, meaning that the minimum annual interest rate will be guaranteed to be 20% the first year and 10 % the second year regardless of the amount of transactions, but the allocation from Lition will diminish if more transaction fees are paid to the staker from the network users. E.g. if the network grows organically and stakers gain 15% in the first year, Lition will pay the difference 20% - 15% = 5% and so on. As soon as the network grows enough to guarantee 20% the first year and 10% the second year, Lition will not allocate those tokens to stakers.

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Genesis Phase	Year one	Year two	Tot	Tot %
Token Allocation for Genesis Phase	65.00%	35.00%		
Tot Token Allocated (31%)	32,240,000.00	17,360,000.00	49,600,000.00	31%
Daily Token Allocated	88,328.77	47,561.64		
Max Number of Stakers	176,000	176,000		
Average Earnings for Staking 1000 LITION				
- Day	$0.06	$0.03		
- Month	$1.66	$0.89		
- Annual	$20.15	$10.85		
- Annual interest Rate	20.15%	10.85%		

Table 2: Token allocation during Genesis Phase

The Genesis Phase will come to an end once the system is able to sustain itself. For now, the maximum timeframe is set to two years, however future events and community demand can have an influence. For low-transaction side chains, it will also be possible to incentivize nodes to stake with a rent that the developer will pay.

Expected Balance of Token Supply and Demand

To ensure that the Lition blockchain infrastructure stays open and efficient, we have introduced a token-based concept. As previously described, its prime uses are to pay for transactions, staking for correct network behavior and the creation of private sidechains that distributed blockchain applications (dApps) can use.

Due to the widespread use of tokens, we anticipate a strong demand for them driven by organic (i.e. non-speculative) business use, as outlined in Figure 9.

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Increased Platform Usage Correlates with Increased Costs for Computational Resources

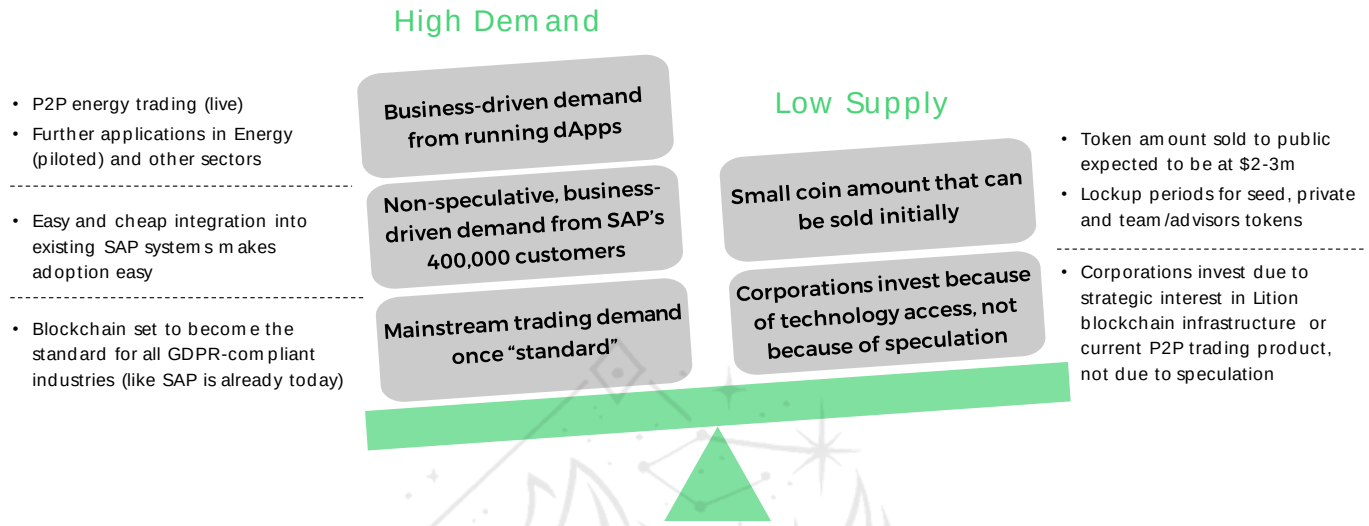


Figure 9: Drivers for expected increase in platform usage

Lition Revenue Sources as a Company

To push the Lition blockchain as the standard for business use, Lition as a company with its entity Lition Technology AG requires a sustainable source of income. This income pays for development costs, marketing towards gaining additional use cases, etc. A sustainable revenue source is crucial, as income gained through an ICO is a one-time effect.

Revenue sources are both digital and non-digital, split into the following two categories:

a) Mining Rewards through Staking Lition Tokens

In the Lition eco-system, individuals and businesses use and pay with LITION Tokens for transactions, staking and to spawn private sidechains. These tokens will be sold in an initial coin offering (ICO) and listed at exchanges after the Token Generation Event (TGE). Lition will have ICO revenues from tokens sold, as well as continuous revenues through staking. Initially, only ~60% of the tokens will be distributed, so ~40% will remain with Lition (details see page 53). These ~40% will be used for staking, and statistically lead to 40% of all transaction costs to be mined by Lition.

b) Intellectual Property (IP)

While usage of the blockchain infrastructure does not require special IP, just Lition tokens to pay for Gas, this is different for use cases. Lition owns the licenses and trademarks on their developed public private blockchain use cases. While the code is open source, only non-commercial use is allowed (see github.com/lition-blockchain). This intellectual property allows Lition to generate non-digital revenues through the traditional IP revenue methods. Lition will exploit, license, askew, sell and share its IP to private businesses and global industry players.

Depending on the product, industry and region, Lition will choose the most adequate method. Of course, this is also influenced by the background and experience of the founders and core team. Currently the team's focus is on creating and applying tech products and services in the energy and banking sector.

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Currently, Lition owns the IP on two working use cases, both described in this white paper. These are energy, which is commercially live (page 30), and banking, with an MVP for syndicated loans with security tokens (page 37).

The business customers can either pay a one-time fee or a royalty on every sale/transaction for the use cases they desire. Furthermore, Lition will share its knowledge with stakeholders, the community and clients. The paid training, coaching, customization and consulting services provide additional revenue streams and work as a highly cost-effective marketing platform to grow our brand awareness.

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ACTIVE USE CASE IN P2P ENERGY TRADING

LITION ENERGIE – THE WORLD'S FIRST MASS MARKET P2P TRADING PLATFORM

Alongside the Lition Foundation in Liechtenstein developing the standard blockchain infrastructure for business, the German Lition Energie started with a P2P energy trading dApp and is now an officially licensed energy supplier connecting renewable energy producers directly to consumers via its blockchain-based Energy Exchange platform. By implementing a novel end-to-end energy exchange system, this Lition use case bypasses unnecessary middle men within the energy supply chain. The combination of a blockchain solution with highly efficient corporate processes and service operations that are built on cloud-based solutions (SaaS) allows lower costs for energy customers while providing energy producers with higher profit margins.



This Lition use case simplifies and standardizes the energy sector, shifting power from established and traditional utility corporations to consumers and producers by providing consumers with decision-making power regarding their energy sourcing. The exchange platform enables location and preference-based offerings, thus leaving it to consumers to decide whether they want to receive their energy from a photovoltaic installation on the neighbor's rooftop or a solar park from a renewable energy company in another state. This is the key difference from today's industry practice, in which consumers can choose their energy supplier, but not where the supplier ultimately sources its energy. With the new approach, an increase in market demand for green electricity is directly routed to the energy source and the consumer decides. Following the economic principles of matching supply and demand, the increased demand is met by new, green power plants. This is how Lition Energie will democratize the energy sector.

In addition, by cutting out intermediaries, this use case results in green energy becoming more competitive. Using an efficient blockchain-based exchange platform, Lition Energie simplifies the legal, operational and economic hurdles for green power producers, allowing the consumer to buy genuine green electricity at a record-low price. Long-term industry expertise and continuous market research clearly show that price is the prime decision criterion for consumers. Therefore, a large-scale rollout of green electricity with fast adoption rates requires competitive pricing[7].

The energy use case currently supplies customers in more than 25 cities and has been featured in various news outlets like Coindesk[8] and Huffington Post[9].

[7] Lition Energie internal study on price comparison conducted in June 2018
[8] https://www.coindesk.com/ethereum-energy-project-now-powers-700-households-in-10-cities/
[9] https://www.huffingtonpost.co.uk/entry/renewable-energy-blockchain-lition_us_5bfeb5a9e4b0d23c2138e1ff

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LIVE DEMO AND SOURCE CODE

For those that are not customers of the energy provider Lition, there is a live demo of the energy trading solution, including the ability to buy and sell energy and view the blockchain transactions on a block explorer at:

- http://demo.lition.de
- User Name: demo
- Password: demo1234
- Source code: www.github.com/lition-blockchain

HOW IT WORKS TODAY

For consumers, the local Lition supplier functions as an energy supplier with all country-specific licenses in place. In Germany, consumers are supplied through the German Lition Energie GmbH. The German company holds a difficult-to-obtain license from Germany's Federal Network Agency (Bundesnetzagentur), and has signed contracts with over 600 grid distribution system operators (DSOs) to ensure energy delivery to consumers and compliance with national legislation and taxation. Thus, Lition Energie can officially guarantee power delivery to the consumer.

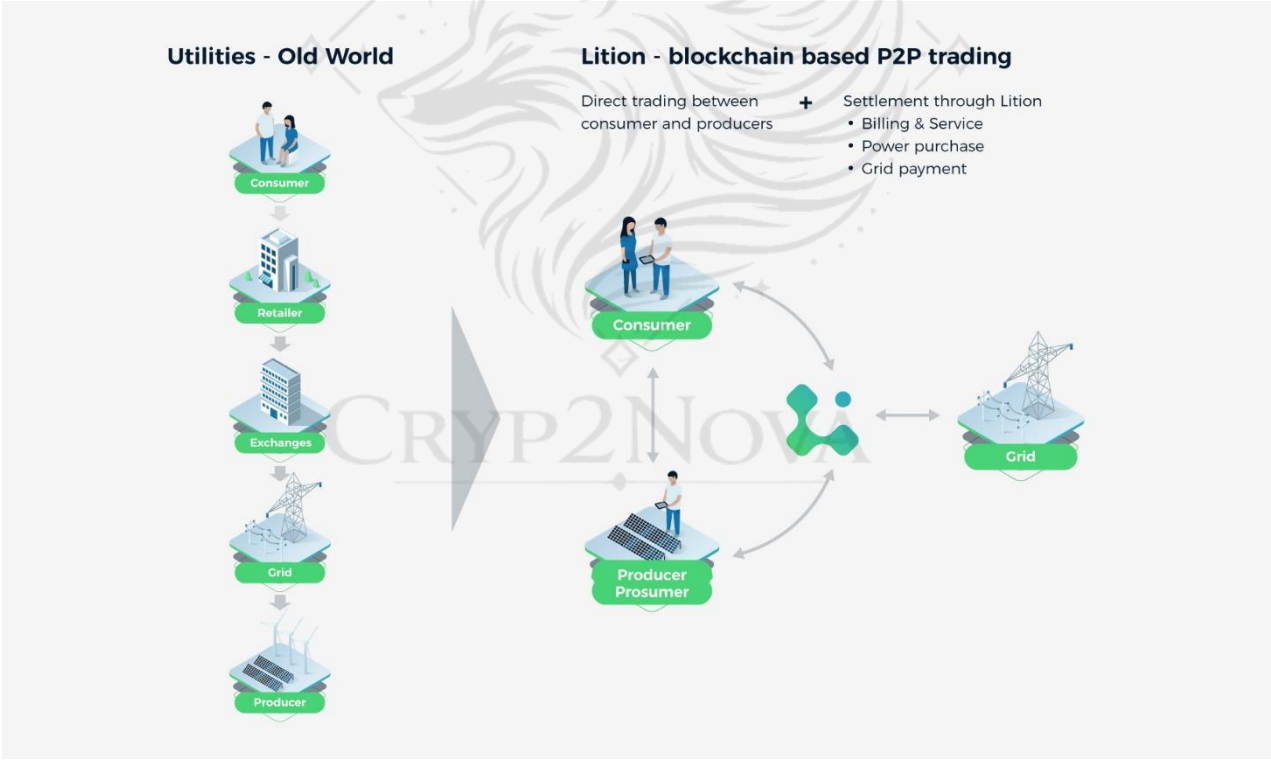


Figure 10: Description of the Lition P2P energy trading use case

Unlike traditional utilities in the "old world", this use case changes antiquated processes in the energy sector. As outlined in Figure 10, it enables direct trading between consumers and producers or prosumers so that costly intermediaries, such as the European Energy Exchange (EEX), are no longer necessary. The trade itself is a smart contract execution. The blockchain verifies the authentication of buyers and sellers trading energy with each other, matches price and volume, and ensures that the quantity of traded energy is sufficient (for details, see the blockchain section).

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After the non-physical trade, the physical execution is carried out by the local Lition supplier (Lition Energie in the case of Germany). It ensures that the grid is compensated, as this is an intermediary that cannot (currently) be taken out. The power is delivered according to the country's regulatory requirements and the customer receives billing and customer service. While the customer's energy exchange portal offers large self-service capabilities, traditional communication channels like telephone and email are in place with a fully-operational call center. As quality of customer service is of utmost importance for a sustainable business, Lition Energie has officially partnered with GASAG, a leading German utility with over 400 call center agents, to provide service operations to Lition Energie's customer base.

CONSUMER BENEFITS

Customers of Lition Energie enjoy tangible and unprecedented benefits making it a truly mass market product. As an enabler, Lition takes out middle men that, in the energy industry, are conglomerates and have generated excessive profits for decades. As a result of the blockchain-based peer-to-peer energy trading, highly efficient corporate processes, and dedicated focus on digitization, customers benefit from record-low prices; their most relevant decision criterion. Currently, customers are saving approximately 20% on their monthly energy bill, which makes Lition Energie one of the cheapest energy suppliers in the market. Additionally, customers get to choose and support the power plant directly, so the choice isn't made by a big utility, but rather the customers themselves. It is their contribution to a greener future.

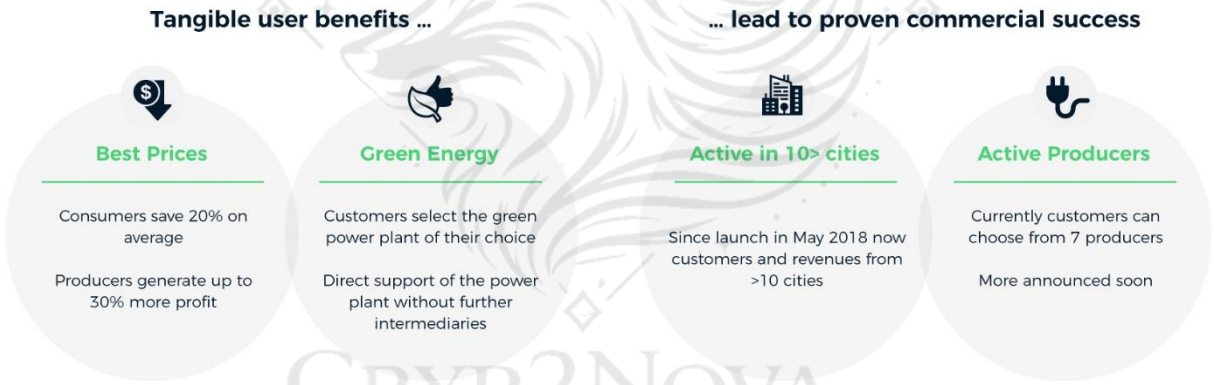


Figure 11: Lition's P2P use case customer benefits and resulting commercial success

With these mass-market benefits, Lition Energie was able to prove that offline revenues can be shifted into the blockchain space. This makes Lition different from most of today's popular blockchain solutions like Bitcoin, Ethereum and other altcoins, which generate revenue solely from a closed community of Cryptocurrency-affiliated audiences. All solutions are not mass-market products. Although they could create media hype, nearly all blockchain protocols on the market suffer from limited communities, low token usage, and low revenues shifted from offline to their blockchain. In contrast, within just weeks of the commercial launch in May 2018, Lition Energie has already attracted customers in over 25 cities and has contracted 7 green power plants, with many more in the pipeline.

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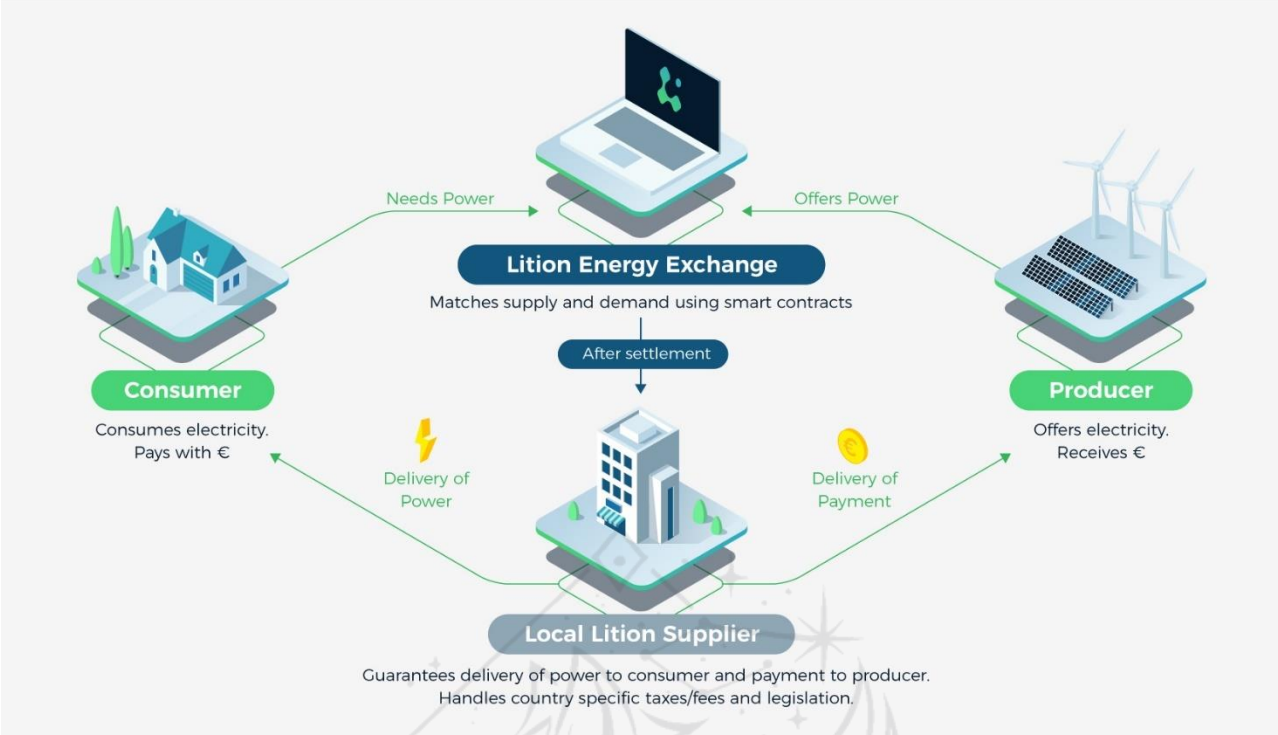


Figure 12: Illustration of the Lition Energy Exchange

COMPARISON WITH OTHER P2P ENERGY TRADING PROJECTS

So far, there have been several blockchain-based energy solutions that have issued an ICO. The four main projects are WePower from Lithuania, which is active with a PoC; Restart Energy, which is also active with a PoC (their existing customer base is solely from their traditional non-blockchain energy business), Powerledger.io from Australia active with 4 pilots in Australia and New Zealand and Electrify Asia from Asia which is active with a PoC. All those projects share a similar conceptual frame in that they use a blockchain-enabled platform to trade energy. While these projects are all still working on establishing the platform and/or starting in smaller markets, the Lition Energy Exchange is a) active, not only with a pilot but fully fledged and b) running in a 41 million household mass-market. And all this has happened in Germany, the largest and most regulated market in Europe.

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		WePower	Restart Energy	Power Ledger	Electrify Asia
Existing customer base	Yes		Yes		Yes (as price comparison website)
Existing Blockchain-based Energy Exchange with real customers and revenues	Yes	Partly (Pilot)	Partly (Pilot)	Partly (Pilot)	Partly (Pilot)
Fully operational energy supplier available to a mass-market (80 million people	Yes				
Embedded in large-scale Energy Ecosystem	Yes	Partly		Yes	
Built on proprietary blockchain, safeguarding private data	Yes				
Founders with experience as executive manager at large utilities	Yes				

Table 3: Comparison of product characteristics

Source: Whitepapers and website updates of projects as of May 2018

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CURRENT IMPLEMENTATION OF BLOCKCHAIN USE CASE

As of May 2018, the distributed Lition blockchain application is running initially on the Ethereum public blockchain, to ensure deployment on a trusted, well-working infrastructure. The section below describes the current blockchain application serving today's energy customers, which will be extended once migrated to the new infrastructure.

Technically, every customer and every producer can run an individual node in the current Lition blockchain network. Participation is at their own discretion. As such, each participant confirms blockchain transactions and contributes to the succession of the blockchain. Lition utilizes adapted blockchain clients based on market-leader Parity in combination with a specific, custom-developed API interface that customers can access by choice, e.g. in case they want to optimize their energy algorithms themselves. Energy customers just wanting to benefit from the producer of their choice and low energy prices can delegate blockchain engagement and trading to their local Lition energy supplier (currently Lition Energie in Germany) similar to cryptocurrency exchanges holding hot wallets for their customers. The latter does not hold the private keys. Hence, the local Lition Energy supplier runs a node acting on behalf of all its customers, but still signs every transaction with the individual private key of the customer to ensure every transaction can be reconstructed on the block, while giving non-technical customers a convenient and less tech-related energy supply. These customers therefore benefit from the blockchain in a "fire and forget" mode after their initial signup. Hence, customers don't need to deal with the blockchain unless they actively choose to do so.

While the majority of energy customers fall into the low involvement category, Lition strongly believes in providing customers the freedom of choice to receive direct node and trading access to the energy exchange while using their own nodes. As another layer of trust, Lition provides the source code to the client and the blockchain smart contracts as open source to the developer community. This allows every user to verify for themselves that energy transactions are carried out as intended. This applies to the producers as well, who use the same blockchain node client, however as sell (as opposed to buy) smart contracts and functions.

The local Lition energy suppliers also run their own blockchain nodes to scan the stored blockchain transactions for settled contracts, as this information is needed for settlement of the energy trades.

Prior to participating in transactions, the nodes need to register with their public keys at their preferred local Lition Energy supplier for physical settlement of energy and funds. Only producers that can in fact physically deliver power to the selected region are added to ensure market deals can be executed and that market participants are protected. The requirements are country-specific: In Germany, this requires recognition as a green producer as part of the Renewable Energy Act (EEG), and the ability to physically deliver power into the high-voltage grid with a balancing operator area (Bilanzkreis) registered at one of the 4 transmission system operators. Customers that wish to consume energy need an active energy delivery contract with the local Lition energy supplier. After registration, the market participant receives an 11-digit pre-shared key that is used once for registration of their public key at the local exchange. Since this transaction is written in the public blockchain, all market participants can verify the registration of a consumer or a producer with their provided public key. These are the `registerProducer()` and `registerConsumer()` functions, that additionally pass an optional `consumerData` / `producerData` object describing the nature of the market participant to its peers.

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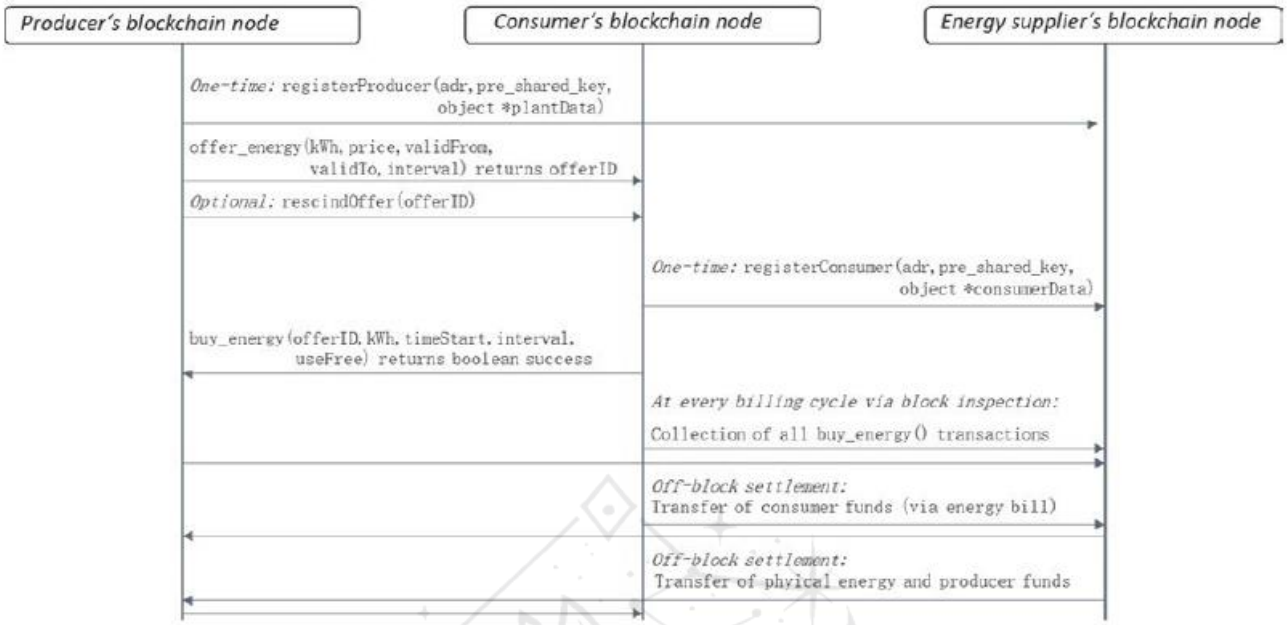


Figure 13: Technical flow of Lition energy transactions

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MVP USE CASE IN BANKING & STO

SUMMARY

Lition has secured a piloting project with a two cooperative Banks of the German Volks- and Raiffeisenbanken, which are part of a Cooperative Financial Network holding assets summing up to more than 1 trillion USD (891 billion EUR) and a real estate development company (>100 million USD).Lition has signed a contract to develop an MVP for a syndicated loan. Lition is, together with the involved companies, developing a DApp on the Lition blockchain for syndicated loans, starting with a real estate loan of >20 million EUR covering a syndication of two banks. A loan is ideal as it showcases public data – such as the approval that a loan has been given – as well as private data such as the underlying documents used to apply for the loan. Using private keys, the approval process of the banks can be further simplified.

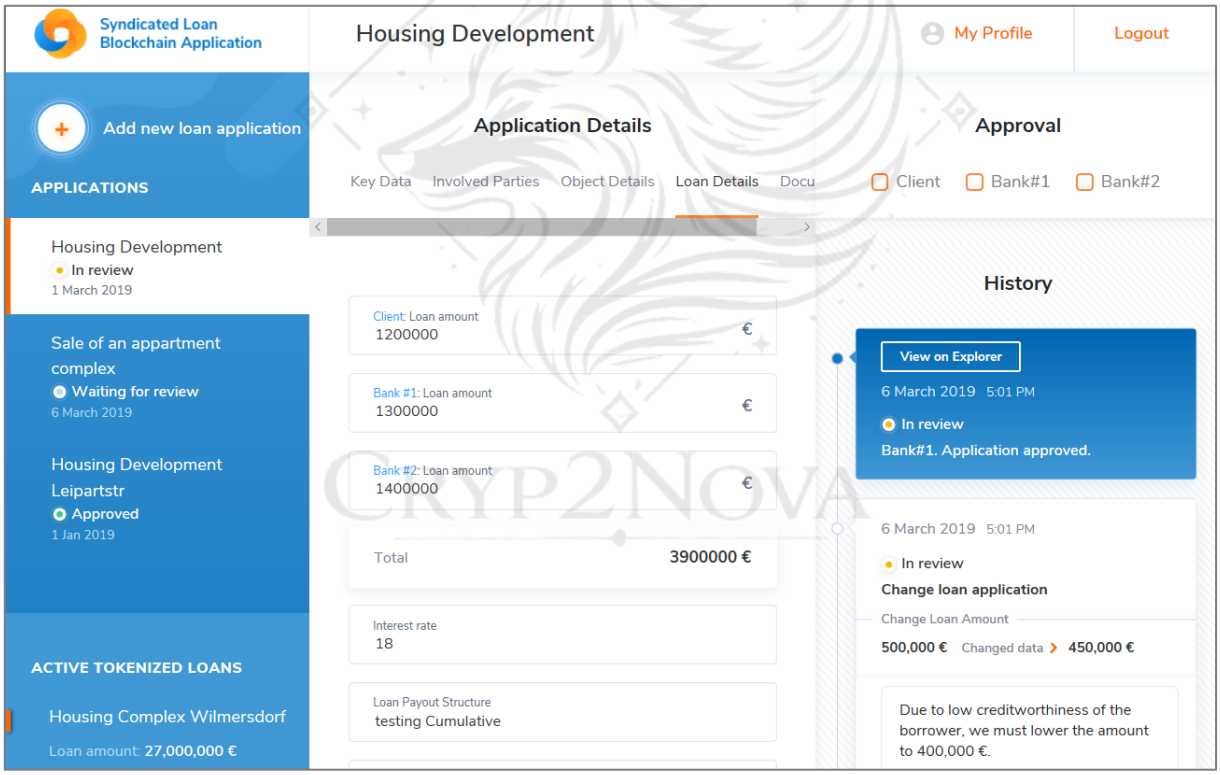


Figure 14: Screenshot of Banking MVP

In a second stage, we are creating security tokens for the loan, thereby tokenizing it. While the syndicated loan application process is done using a real loan, the tokenization is a technical showcase as the legal framework has not yet been developed for this – though Lition is working on this topic as well together with the German government, as further detailed on our medium blog[10].

[10] https://medium.com/lition-blog/a-legal-framework-for-blockchain-made-in-germany-with-the-help-of-startups-like-lition-9252688a46ef

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PILOTED USE CASES IN OTHER ENERGY SECTORS

NETWORK EFFECTS

The energy industry is well suited to benefit from certain characteristics of blockchains, like immutability and direct connection between peers. Many articles have stated that blockchain has the potential to disrupt the energy sector, for example PwC[11] describes multiple use cases in their papers. The opportunities are widely recognized, but so far there has only been progress on a pilot scale, e.g. by the Brooklyn Microgrid[12] which tests how blockchain technology can be used to affect direct neighbor-to-neighbor sales of solar energy. Other P2P-energy projects in MVP or pilot-scale include WePower, Powerledger, RestartEnergy, Verv and Enosi. Other applications - like blockchain-based billing of electric vehicle charging stations with Motionwerk, or certificate of origin trading like SolarCoin for Electrify.Asia – are all in the MVP/Pilot stage.

Leading the frontier to commercial readiness with a proven Peer-to-Peer energy trading application with real customers and power plants, the Lition blockchain infrastructure already has a strong application prior to mainnet launch. As several partners are already evaluating their blockchain-based solutions in energy to run on the Lition blockchain infrastructure, it is well positioned to become the standard for the energy industry as all participants gain network effects.

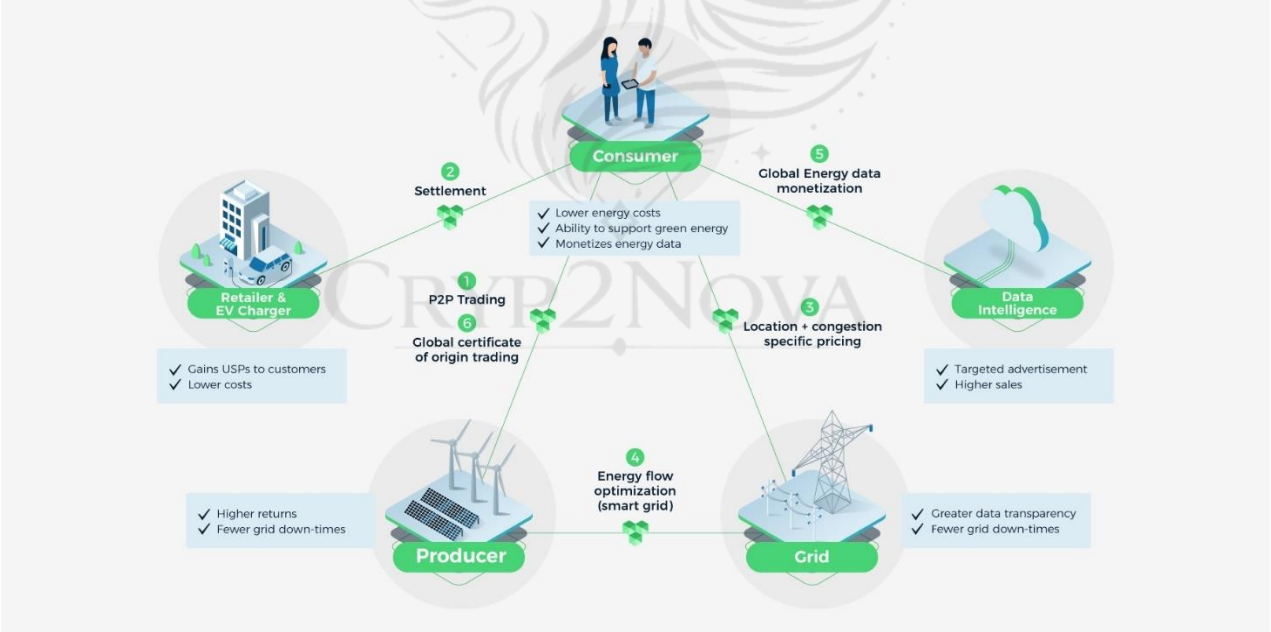


Figure 15: Overview of additional use cases in the Energy sector and their network effects

Lition will develop the Energy Ecosystem together with partners such as energy retailers, electric vehicle charging station providers, Smart Meter manufacturers and grid companies. Each of them will be connected to the worldwide energy ecosystem enabled by

[11] https://www.pwc.com/gx/en/industries/assets/pwc-blockchain-opportunity-for-energy-producers-and-consumers.pdf
[12] www.brooklynmicrogrid.com

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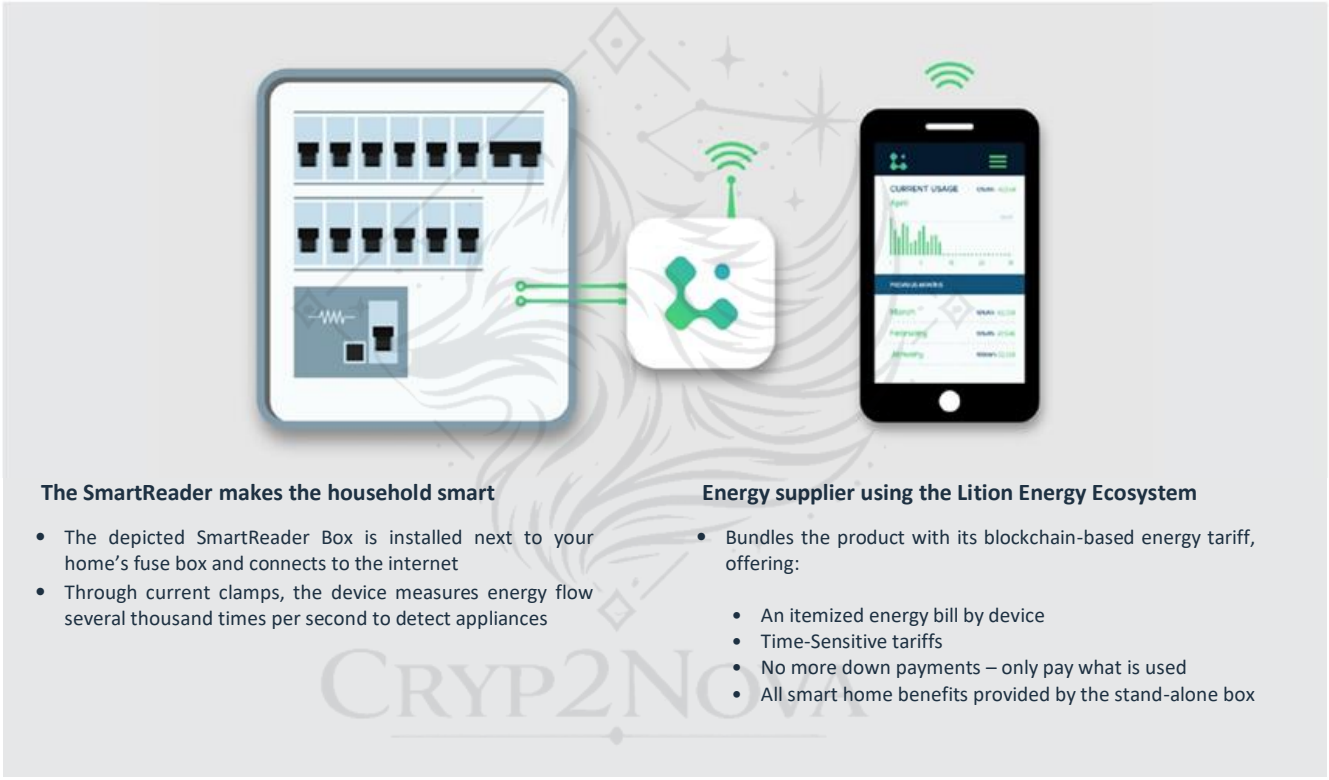
the Lition Energy blockchain. Lition has already signed and lined up multiple international partners for this. More details can be found in this whitepaper's growth chapter.

USE CASES FOR SMART METERING AND ENERGY-DATA-DRIVEN RECOMMENDATIONS

End-to-end transparency is the guiding theme of Lition's core P2P trading use case. By using the blockchain-based Lition Energy Exchange platform, consumers can now choose their preferred renewable energy producers. While this novel transparency on the production side is great, we want to take it one step further and also bring this transparency to households and businesses. This enables any energy retailers and Smart Meter providers using the technology to offer additional services to their customer base.

THE SMART READER MAKES A SMART METER OUT OF OUR FUSE BOX

… SO YOU KNOW WHEN AND HOW MUCH EACH DEVICE CONSUMES



The SmartReader makes the household smart

- The depicted SmartReader Box is installed next to your home's fuse box and connects to the internet
- Through current clamps, the device measures energy flow several thousand times per second to detect appliances

Energy supplier using the Lition Energy Ecosystem

- Bundles the product with its blockchain-based energy tariff, offering:
  - An itemized energy bill by device
  - Time-Sensitive tariffs
  - No more down payments – only pay what is used
  - All smart home benefits provided by the stand-alone box

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Figure 16: Illustration of the Lition Smart Reader App

This is achieved by installing a smart reader, a small device connected to the internet via Wi-Fi or cable connection, next to the customer's fuse box. A smart reader is a Smart Meter at a significantly lower cost. The smart reader measures energy consumption and sends the data privately to the blockchain, effectively providing the same functionality as a Smart Meter at a fraction of the cost. Using a mobile app, customers are able to observe a detailed real-time visualization of the energy usage of all their household's electrical devices by utilizing energy disaggregation. A customer can detect which appliances are currently active, e.g. washing machine, TV, fridge, etc., and review statistics on the overall energy consumption in kWh. The app further provides various smart home features, like a safety alert when you've kept your oven on for too long or a security alert if a device like a light is switched on when you're not at home.

While these features are useful on their own, bundling them with blockchain-based energy supply contracts offers additional benefits. By using a Smart Reader (equivalent to a Smart Meter but installed in the fuse box) to identify energy consumption of individual household devices, a supplier using this Lition blockchain-based technology can offer an itemized monthly energy bill.

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This means instead of charging an estimated monthly down-payment based on annual traditional meter readings, customers are charged the exact amount as measured, and they benefit from a further breakdown on the bill for each detected device. This will provide full transparency to consumers who want to know their exact monthly cost per device. Furthermore, consumers will be able to replace high energy-consuming devices with more energy-efficient appliances by using our data-driven approach. Such analysis and smart recommendations are additional services to provide in the future.

There is another major benefit of having a smart reader. By accumulating the data received from thousands of smart readers in Lition's customer households, energy retailers will be able to offer time-sensitive tariffs to customers. With these tariffs, customers can save costs during off-peak hours e.g. in the very early morning hours. These tariffs will also enable demand-shaping, as customers will have an incentive to relieve the grid in peak times and shift their load to off-peak hours. In Germany, for example, only high-consumption customers (over 100,000 kWh annual consumption) can benefit from lower off-peak prices as of now.

Moreover, reasonable product recommendations (e.g. new fridge or AAA LED-Bulbs due to high costs) based on various partnerships are further potential revenue streams, while providing customers with recommendations for saving energy and money. This global marketplace for energy-data-driven, AI-generated product recommendations gives customers unique insights for the right appliance decisions.

In summary, the benefits are:



Smart	Affordable	Easy
• Identifies your appliances and their energy consumption • Receive product recommendations based on your energy data • Full energy cost control	• Benefit from low market prices during off-peak hours • Save up to 20% on household energy consumption in addition to the 20% cost savings of the Lition tariff • Device and its installation through a certified electrician included in rate	• Pay only for energy that has actually been consumed • Innovative App • No more meter reading • Optional: Measurement of solar production

Figure 17: Lition Smart Reader Benefits

Lition Energie is already a frontrunner in applying this use case in Germany and has already successfully integrated a Smart Reader that provides the daily energy quantity for blockchain-based energy trading. The additional benefits such as device disaggregation are currently being implemented and will be available to the consumer in the near future.

To make this use case possible, Lition has partnered with the Smart Reader pioneer Watty from Stockholm, Sweden. They are a supplier of Smart Reader devices and developer of AI-based algorithms for device detection, and they are currently the market leader in disaggregation technology.

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USE CASES FOR ELECTRIC VEHICLES

The blockchain technology and the underlying Lition Token is well positioned to become the standard for charging electric vehicles and will highly impact worldwide desirability and usage of e-mobility.



Background and Challenges of E-Mobility

Due to environmental problems and changes in global outlook on e-mobility, the market is growing rapidly. Based on manufacturers' launch plans and expected penetration rates, the market potential for electric vehicles is projected to reach approximately USD 340 billion by 2020[13], which is equivalent to 10 to 15 percent of the global automotive market in that year. Global plug-in vehicle deliveries reached 1.25 Million units in 2017, resulting in a sales volume 57% higher than in 2016[14]. The growing number of electric vehicles requires an increasing number of charging stations, and also increases the demand for electricity; the average electric vehicle consumes nearly as much electricity as a four-person household per year. In other words, electricity consumption per household doubles when an electric vehicle is purchased.

With today's e-mobility infrastructure, drivers of electric vehicles face three major issues when charging their vehicles:

- Numerous payment systems for e-mobility solutions often make charging and payment for electric vehicles unnecessarily complicated for customers.
- Pricing is expensive, inconsistent and non-transparent. Electricity prices vary by more than 100% between individual charging stations.
- Buying electricity at charging stations involves high-priced intermediaries and lacks transparency. Again, large energy suppliers are hoarding the profits.

[13] www.atkearney.de/documents/10192/245028/eMobility-The_Long_Road_to_a_Billion-Dollar_Business.pdf/5f3b8f4d-1c68-41c2-8b92-8453d5561b05
[14] www.peakresources.com.au/news/global-plug-in-sales-for-2017-q4-and-the-full-year-prelim/

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Contrary to many customers' beliefs, green energy charging stations don't necessarily use green energy but often rely on traditional local and nuclear energy sources. Suppliers can free themselves of their bad reputations by obtaining easy-to-access and cheap green certificates. In fact, an electric vehicle can pollute as much as driving a dirty combustion engine vehicle.

Lition's Blockchain Infrastructure as a Foundation to E-Mobility

The Lition blockchain infrastructure is the foundation to solve these problems with its unique and globally adaptable blockchain approach. Lition is already partnering with a leading charging operator with whom the use case will be developed and then deployed to their 1500 charging stations.

The underlying blockchain infrastructure will be the basis for this, which will result in the following benefits for the consumer:

Convenience	Cost	Smart
• Charge their electric vehicles at any charging station • Use their producer of choice for charging their EV. This may be the same producer they already selected for their electricity at home or a completely new one.	• Use their existing individual record-low tariff to save money when charging • Receive one bill for e-mobility and electricity • Earn money if car is used as electricity storage while plugged in	• Use their individual smart contracts within our end- to-end energy exchange platform to charge their electric vehicles • Drive with genuine green energy instead of coal or nuclear energy

Table 4: Benefits for Consumers

USE CASES FOR SMART GRIDS

So far, Lition has commercialized one use case (P2P energy trading) and is actively developing three other use cases (e-mobility, Smart Metering and data recommendations) as described above. On top of this, there are additional applications from within the energy sector for which Lition is actively looking for partners, with smart grids being one of the most relevant.

By connecting customers and producers directly via Lition's P2P trading use case, transmission and distribution grid companies gain additional insights into their power flows. On top of this, Lition's blockchain technology can support their businesses in various ways:

- **Time-of-Use Pricing:** To reduce demand during high-cost peak usage periods, communications and metering technologies inform smart devices in homes and businesses when energy demand is high, and track how much electricity is used and when. These technologies also give utility companies the ability to reduce consumption by communicating to devices

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directly in order to prevent system overloads. For example, a utility could reduce the usage of a group of electric vehicle charging stations or shift temperature set points of air conditioners in a city. To motivate them to cut back use and perform what is called peak curtailment or peak leveling, prices of electricity are increased during high demand periods, and decreased during low demand periods. It is assumed that consumers and businesses will consume less during high demand periods if it is possible for consumers and consumer devices to be aware of the high price premium for using electricity at peak periods. This could mean making trade-offs such as cycling on/off air conditioners or running dishwashers at 9 pm instead of 5 pm. When businesses and consumers observe a direct economic benefit of using energy at off-peak times, chances are high they will include energy cost of operation into their consumer device and building construction decisions. Hence, they will become more energy efficient. As energy pricing is already defined by blockchain-based P2P-trading, time-based pricing is a logical and easy extension.

- **Distance Pricing:** Applying the same principles as for time-of-use pricing, distance between the power plant and the consumer can be factored into customer pricing offered through the blockchain solution. If a customer chooses a power plant close by, he can save by paying a lower price compared to a power plant further away.

- **Reliability:** The smart grid makes use of technologies such as state estimation[15] which improves fault detection and allows for automated corrections of the network without the intervention of technicians. This will ensure a more reliable supply of electricity and reduced vulnerability to natural disasters. A blockchain provides the necessary infrastructure for this, including a reliable source of underlying data and verifiable transactions to resolve issues.

- **Security:** Grids using the robust, tamper-proof Lition blockchain will mitigate vulnerability to terrorism or cyberattacks because data and transactions are highly secured. With cyberattacks on the rise worldwide, experts rate these features as very important for the future.

- **Bi-Directional Energy Flows:** Next-generation transmission and distribution infrastructure will be better able to handle possible bi-directional energy flows, allowing for not only distributed energy such as from photovoltaic panels on building roofs, but also the use of fuel cells, charging to/from the batteries of electric cars, wind turbines, pumped hydroelectric power, and other sources. Classic grids were designed for a one-way flow of electricity, but if a local sub-network generates more power than it is consuming, the reverse flow can raise safety and reliability issues. A smart grid aims to manage these situations via Lition's P2P-trading solution on the blockchain. As the underlying energy flows are already contracted on the blockchain, managing the physical flows on the blockchain is a logical next step to avoid data duplicity with a single source of truth.

USE CASES FOR CERTIFICATES OF ORIGIN

The Certificate of Origin (also Guarantee of Origin) is an instrument that labels electricity from a specific source, e.g. a specific power plant or a certain type of renewable energy generation through legal means (Directive 2009/28/EC[16]) in Europe. With this label, customers can be certain of the origin of their electricity. In operation, a GO is a "green label" or "tracker" guaranteeing that one MWh of electricity has been produced from renewable energy sources. GOs are traded. When a company buys GOs, as documentation for the electricity delivered or consumed, the GOs are cancelled in the electronic certificate registry. This single

[15] Yih-Fang Huang; Werner, S.; Jing Huang; Kashyap, N.; Gupta, V., "State Estimation in Electric Power Grids: Meeting New Challenges Presented by the Requirements of the Future Grid," Signal Processing Magazine, IEEE , vol.29, no.5, pp.33,43, Sept. 2012

[16] http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32014L0095

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standardized instrument makes it possible to track ownership, verify claims and ensure that GOs are only sold once and that there is no double counting.

While this practice works in theory, it is a highly inefficient process with many intermediaries such as the energy producer, its energy reseller with market access, the exchanges on which certificates of origin can be traded, the distribution grid operator obtaining the certificate from the producer, and the transmission system operator invoicing it to the energy retailer, who eventually bills it to the customer. They all need to trust each other, and they all need to communicate.

This is a conventional use case in which the trustless, open nature of blockchains, together with asynchronous encryption at the point of origin (the power plant), can simplify a process by taking out the many middlemen. As customers are already trading energy with producers via the Lition P2P energy exchange, storing certificates of origin on the blockchain is an easy extension allowing for global scale. In this way, the certificate of origin does not have to be linked to the physical energy delivery at all.

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USE CASES IN OTHER INDUSTRIES

Fast transaction speeds aren't the only requirement of all use cases; regulated businesses also require data deletion and truly private data. As no other current blockchain can fulfill these requirements as outlined in the previous chapters, Lition's new blockchain infrastructure is the solution of choice for the disruption of many additional use cases across a multitude of industries as outlined in Figure 18.

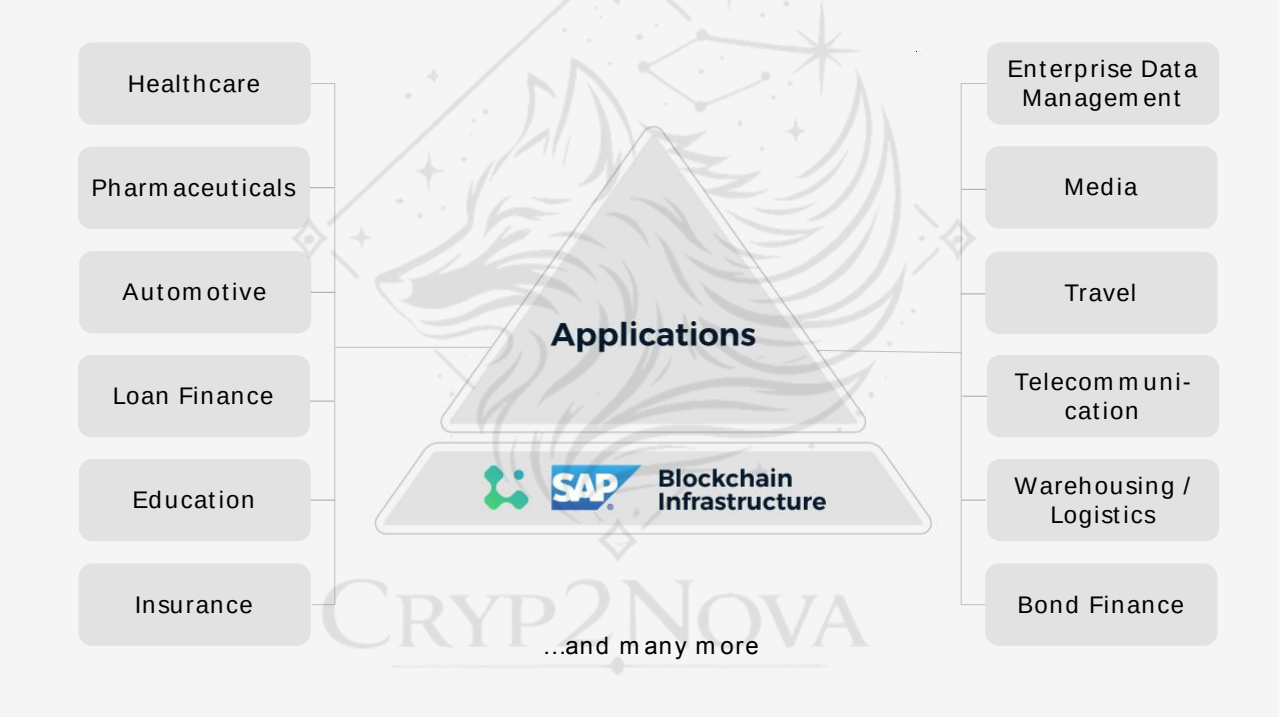


Figure 18: Sample industries with use cases for blockchain infrastructure

A selection of some of the potential applications is detailed in the section below.

USE CASES FOR HEALTHCARE

Currently, medical patient data regarding diseases and insurance details are filed in different places. When a patient has to settle insurance claims, he or she has to collect and file all of this data. With a blockchain solution, this highly sensitive information can be stored on a private sidechain for doctors and insurance companies during claim settlement. After the claim is settled, the patient can – with the new infrastructure – delete the data on the blockchain. Thus, patients' privacy will be kept secure at all times and this complex process can be managed efficiently.

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USE CASES FOR PHARMACEUTICALS

Data privacy is crucial across the pharmaceutical industry. The research, development, and clinical testing data required for approval of new drugs by public institutions like the FDA (Food and Drug Administration), and private patient data concerning illnesses, medication, age, gender, and family medical history require absolute confidentiality. However, relevant parties still need access to that sensitive information.

With the new Lition mainnet, confidential data will be stored on a private sidechain, providing access to involved parties, and allowing for deletion of private patient data when it is no longer needed. This will significantly streamline and further secure the entire approval process for new drugs.

USE CASES FOR ENTERPRISE DATA MANAGEMENT

Research recently predicted that the rapid digitization of consumers' lives and enterprise records will increase the cost of data breaches to USD 2.1 trillion globally by 2019[17]. As data exchange between enterprises is indispensable, privacy and security is more than crucial. The Lition Mainnet offers exactly the features needed to ensure privacy and security while effectively sharing data with the appropriate parties. Confidential data is stored on private sidechains only accessible with private keys and deleted as soon as the data is no longer required. The functionalities of decentralized data storage, limited availability of private data and highly restricted access prevents data theft and sabotage.

USE CASES FOR BOND FINANCE

The worldwide corporate bond market requires myriad approvals (e.g. credit rating scores, balance sheets) and many middle men (for settlement, custody, etc.). The Lition Mainnet enables decentralized storage of all prerequisites for a loan, plus automated issuance using a smart contract. After the bond has been issued, the beneficiary company can delete the data they no longer need. Bond financing can be fully described within the public/private logic of the Lition Mainnet, representing a much faster, more reliable and cheaper way for companies to issue bonds around the globe.

USE CASES FOR PURCHASING/LOGISTICS

The infrastructure of the Lition Mainnet allows users to publicly store material inventory data such as stock items, certificates of origin, quantities, prices, manufacturers and complaints. Linking this information to a private sidechain with purchaser information can automate payment procedures, increase restocking efficiency, optimize transportation, and improve material quality and response to supply and demand. But not all data in these processes is meant to be public; e.g. prices and demand. Again, the advantage of the Lition Mainnet is the private/public logic of the blockchain.

USE CASES FOR AUTOMOTIVE

Odometer manipulation is a major issue in second hand car sales. Even in highly regulated countries like Germany, police estimate odometer manipulation on 30% of all second-hand cars sold, resulting in annual damages for insurers between 6 and 7 billion euros[18]. As odometer levels are classified as private data due to the connection to the car holder, they cannot currently be publicly

[17] https://www.forbes.com/sites/stevemorgan/2016/01/17/cyber-crime-costs-projected-to-reach-2-trillion-by-2019/#6db226a73a91
[18] https://global.handelsblatt.com/companies/protecting-used-car-buyers-651071

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stored. With the Lition Mainnet, anonymous movement data can be stored on the private sidechain, ensuring privacy of the vehicle holder, as well as fraud protection on purchase via the public availability of the car's history.
Additional car details regarding accidents, repairs, etc. may also be shifted to a private sidechain and used to settle insurance claims. Again, upon the driver's request, personal data is deletable when no longer required.

USE CASES FOR TRAVEL

Common search engines for hotels, flights, and rental cars operate as middle men between the customer and partners of the tourism industry, causing unnecessary costs on both sides. With the Lition Mainnet solution, all offers can be stored on a public blockchain. The customers' private information during the booking process (date of travel, prices, bank data, etc.) is held on a private sidechain, where payment procedures and travel details are kept anonymous and secure. On request, data can be deleted when no longer required.

USE CASES FOR SAP CUSTOMERS

Even though this was only a very brief description of potential use cases, it demonstrates the potential of the Lition Mainnet as nearly unlimited in commercial and industry applications. SAP already forms the IT-backbone of many modern enterprises and can integrate the blockchain into existing SAP systems running in more than 400,000 companies with more than 12 million users worldwide. In this way, rapid market penetration is inevitable.

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PARTNERS

Lition is backed by major industry players in the utility and finance sectors as well as specialized technology partners on a global level. These partners have been invaluable assets to our company growth thus far, and will remain essential to our future as we expand into more use cases.

The current lead partners and investors are the following:

Lead Partner and Advisor

SAP is a multinational market leader in enterprise application software, managing business operations and customer relations with over 400,000 customers in over 180 countries. They have a market capitalization of approx. USD 150bn. See the separate section on the SAP cooperation and their interview on page 11.

Incubation Partner and Advisor

Longhash is a well-known blockchain accelerator with offices in Tokyo, China, Hong Kong, Singapore and Berlin. They have chosen Lition as their second investment of their German office next to the project MXC. Longhash has a strong network of technical and financial partners and supports us in these matters together with their co-founder and Lition Advisor Yan Feng Chen.

Financial Partner

Alpha Labs is one of the largest crypto asset funds based in Seoul, South Korea. They gained reputation as serial entrepreneurs, VCs, and early blockchain supporters focused on catalyzing high-impact projects from China, South America, Southeast Asia and Japan.

Technology Partner

Lition was accepted into Microsoft's Startup Program, and uses it for parts of its infrastructure and exchange regarding advanced blockchain technologies.

Financial Partner

LD Capital is one of Asia's earliest organizations focusing on value investing in the blockchain field. LD Capital has successively discovered and invested in projects such as Qtum, Vechain and Eos which all achieved over 100 times return.

Energy Partner Germany

GASAG is a leading utility with over USD 1bn in revenue and over 1m customers. Lition Energie has connected GASAG power plants to Lition's blockchain energy exchange, and GASAG operations in turn provides outstanding customer service to our user base.

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We further benefit from the following technology, blockchain, and token sale partners:

Company	Website	Support Lition with
tokeny	https://tokeny.com/	Secure settlement
instinctools™	http://www.instinctools.com/	Development
QUANTUM FACTORY	http://www.quantum-factory.de	Development
onfido	https://onfido.com/	KYC (identity verification)
ADVISUM	http://www.advisum.de/de	Strategic Partner

Table 5: Current technology, blockchain and token sale partners

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TIMELINE

Use Cases	Blockchain Infrastructure
Q4 2017 - Forming	
• Alpha version of P2P energy trading app • Licensing process for electricity supplier initiated • First partnership initiated	
• Lition starts • Initial fundraising	
Q1 2018 – Building P2P Use Case	
• Beta version of P2P energy trading app • License as electricity supplier in Germany obtained • First green power plants connected to Lition Energy Exchange • First employees on board (4 internal and 6 external)	
Q2 2018 – Commercial Launch of P2P Use Case	
• Lition tariffs are available to mass market (>41 million households) • Scale up connected green power plants to 18 GWh in Germany • Integration of Smart Reader use case	• Business requirements for blockchain infrastructure specified • Design of technical blockchain architecture initiated • Technical advisory SAP
Q3 2018 – Designing Blockchain & Ecosystem Initialization	
• Use case for P2P energy retailing piloted • Leading energy partners onboarded • Lition staff grows to 20 (internal and external) • Lition representative office opened in Beijing	• Technical whitepaper released • Blockchain prototype • Development with SAP started
Q4 2018 – Testnet MVP	
• Commercial expansion of P2P energy trading use case • Contract signing with leading bank on banking use case	• Support of German blockchain lawmakers enabling STOs in Lition blockchain • MVP of testnet (private release) • Seed funding round completed
• **Q1 2019 – Testnet Release & Ecosystem Growth**	
• Launch of banking use case • Launch of security token use case for real estate • Expansion of P2P trading use case also for large industrial clients	• ***Testnet 1.0 public release*** • First use cases migrated to Lition Testnet infrastructure • dApp partners onboarded • Team scale-up

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	• ICO (March)
Q2 2019 – Mainnet Release & Ecosystem Growth	
• Launch of STO use case outside of real estate with partner • Launch of smart grid use cases	• ***Mainnet 1.0 Private release*** • Migration of use cases to Mainnet • Start Genesis Phase
Q3 2019 – Mainnet Release & Ecosystem Growth	
• Growth of partner network across industries • First pilots of regulated industries outside Energy sector that deal with private data • Onboarding of dApp partners	• ***Mainnet 1.0 Public release*** • Hosting first STO's
Q4 2019 – Ecosystem Growth	
• Industry-designed toolkit for the development of blockchains	• Testnet Update • Large-scale user migration • Mainnet 1.5 Update, including data deletability
2020 – Mainnet Evolution & Cross-Industry Expansion	
• Large-scale marketing for ecosystem	• Mainnet 2.0 Public release with full set of features • Worldwide commercial, large-scale use cases of industries outside of Energy (Healthcare, Finance)

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TOKEN SALE

With the blockchain infrastructure run on Lition Tokens (LITION) for transaction execution, staking and sidechain creation (see the section on page 23), there will be an initial generation of tokens called the Token Generation Event (TGE).

This is the summary of the token sale, but please refer to the this Medium article. It includes the details on the bonus system ("HODL-Highway") and Lition investment cornerstones.

Lition also offers a buyback program of up to 50% of the original value, as detailed in this article on Medium.

Cornerstones of TGE

- Token Supply: 145m LITION
- Price at ICO: USD 0.10 / LITION
- Hard cap: USD $4.9m
- Soft cap: USD $2m
- Type: ERC20 token on Ethereum
- Period: March 18-26, 2019. See this article for full details incl. details on circulating supply
- Up to 25% bonus for HODLing, see this article on Medium for all details, incl. lockup and bonus structure
- Up to 50% buyback, detailed in this article on Medium
- Lock-Up periods:
    - Seed investor: vested 90 – 180 days, every 30 days 25% unlocked
    - Private Investor: vested 90 – 180 days, every 30 days 25% unlocked
    - Public Investor: directly available or bonus for hodling after listing
    - PR & Community: vested 90 – 360 days, every 90 days 25% unlocked
    - Team: vested over 720 days, every 180 days 25% unlocked
    - Support Ecosystem: 12.5% instantly released after TGE, next 12.5% after 90 days and so on
    - Advisory: vested 90 – 180 days, every 30 days 25% unlocked

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Token Sale Distribution

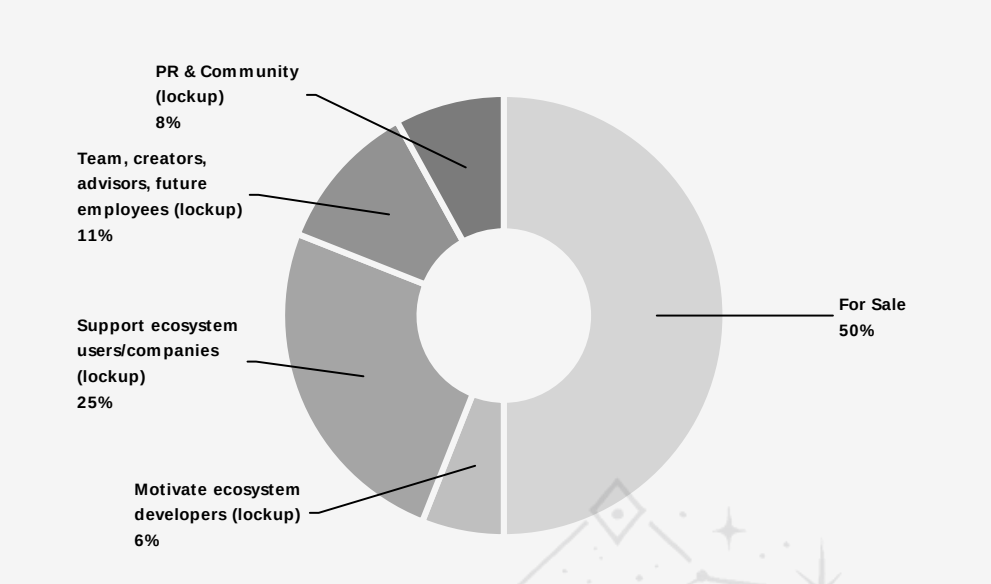
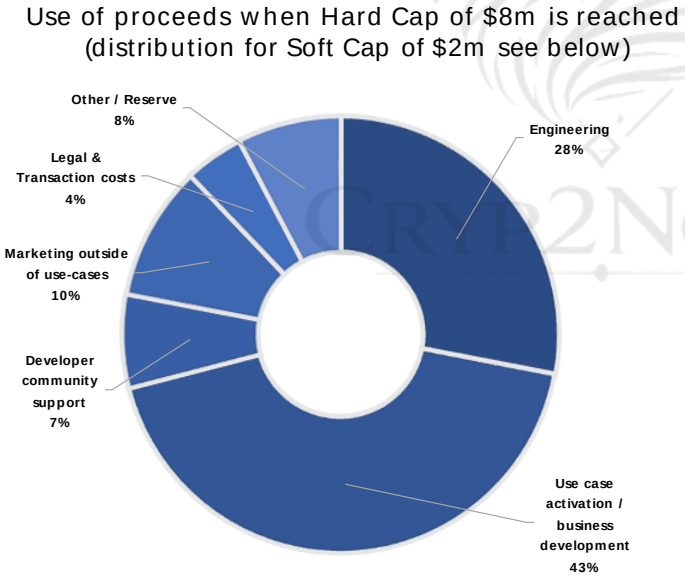


Figure 19: Token sale distribution

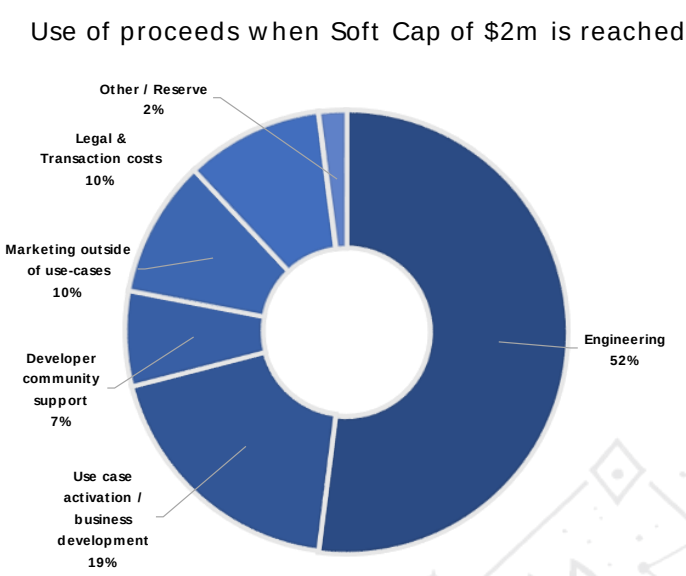
Use of Proceeds (Upon Reaching Hard Cap)



Usage of proceeds (absolute, in USD)	Year 1	Year 2	Year 3
Engineering	**851,000**	**896,000**	**493,000**
Fundamentals/ research	*213,000*	*134,000*	*25,000*
Consensus layer	*298,000*	*269,000*	*148,000*
Storage layer integration (development by SAP)	*43,000*	*45,000*	*25,000*
Client	*128,000*	*134,000*	*99,000*
Testing	*102,000*	*242,000*	*158,000*
Other	*68,000*	*72,000*	*39,000*
Developer headcount (Lition)	7,000	7,000	4,000
Developer headcount (SAP)		Paid by SAP	
Use case activation / business development	**860,000**	**1,720,000**	**860,000**
P2P Energy Trading	*258,000*	*344,000*	*86,000*
Smart Grids	*215,000*	*430,000*	*146,000*
Smart Metering	*258,000*	*258,000*	*112,000*
Other Energy	*43,000*	*138,000*	*86,000*
Other sectors	*86,000*	*550,000*	*430,000*
Developer community support	**196,000**	**224,000**	**140,000**
Marketing outside of use-cases	**320,000**	**320,000**	**160,000**
Legal & Transaction costs	**281,000**	**53,000**	**18,000**
Other / Reserve	**213,000**	**244,000**	**152,000**
Sum	**2,721,000**	**3,456,000**	**1,823,000**

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Use of Proceeds (Upon Reaching Soft Cap)



Usage of proceeds (absolute, in USD)	Year 1	Year 2	Year 3
Engineering	**395,200**	**416,000**	**228,800**
Fundamentals/ research	*98,800*	*62,400*	*11,440*
Consensus layer	*138,320*	*124,800*	*68,640*
Storage layer integration (development by SAP)	*19,760*	*20,800*	*11,440*
Client	*59,280*	*62,400*	*45,760*
Testing	*47,424*	*112,320*	*73,216*
Other	*31,616*	*33,280*	*18,304*
Developer headcount (Lition)	4	4	2
Developer headcount (SAP)		Paid by SAP	
Use case activation / business development	**95,000**	**190,000**	**95,000**
P2P Energy Trading	*95,000*	*190,000*	*95,000*
Smart Grids	*0*	*0*	*0*
Smart Metering	*0*	*0*	*0*
Other Energy	*0*	*0*	*0*
Other sectors	*0*	*0*	*0*
Developer community support	49,000	56,000	35,000
Marketing outside of use-cases	80,000	80,000	40,000
Legal & Transaction costs	160,000	30,000	10,000
Other / Reserve	14,000	16,000	10,000
Sum	**793,200**	**788,000**	**418,800**

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OUR TEAM

The leadership team of Lition and Lition Energie consists of top managers and entrepreneurs with a combined 100 years of relevant experience. The CEO and COO have worked together for over 5 years, and other Lition team leads have worked cooperatively for more than 25 years. This results in a wealth of experience and solid professional relationships across the entire Lition team.

LEADERSHIP TEAM



Dr. Richard Lohwasser
Co-Founder & CEO

Richard was born in 1983 and is an internationally-awarded IT specialist and blockchain expert. Richard started programming when he was 13 years old. At 15, he was fluent in seven different programming languages. At 17, he developed and founded the start-up Clanintern; a Top-10 website in Germany with over 1 million page impressions per day. Later he completed a 5-year university program in three years, graduating as the top student in his class, after which he completed a 3-year PhD program in one year.

Richard was managing director at ExtraEnergie, one of Germany's top three independent electricity suppliers, with about 700,000 customers in B2C & B2B, USD 850 million in revenues, and USD 100 million in operating profit. At ExtraEnergie, Richard was head of seven departments, making him responsible for about 350 employees out of the company's 400 total staff. As the company's managing director, Richard created efficient processes, achieved milestones, and reached sales targets that he now plans to implement at Lition.

Before ExtraEnergie, Richard served as the youngest director in the history of Vattenfall, a company with USD 10bn in sales and one of the four energy conglomerates dominating the German market. As the head of customer processes and IT, he was responsible for all of Vattenfall's 3 million German customers.

Prior to his employment at Vattenfall, he was the Engagement Manager in the technology practice of McKinsey (McKinsey Digital), a globally acclaimed strategy consulting firm where he helped clients in the utility and high-tech industries to grow, restructure and become more profitable overall.

As of now, Richard has also founded 2 start-ups, one in collaboration with his brother Reinhard Lohwasser and Manfred Gabriel.

Richard lives in Hamburg and Berlin and holds his Ph.D. in economics from the Technical University of Aachen, one of the top ten universities in Germany. Before pursuing his Ph.D., Richard was a graduate student in computer science at the University of California, San Diego, USA, and holds a graduate degree in information systems from the University of Göttingen, Germany. During

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his academic career, Richard was frequently awarded internationally for his academic merits and IT achievements. He was the recipient of a full-tuition scholarship at the University of California. Richard has also received scholarships from the German state of Lower Saxony and e-Fellows. As a licensed pilot (PPL-A), Richard enjoys flying in his free time.



Dr. Kyung-Hun Ha
Co-Founder & COO

Kyung is a senior IT expert and programmer. He has also founded five start-ups in the tech and e-commerce sector.

Kyung is a senior director at GASAG, a USD 1.4bn leading energy supplier in Germany, responsible for online customer service and systems, as well as customer sales. He is further responsible for all reporting, analysis, and predictive projects for the GASAG Group.

Prior to his engagement at GASAG, Kyung served as the Director of Online Capabilities at Vattenfall. Before working at Vattenfall, he was the Managing Director of the Open Idea and Innovation Program for the European Union, and directly reported to the EU Commission in Brussels.

As a product manager for the Mercedes-Benz Bank, he was responsible for their vans' product management strategy development. He also worked as a project manager for Daimler AG in the quality department for their M-, R- and GL-Class.

Kyung, who was born in 1981, lives in Berlin and holds a Ph.D. in IT (Summa cum Laude) from the ESCP Europe Business School, a top 5 Business School in Europe. He also graduated with distinction in business administration and systems engineering at the Technical University of Berlin, a top-ranking university in Germany. He holds a Master of Business Administration (with distinction) from the University of Maryland, a highly ranked university in the United States. Kyung was frequently granted scholarships and awards throughout his academic career.

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Dr. Manfred Gabriel
Board Member

Manfred is one of the founding partners of ADVISUM, a Berlin-based investment firm founded in 2001. He has been responsible for an investment volume of more than USD 1bn to date. He has developed, raised, invested in, and managed investment funds for institutional investors with a volume of more than USD 700m. Manfred has invested in more than 100 companies with a combined revenue of more than USD 7bn and more than 35,000 employees. In addition, Manfred has launched five start-ups, one in collaboration with Reinhard and Richard Lohwasser in 1998.

Before founding ADVISUM, he was a managing partner of GCI in Switzerland, a now publicly traded investment firm. Before that, Manfred served as an account manager at Cap Gemini, where his responsibilities were focused on growing and restructuring companies in the technology, automotive and financial industries, with clients including Deutsche Bank, Daimler-Benz, BMW AG and Citigroup.

Manfred, born in 1965, lives in Germany and holds a Ph.D. in business. He graduated in business administration from the University of St. Gallen in Switzerland, one of the top 3 business schools in Europe.



Jan Wiedenhaupt
Board Member Legal/Finance

Jan has been a founding partner and managing director at ADVISUM since 2001, where he has developed, invested in, and managed investment funds for institutional investors with a volume of more than USD 700m. He has been responsible for an investment volume of more than USD 1 bn to date. Jan has also founded four start-ups. Before that, he was a member of the management board of GCI Management Germany, now a publicly traded investment firm. Previously, he also served as an engagement manager at Cap Gemini where he was responsible for clients like Deutsche Bank, Deutsche Telekom, Daimler-Benz, BMW AG, and other firms in the financial, technology, and automotive sectors.

Born in 1968, Jan currently lives in Berlin. He graduated in Business Administration and Engineering at the Technical University of Berlin, a top 5 German university.

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Reinhard Lohwasser
Board Member Technology

Reinhard has been a partner at ADVISUM since 2006. He manages funds worth more than USD 700m, and over 100 companies with 35,000+ total employees and a combined revenue of more than USD 7bn. As of today, Reinhard has been responsible for an investment volume of over USD 400m. He has founded three start-ups, one co-founded with his brother Richard.

Previously, Reinhard also worked for Lucent Technologies where he served in various top management positions. He was closely involved in Lucent's activities in Shanghai, China, and led the global product management team holding the international profit and loss responsibility for the worldwide leader in optical multiplexers. Reinhard also served as an appointed member of the German national chamber of commerce's telecommunications committee.

Prior engagements include consulting for Cap Gemini, GCI Management, and at Lockheed Martin in the United States, where he worked in the field of atomic physics.

Reinhard, born in 1971, lives in Germany. He completed his master's degree in physics from the Ludwig-Maximilians University in Munich and holds an MBA degree (full-time) from the Pennsylvania State University, a highly ranked university in the United States.

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ADVISORS



Dr. Jürgen Müller
Chief Innovation Officer and Executive Board Member at SAP SE

Jürgen holds a Ph.D. in IT systems engineering from the Hasso Plattner Institute (HPI) for Software Systems Engineering, University of Potsdam, Germany, where he was co-representative of Professor Plattner's research chair. In addition to numerous teaching responsibilities, he mainly contributed to research projects in the area of In-Memory Data Management.

Jürgen is Chief Technology Officer of SAP, the world's leading enterprise software company with over 335,000 customers in over 180 countries and €22 bn in revenues. Jürgen has global responsibility for innovation across SAP and advises the executive board on all innovation-related topics in the tech field. As SAP's main driver for innovation, he has a deep understanding of the latest tech trends, such as blockchain technology.

As Lition's chief advisor for innovation and blockchain technology, Jürgen assures Lition develops the most technically sound, innovative and tangible solutions to conquer the market. Therefore, Jürgen is working very closely with Richard and Kyung to plan and execute all tech and innovation decisions.



Yan Feng Chen
LONGHASH Co-Founder

Yan holds a master's degree in electrical engineering from Shanghai Jiao Tong University, once served as general manager of the Western Region in the United States National Instruments Co., Ltd. (Nasdaq: NATI), and later established the "Polystar Instrument" as a founding shareholder to provide customized tests and measurement instruments for industrial clients.

He is also an early participant and investor in the blockchain industry and has been engaged in a number of blockchain projects with a deep understanding of the industry. Yan also led the team that built WOOKONG, the first multi-signature hardware cold wallet for various currencies, and co-founded Cybex, the decentralized Exchange, and LongHash.

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Sang-Seop Lee 이상섭

Head of Specialists, Korea Blockchain Association

Sang-Seop is working as Head of Specialists and Leading Energy Expert for the Korea Block Chain Association (KBCA), primarily conducting research and providing blockchain consulting services for the smart energy age. With his strong ties to the international energy community and profound technical know-how, Sang-Seop constantly explores the implementation of blockchain technology in the energy sectors with leading experts and executives around the globe.

Sang-Seop has worked in the tech and IT sectors in various senior executive positions for over 16 years. For seven years he has been the Head of SI Division of Gabia, one of the leading South Korea-based companies dedicated to the provision of internet infrastructure services. Prior to that, he worked as Managing Director at Godosoft Co. Ltd., the leading e-commerce solution provider in South Korea. Sang-Seop has a Sociology degree from the prestigious Yonsei University in Seoul, South Korea.

As Lition's advisor for blockchain and energy use cases, Sang-Seop strongly supports Lition's ambitions to scale its energy blockchain solution internationally. He facilitates and builds relationships with top blockchain experts, business executives, and politicians, especially in the Korean market.



Prof. Dr. Markus Bick

Advisor for Research

Prof Dr. Markus Bick has been Head of the Chair of Business Information Systems at the ESCP Europe, one of the top tier Business Schools in Europe, since 2005. His chair of talented researchers and developers mainly focuses on the effective and efficient development and utilization of information systems like blockchain technology, as well as on the challenges and opportunities related to digital transformation. His main objective is to gather theoretical knowledge, methods and tools regarding modern digital information systems and technologies. During his tenure at ESCP Europe, Prof. Dr. Markus Bick has published countless journals, conference papers, and book contributions at highly renowned outlets worldwide. He holds a Ph.D. in Business and Information Systems from the University of Duisburg-Essen, where he worked as a researcher in the Department of Information Systems for Production and Operations Management (Prof. Dr. H. Adelsberger).

As Lition's advisor for research, Prof. Dr. Markus Bick strongly supports Lition with the latest research insights in blockchain and key drivers for market adoption.

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Kelly Ford
Business Angel, previously:
- N26 CMO
- PayPal CMO for Germany, Austria, Switzerland

Kelly is a serial international entrepreneur with 28 years of international marketing and strategy experience including 2 venture-funded tech startups (SiteAdvisor and Hunch) with successful exits (to McAfee and eBay). Most recently, Kelly served as Chief Marketing Officer at leading European mobile bank N26. During his marketing leadership, N26 became one of Europe's most successful FinTechs, expanding from 2 countries to 17, growing its customer base 12x to more than 1 million, and raising in excess of USD 200m in venture capital.

Before N26, Kelly was CMO for PayPal in Germany, Austria and Switzerland and Head of Marketing for eBay New York. His early career included 8 years in international brand management at the iconic Campbell Soup Company as well as several years in boutique strategy consulting to Fortune 500 clients. Kelly has an electrical engineering/computer science degree from Stanford University and an MBA from INSEAD.

Kelly's deep experience in brand building, performance marketing and international growth strategy will be an invaluable asset as Lition builds a trusted consumer brand with global presence.

* More advisors to be announced soon

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LITION TECHNOLOGY TEAM (BLOCKCHAIN DEVELOPMENT TEAM)



Josef Sevcik
Head of Blockchain Development

Josef has a Master's in Computer Science and an MBA in General Management. He is a professional with 18 years of experience selling, developing and delivering as an IMS Developer for Siemens and a Solution Architect for Ericsson (9 years). As a blockchain developer, he is very interested in challenging tasks where he can utilize his programming skills to the fullest and further expand them, creating products and services that bring real value to the end users. In 2018 he led the design development of the blockchain B2B solution for Sophia TX as a blockchain architect. Now he is applying his skills as Lition's architect.



Aliaksei Hiatsevich
Blockchain Software Engineer

Experienced Lead Software Engineer with a long history of working in the computer software industry. Skilled in Blockchain, Ethereum(Solidity), Hyperledger, C/C++, iOS/Swift and Linux. Strong engineering professional with a B.A. in Radio Physics, fascinated by all kinds of things like blockchain, distributed ledgers and smart contracts. Allaksei has extensively studied blockchain and layer 2 scaling solutions. In particular, he is working on and exploring the possibilities to "delete" data on the blockchain without jeopardizing its immutability for Lition.



Eugene Melnikov
Senior Blockchain Engineer

Eugene is a very experienced specialist. He has been working in IT for more than 10 years. Now he is focused on various blockchain families: Ethereum, Hyperledger, Bitcoin, and Graphene. Eugene has successfully implemented a number of blockchain projects, participated in hackathons and meetups, is continuously learning new technologies and dreams about decentralizing the world. He has been a Blockchain Engineer for Smart Contracts for Etherisc and an IoT Developer, Blockchain Software Engineer, a Ruby Developer and a PHP Developer for Altoros for more than 10 years.



Ivan Dubouski
Senior Blockchain Engineer

Ivan is a Senior Software Engineer. He has a strong technical background with over ten years of commercial IT development experience. He has extensive expertise in Java enterprise development, web development, blockchain, technical and group leading, and project management. He is a team lead and software engineer with proficiency in problem solving, and can convert challenges to tasks and collaborate with international teams on the way to success.

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TECHNOLOGY TEAM (USE CASE IMPLEMENTATION TEAM)



Artur Basak
Lead Developer

Artur holds a B.A. in computer science. He is an outstanding specialist with strong skills in front-end development, and a deep knowledge of a vast range of technologies including blockchain. Artur started to program in the 5th grade. Currently, Artur serves as Blockchain and Fullstack Developer and has contributed to an impressive number of successfully implemented projects. Furthermore, Artur is a programmer and lead software developer at *instinctools. He continues to master his skills day by day, and he enjoys sharing his profound knowledge as a teacher and lecturer.



Nastassia Miatselitsa
Scrum Master

Nastassia has an extensive academic background. After her studies, she began to work on various IT-related topics in the sales department. After successful delivery, she moved quickly into a project management position for *instinctools clients. As Project Manager, her strength lies in facilitation skills, agile approaches, time and resource management, and providing technical expertise. Nastassia is very fond of blockchain technology and cryptocurrency projects in the renewable energy sector.



Aliaksandr Zimakou
Blockchain & Front-End Developer

Aliaksandr started his career path by gaining practical experience in back-end development. Thanks to an impressive number of implemented projects across various domains, Aliaksandr developed a strong skill set in front-end, full-stack and blockchain development. Aliaksandr is very enthusiastic about studying new technologies, such as Ethereum ERC20, as well as learning new programming languages. He quickly improves hard and soft skills and is able to program and lead sophisticated projects. He is also an early investor in bitcoin.



Jan-Patrick Schulz
UX/UI Expert

Jan has a degree in communication psychology. He started his career as a consultant in communication planning for multinational clients in DACH and Eastern Europe at Initiative Media GmbH. Lately, he began to focus solely on digital product development driven by user insights. He researches, designs and evaluates high-end digital user experiences. He is a professional user researcher, product designer, and innovation facilitator with six years' experience in UX consulting in the energy sector and across various other markets at eparo GmbH and additional freelance engagements.

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LITION CORE TEAM (BUSINESS DEVELOPMENT I MARKETING & OPERATIONS)



Qinwei Hao
Managing Director Lition China

Qinwei is a graduate of the renowned China Youth College for Political Sciences (中国青年政治学院), which only accepts 100 students per year. Thereafter, she earned a master's degree in economics from the University of Cologne. She then held various managerial positions in an electrical company, where she worked for more than seven years. Thanks to the international context she has worked in, Qinwei has developed a strong intercultural mindset which fits Lition's global vision. As Managing Director, she is leading Lition's Chinese branch in implementing EV charging stations in China.



Stephan Vogel
Head of Business Development

Stephan has a degree in economics and a master's degree in international business, with a strong focus on marketing and tech business processes. He is an experienced leader, having worked for more than a decade as a senior project and business development manager for T.A. Cook, a leading strategy and implementation consulting boutique focused on asset-intensive industries. There, Stephan founded the Brazilian office and converted millions in sales. With his strong entrepreneurial mindset, he plays a key role in building Lition, propelling the company to be the blockchain standard for business across all industries.



Stephan Bialek
Head of Finance & Operations Manager

Stephan is a certified accountant. As a department manager at ExtraEnergie, he ensured correct billing and revenue assurance of 700,000 customers. He was responsible for more than 30 employees in the areas of finance, accounting, and controlling. His excellent leadership qualities and successful optimization of operating processes were a significant benefit for the department. Stephan has also studied information systems with a focus on development, administration, and web connection of DB2 and SQL databases. Furthermore, he successfully founded an e-commerce platform for World of Warcraft.



Benni Wörpel
Blockchain Marketing Manager

Benni has a B.A. in Science and Technology and a master's degree in integrated natural resource management. His main focus areas are renewable energy and climate change and methodology and modelling of sustainability. He is a blockchain pioneer, and is certified by the first blockchain university courses in Germany. His master's thesis examines the implementation of blockchain technology in a carbon cap and trade scheme. Benni has marketed and partnered with various startups, and is also an early investor in bitcoin and altcoins.

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Susanne Hößler
Senior Data Analyst

Susanne's working career began at AMD, where she technically supported both private and business clients. Her strong analytic mindset and technical understanding not only enabled highly efficient service, but also prepared her for nearly a decade as Data Analyst at eg factory, a leading IT and operations service provider in Germany. Susanne led the analysis of the company's >700,000 customers. Working closely with senior tech experts and company leadership, Susanne's data-driven approach fundamentally influenced business procedures and company decisions.



Chris Kilchling
Brand & Design Manager

Chris has led branding and design across many industries. In the blockchain space, Chris served as Creative Director of Crypto Club Africa and is now responsible for all brand and design matters at Lition. Prior to this, he earned a diploma in graphic design and accumulated 15 years of multidisciplinary experience while working as a brand consultant and creative director on projects around the globe. He specializes in the development of corporate identities for forward-thinking brands in a variety of markets. Through his work, he has elevated numerous successful companies by implementing compelling and fully-integrated design and branding strategies.



Amy Xiao
Marketing & Community Manager

Amy has worked with multinational companies for more than 9 years, and has gained tremendous experience in global sales and marketing. Her work environment has always been very international, so she has excellent, customer-driven communication skills. Amy runs our Chinese social media channels and community building. Additionally, having studied international business English for several years, Amy is currently translating all relevant material about our blockchain technology for the Chinese market.



Alexander Bugaj
TGE Manager

Alex holds a B.A. Degree in International Business and has found his true passion within the crypto sphere. He succeeded early on within the market by putting his focus mainly on token sales. Thanks to his occupations as an ICO Researcher, Alex took a deep dive into the subject of token sales and has been confronted with community management tasks as well as investor relations.

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DISCLAIMER AND ASSESSMENT OF VARIOUS RISKS INVOLVED

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REGULATORY RISKS

The regulatory status of cryptographic tokens, digital assets and blockchain technology is unclear or unsettled in many jurisdictions. It is difficult to predict how or whether governmental authorities will regulate such technologies or what tax implications could arise for the holders of the tokens. It is likewise difficult to predict how or whether any governmental authority may make changes to existing laws, regulations and/or rules that will affect cryptographic tokens, digital assets, blockchain technology and its applications. Such changes could negatively impact tokens in various ways, including, for example, through a determination that tokens are regulated financial instruments that require registration. Lition may cease the distribution of tokens, the development of the project or cease operations in a jurisdiction in the event that governmental actions make it unlawful or commercially undesirable to continue to do so.

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The industry in which Lition operates is new, and may be subject to heightened oversight and scrutiny, including investigations or enforcement actions. There can be no assurance that governmental authorities will not examine the operations of Lition and/or pursue enforcement actions against Lition. Such governmental activities may or may not be the result of targeting Lition in particular. All of this may subject Lition to judgments, settlements, fines or penalties, or cause Lition to restructure its operations and activities or to cease offering certain products or services, all of which could harm Lition's reputation or lead to higher operational costs, which may in turn have a material adverse effect on the tokens and/or the development of the project.

All information is provided without any warranties of any kind. Lition and its advisors make no representations and disclaim all express and implied warranties and conditions of any kind, including, without limitation, representations, warranties or conditions regarding accuracy, timeliness, completeness, non-infringement, suitability of the Tokens for any prospective contributor, and Lition and its employees, officers or professional advisors assume no responsibility to you or any third party for the consequence of errors or omissions.

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The industry in which Lition operates is new, and may be subject to heightened oversight and scrutiny, including investigations or enforcement actions. There can be no assurance that governmental authorities will not examine the operations of Lition and/or pursue enforcement actions against Lition. Such governmental activities may or may not be the result of targeting Lition in particular. All of this may subject Lition to judgments, settlements, fines or penalties, or cause Lition to restructure its operations and activities or to cease offering certain products or services, all of which could harm Lition's reputation or lead to higher operational costs, which may in turn have a material adverse effect on the tokens and/or the development of the project.

Restricted Territories

Viewing the materials available hereafter may not be lawful in certain jurisdictions. In other jurisdictions, only certain categories of persons may be allowed to view such materials. Any person who wishes to view these materials must first ensure that they are not subject to any local requirements that prohibit or restrict them from doing so.
The materials are for information purposes only and do not constitute or form a part of any offer or invitation to sell or issue, or solicitation of any offer, to purchase or subscribe for the tokens in any jurisdiction or jurisdictions in which such offers or sales are unlawful prior to registration or qualification under the securities laws of any such jurisdiction (restricted territories).

Accordingly, unless an exemption under the relevant securities law is applicable, the tokens may not be offered, sold, pledged, taken up, exercised, resold, renounced, transferred or delivered, directly or indirectly, in or into a restricted territory where to do so would constitute a violation of the relevant laws of, or require registration thereof in such jurisdiction.

There will be no public offering of the tokens in the restricted territories. If you are not permitted to view materials on this web page or are in any doubt as to whether you are permitted to view these materials, please exit this web page.

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Currency Regulation Risks

Governments are still grappling with public policy on the regulation of crypto currencies as a form of settlement in trade. Governments adverse to the proliferation of the use of crypto -currencies in local commerce could issue laws and regulations deeming the use of cryptocurrencies a regulated activity. Countries such as China and Korea have issued regulations or statements prohibiting token sales, United States allowing only certified investors to participate to the sale while other countries have sought

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to bring the sale of tokens within the regulator control of securities offerings. This could result in holders of token being unable to use their token in the future without further regulatory compliance.

Risks Associated with Crowd Sale

Tokens are not investment products. Rather, token serve a specific function within the Lition ecosystem. For these and other reasons, we believe the sale of token does not constitute a public offering of securities subject to prospectus registration requirements. However, public policy towards token sales is changing, and it is conceivable that regulators may in the future seek to broaden the scope of regulation of token sales. This could make token sales subject to registration requirements in the United States and similar jurisdictions. If the token sale becomes subject to registration requirements, this would delay or potentially postpone the proposed token sale indefinitely.

Taxation Risks

The use of token as a form of settlement currency may or may not be subject to local income tax, capital gain taxes, VAT or other forms of taxes. This uncertainty in tax legislation may expose merchants and customers alike to unforeseen future tax consequences associated with the use of token as a settlement currency, and/or the trading of tokens or token for capital gains.

Capital Control Risks

Many jurisdictions, such as China impose strict controls on the cross-border flow of capital. Holders of token may be subject to these regulations and/or arbitrary enforcement of such regulations at any time. This would make the transfer of token out of the local jurisdiction to overseas exchanges an unlawful activity exposing the user of token to government fines or other regulatory sanction.

CTF and Anti-Money Laundering Regulations

The United States has issued a series of regulations to combat terrorist financing (CTF) and money-laundering activities. Many other countries have enacted similar legislation to control the flow of capital for such illicit activities. The use of cryptocurrencies by bad actors would breach such regulations. Any illicit use of the token could seriously impact the global reputation of the RED token Network. In such event, it is not inconceivable that this could trigger scrutiny by CTF and anti-money laundering regulators and potentially cause significant disruption to the distribution and circulation of tokens and Token in the RED token ecosystem.

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BUSINESS RISKS

Lition plans to conduct closings of sales of token as funds are received. If insufficient funds received from the sale of token, Lition may not be able to implement its plans along the timeline as described in this white paper. Lition's ability to remain competitive may depend in part upon its ability to develop new and enhanced products or services and to introduce these products or services in a timely and cost-effective manner. In addition, product and service introductions or enhancements by Lition's competitors or the use of other technologies could cause a decline in sales or loss of market acceptance of Lition's existing products and services. There can be no assurances that Lition shall be successful in selecting, developing, and marketing new products and services or in enhancing its existing products or services. Failure to do so successfully may adversely affect Lition's business, financial condition and results of operations. Lition's ability to realize its objectives shall be dependent on its ability to attract and retain additional, qualified personnel. Competition for such personnel can be intense, and there can be no assurance that Lition's results shall not be adversely affected by difficulty in attracting and/or retaining qualified personnel. The industry in which Lition operates is new, and may be subject to heightened oversight and scrutiny, including investigations or enforcement actions. There can be no assurance that governmental authorities will not examine the operations of Lition and/or pursue enforcement actions against Lition. Such governmental activities may or may not be the result of targeting Lition in particular. All of this may subject Lition to judgments, settlements, fines or penalties, or cause Lition to restructure its operations and activities or to cease offering certain products or services, all of which could harm Lition's reputation or lead to higher operational costs, which may in turn have a material adverse effect on the token and/or the development of the project.

Further on, any transaction concluded based on this whitepaper shall be considered as a random agreement meaning that the length and even the enforceability of the rights provided herein is not known/entirely known at the moment of its signing, given that the main rights and obligations of this agreement depend on one or several future events and therefore any of the signing party bear the risk of winning or losing depending on future events.

Forward-Looking Statements

Lition makes no warranty whatsoever with respect to the tokens, including any: (i) warranty of merchantability; (ii) warranty of fitness for a particular purpose; (iii) warranty of title, or (iv) warranty against infringement of intellectual property rights of a third party; whether arising by law, course of dealing, course of performance, usage of trade, or otherwise. Except as expressly set forth herein, recipient acknowledges that it has not relied upon any representation or warranty made by Lition, or any other person on Lition`s behalf.

All estimates, projections, forecasts, prospects, expressions of opinion and other subjective judgments contained in this paper are based on assumptions considered to be reasonable as of the date of the document in which they are contained and must not be construed as a representation that the matters referred to therein will occur. Any plans, projections or forecasts mentioned in this paper may not be achieved due to multiple risk factors including without limitation defects in technology developments, legal, economic, or regulatory exposure, market volatility, sector volatility, corporate actions, or the unavailability of complete and accurate information.

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BLOCKCHAIN RISKS

On the Ethereum blockchain, timing of block production is determined by proof of work so block production can occur at random times. For example, ETH contributed to the token distribution contract in the final seconds of a distribution period may not get included for that period. Buyer acknowledges and understands that the Ethereum blockchain may not include the buyer's transaction at the time buyer expects and buyer may not receive token the same day buyer sends ETH. The Ethereum blockchain is prone to periodic congestion during which transactions can be delayed or lost. Individuals may also intentionally spam the Ethereum network in an attempt to gain an advantage in purchasing cryptographic tokens. Buyer acknowledges and understands that Ethereum block producers may not include buyer's transaction when buyer wants or buyer's transaction may not be included at all. Token may be subject to expropriation and or/theft. Hackers or other malicious groups or organizations may attempt to interfere with the token distribution contract or the token in a variety of ways, including, but not limited to, malware attacks, denial of service attacks, consensus-based attacks, Sybil attacks, smurfing and spoofing. Furthermore, because the Ethereum platform rests on open source software and token are based on open source software, there is the risk that Ethereum smart contracts may contain intentional or unintentional bugs or weaknesses which may negatively affect the token or result in the loss of buyer's token, the loss of buyer's ability to access or control buyer's token or the loss of ETH in buyer's account. In the event of such a software bug or weakness, there may be no remedy and holders of token are not guaranteed any remedy, refund or compensation. Although Lition and the blockchain are operational at the time of the ICO, it might not function as intended, and any tokens may not have functionality that is desirable or valuable.

TOKEN CHARACTERIZATION AS A UTILITY

Lition Tokens are a utility token. By design, there is no proximity to financial instruments and no financial instrument is provided to token holders in return. The token is only used inside the blockchain as described in the respective section in this whitepaper. Further use cases, such as for charging stations and other additions will include elements that will not turn the token into a security.

BUYER KNOWLEDGE AND NO WITHDRAWAL RIGHT

Buyer has sufficient knowledge and experience in business and financial matters, including a sufficient understanding of blockchain or cryptographic tokens and other digital assets, smart contracts, storage mechanisms (such as digital or token wallets), blockchain-based software systems and blockchain technology, to be able to evaluate the risks and merits of buyer's purchase of tokens, including but not limited, to the matters set forth in this white paper, and is able to bear the risks thereof, including loss of all amounts paid, loss of tokens, and liability to Lition Parties and others for its acts and omissions. Buyer has obtained sufficient information in order to make an informed decision to purchase tokens.

While deciding to enter and entering into any transaction based on this whitepaper the buyer/interested party is hereby informed and undertakes it will not benefit from a right of withdrawal from the transaction and his decision of entering into such transaction is final and under no circumstance he shall be given with a withdrawal right.

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KNOW YOUR CUSTOMER (KYC) RULES

Considering the anti-money-laundering and anti-terrorism national and international regulations, Lition reserves the right to develop and apply KYC rules and procedure before the sale of tokens, before the trade of such tokens and before or during the execution of any transactions; likewise, depending on the findings of such rules and procedure or when there exists a reasonable doubt that a certain participant/interested party is involved in money-laundering or terrorism, Lition reserves the right to refuse at its sole discretion a transaction, trade or sale of token to any third party and also has the right to refuse the access to its platform and/or to suspend such access at any given moment. Our KYC service provider is using machine learning technology, to identity trust worthy clients, by cross-referencing them against international credit and watch list databases.

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