



The Blockchain Standard Infrastructure for Business

Bringing Blockchains into Mainstream Use

WHITEPAPER

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KEY HIGHLIGHTS

Lition is developing the only 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 Lition's advisor. SAP, a company with >400mn customers and >10.000 developers, is developing the decentralized ledger and smart contract layer, and 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. Next to this already-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 loan as a Security Token (STO). Beyond this, there are many more use cases with potential to disrupt not only the Energy and Banking space, but many more.

Furthermore, SAP can easily implement this blockchain into their existing customer base of >400.000 making them immediately ready for blockchain use cases. It is therefore well positioned to be the standard mainnet for business applications.

LITION HIGHLIGHTS:

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



Your data kept private

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



Regulationproof & deletable

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



Co-innovated by SAP and Lition

Made possible through 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 commercially productive dApp



Fast and lowpriced

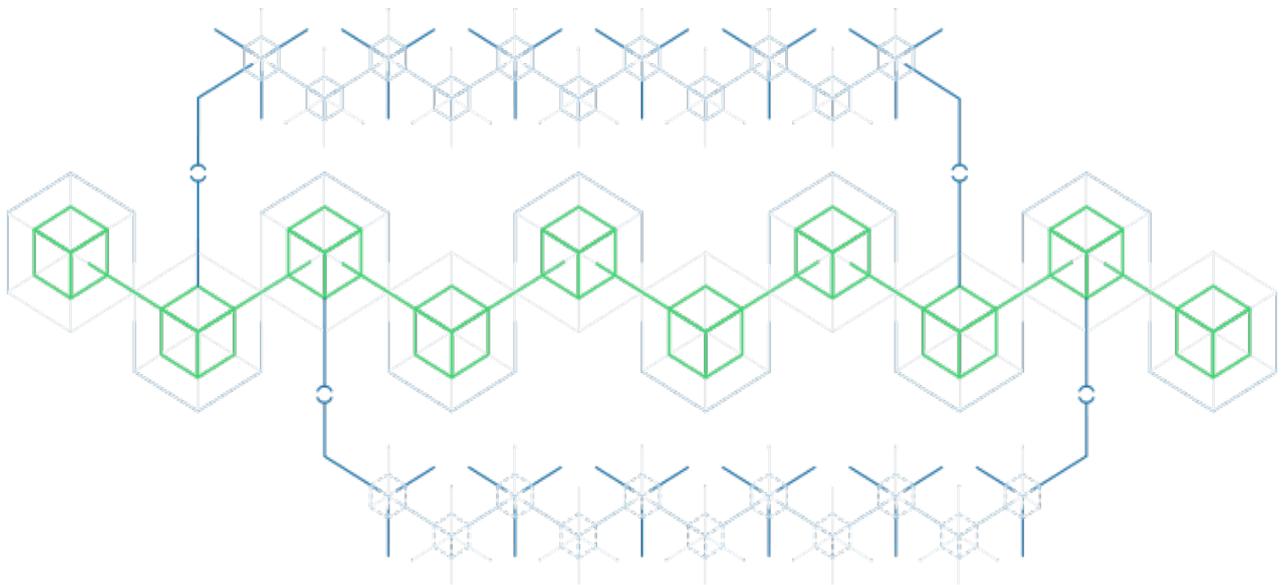
Smart contract execution for \$0.01 and only 3 sec. block confirmation time

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

As a means to achieve this, our objective is to develop an easy-to-use and easy-to-develop infrastructure that fulfills the requirements of business use, both from smaller companies as well as large corporations. The blockchain should be the number one choice for any developer and company seeking to use blockchain technologies.



THE BLOCKCHAIN INFRASTRUCTURE

WHY BLOCKCHAINS MISS MAINSTREAM ADOPTION

Even though blockchains are regularly praised as a technology with the potential to disrupt everyday lives like the internet did 20 years ago, we see limited mainstream adoption. There are hardly any distributed applications (dApps) that have made it into mass-market use and large companies keep shying 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. Also, the leading (technology) companies are not pushing blockchain into the market.

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

COMMERCIAL / LEGAL REASONS

Large-scale adoption of technical solutions primarily come from large, 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 to roll out a new technology to their customers or not.

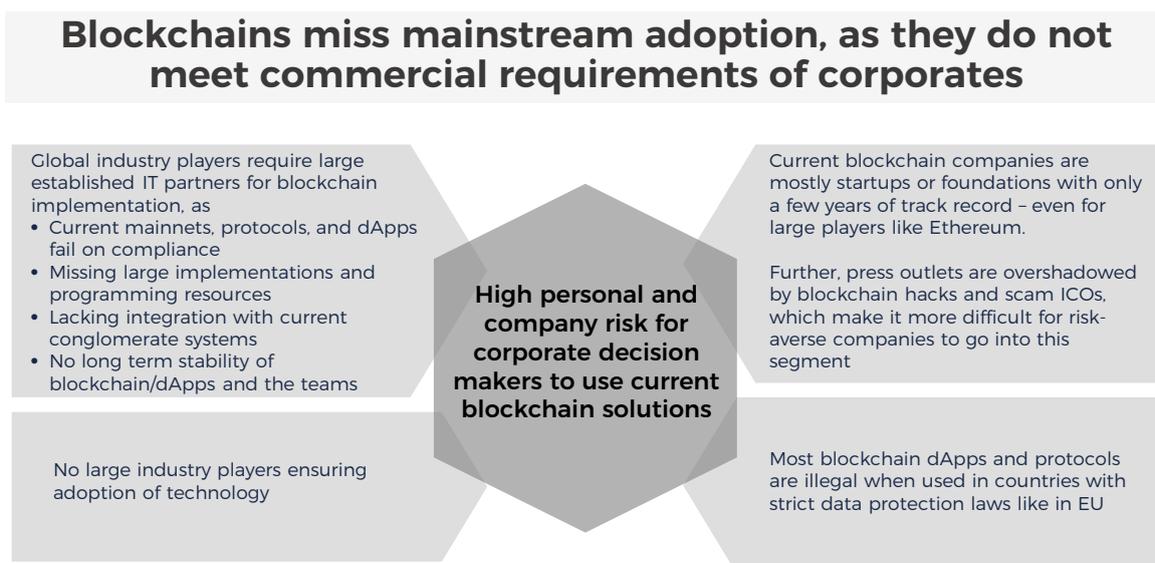


Figure 1: Commercial reasons for low mainstream adoption of blockchains

So far, there is a high personal and company risk for corporate decision makers to use current blockchain solutions, with 4 key reasons as outlined in Figure 1. Until now, there was no solution that addressed these issues.

TECHNICAL REASONS

With Lition's hands-on experience gained as one of the world's few mass-market blockchain applications in commercial production, Lition 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.

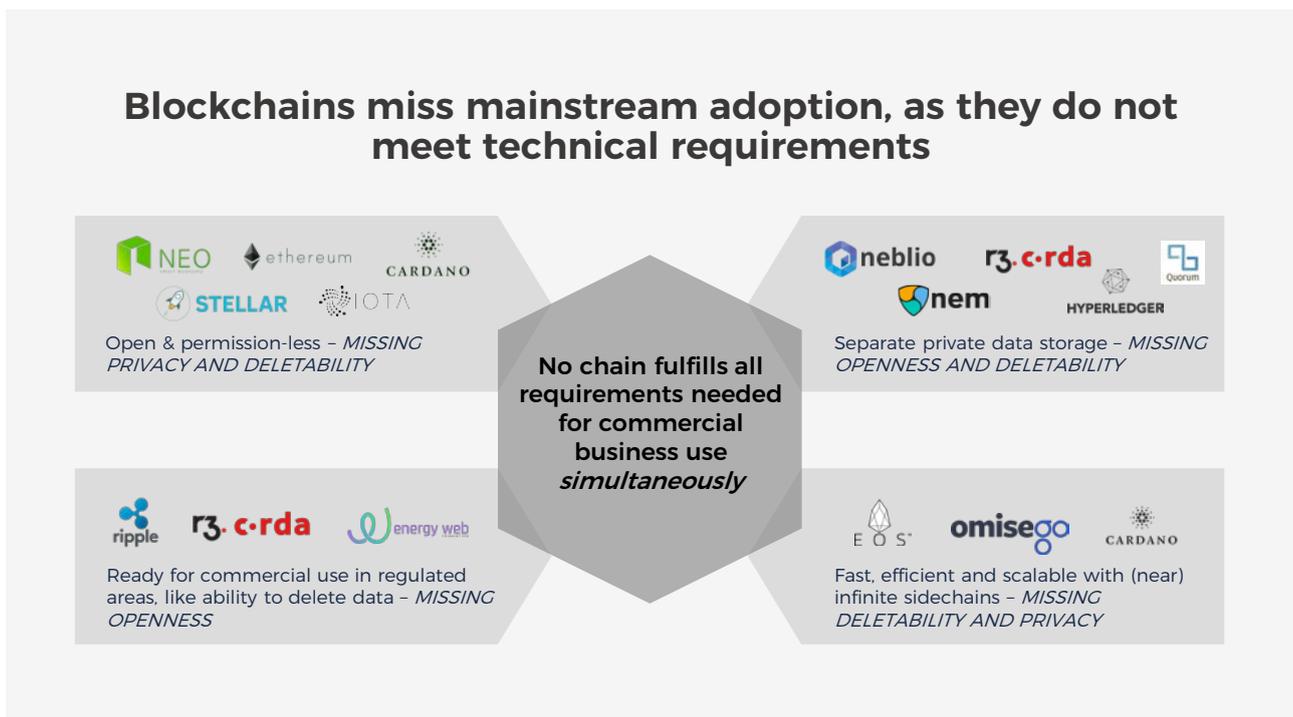


Figure 2: Technical reasons for low mainstream adoption of blockchains

These limitations are largely why mainstream adoption of blockchains has been so slow, and instead much of the attention of people and media has been driven by cryptocurrency price developments and speculative use.

LITION'S APPROACH TO BRING BLOCKCHAIN INTO MAINSTREAM USE

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 up with SAP. The software giant SAP is the worldwide leader of business software with a market capitalization of \$150bn, over >400mn users from their >400.000 customers and the power of >10.000 developers. Together with Lition's IT mastermind knowledge and experience from the world's first blockchain-based peer to peer energy trading application active on a mass market, we're working on a next-generation blockchain infrastructure. The Lition/SAP blockchain is made specifically to be the blockchain standard 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.

With a strong company like SAP and with new privacy and deletability features, the 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 the separate section coming up on page 11.

Next to the commercial reasons, 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 6 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.

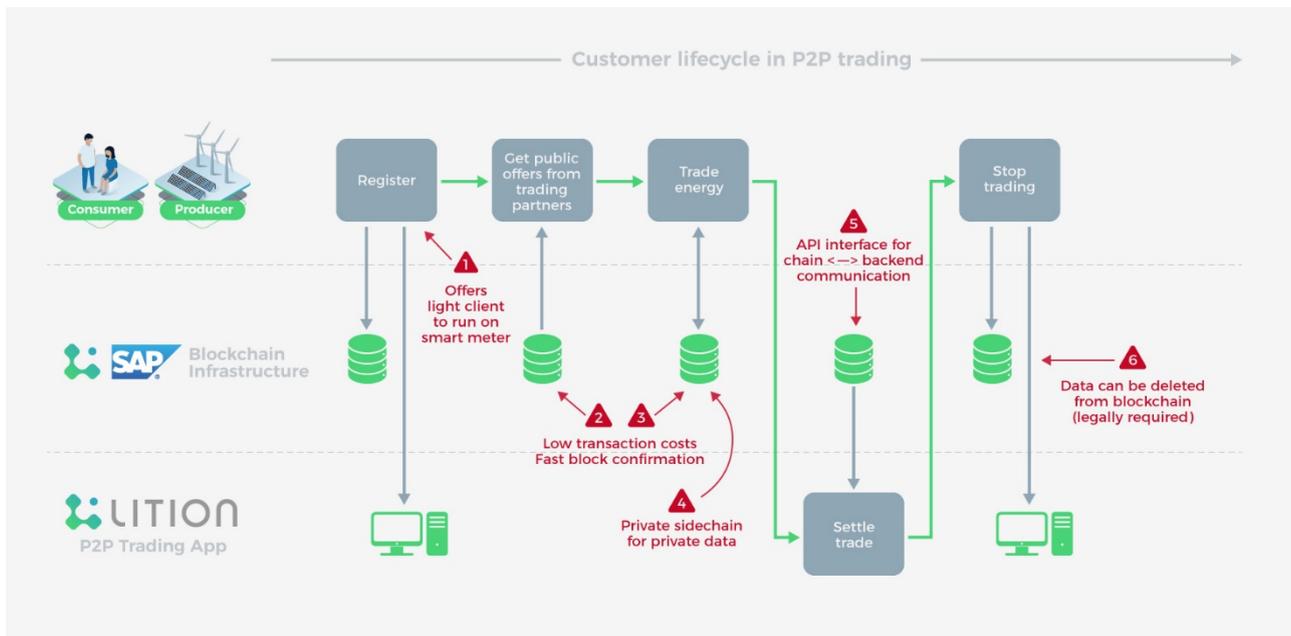


Figure 3: Improvements of new blockchain infrastructure, illustrated along existing peer to peer trading use case

Feature 1 – Light Client That Can Run on IoT Devices

Many use cases need IoT devices, e.g. sensors, appliances or Smart Meters, as used by Lition (see the appropriate section in the use cases). Today's blockchain clients who 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, needs over 300 GB of storage. Even special clients like GETH¹ need 80 GB of storage in their fast mode, going 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 go down to 40 MB, but just like remote clients that don't need any storage, light clients do not have access to the data of previous blockchain executions. The latter, however, is needed to execute smart contracts and to verify the correct execution of network nodes.

A blockchain built for widespread commercial use therefore needs clients that can run on thin hardware, like in the case of 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

¹ See <https://github.com/ethereum/go-ethereum/releases>

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.

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

Feature 2 – Low Transaction Costs

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

Bitcoin currently needs 60 TWh² annually for its blockchain to operate, an amount of energy equivalent to the country of Columbia'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/transaction², thus making it 12.2 times more energy efficient than the Bitcoin network, which uses 957 kWh/transaction². 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 Plasma³ is released into production state. To operate sustainably, Lition aims to reduce the energy consumption and thus, costs 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 open-source reference implementations available. Therefore, this issue has been solved. However, none of these chains are additionally able to solve the other drawbacks that concern businesses, like storage of private data in separated but publicly verifiable sidechains, or deletability.

Feature 3 – Fast Block Confirmation

Currently, customers need to wait well over a minute until 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.

Similar to the second issue of high transaction costs, most modern chains have claimed to find solutions to this problem while staying permission-less. But as is the case with the transaction cost issue, they have not been able to do so in combination with solving other shortcomings, like private data (see upcoming point).

Feature 4 – Private Sidechains for Private Data

Today, typical permission-less blockchains store their data publicly, allowing criminals to potentially misapply 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, can provide an indication of household income: A customer possessing 3

² digiconomist.net/bitcoin-energy-consumption

³ plasma.io

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 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, transaction data of bank accounts, (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 to reach privacy by putting private data on a public chain and encrypting it, as suggested e.g. by researchers Karla Kvaternik et. al. ⁴, or used for location-data by the blockchain Project Fysical ⁵. Lition is aware that these solutions have fundamental limitations as the encrypted data is still publicly available and 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 also be there in 5 or 10 years, when quantum computing is 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 offered energy price of powerplants that need to be publicly available. Both the private and the public sidechains need to be embedded in a greater public and permission-less network so that new participants can easily join to ensure a developer-friendly and easy adoption of the chain. A solution is the utilization of probabilistic zero-knowledge-proofs as shown in the technical white paper. Thereby, public nodes can still 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 Lition energy trading use case, Lition developers had to spend intense time and resources to develop an API interface to communicate between the blockchain and the Lition backend application. In fact, blockchain nodes need a simple API interface to allow easy integration into non-blockchain applications. This is basically required by any business blockchain application in every industry that needs 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 now needs to 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

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

⁵ See fysical.org

relationship, a customer might accept that his social security number or bank account is needed, but he wants to make sure this data is deleted once the business relationship ends and there is no more need for the data. However, once a customer terminates his contract, there currently is 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 unchanged, but the off-block data is deleted. The problem with this approach is that any smart-contract execution needing private data requires access to the off-block 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 not needed anymore. For the EU, violations of this law can lead to fines up to 4% of a company's global annual revenue, which can be hundreds of millions of dollars for large corporations. This was also the focus of several press articles⁶.

While this might not be an issue for Proof-of-Concept blockchain applications, it is 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 leader with over 400.000 customers and >10.000 developers has signed a co-innovation contract to work on solving the limitations of today's blockchain infrastructure like privacy, speed and transaction costs with Lition.

A summary of the 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/IXpBRHptyKk>

SAP and Lition believe that a technical solution of the issues limiting mainstream use will infuse adoption of blockchain or blockchain influenced applications. This will benefit SAP's customers and enable Lition's public mainnet users alike. SAP and Lition therefore cooperate on this matter by combining a data storage & exchange focused, permissioned platform with a layer for publicly verifiable claims similar to concepts described commonly

⁶ See e.g. <https://iapp.org/news/a/blockchain-technology-is-on-a-collision-course-with-eu-privacy-law/>

as zero-knowledge proofs. This would allow high throughput, low latency for the majority of private transactions and public validation capabilities for select records.

Based on this design, SAP would aim to explore a decentralized data storage & exchange focused, permissioned platform, that incorporates a pluggable verification layer, leveraging their existing database & middleware expertise. 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 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 conducted intensive discussions with leading experts 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	✓	-	-	✓	-	-	✓	✓	✓	✓
Possibility to delete data	✓	-	-	-	-	-	-	-	-	n/a
Consensus mechanism	PoS	PoW	dPoS	Pol	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

To provide a background to the outcome, the underlying 6 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. Already with the currently ongoing Hyperledger-implementation, Lition addresses many of them. As many open-source implementations exist with a license allowing code re-use for commercial applications, these are less-critical concerns.
- Private sidechain for private data (#4). Here 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 provide a solution to delete 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/permission-less networks. However, due to a faulty implementation by their developer Parity Technologies, Ether valued at USD 150m is frozen forever⁷. 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 conglomerates profits and continued market domination. 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 has many Ethereum-related shortcomings: 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.

⁷ <https://www.trustnodes.com/2017/11/07/ethereums-parity-hacked-half-million-eth-frozen>

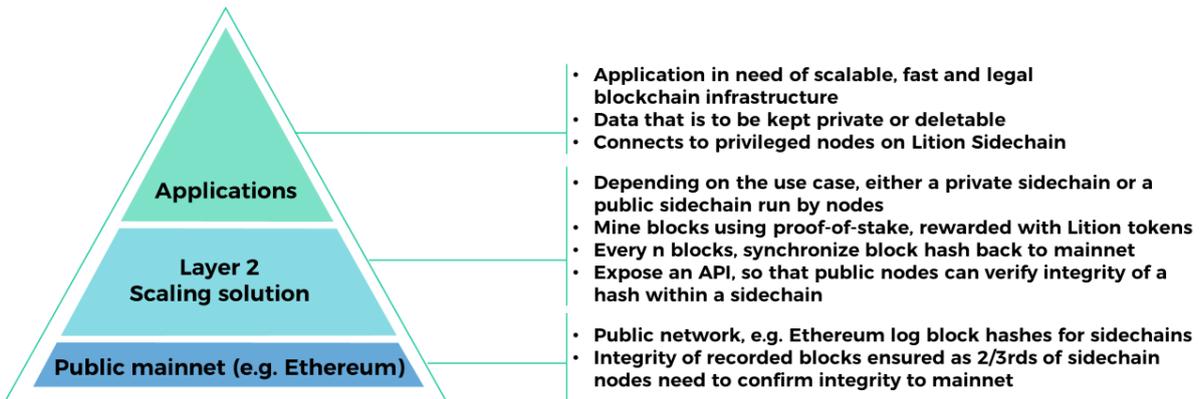
ARCHITECTURE

Applications need scalable, fast and legal blockchain infrastructures to be able to find a fertile context where it makes sense to approach the business arena. As of the time of writing, there is not such a context. Solutions able to keep data private as well as delete them, are missing. Three keywords in direction solution are, sidechain, permissioned nodes and permission-less nodes.

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

THE LAYER 2 STRUCTURE

Lition’s Layer 2 solution consist in permissioned nodes that run a privileged blockchain network, that becomes a sidechain once the mainnet sync happens. The nodes run the network with Lition Proof of Stake (LPoS) consensus algorithm, making it an extreme fast chain. Every n blocks, depending on the industry requirements, the side chain synchronize to the public mainnet. Only the hash of the last block is published and saved on the mainnet since it assures the integrity of all previous 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 public network, Lition will use the Ethereum blockchain. However, if technology advances and interoperability between different blockchains will become feasible it is Lition’s goal to develop an “universal” layer 2 solution for all Public blockchains. The role of a public mainnet is to store sidechain’s hashes as proof of their historical integrity. The integrity of recorded blocks is ensured as 2/3rds of sidechain nodes need to confirm integrity to the mainnet.

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 design for a blockchain network 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 postquantum 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 thereby acts as a “notary” for the private data stored only in the sidechain.

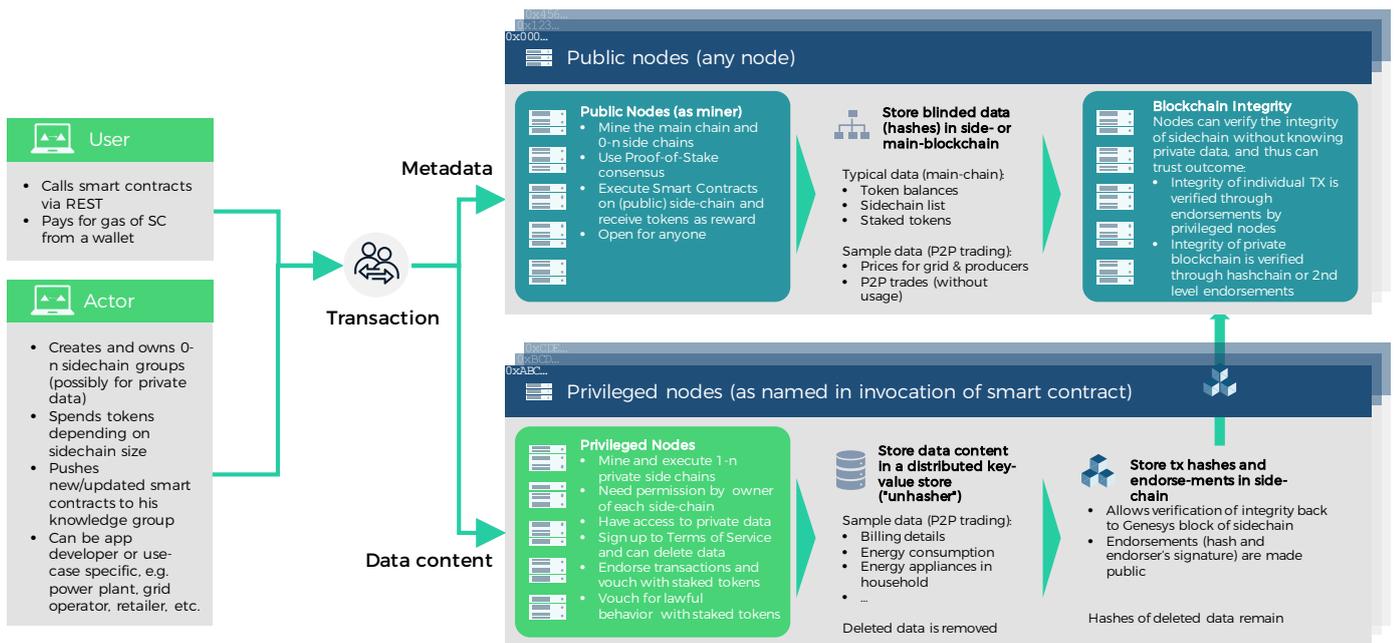


Figure 5: Lition blockchain data separation and deletion concept

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 section to delete data when asked for. 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 for.

Technically, a deletion requests 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.

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, nodes can join the network and how they can stake and validate new blocks.

STEP-BY-STEP DESCRIPTION: TRANSACTION PROCESSING AND MINING

By observing Lition’s blockchain from a high level, six main stages are needed to complete the transaction (=Tx) flow. In this order *Put Gas on Sidechain*, *Create Tx*, *Process Tx*, *Propagation within sidechain*, *New block creation* (*Sidechain*) and *Mainnet synchronization*. To have a better understanding of the following explanations, please refer to the architecture table below.

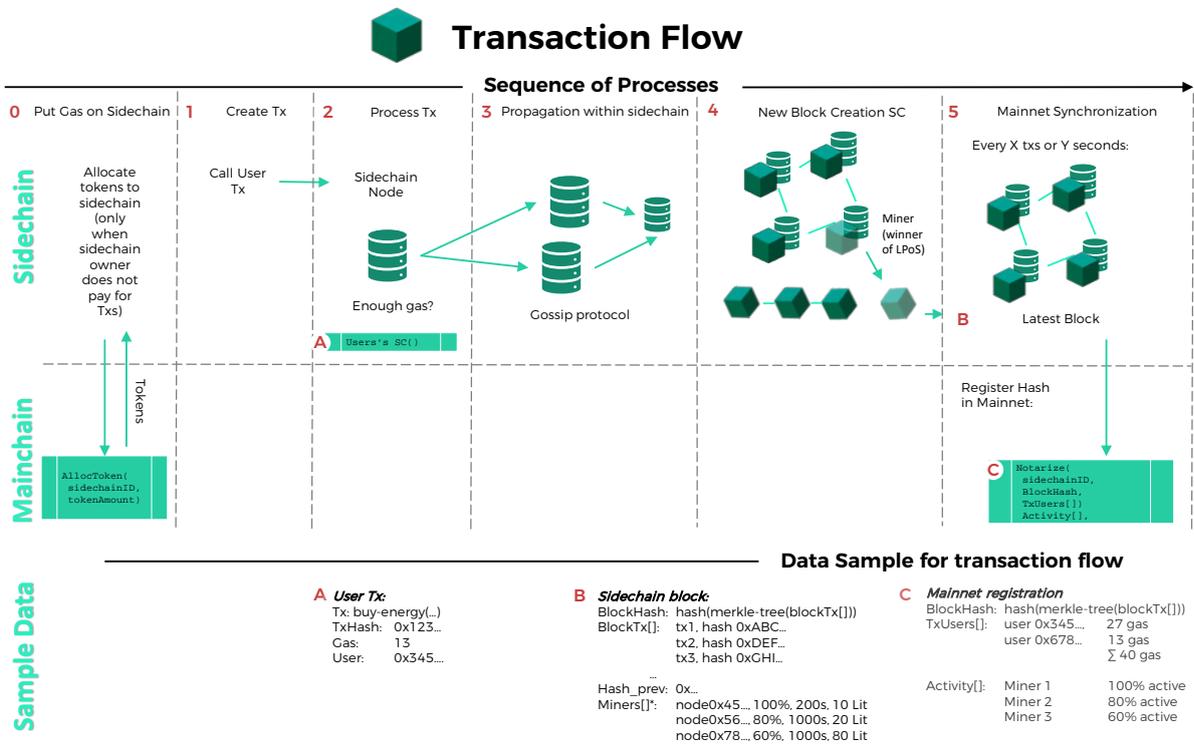


Figure 6: Transaction Flow in Sidechain

Step 0: Put Gas on Sidechain

In order to guarantee that a certain network user will be able to pay for the transactions, he or she needs to allocate tokens to the specific Sidechain. This process needs a smart contract execution on the mainchain called

AllocToken(sidechainID, tokenAmount), as intuitive, the amount of tokens and the ID of the sidechain are required. This ensured that the solution is protected against double-spend attacks on multiple sidechains.

Step 1: Create Tx

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

Smart Contracts: Should dApp developers for example use truffle, 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 keep using plugins such as Metamask, and dApp developers can re-use their existing Ethereum applications.

Step 2: Process Tx

During this process the transaction is received from the node which will in turn ensure that enough gas is owned by the user, the users' smart contract is triggered that contains the following information:

```
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:        users' 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 executed without errors and if the user has had sufficient gas. This ensures the customer's convenience and expectation for mass market use cases is catered for.

Step 3: Propagation within Sidechain

Once the transaction is processed, it is propagated throughout the network of nodes being part of the sidechain previously specified by the user using a gossip protocol. At this point the transaction will be in at 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, is going through a process that validates this bundle of data and transfers them 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 authority that guarantees correct behavior within the network by

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 for 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 requires them to delete data once the properly signed request arrives. However, they only delete the data but keep 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 now is already integral part of the sidechain and therefore is irreversible in its specific allocation is going to be validated by a public mainnet. The communication frequency with the backbone blockchain is industry specific, for example, energy transactions need to be synced often, while notary contracts less.

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 or 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 has arrived, the following smart contract function is called in order to anchor the sidechain data in the mainnet, and 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 to.

STEP-BY-STEP DESCRIPTION: SIDECHAIN MANAGEMENT

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

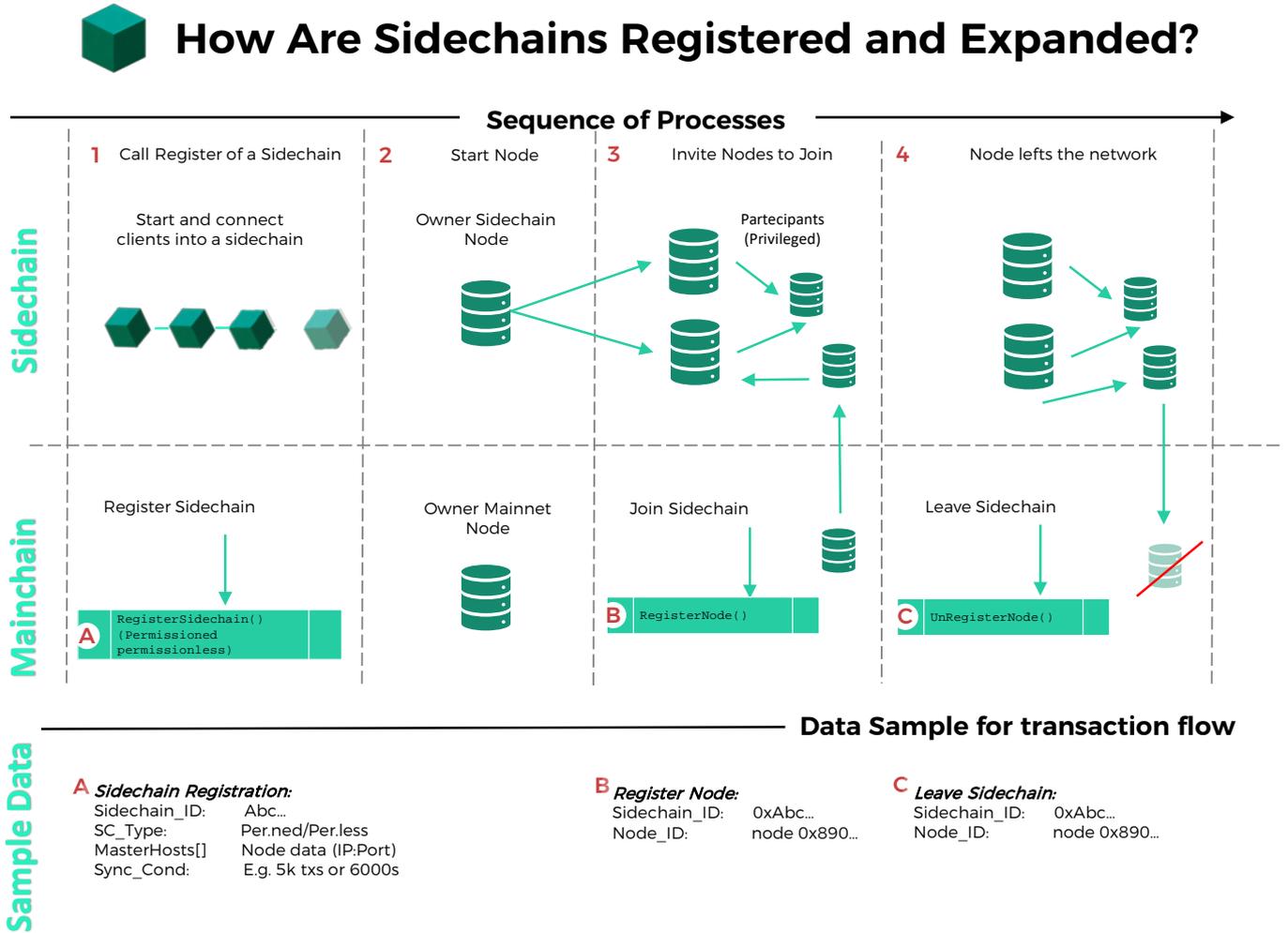


Figure 7: Sidechain registration and expansion

Step 1: Start and Register a Sidechain

Every developer or company that decides to join the network has to register it's 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 about 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

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 confidential data, new nodes must accordingly be either privileged or public.

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:      that 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 following the `UnRegisterNode()` function. Respectively the following data sets need to be included:

UnRegisterNode:

```

Sidechain_ID:      that is the ID created from the sidechain initiator
Node_ID:           this code makes each node unique & identifiable

```

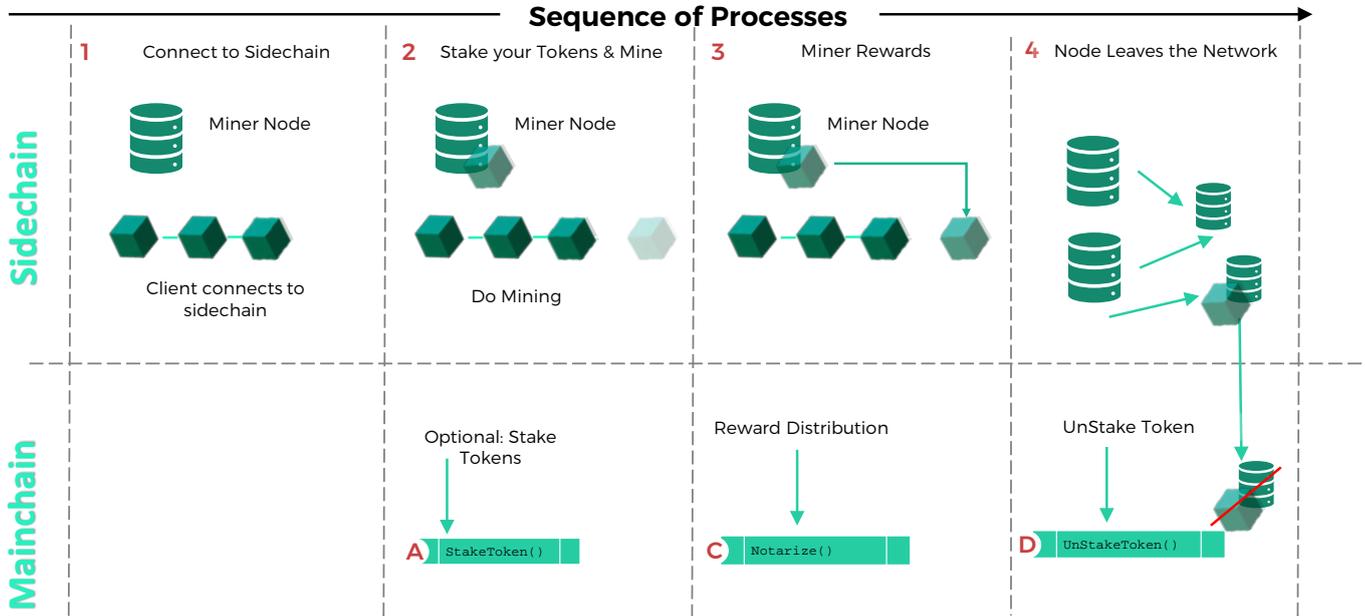
A call to `UnRegisterNode()` automatically unstakes any tokens a miner might have staked on this sidechain, as staking rewards can only be received when mining.

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 to which miner the rewards are going (LPoS). Below a step-by-step explanation is outlined.



How Are Tokens Staked?



Data Sample for transaction flow

Sample Data

- A Stake Tokens:**
 Sidechain_ID: 0xAbc...
 Node_ID: node 0x890...
 Miner_wallet: 0x123...
 Tokens_N: 1.000 LITION
 %_active: 80%
 Sec_avtive: 200s
- C Payment Data:**
 Done on every anchoring of the sidechain, see process flor for transaction execution
- D UnStake Token:**
 Sidechain_ID: 0xAbc...
 Staker_wallet: 0x123...
 Tokens_N: 1.000 LITION
 Node_ID: node 0x890...

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, automatically the block verification process starts, and the user becomes a functioning validator in the system. Since there is little incentive to operate a full node, node operators are incentivized through mining rewards in the form of tokens. The token distribution happens once every time the blocks are synchronized with the mainchain. Nodes are therefore not only carrying all the historical sidechain data but also function as authority that guarantees correct behavior within the network by staking their own tokens as “collateral”, meaning that in the case of dishonest mining, tokens are going to 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 for one or more particular chain(s) 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
Tokens_N:         amount of tokens to allocated to specific SC. These tokens are
                  then unavailable for transfer in the mainnet until retrieved again
                  using the UnstakeTokens() smart contract.

%_active:         percentage being active since last block. Mining rewards are
                  multiplied by this figure.

Sec_active:       seconds active continuously. 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 is going to 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 takes care of the staking-tokens transfers from the user wallets to the miner wallets is called `Notarize(sidechainID, BlockHash, TxUsers[], Activity[])`, which has been described in the first step-by-step process description.

Step 4: Node Leaves the Network

Once the node decides to stop staking, e.g. because he 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 need to be provided to the system:

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

Now the tokens are available to join other sidechains.

LITION'S PROOF OF STAKE CONSENSUS ALGORITHM

Necessity for Tokens

Lition itself is not charging 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.

Validator's Consensus Algorithm Types

There are several logics/processes (algorithm) to reach a consensus on who is the participant of the network (node) that is adding/confirming the newest block and at the same time validates the content integrity.

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

Blockchains using Proof of Work (PoW) chose 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 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 being 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 active node since it went online. By this mechanism the commitment of validating nodes in the Lition network is rewarded and thus honest behavior incentivized.

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

In the case of Lition's layer two 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 its application on the network and create its own sidechain(s) to store any public or private data a developer may need. Through that, nodes subscribe 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 needs to pay a "rent" in tokens that increases with storage size of the sidechain. This is given as extra incentive to the nodes mining it and ensures that even in low-transactions the chain 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 a system that is composed of two core engines. One of these being Lition's EVM-compatible virtual machine, which executes smart contracts on its sidechains and the other being the link to the Ethereum mainnet where block hashes are periodically notarized for every sidechain.

Once a side chain 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 Genesis Phase (you can obtain more information about it below in the specific section). On top of this, the transactions costs revenue flow is divided among the staking nodes. By doing so, the blockchain 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 a flexibility that each side chain is free to decide depending on the industry.

As it is nicely pointed out in the table below, the process of Mainnet Sync from the sidechains to the Ethereum mainnet produces irrelevant 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

Transaction Costs

This can be mostly 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 covered through periodical gas modifiers. This allows DApp users to calculate with fixed transactions 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 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 for a particular chain by filling in some parameters in a sidechain-specific smart contract to the backbone mainnet. The function to call is StakeTokens(). By doing it, it is 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 during time accordingly to the USD market value of Lition tokens. The goal is to maintain the network accessible over time. Meaning that if the market price of Lition is doubled and sustained 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 two solution is conceived as a scalable layer. Therefore, two main points have to be tackled: costs and speed of transactions execution.

To lower costs, Lition decided to develop a system in which the transaction cost 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.

Below the staking revenue stream for staking 1 000 LITION is presented. The equivalent of USD 100 in LITION tokens is the minimum amount needed to be eligible as a staking node. As the transactions costs depend on the LITION/USD exchange rate, this amount can therefore also change. This is needed to ensure network security should LITION prices drop, but at the same time give business users security on their transaction costs.

In the first scenario called “Today’s use cases” it refers to the Lition Network once our energy and banking use case have been migrated on our system. It is a conservative projection, since it takes into account that 1 000 customers utilize our use cases, as it is already today.

E.g.: **Energy Use Case:** every 15 min 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 1,000 customers * 100 transaction/ day / customer = 100,000 tx/day.

In the *Upcoming use cases* scenario it is shown how many other use cases we plan to launch in the near future and how it would proportionally affect the transaction per day, following the above logic. The same, but delayed in time, applies to the *growth plan 2020* scenario.

At the bottom of the table it is shown the *annual interest rate*, which will be as high as 34 %, once more use cases are launched. The transactions day are based on assumed observed by today's use cases. Although it is already appealing it is a very conservative approach as said in the beginning, 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
Tot. 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 Staker	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 adoption time, 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 holder of Lition tokens that decide to stake. With this solution it is made 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 in the first two years since the launch of the Lition layer two blockchain. In this phase the initial functioning of the network is assured by Lition which will distribute tokens for each staker regardless of transactions in the network. However, the variables that decide 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 active node since it came online. This rewards commitment of nodes in the Lition network. As the table below shows, it assures a constant LITON 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 proportional 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% 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.

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 staker	1,000.00	1,000.00		
Max Number of Staker	176,000	176,000		
Average earnings for staking 1.000,00 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

Once the system is sustainable by itself, the Genesis Phase will be over, as for now the maximum timeframe is set to two years, however events and community demand, can have an influence. For low transactions 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 just 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.

Increased platform usage correlates with increased costs for computational resources

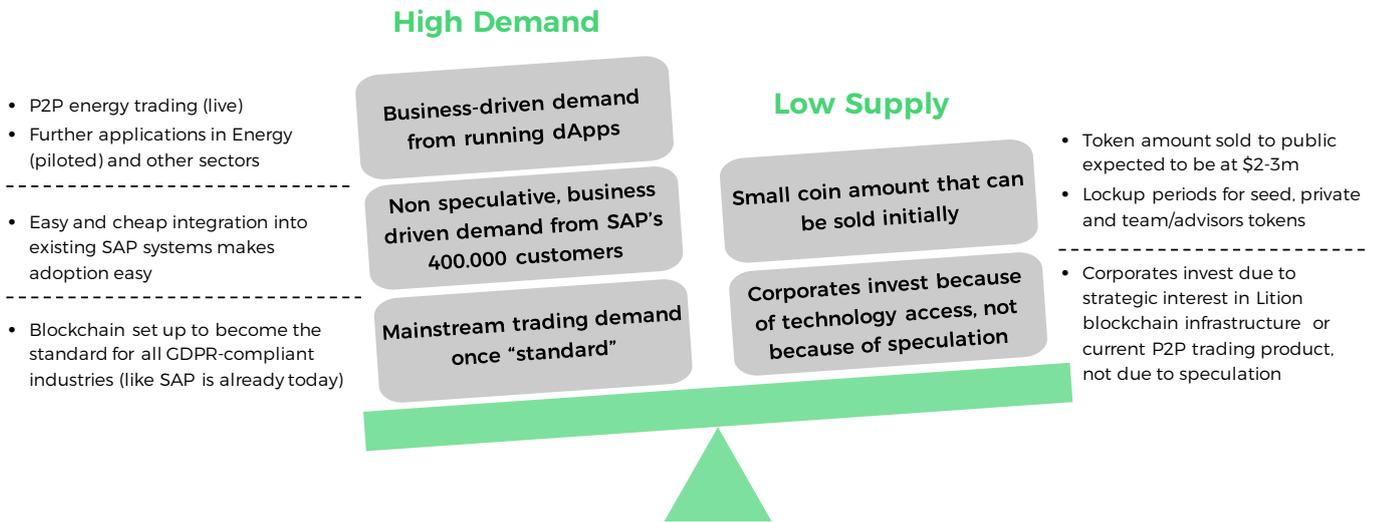


Figure 9: Drivers for expected increase in platform usage

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 require 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 in 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 of sold tokens, as well as continuous revenues through staking. Initially, only ~60% of the tokens are distributed, so ~40% remain at Lition (details see page 52). These ~40% are 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 need special IP and just Lition tokens to pay for Gas, this is different for the use cases. Lition is owning 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 it's IP to private businesses and global industry players.

Depending on the product, industry and region, Lition will chose 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.

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.

ALREADY ROLLED OUT USE CASE IN P2P ENERGY TRADING

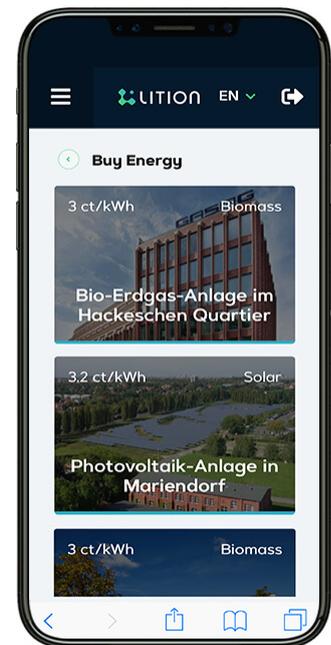
LITION ENERGIE – THE WORLD'S FIRST MASS MARKET P2P TRADING PLATFORM

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 roll-out of green electricity with fast adoption rates requires competitive pricing⁸.

The energy use case supplies currently customers in more than 25 cities and was featured in various news outlets like Coindesk⁹ or Huffington Post¹⁰.



⁸ Lition Energie internal study on price comparison conducted in June 2018

⁹ <https://www.coindesk.com/ethereum-energy-project-now-powers-700-households-in-10-cities/>

¹⁰ https://www.huffingtonpost.co.uk/entry/renewable-energy-blockchain-lition_us_5bfeb5a9e4b0d23c2138e1ff

LIVE DEMO AND SOURCE CODE

Even people 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 challenging-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.

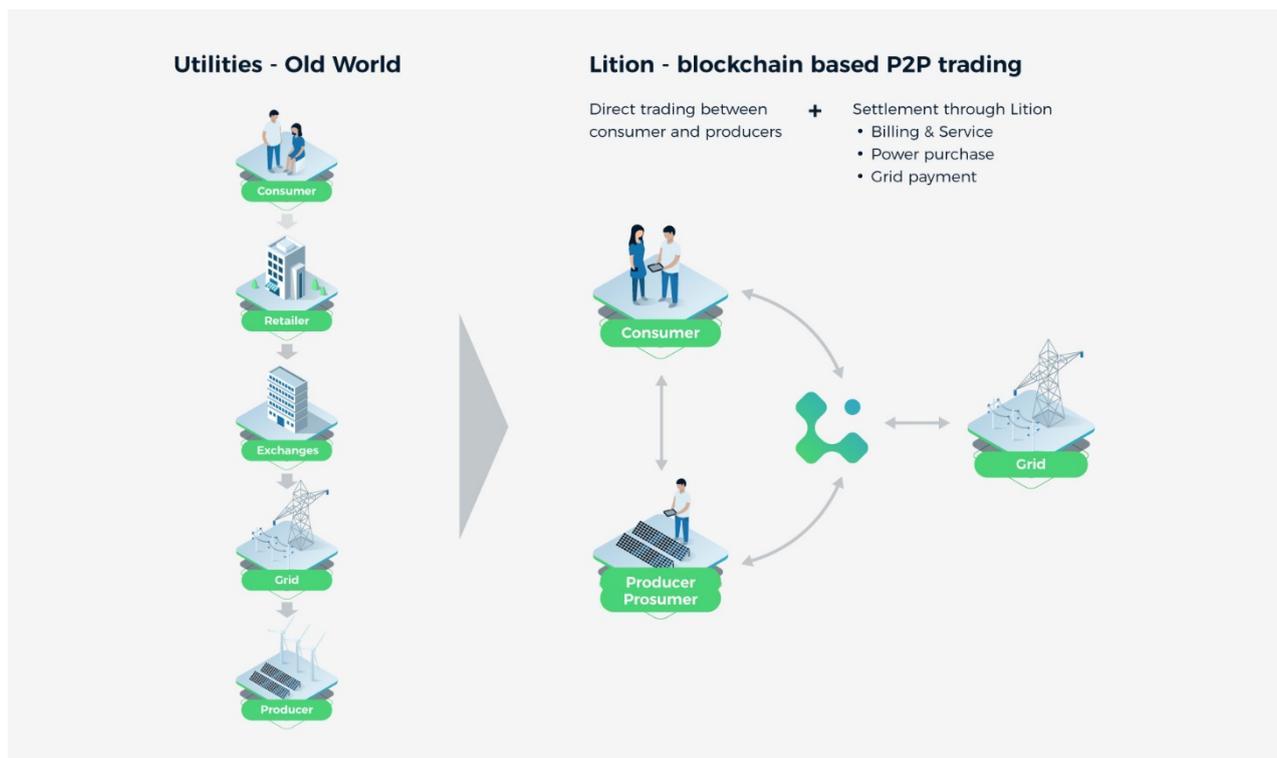


Figure 10: Description of the Lition P2P energy trading use case

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).

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 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 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 it's not a big utility making the choice, but rather the customer. It is their contribution to a greener future.

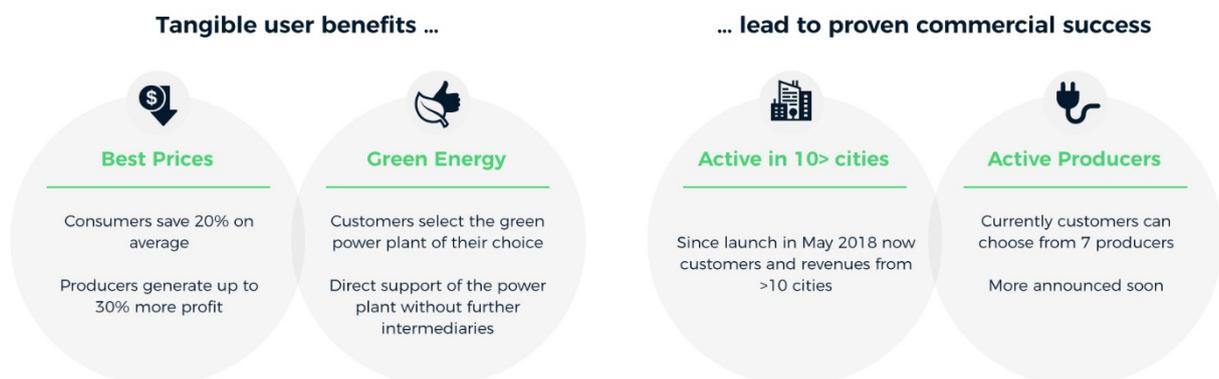


Figure 11: Lition's P2P use case customer benefits and resulting commercial success

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 than 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, just within weeks after commercial launch in May 2018, Lition Energie already has attracted customers in over 25 cities and has contracted 7 green power plants, with many more in the pipeline.



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 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.

		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

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 of them confirms blockchain transactions and contribute 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 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 producer as well, who uses 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 key 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 Renewables Energy Act (EEG), and a physical ability to 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.

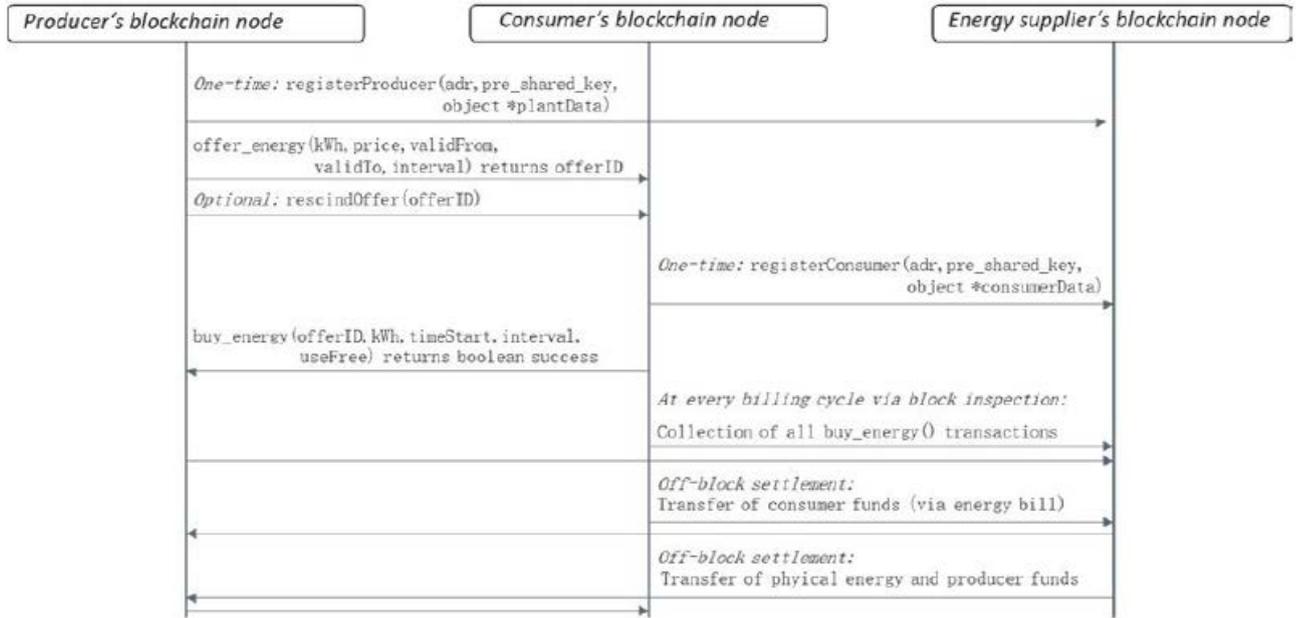


Figure 13: Technical flow of Lition energy transactions

MVP USE CASE IN BANKING & STO

SUMMARY

Together with a soon-to-be-announced leading bank (~1 trillion USD total assets) 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 a DApp on the Lition blockchain for syndicated loans, starting with a loan for a real estate at a volume of >20 million EUR covering a syndication of 2 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 further be simplified.

The screenshot displays the 'Syndicated Loan Blockchain Application' interface. The main header shows 'Housing Development' with navigation links for 'My Profile' and 'Logout'. The left sidebar contains a navigation menu with 'Add new loan application' and a list of applications: 'Housing Development' (In review, 1 March 2019), 'Sale of an apartment complex' (Waiting for review, 6 March 2019), and 'Housing Development Leipartstr' (Approved, 1 Jan 2019). Below this is a section for 'ACTIVE TOKENIZED LOANS' with details for 'Housing Complex Wilmersdorf'.

The main content area is divided into 'Application Details' and 'Approval'. The 'Application Details' section includes tabs for 'Key Data', 'Involved Parties', 'Object Details', 'Loan Details', and 'Documents'. It lists loan amounts for 'Client' (1200000 €), 'Bank #1' (1300000 €), and 'Bank #2' (1400000 €), with a total of 3900000 €. Other details include an interest rate of 18%, and loan structures for 'Cumulative' and 'testing structure'.

The 'Approval' section shows a timeline of events: 'Bank#1. Application approved.' (6 March 2019, 5:01 PM) and 'Change loan application' (6 March 2019, 5:01 PM) where the loan amount was changed from 500,000 € to 450,000 €. A comment from Michael Brown notes: 'Due to low creditworthiness of the borrower, we must lower the amount to 400,000 €.'

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 been developed yet for this – even though Lition is working on this topic too together with the German government, further detailed out in [this news post](#).

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 PwC¹¹ 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 Microgrid¹² 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 or 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 powerplants, 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.

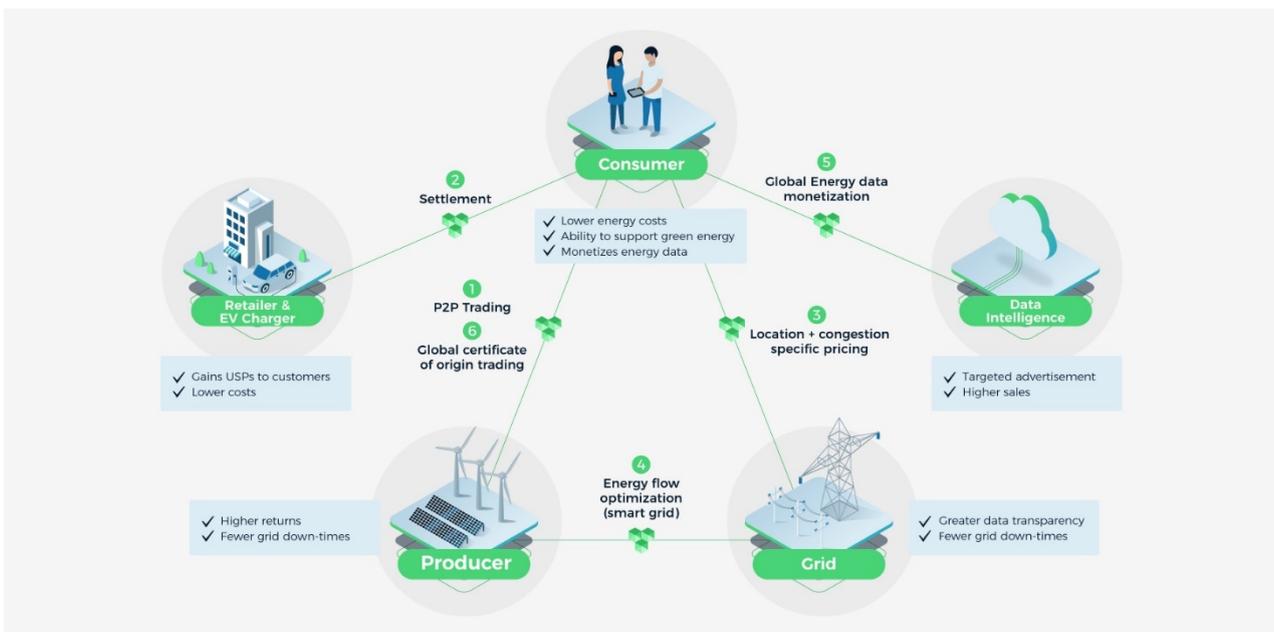


Figure 15: Overview of additional use cases in the Energy sector and their network effects

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

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

USE CASES FOR SMART METERING AND ENERGY-DATA DRIVEN RECOMMENDATIONS

End-to-end transparency is Lition's guiding theme of the 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 WHICH DEVICE CONSUMES HOW MUCH

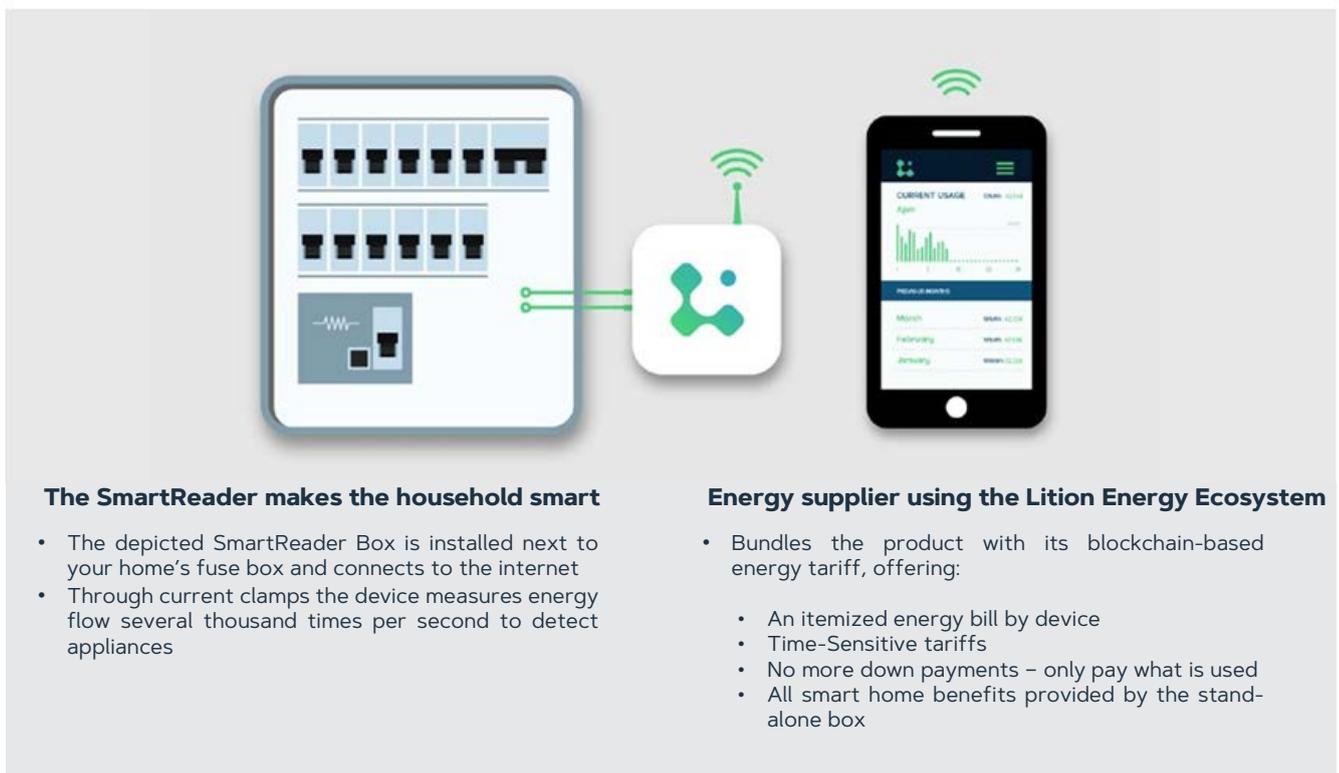


Figure 16: Illustration of the Lition Smart Reader App

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 its cost. Using a mobile app, customers are able to observe a detailed real-time visualization on the energy usage of all their household's electric 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 is switched on, e.g. a light even though 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) functionality to identify energy consumption of individual household devices, a supplier using this Lition blockchain based technology can offer an itemized monthly energy bill. 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 break down 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

- Identifies your appliances and their energy consumption
- Receive product recommendations based on your energy-data
- Full energy cost control



Affordable

- Benefit from low market prices during off-peak hours
- Save up to 20% on household energy consumption in addition to the 20% cost saving of the Lition tariff
- Device and its installation through a certified electrician included in rate



Easy

- 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 adopting 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 the Smart Reader device and developer of the AI-based algorithms for device detection in which they currently are the market leader in disaggregation technology.

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 rapidly growing. Based on manufacturers' launch plans and expected penetration rates, the market potential for electric vehicles is projected to reach approximately USD 340 billion by 2020¹³, 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 2016¹⁴. The growing units of electric vehicles require an increasing number of charging stations and they also increase 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 whenever an electric vehicle is bought.

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/

With respect to the currently existing e-mobility infrastructure, drivers of electric vehicles face three major issues when charging their vehicles:

- Different 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.

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 reputation by obtaining easy-to-access and cheap green certificates. In fact, an electric vehicle can be as pollutive as driving a dirty combustion engine.

Lition’s Blockchain Infrastructure as 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 1.500 charging stations.

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



Convenience

- 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.



Cost

- 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



Smart

- 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 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 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 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 with a power plant further away.
- **Reliability:** The smart grid makes use of technologies such as state estimation¹⁵ that 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 terrorist or cyberattacks because data and transactions are highly secured. With cyberattacks on the rise worldwide, experts rate these features as very important in the future.

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

- **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/EC¹⁶) 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 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 certificate of origins 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 on 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 middle men. As customers are already trading energy with producers via the Lition P2P energy exchange, storing certificates of origin on 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.

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

USE CASES IN OTHER INDUSTRIES

Not only do all use cases need fast transaction speeds; 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 disruption of many additional use cases across a multitude of industries as outlined in Figure 18.

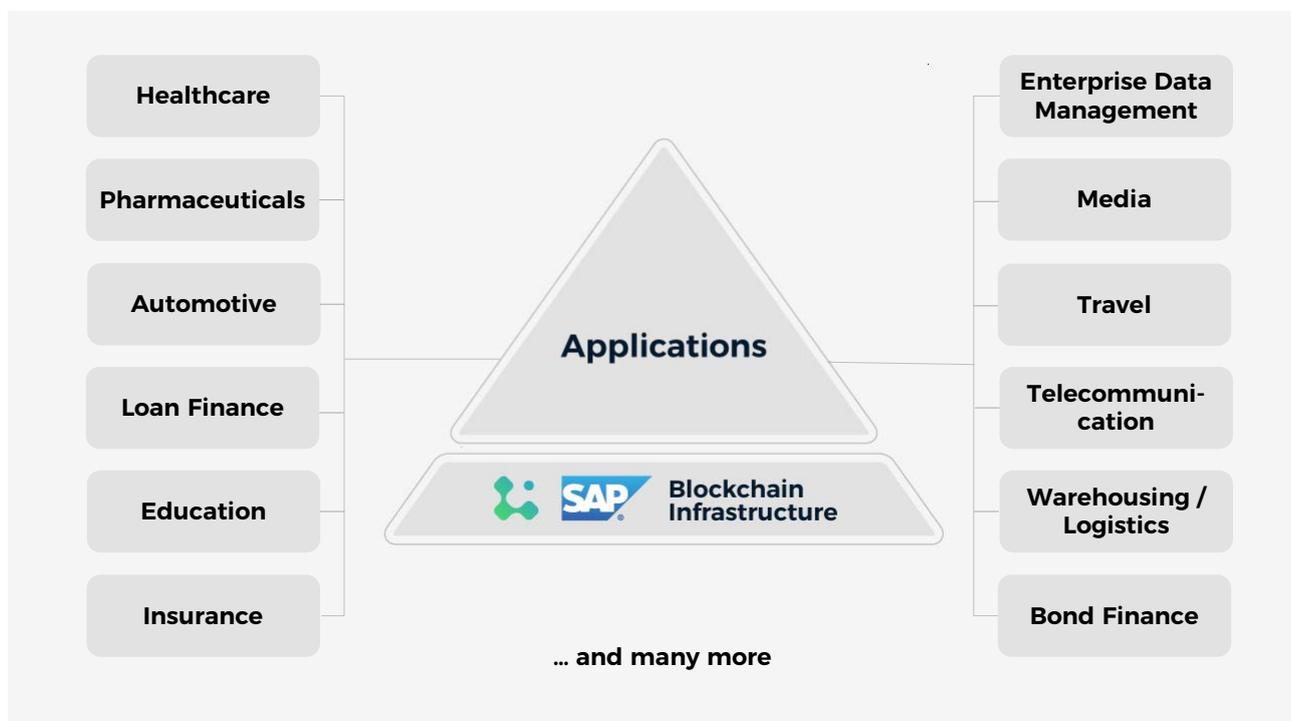


Figure 18: Sample industries with use cases for blockchain infrastructure

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 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.

USE CASES FOR PHARMACEUTICALS

Data privacy is crucial across the pharmaceutical industry. Both 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 no longer required. This would significantly streamline and further secure the entire approval process of 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 2019¹⁷. 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, 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.

¹⁷ <https://www.forbes.com/sites/stevemorgan/2016/01/17/cyber-crime-costs-projected-to-reach-2-trillion-by-2019/#6db226a73a91>

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 to 7 billion euros¹⁸. As odometer levels are classified as private data due to the connection to the car holder, they cannot currently be publicly 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, on 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 tourist 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 if 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.

¹⁸ <https://global.handelsblatt.com/companies/protecting-used-car-buyers-651071>

PARTNERS

Lition is backed by major industry players in the utility and finance sector 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 their infrastructure, and exchange regarding advanced blockchain technologies.



Financial Partner

LD Capital is one of Asia's earliest organizations focusing on value investing in 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.

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

Company	Website	Support Lition with
 tokeny <small>The Most Advanced ICO Platform</small>	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

TIMELINE

Use Cases	Blockchain Infrastructure
Q4 2017 - Forming	
<ul style="list-style-type: none"> • Alpha version of P2P energy trading app • Licensing process for electricity supplier initiated • First partnership initiated 	
<ul style="list-style-type: none"> • Lition starts • Initial fundraising 	
Q1 2018 - Building P2P Use Case	
<ul style="list-style-type: none"> • 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	
<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Business requirements for blockchain infrastructure specified • Design of technical blockchain architecture initiated • Technical advisory SAP
Q3 2018 - Designing Blockchain & Ecosystem Initialization	
<ul style="list-style-type: none"> • Use case for P2P applied for energy retailing piloted • Leading energy partners onboarded • Lition staff grows to 20 (internal and external) • Lition representative office opened in Beijing 	<ul style="list-style-type: none"> • Technical whitepaper released • Blockchain prototype • Development with SAP started
Q4 2018 - Testnet MVP	
<ul style="list-style-type: none"> • Commercial expansion of P2P energy trading use case • Contract signing with leading bank on banking use case 	<ul style="list-style-type: none"> • Support of German blockchain law makers enabling STOs in Lition blockchain • MVP of testnet (private release) • Seed funding round completed
• Q1 2019 - Testnet Release & Ecosystem Growth	
<ul style="list-style-type: none"> • Launch of banking case • Launch of security token use case for real estate • Expansion of P2P trading use case also for large industrial clients 	<ul style="list-style-type: none"> • <i>Testnet 1.0 public release</i> • First use cases migrated to Lition Testnet infrastructure • dApp partners onboarded • Team scale-up

	<ul style="list-style-type: none"> • ICO (March)
Q2 2019 – Mainnet Release & Ecosystem Growth	
<ul style="list-style-type: none"> • Launch of STO use case outside of real estate with partner • Launch of smart grid use cases 	<ul style="list-style-type: none"> • Mainnet 1.0 Private release • Migration of use cases to Mainnet • Start Genesis Phase
Q3 2019 – Mainnet Release & Ecosystem Growth	
<ul style="list-style-type: none"> • Growth of partner network across industries • First pilots of regulated industries outside Energy sector that deal with private data • Onboarding of dApp partners 	<ul style="list-style-type: none"> • Mainnet 1.0 Public release • Hosting first STO's
Q4 2019 – Ecosystem Growth	
<ul style="list-style-type: none"> • Industry-designed toolkit for the development of blockchains 	<ul style="list-style-type: none"> • Testnet Update • Large-scale user migration • Mainnet 1.5 Update, including data deletability
2020 – Mainnet Evolution & Cross-Industry Expansion	
<ul style="list-style-type: none"> • Large-scale marketing for ecosystem 	<ul style="list-style-type: none"> • Mainnet 2.0 Public release with full set of features • Worldwide commercial, large-scale use cases of industries outside of Energy (Healthcare, Finance)

TOKEN SALE

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

This is the summary of the token sale, but please refer to the [following article on medium](#). It includes the details on the bonus system ("HODL-Highway") and details on the lockup structure.

Also, Lition offers a buyback program of up to 50% of the original value, detailed in [this article on medium](#).

Cornerstones of TGE

- Token Supply: 176m LITON
- Price at ICO: USD 0.10 / LITON
- Hard cap: USD \$8m
- Soft cap: USD \$2m
- Type: ERC20 token on Ethereum
- Period: 18-26th of March, 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](#)

Token Sale Distribution

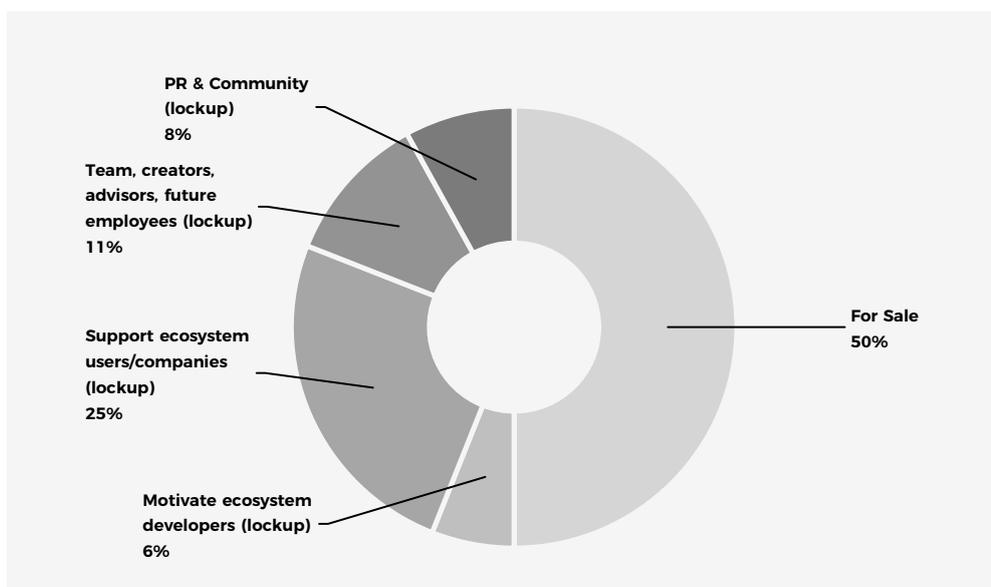
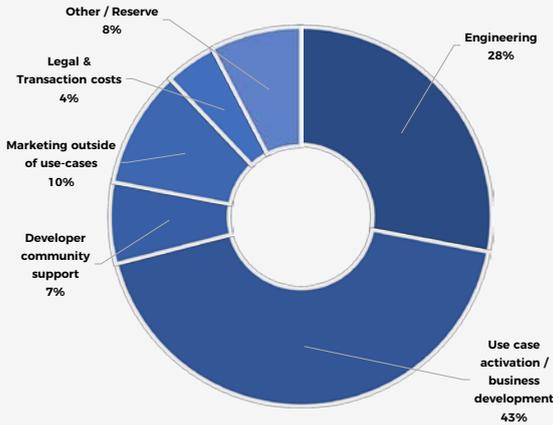


Figure 19: Token sale distribution

Use of Proceeds (Upon Reaching Hard Cap)

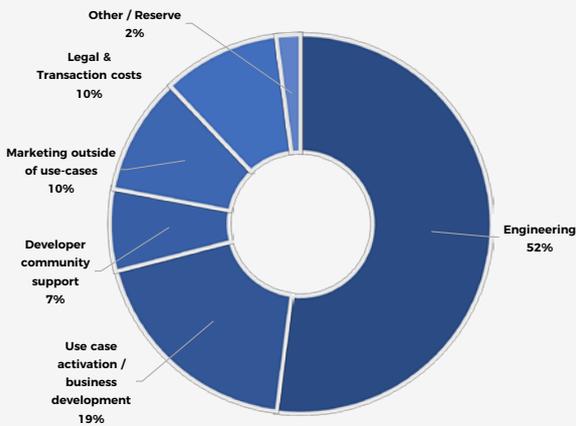
Use of proceeds when Hard Cap of \$8m is reached
(distribution for Soft Cap of \$2m see below)



Usage of proceeds (absolute, in USD)	Year 1	Year 2	Year 3
Engineering	851.000	896.000	493.000
<i>Fundamentals / research</i>	<i>213.000</i>	<i>134.000</i>	<i>25.000</i>
<i>Consensus layer</i>	<i>298.000</i>	<i>269.000</i>	<i>148.000</i>
<i>Storage layer integration (development by SAP)</i>	<i>43.000</i>	<i>45.000</i>	<i>25.000</i>
<i>Client</i>	<i>128.000</i>	<i>134.000</i>	<i>99.000</i>
<i>Testing</i>	<i>102.000</i>	<i>242.000</i>	<i>158.000</i>
<i>Other</i>	<i>68.000</i>	<i>72.000</i>	<i>39.000</i>
Developer headcount (Litton)	7.000	7.000	4.000
Developer headcount (SAP)		Paid by SAP	
Use case activation / business development	860.000	1.720.000	860.000
<i>P2P Energy Trading</i>	<i>258.000</i>	<i>344.000</i>	<i>86.000</i>
<i>Smart Grids</i>	<i>215.000</i>	<i>430.000</i>	<i>146.000</i>
<i>Smart Metering</i>	<i>258.000</i>	<i>258.000</i>	<i>112.000</i>
<i>Other Energy</i>	<i>43.000</i>	<i>138.000</i>	<i>86.000</i>
<i>Other sectors</i>	<i>86.000</i>	<i>550.000</i>	<i>430.000</i>
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

Use of Proceeds (Upon Reaching Soft Cap)

Use of proceeds when Soft Cap of \$2m is reached



Usage of proceeds (absolute, in USD)	Year 1	Year 2	Year 3
Engineering	395.200	416.000	228.800
<i>Fundamentals / research</i>	<i>98.800</i>	<i>62.400</i>	<i>11.440</i>
<i>Consensus layer</i>	<i>138.320</i>	<i>124.800</i>	<i>68.640</i>
<i>Storage layer integration (development by SAP)</i>	<i>19.760</i>	<i>20.800</i>	<i>11.440</i>
<i>Client</i>	<i>59.280</i>	<i>62.400</i>	<i>45.760</i>
<i>Testing</i>	<i>47.424</i>	<i>112.320</i>	<i>73.216</i>
<i>Other</i>	<i>31.616</i>	<i>33.280</i>	<i>18.304</i>
Developer headcount (Litton)	4	4	2
Developer headcount (SAP)		Paid by SAP	
Use case activation / business development	95.000	190.000	95.000
<i>P2P Energy Trading</i>	<i>95.000</i>	<i>190.000</i>	<i>95.000</i>
<i>Smart Grids</i>	<i>0</i>	<i>0</i>	<i>0</i>
<i>Smart Metering</i>	<i>0</i>	<i>0</i>	<i>0</i>
<i>Other Energy</i>	<i>0</i>	<i>0</i>	<i>0</i>
<i>Other sectors</i>	<i>0</i>	<i>0</i>	<i>0</i>
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

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 7 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 3 years, graduating as the top student in his class, after which he completed a 3-year PhD program in 1 year.

Richard was managing director at ExtraEnergie, one of Germany's top 3 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 10 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 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 top 10 university in the United States. Kyung was frequently granted scholarships and awards throughout his academic career.



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 until today. He 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 stock-listed 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 invested in more than 100 companies with more than 35.000 employees and a combined revenue of more than USD . He has been responsible for an investment volume of more than USD 1bn until today. Jan has also founded four start-ups.

Before that, he was a member of the management board of GCI Management Germany, now a stock listed 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.



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 this day, 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 has 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 multiplexer. Reinhard also served as an appointed member to the German national chamber of commerce's telecommunications committee.

Prior engagements include consulting for Cap Gemini, GCI Management, and at Lockheed Martin, USA, 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 university ranked in the top 10 in the United States.

ADVISORS



Dr. Jürgen Müller

*Chief Technology Officer and
Executive Board Member at SAP SE*

Jürgen holds a Ph.D. in IT systems engineering from the Hasso Plattner Institute where he was co-representative of Professor Plattner's research chair at the Hasso Plattner Institute (HPI) for Software Systems Engineering, University of Potsdam, Germany. Besides numerous teaching activities, 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 most recent 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. Leader of the team that built WOOKONG, the first multi-signature hardware cold wallet for various currencies, and co-founded Cybex, the decentralized Exchange, and the LongHash.

**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 at 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 Korean-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 & energy use cases, Sang-Seop strongly supports Lition's ambitions to internationally scale its energy blockchain solution. 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 at 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.

**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

LITION TECHNOLOGY TEAM (BLOCKCHAIN DEVELOPMENT TEAM)



Josef Sevcik
*Head of Blockchain
Development*

Josef has Master in Computer Science and an MBA in General Management. He is a professional with 18 years of experience in selling, developing and delivering. Such as a IMS Developer for Siemens, 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 & further extend it, in creating products and services that bring real value to the end-users. In 2018 he was leading 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 computer software industry. Skilled in Blockchain, Ethereum(Solidity), Hyperledger, C/C++, iOS/Swift and Linux. Strong engineering professional with B.A. in Radio physics, fascinated by all kind of things like blockchain, distributed ledgers and smart contracts. Allaksei has intensively studied blockchain and layer 2 scaling solutions. In particular he is working / exploring the possibilities to "delete" data on the blockchain without jeopardizing it's immutability for Lition.



Eugene Melnikov
Senior Blockchain Engineer

Eugene is very experienced specialist. He has been working in IT more than 10 years. Now he focused on different blockchain families: ethereum, hyperledger, bitcoin, graphene. Eugene successfully implemented number of blockchain projects, participate in hackathons and meetups, continuously learning new technologies and dream about decentralizing the world. He has been a Blockchain Engineer for Smart Contracts for Etherisc and a IoT Developer and 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 10 years of commercial IT development experience. He has extensive expertise in Java enterprise development, web development, blockchain, technical & group leading, project management. He is a Team lead and software engineer with proficiency in problem solving. Can convert challenges to tasks and collaborate with international teams on the way to success.

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 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 started to work on various IT related topics in the sales department. After successful delivery, she moved quickly into the 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 with getting 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 solely focuses 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 6 years' experience in UX consulting in the energy sector and across various other markets at eparo GmbH and additional freelance engagements.

LITION CORE TEAM (BUSINESS DEVELOPMENT | 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 7 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 area 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.



Susanne Höbler
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.



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.



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.



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.

DISCLAIMER AND RISKS

DISCLAIMER AND ASSESSMENT OF VARIOUS RISKS INVOLVED

Please read this disclaimer notice carefully. Please note that the disclaimer set out below may be altered or updated, at any time in whole or in part at the sole discretion of Lition. You should read it in full each time you visit the site.

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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.

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.

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.

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.

Lition shall not have any responsibility in respect of access to it from territories whose laws prohibit such access or where any aspect of the content of the site may be illegal. Those who choose to access this site from other

locations do so on their own initiative and at their own risk, and are responsible for compliance with applicable local laws.

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 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.

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.

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.

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 identify trust worthy clients, by cross-referencing them against international credit and watch list databases.