



Bitlumen





“We will make electricity so cheap that only the rich will burn candles” Thomas Edison

Bitlumens brings off grid electricity from renewable sources to women in rural villages in Latin America, leveraging on Internet of Things (IoT) and the Blockchain.

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Important Information

This Whitepaper is provided by Bitlumens GmbH for informational purposes only. Nothing in this Whitepaper shall be construed as an offer to sell or buy securities in any jurisdiction, or a solicitation for investment, or an investment advice. The Whitepaper does not regulate any sale and purchase of BLS tokens (as referred to in the Whitepaper). The purchase of BLS tokens is subject to the Token Sale Terms and Conditions and the use of Bitlumens is subject to the Platform Terms and Policies.

This Whitepaper describes the current vision for Bitlumens. While we intend to attempt to realize this vision, please recognize that it is dependent on a number of factors and subject to risks. It is entirely possible that Bitlumens will never be implemented or adopted, or that only a portion of our vision will be realized. We do not guarantee or warrant any of the statements in this Whitepaper, because they are based on our current beliefs, expectations and assumptions, about which there can be no assurance due to various anticipated and unanticipated events that may occur. Blockchain, cryptocurrencies and other aspects of the technology used for Bitlumens is in its infancy and will be subject to many challenges, competition and a changing environment. We will try to update our community as things grow and change, but undertake no obligation to do so.

Due to the retrospective nature of regulatory action or guidance, we can make no guarantees regarding the legality of Bitlumens or BLS token launch in any given jurisdiction. We must operate in accordance with the laws of relevant jurisdictions. As such, BLS tokens may not be immediately available in certain countries.

BLS tokens are functional utility smart contracts within Bitlumens platform. BLS tokens are non-refundable and are not for speculative investment. No promises of future performance or value are or will be made with respect to BLS tokens, including no promise of inherent value, no promise of continuing payments, and no guarantee that BLS tokens will hold any particular value. BLS tokens are not securities hold no rights in Bitlumens GmbH.

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People who intend to purchase BLS tokens, should seek the advice of independent experts before committing to any action, set out in the Whitepaper.

This document provides information on the Bitlumens project, its core conceptual idea, business model, competitive advantages, the team, ICO details and roadmap towards the first MVP. A more technical description of the core architecture and APIs will follow soon after. This whitepaper has been published in March 2018. We recommend following updates on our website and other media





channels periodically, for new information and updates. Also, more detailed papers will be released in the future, specifically on the consensus and governance mechanisms. However, it should be noted that our architecture is holistic, all components tie together and synergize in a modular way.

Preamble

Bitlumens mission is to provide options to rural communities to displace kerosene, wood or plastic-dependent households and give immediate access to cleaner, safer, and affordable energy in Latin America.

Bitlumens brings electricity from renewable sources using Internet of Things (IoT) and the Blockchain to women in rural villages in Latin America. Thanks to solar energy and our technology, people can use electricity, charge their electrical appliances and even water their crops! Women lease our hardware and pay in installments denominated in BLS tokens. This allows them to build a credit score leading to financial inclusion and poverty alleviation. In addition, family members can buy tokens to send a remittance which could cover the expenses for the machine, meaning water and electricity bills can be covered. We also quantify carbon mitigation and particulate matter reduction in each household to allow women to become carbon credit issuers at a later stage.

The current milestones of Bitlumens are:

1. The deployment of 100 off grid solar devices by the end of May 2018.
2. The addition of the software to run the hardware using tokens by the end of May.
3. The deployment of IoT to track carbon and black carbon mitigation.
4. After June we will be adding solar pumps into our hardware ecosystem.

Mission

Our mission is to offer a peer to peer platform where users adopt off grid Solar systems to reduce carbon emissions and get access to lighting and water in places where there is no power grid. Our platform allows the leasing of Solar Home Systems (SHS) to be done through installments denominated in Bitlumens Tokens (BLS). Our goal is to create a positive measurable social and environmental impact.

We provide solar energy to remote villages and in consequence reduce CO2 and health hazards. We replace the use of kerosene lamps, diesel, plastic, biomass and bio-fuels for lighting and irrigation purposes with solar technologies. This allows farmers to reduce their costs and increase their savings while proliferating financial inclusion and in some cases providing employment. Our digital platform aims at offering distributed, managed by consensus and off grid smart energy solutions in low resource households. Our platform contributes to the UN SDGs, in particular with; Affordable and Clean Energy, Sustainable Cities and Communities, Good Health and Well-being, Gender Equality and Climate Action. Bitlumens GmbH is registered and incorporated in Zug, Switzerland.





Introduction

Bitlumens electrify rural areas, help bring down CO₂ emissions, foster gender equality and promote financial inclusion through its platform.

1.1 billion women remain locked out of the financial system, not least due to the lack of proper identification documents. Identity does not have to remain a barrier for financial inclusion and economic empowerment. In addition, according to the World Energy Outlook, 1.2 billion people don't have access to electricity while 2.7 billion don't have access to clean cooking. Only a small portion of rural inhabitants have access to electrification [see Table 1]. Most of them depend on inefficient and hazardous fuels, such as biomass, kerosene, plastic, battery torches and candles. Fuels and its combustion process contribute to the release of greenhouse gases into the atmosphere. Among those fuels, kerosene is a source of CO₂ and black carbon. Black carbon or soot, a particulate matter (PM) resides only a few days or weeks until a natural phenomenon called coagulation happens, where cloud droplets and aerosol particles attract each other. This phenomenon helps to clean the atmosphere by flushing out aerosol particles. Hence, replacing all kerosene lamps worldwide with solar lights could serve as short-term action to reduce global warming. A single kerosene lamp emits over 100 kg of CO₂ per year when used four hours a day.

Globally, burning kerosene for lighting generated 240 million tons of CO₂ equivalent a year, around 0.5% of global emissions. In fact, just kerosene lamps replaced in Africa and Asia with solar panels saved 1.4 million tons of CO₂ equivalent in 2014 alone. Moreover, on a general basis burning 20 kg wood during one day emits about 200 grams of PM2.5, this equals smoking 10,000 cigarettes.



The energy sector in Latin America and many other developing regions present major challenges to meet energy requirements. In fact, some of these countries rely on fossil fuels to meet energy demand. Price volatility, fossil fuel shortages, governmental regulations on fossil fuel prices, geopolitical settings, power outages and climate change mitigation are major key variables that need to be considered to address energy security. However, the Latin America presents a vast amount of non-conventional-renewable-energy sources such as wind and solar which can be exploited to address power reliability and energy security.





Table 1 illustrates the megatrends driving the development on solar off grid projects. Large number of people without electricity, increasingly cheaper solar panels, growing mobile phone penetration (SIM cards) and high energy spending on inefficient fuel sources are some of the variables we take into account to model off grid energy solutions. In addition, we focus on the intersection of high cell phone availability, low rate of electrification, high number of adults unbanked and high adoption rate of kerosene or other inefficient fuels used for cooking or electricity.

	Population without Electricity	Rural Electrification Rate	CO ₂ (metric tones per capita) 2013	Mobile Penetration	Residential Electricity Price
	Millions	%	Tones	%	¢/kWh
Haiti	7.5	17.2	0.23	55	33
Nicaragua	1.4	57.1	0.77	78	21
Trinidad and Tobago	0	99.4	34.52	140	32
Ethiopia	73	12.2	0.11	18	9
Zambia	11	3.8	0.25	40	15
Peru	3	74.5	1.87	66	9
Guatemala	1.7	74.8	0.87	51	18
Brazil	0.8	97.8	2.49	57	10
Honduras	0.9	76.3	1.05	66	17
Panama	0.3	65.65	2.7	81	16
Ecuador	0.5	97.05	2.78	55	8

Table 1: Potential Markets





Displacing kerosene and biomass

Combining clean tech, fintech, the blockchain and cloud computing, Bitlumens offers a software as a service (SaaS) where women living in rural villages and in need of power can get access to Sun Home Systems (SHS).

In many developing countries kerosene (paraffin) is widely used as fuel for light and cooking. The use of kerosene as lighting fuel is an important source of black carbon (BC) and carbon dioxide. Especially in rural areas where most families use dim kerosene lamps to light their homes at night. The combustion originated from burning fuel indoors pollutes the air with harmful particles, which can irritate the eyes and lungs, and can also cause accidents. According to different studies 3.5 million premature deaths occur each year are linked to smoky indoor environments. Off grid energy services supplied from renewable sources can not only displace kerosene usage with efficient Light Emitting Diodes (LEDs), but also reduce the dangerous side effects produced by combustion. Other sources of fuel are pine kindling, used in Latin America as a source of light. Like kerosene, pine kindling often causes health issues, such as long-term neurological and kidney damage.

Kerosene and biomass powered wick lamps are far less efficient than solar powered LED lanterns. As stated by kerosene is a dangerous and inefficient fuel used in wick lamps which provides less useful light compared to solar lanterns. Kerosene wick lamps provide 1 to 6 lumens per square meter. LED has higher efficiency - measured in lumens per watts- quality and quantity of lighting when compared to kerosene lamps. The use of LED lanterns entails reductions on greenhouse emissions and operating costs. A kerosene lamp producing 37 lumens during a period of four hours per day will consume about three liters of kerosene per month at an average cost of USD 0.35 per liter in India.

Most off-grid customers live in rural areas and on less than \$2 a day. Therefore, energy accounts for a significant amount of their spending. However, distributed energy companies (DESCO) are bringing new forms of financing to the homes of people living in rural areas.





By generating renewable power from the sun, DESCO aim at offering reliable energy services and reducing greenhouse gas emissions in a cost competitive manner. Some of these companies use “pay as you go systems” to provide access to credit for people who do not have access to cash. This solution is a leasing, providing the choice to own the technology once all installments had been paid. Bitlumens provides a solution to support villagers gaining access to IDs, micro-credits, electricity by using solar panels and the blockchain. Combining clean tech, fintech, the blockchain and cloud computing, Bitlumens offers a software as a service (SaaS) where women living in rural villages and in need of power can get access to Sun Home Systems (SHS). The latter are user-friendly, eco-friendly, and smart internet of things (IoT) devices that bring power to the unbanked in places without power grid. In short, our platform gives options to rural communities to displace kerosene, wood or plastic-dependent households and give immediate access to cleaner, safer, and affordable energy in Latin America.

Initial Markets

We focus on the intersection of high cell phone availability, low rate of electrification, high number of adults unbanked, countries with inflation rates below 10% and high adoption rate of kerosene or other inefficient fuels used for electricity.

	Lat	Lon
Guaramal Panama	8.337543	-82.551045
Valle Departament Honduras	13.422095	-87.547689
Chinandega Nicaragua	12.896268	-87.537753
Escuintla, Guatemala	14.3009	-90.7882

Table 2: Locations to install the first minimum viable product



The Solar System



Ideally, our Solar Kit will initially use a 15/20/50W solar panel and 3000 mAh, Lithium Ferro-Phosphate (LFP) Battery. We will sell 3 systems coming with different appliances, i.e. two USB charging ports; integrated dimmable LED lights; LED Backlit LCD TV; Radio and TV.

The battery should last for 5 years and the system has a 2 years warranty minimum.

The system must provide to the final user: available credit, battery availability, electricity consumed, lighting duration, daily cost and energy output. The data will be sent to the network on a daily basis between 7-10pm.





	USB	LED Bulbs	LED Bulbs	Radio	TV 15.6'	Battery	PV panel
		200 lumens	400 lumens			mAh	Watts peak
First Configuration	2	2 used for 6 h	-	1	-	3000	15
Second Configuration	2	2 used for 4 h			1 TV for 6 h	4500	20
Third Configuration	4		3 used 6 h	-	1 TV for 6 h	10500	50

Table 3: Solar Home System Configurations

	GHI	PSH	PR	Y_e	E_v
	kWh/m ² /a	[h/a]	[-]	[kWh/kWp/a]	[USD cents/kWh]
Ecuador	1641	1641	0.80	1313	11
Honduras	2230	2230	0.80	1784	30
Nicaragua	1909	1909	0.80	1527	32
Panama	2000	2000	0.80	1500	24
Guatemala	2200	2200	0.80	1760	31

Table 4: irradiance values, peak hours and the performance ratio.

The solar kit is connected to a smart meter and to the user's cell phone. We use programmable logic controllers (PLC) that allow the current to be measured. There are several circuits which can be used to determine the voltage and current generation/consumption. Each sensor must be connected to an analog-to-digital converter (ADC) in the Controller Hardware. We'll need at least one circuit at the Solar Panel input and another at the battery output. With these values it calculates the power produced and consumed. The smart meter works LPWAN solutions for IoT, which can work for several kilometers distance. Sensors will provide the data in the form of text messages, such as, available credit, battery availability, electricity consumed, lighting duration, daily cost and energy output.





The Blockchain

We use a combination of on and off chain data sources to calculate the credit score of women farmers

Off Chain: The digital IDs are not part of the blockchain but are going to be centralized. Each user will be able to have their own ID and credit history. This information can be shared to third parties who offer microlending solutions, governments and development banks. Users can get access to microcredits by paying a specific interest rate based on personal and behavioral variables.

On chain: The idea is that our investors know when the transactions by our users are done. After the transaction is entered in the system by our agents, Bitlumens will pay these agents a commission denominated in tokens.

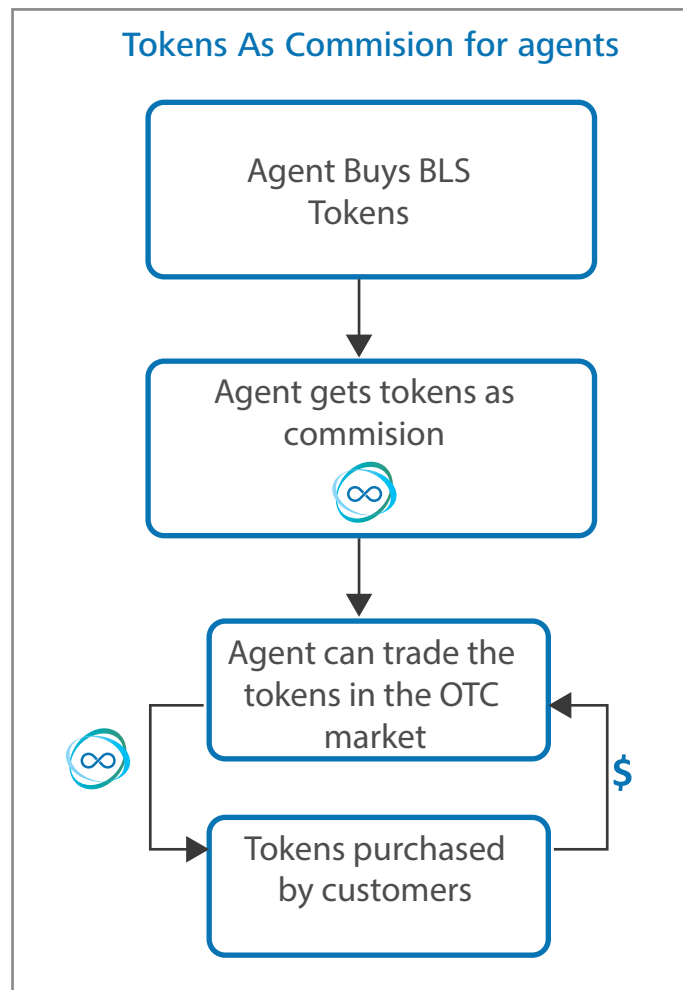
To be able to provide financial inclusion two important pieces of information are provided, IDs and KYC (Know Your Customer) information. Bitlumens gives access to a platform that connects micro-credit solutions to users who are not powered to the grid, offering SHS. We will provide cooperative banks with key pieces of information they require to open an account or facilitate financial services given the proof of valid microcredit. Each user will be able to have their own ID and credit history. This information can be shared to third parties who offer microlending solutions, governments and development banks. Users can get access to microcredits by paying a specific interest rate based on personal and behavioral variables.

The system will be comprised (at minimum) of the following components:

- (i) A token creation smart contract (Ethereum)
- (ii) A utility billing system contract (Ethereum)
- (iii) IPFS (hash-based decentralized file storage)
- (iv) A centralized server to hold fingerprint data and notarize identity requests (approve/refuse)

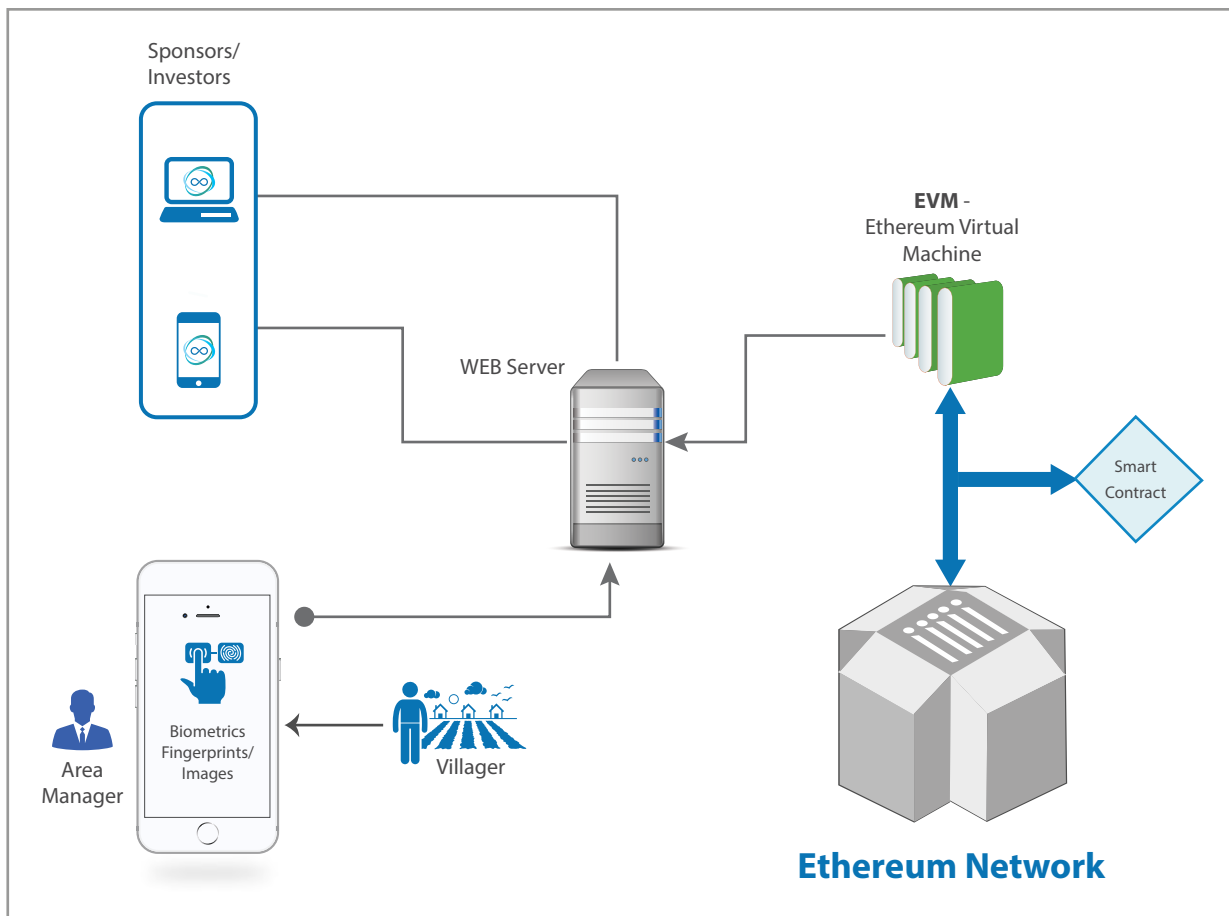
Bitlumens team will own the private key to add and remove agents. Agents have the power to add utility bills for clients. The workflow is the following: the agent goes to the client's home, collects the money and buys a token in the OTC market for the client to use (so she can use the hardware). In addition, agents get a commission in tokens as explained in the following graph:





Then, the agent makes a blockchain transaction that contains the utility bill data of the client. The agent uploads the detailed information to IPFS. We use IPFS files to store the information on the file itself. More specifically, the transaction contains the following information: the token value information, potentially some of the energy consumption (but only a few, as storage on Ethereum is very costly) and a IPFS hash to the file containing the detailed energy consumption. Each client is assigned a user number, which identifies them uniquely. For KYC purposes, it suffices for the bank to ask a server (iv) that their client's number matches the correct fingerprint. Once they can trust the user number, they can look at the blockchain (ii) smart contract to estimate the credit rating of the client and participate on a microcredit. It is also possible to add a credit rating functionality, where a credit rating agency would associate client numbers with credit rating, thereby making the process easier for banks.

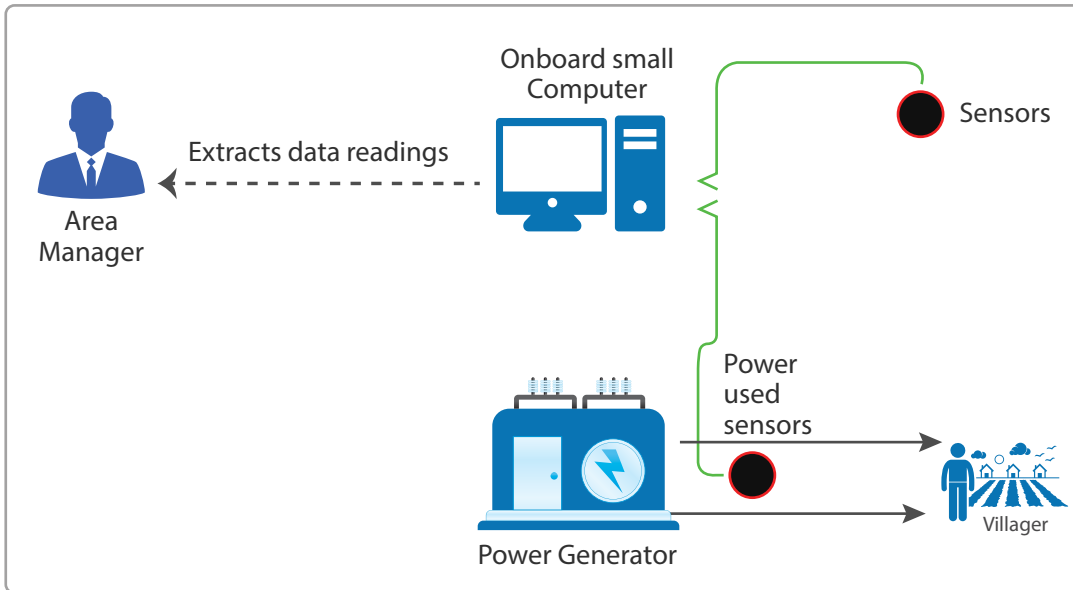
The area manager, the agent and the investor interact through our web and mobile app. On and off chain data communicates using oracles. The tokens can be exchanged on a public blockchain through Ethereum. An additional layer of smart contracts is added to execute instructions based on predefined conditions.



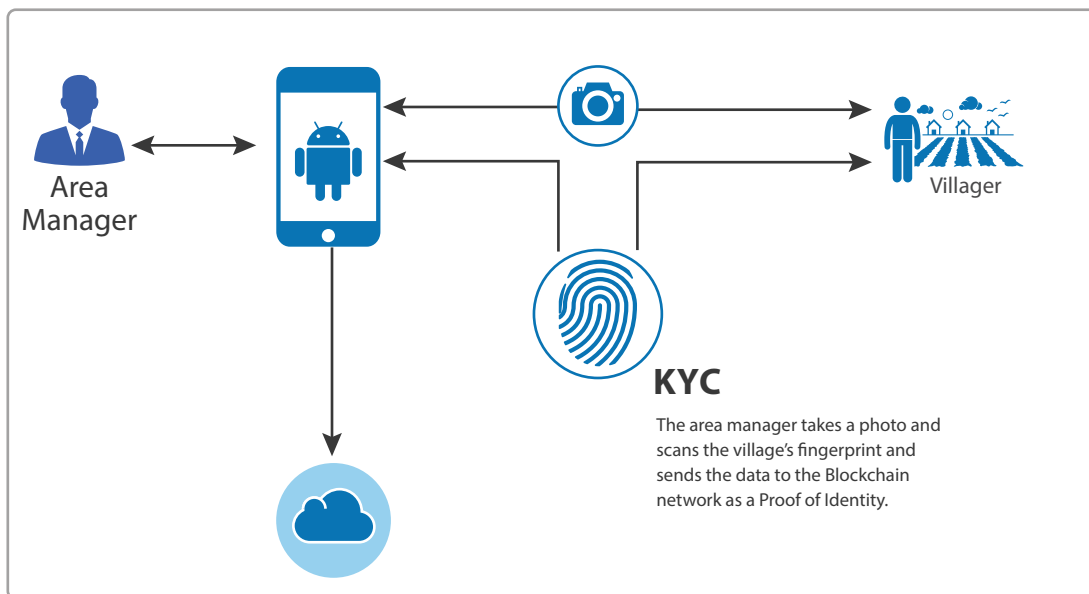
Sensor Data Flow

Women farmers are the owners of their own data. Sensors collect data to verify carbon and black carbon mitigation.

Our clients own their own data. These data can be sold to the government or to development banks. The data runs in a private blockchain and is connected to our sensors.

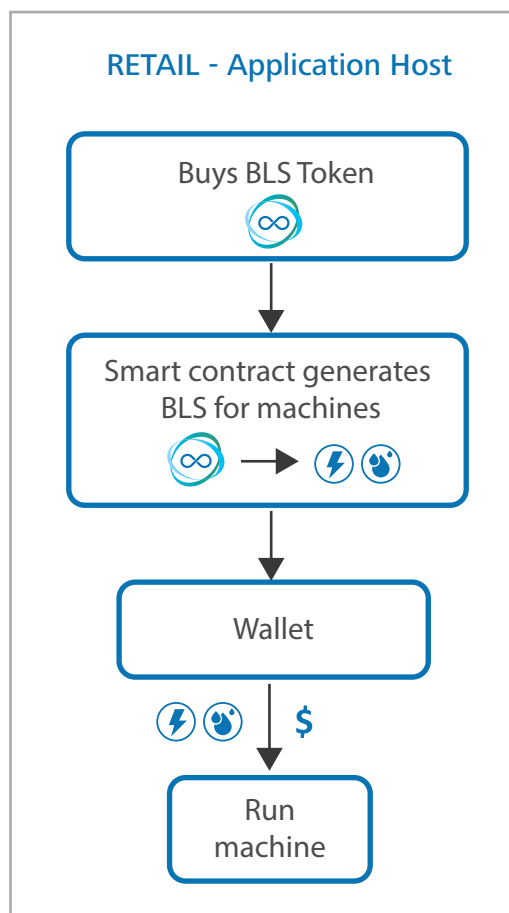


Operation in a Village and Identity of Villagers



Each machine has a serial number and can be linked to a user which is identified using their fingerprint. We will work with a partner provider for the ID and fingerprint. The MVP aims to support usage of Ether and is built on the Ethereum network, as it is currently the most mature blockchain to implement smart contracts.

The following graph shows the flow of BLS tokens needed for women farmers to run their machines. These women buy tokens to run their machines which are used to produce power for electricity or water.



Our mission is to include women living in rural villages into the financial system by providing micro-credit and pay as you go solutions. Therefore, Bitlumens aims at licensing the platform and operate with cooperative banking services in a global scale to improve the lives of villagers while contributing to carbon mitigation strategies related to the Paris Climate Agreement of December 2015.

In addition, family members can buy BLS tokens through our app and send a remittance to one of our final users (leasing party) destined to pay for water and electricity bills.

Use Cases

Bitlumens Tokens/General Overview					
ERC20/ BLS ICO	OTC market	Exchange and Smart Contract layer	Oracles and IoT	Data is Tokenized	Carbon Credits Tokenized

Bitlumens Tokens/Data Ownership					
Data is Tokenized using IoT and oracles	Client owns Data	Pools of Data	Client trades data for tokens by consensus	Data is sent to acquirer + Smart contract layer	Tokens can be used to get discounts on additional devices



Bitlumens Tokens/Remittances					
Remitter creates profile	Buys tokens in OTC market	Wallet Address	Sends tokens to new wallet address	Smart Contract layer	New user runs machine using tokens

Bitlumens Tokens/Carbon Credits (Not denominated as BLS Tokens)					
Agent creates KYC of user	Model carbon mitigation	Client runs machine for 1 year	Model calculates carbon mitigation	Smart Contract layer	Tokens used to get a max. 10% discount on the purchase of new machines

License the Software to a Microlending Entity

Bitlumens software can be licensed to banks (SaaS) in exchange for fees or revenue share. Bitlumens helps the Cooperative Credit Banks originate new sustainable loans, then it syndicates or sells these loans to 3rd party investors where each microcredit has a piece of hardware as collateral. This process allows for the legal creation of the loan and transfer of funds to the borrowers based on an existing banking license. On the payment side, the depository is a collaborating Cooperative Credit Bank and all members who borrow on the platform will be onboarded as a bank member with full AML/KYC and associated accounts.

Before originating a loan, agents will perform the due diligence on each interested villager, including behavioral variables. The platform will evaluate credit metrics and derive a credit score based on the collected information and on the regulatory framework adopted in each country.

Allow Certified Emission Reduction (CER) and Verification

Bitlumens measures emission reductions and allow green project verifiers to certify these reductions

Bitlumens fulfills the requirements based on the clean development mechanism (CDM) under the article 12 in Kyoto's protocol and earn sealable certified emission reduction (CER) credits. The emission reductions occur when villagers don't use biomass or kerosene as lighting source. This information is included in the measurement, verification and reporting (MVR) framework under the Paris Agreement. The methodology for measurement is taken from the intergovernmental panel on climate change (IPCC). Reporting is done through the actions taken to mitigate GHG and on adaptability measures that are considered relevant to the achievement of the climate change objectives. In addition, data verification is done through national MRV and through ICA. The idea is to license the platform to governments to visualize the emission reductions in different areas of the country based on sensors, IoT and the blockchain. This will allow clear auditability and the possibility to enter into Carbon Credit markets.





It is well known deforestation is an issue in Central America, for this reason we include sensors that measure PM2.5 and allow the verification that wood and kerosene is displaced as lighting source. In addition, we use satellite imagery to capture the reduction of deforestation in the surroundings of the villages where we operate. We use 4-band (RGB and NIR) imagery for visual or analytic use.

Leasing machines to clients

Women farmers can run the SHS using BLS tokens

Information of all Bitlumens devices such as serial number and location will be stored in the blockchain. Bitlumens is partnering with a third-party provider for biometric solutions and to run the project in the field. In Guatemala, we are partnering with Amigos de la Aldea and with Brightlight Foundation.

Example of a typical transaction: To assess the risk of each household, our agents collect KYC information from each farmer and feed the risk model with that data. The agents distribute and install the machines at the client's house. The machines are leased for a period a period of 12 to 24 months. The client makes the lease payments in BLS tokens. If needed, the client can purchase the BLS tokens for the lease payment from the agent. If lease payments are not made when due the machine is locked until the payment is made. If users receive remittances from family members to cover a lease payment, Bitlumens charges a 1% transaction fee.

Bitlumens registers the load profile of each machine that is in use. Token holders can monitor these profiles on the blockchain. Thus, they can see the evolution of the project and its environmental and social benefits.

Project timeline

We expect to have one project manager per 100 users, installing between 60-100 systems each month.

Customer defaults rates are expected to vary in each region, but for simplicity reasons our model takes 10% average rate. We choose women as final customers as data shows they are more reliable than men when it comes to payments. However, these cases need to be assessed regularly. Our model quantifies defaults over time. In case of default, the agent working in the field will collect the system back and then sell it second hand.

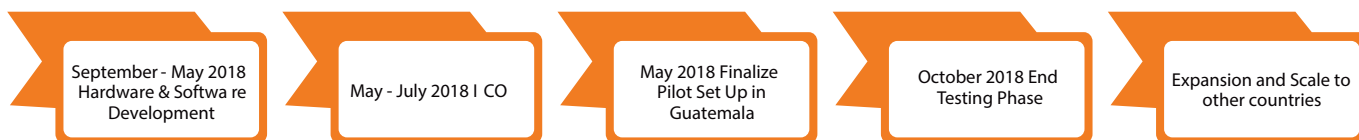
Our system gives the option to add a digital ID for each user, collecting credit data, creating credit scores and giving access to financial services at a later stage.

When it comes to the collection of IDs we plan to partner with companies who are already working with blockchain infrastructures. In India, for instance, the Aadhaar system is now accessible to more than 1.1 billion people. Users can open accounts by presenting the Aadhaar numbers. We plan to deploy a similar scheme in Latin America, where agents collect the fingerprints of our users and save





these in centralized servers supporting encryption. In addition, agents will upload the KYC, load profile while the system will calculate the credit score based on the user’s credit history. We expect to have one project manager per 100 users, installing between 60-100 systems each month. Microlending institutions are providing technical assistance while working closely with their women’s project. Hence, our goal is to train women and make them part of our team as agents. Their wages will depend on the region and are based on commissions. During the third trimester, we expect to have a regional manager to support us on scaling the project in the country.



The following table shows the breakdown of how we expect to invest the funds over a period of 3 years:

Hardware	35%
Legal	2%
Wages	35%
ICO Expenses	2%
Software development	20%
Marketing and PR	6%
Total	100%

The completed milestones are formation of two companies, one in Guatemala and one in Switzerland. BitLumens holds a certificate to import renewable technologies into Guatemala. The pilot is being successfully launched and we expect all machines to be deployed by the end of May. The beta version of the android app for agents is released in May 11 2018. The smart contract has also been developed in February 2018. Back in March 2018 we tested different Blockchain infrastructures and selected the one that fits our needs in terms of transaction costs and time to send the data to the chain.

In 2019 we expect to have the software and sensors connect to at least one microgrid to service 500 users. In addition, we are looking to expand in Q1/Q2 into Southeast Asia in countries such as Indonesia and Myanmar. We are currently speaking to different foundations who have access into rural communities in those countries.

We started the development of an API. Our web api will communicate with oraclize. Communications between Pay as you go systems front-end dashboard, loggers, and mobile app and Bitlumens back-end’s HTTPS server are via RestAPI/JSON. Bitlumens back-end system uses a PostgreSQL database to store the actual data points and IDs. It runs a full ethereum node, and is used for data retrieval and analysis. In addition, we will use Solc compiler, IBM Hyperledger, Ethereum, Java, HTML, IPFS, Native iOS/Android, PHP, Node, Golang and Haskell.

The role of the blockchain within Bitlumens operation is to record each user’s KYC information and the already predefined smart contract to preserve verifiable records of the contract’s conditions during each installment. In addition, we plan to move into microgrids once we had collected data on how much users pay per month, their load profile or electricity consumption and what is the power





generation from each device. We aim to reduce the costs of utility companies who can't build hundreds of kilometers of power line to transmit and distribute energy. Decentralized energy systems give the option to rural communities to get electrified while reducing their carbon footprint.

On Bitlumens, the only state update that can be settled on the blockchain is that of a transfer of tokens. The platform allows for fiat payments in exchange of tokens. The storage and verification of data are placed on a private chain where only investors can access. However, farmers are the sole owners of their data and Bitlumens can only access it to optimize our processes. Bitlumens can't sell the data owned by farmers.

We expect to have the smart meter ready in the second trimester as we plan to create a peer to peer network for power exchange without the need of having a power grid. The smart meter will inform the user how much power has been produced, consumed and stored into the battery which can be traded in exchange for tokens. In addition, during the second trimester of 2018 sensors will be added to the solar home system to allow verification of carbon mitigation.

Bitlumens will be working with a solar manufacturer (Greenlight) who had shipped 100 units together with the pay as you go system within a two-week period. These machines are already in Guatemala. In addition, Bitlumens had already started a pilot project in Guatemala.

Roadmap

Currently, Bitlumens follows these milestones in Latin America:

1. The deployment of 100 off grid solar devices by the end of May 2018 in Guatemala. We are already training the agents who are the distributors of the off grid solar devices.
2. Adding the software to run the hardware using BLS tokens by the end of May.
3. The deployment of IoT to track carbon and black carbon mitigation.
4. After June we will be adding solar pumps into operational locations.

Description	Concept	Proof of Concept	Prototype	Live	Growth
Developer Claims					
	<ul style="list-style-type: none"> ✓ Website ✓ Whitepaper 	<ul style="list-style-type: none"> ✓ Product Prototype ✓ Licenses 	<ul style="list-style-type: none"> ✓ Pilot Studies Beta Users ✓ Hardware 	<ul style="list-style-type: none"> ○ Clients ○ Software Prototype 	<ul style="list-style-type: none"> Scalability Additional Features

BitLumens expects to run a revenue sharing type of mechanism with mini grids. We forecast to have a ROI of 12-15% between the pilot launch and the next 3 years of operation if we reach 15000 households.





Token Specification and ICO rules

Our token is an ERC20 utility token, and aims to provide social and environmental transformation, where all proceeds will support the development of the software and MVPs currently placed in Guatemala. Bitlumens token can also be seen as a loyalty token allowing investors to show their affiliation with and support of the project. It does not represent equity.

The utility tokens are initially distributed in a presale (pre ICO) which starts on May 29 and lasts until June 18 at midnight CET. A maximum of 10 million BLS tokens are offered during the 20 days pre ICO at a price of 2 BLS /USD. Only payments in ETH and fiat currencies are accepted. Bitlumens assists parties preferring to participate in the pre ICO in fiat currency. If all 10 million BLS were sold in the pre ICO, USD 2.5 million would be raised. Tokens that were not allocated in the pre ICO will be added to the ICO pool.

The duration of the ICO is 28 days. It starts on June 19 at midnight CET and is divided into 4 periods (see Table 5). On the first day of the ICO BLS tokens are offered at a price of 1.5 BLS /USD. Between the 2nd and the 7th day, the price is 1.4 BLS/USD and between the 8th and the 14th day the price increases to 1.3 BLS /USD. Finally, during the last 14 days of the ICO the price is 1.2 BLS/USD.

	BLS /USD
Pre ICO	2
ICO Day 1	1.5
ICO Day 2-7	1.4
ICO Day 8-14	1.3
ICO Day 15-28	1.2

Table 5: ICO Price Schedule

The ICO will terminate early, if an equivalent USD 25 million have been raised. This amount corresponds to the projected funding and investment needs for a period of 3 years.

The total supply of tokens is capped to 50,000,000, with the smallest available denomination being 0.0001. The detailed allocation of BLS among the various stakeholders is shown in Table 6. 25% of the tokens will be initially held by Bitlumens in order to provide liquidity to the secondary market.

Allocation	Number of tokens (in million)	in %
Total	50	100
Pre ICO	10	20
ICO	15	30
Bitlumens	12.5	25
Team and Advisors	11.5	23
Bounty	1	2

Table 6: Token issuance

The tokens delivered for the team and advisors are vested for 18 months.





KYC/AML

All participants in the ICO phase will have to meet KYC standards that are in line with best industry practice in Switzerland. Bitlumens will also perform an AML/CFT risk assessment. Eidoo is our KYC provider, please refer to this link to add your KYC and get BLS tokens. <https://icoengine.net/ico/bitlumens>

TEAM

Veronica Garcia: CEO/Founder, Veronica Garcia has been an investment consultant at Credit Suisse and UBS. After finishing her graduate studies at the ETH in Zurich she joined the IBM Research Lab in Zurich. She had worked as a consultant for the World Bank, IADB and Castalia.

Daniel Heller: CFO. Daniel was a visiting fellow at the Peterson Institute for International Economics in 2017 where he studied the impact of emerging digital technologies such as blockchain on the financial sector, financial stability, and central banking. Previously, he was head of financial stability at the Swiss National Bank, head of the Secretariat of the Committee on Payment and Settlement Systems at the Bank for International Settlements, and Executive Director for Switzerland, Poland, Serbia, Azerbaijan, and four Central Asian republics at the International Monetary Fund. He received his PhD from the University of Bern and was a research fellow at Stanford University. He is also affiliated with the Centre for Blockchain Technology at University College London.

Yash Patel: Frontend Developer: Yash is working as a Software Engineer at Onata. Expertise in leveraging front-end technologies to develop high end web application using Angular, Bootstrap, HTML5 and React JS. Fundamental mastery of the AWS cloud computing platform, and its many dimensions of scalability - including but not limited to: VPC (Virtual Private Cloud), EC2, Load-balancing with ELB, Cloud Formation, Cloud Watch, the AWS API and different toolkits for instrumenting it.

Thomas Kansy: Carbon Credit Specialist, Advisor. Thomas is an experienced quantitative modeler and designs and carries out complex research on the relationship of asset values and regulation. Thomas has worked with a broad portfolio of public and private clients, including multinational energy companies, multi-lateral organisations such as the OECD and World Bank, governments across the world, and the European Commission.

Ram Kumar: CTO. Ram Kumar, an entrepreneur and a visionary in blockchain and digital advertising technologies for the better part of this decade, having pioneered a handful of featured solution and continues to head few companies. Moving ahead with a keen motive of being a catalyst in the dynamic world of technology, he ventured into blockchain even when it was at its infant stage. Being the founder and CEO of Scala Blockchain, one of the leading blockchain technology specialists, serving a wide array of industries and a magnitude clientele spanning across the globe; with Dapps, ICO, and Crypto solutions being the core expertise among other services.



Mihaela Ulieru: Big Data Expert Advisor, Mihaela is a Blockchain champion at the World Economic Forum where she advocated to list it in the 2016 Top 10 Emerging Technologies, developed in collaboration with Scientific American. Mihaela's research in distributed intelligent systems created a strong foundation for governance on Blockchain as an institutional technology for its role in revolutionizing manufacturing, logistics and homeland security. Mihaela has been awarded the "Industrial Research Chair in Intelligent Systems" and the "Canada Research Chair in e-Society" and holds numerous board appointments including the Science Councils of Singapore, Canada and European Commission and to the Global Agenda Council of the World Economic Forum. She is a Global Leader with the Aspen Institute and President of the IMPACT Institute for the Digital Economy.

Herbert Sterchi: Advisor. Herbert has been the Lead Finance at Thomson Reuters Global Resources. He specialized in accounting processes, SAP implementation and audits based on IFRS. He had pioneered controls and procedures, bringing increased accountability to technology and content development and reducing overall spend while increasing product functions and features and reducing time to go to market.

Jim Kyung-Soo Liew: AI Expert, Advisor. Jim is an Assistant Professor of Finance at Johns Hopkins Carey Business School and revels in pushing the boundaries of financial knowledge and product development both as an academic and FinTech Data Scientist. He has published pioneering research in the intersection of social media big data, crypto-currencies, and financial markets. He currently teaches "Big Data Machine Learning," "Advanced Hedge Fund Strategies," and "Leading Entrepreneurship and Innovation" at the Johns Hopkins Carey Business School. Additionally, he serves as the Chairman of the Johns Hopkins Innovation Factory and has received the Dean's Award for Faculty Excellence 2015-2017.

Saiprasad V Bhosle: Project Manager. Saiprasad V. Bhosle has been associated with Futran I.T solutions as Market analysts. For Bitlumens he brings 6 years of experience in project management. With strong academic background in masters in business administration and information system he as supported various startup in strategizing their market analysis with the help of various research and analytics methods. Being Certified I.T project manager and Business process management he created his own identity in managing project right from scheduling to delivery. He as been actively involved in evolving various project both in India and United States.

Joao Santos: Advisor. Joao Santos is a Computer Engineer (PUCRS/Brazil) with a master in biomedical engineering (PUCRS/Brazil) and another in microelectronics (EMSE/France). He has a multidisciplinary curriculum and had experience from the chip design, embedded solutions and also with high level software applications. He worked as a chip designer, project manager, product and application engineer, web and app developer. He developed several applications focused in low-power using RFID, WiFi, BLE, LoRa among others.



Mircea Davidescu: Big data and Analytics Expert. Mircea Davidescu is a big data and analytics expert, working both in the private sector and academia. He has implemented big data solutions and served as an advisor on analytics for Fortune 500 companies in numerous industries. He holds a Ph.D from Princeton University, where he sharpened his big data, analytics, and machine learning skills tackling some of the most difficult challenges in collective behavior and decentralized communication and coordination. Mircea served in numerous advisory and leadership roles, including as President of the Graduate Student Government and executive on the Council of the Princeton University Community, advising the University President and Provost. A published author of both science and history, he received numerous awards including Canada's NSERC Julie Payette Doctoral Fellowship, awarded each year to the nation's 24 most promising young minds.

Megan Kernis: Engineer, Advisor. As a solar engineering consultant with a focus on emerging economies, Megan has a passion for bringing equity and diversity into the renewable energy sector. She holds a Masters in Civil Engineering from Stanford University and has worked for various Bay Area solar companies, including overseeing a national solar quality assurance program with Sunrun. She has also actively participated in the funding, design, and installation of solar and micro hydropower projects in Thailand, Burma, and Ethiopia. In 2016, Megan started Solar Stewards, LLC, serving as a technical advisor to commercial- and utility-scale projects in the US and the Caribbean.

Nihaz Rahman: Blockchain Enabler, Advisor. Nihaz is a blockchain enabler and founder of Oovya LLC, a blockchain and ICO advisory startup based out of Dubai. He is a Certified Bitcoin professional, Project Management Professional and Scrum Master. Nihaz has over a decade of expertise in Enterprise IT implementations related to CRM, Business Process Reengineering and Fintech. He brings to BitLumens a wealth of information related to component selection in the blockchain architecture and ICO management.

Ana Lucrecia Castellanos: Business Developer. Ana Castellanos, has her own family business. Ana has also worked with Guatemalan communities for more than 20 years. She is a true entrepreneur and visionary who had educated children to respect the planet, take care of it and share those values with others. Ana helps BitLumens with Business development and introduces the technology into new communities.





BLS TOKEN LEGAL INFORMATION

A. GENERAL INFORMATIONS

1. In order to fund the development of the BitLumens GmbH, BLS Tokens (["Token"]) will be created on the Ethereum blockchain and will be sold to the public (the "ICO Placement").
2. BLS Tokens will be issued by a technical process that uses the «Blockchain» technology. This is an open source IT protocol over which the BitLumens GmbH has no rights, control or liability in terms of its development and operation. The BLS Token distribution mechanism will be controlled by a Smart Contract; this involves a computer program that can be executed on the Ethereum network or on a blockchain network that is compatible with Smart Contract programming language.
3. BLS is a token
 - that will allow the user to access the service provided by the BitLumens platform (Utility Token)
4. The sale of BLS Token is final: the Token is non-refundable and not redeemable.
5. As of the day of the ICO Placement, BLS Token does not have the legal qualification of a security pursuant to Swiss Law and is therefore not qualified as an Asset Token pursuant to the Guidelines (the "Guidelines") issued on February 16, 2018 by Swiss Financial Market Supervisory Authority ("FINMA").
6. BLS Token does not have a performance or a particular value outside the BitLumens Platform. BLS Token shall therefore not be purchased or used for speculative or investment purposes.
7. As of the day of the ICO Placement, the BLS Token sale is currently not subject to the Federal Act on Stock Exchanges and Securities Trading Law and the Financial Market Infrastructure Act, which ensure that the sale of certain products or assets is subject to regulatory scrutiny for the investors' protection and may only be sold to investors provided that, inter alia, the respective documentation include all the proper disclosures and that the sale of investments.

B. TOKEN DOCUMENTATION

8. This white paper (the "White Paper") together with the BLS Token Terms and Conditions (the "Terms & Conditions", www.bitlumens.com), as amended from time to time, shall form the entire documentation for the BLS Token sale (the "Token Documentation").

C. KNOWLEDGE REQUIRED

9. Any purchaser of BLS Token (the "Purchaser") shall understand and have significant experience of cryptocurrencies, blockchain systems and services, and understand the risks associated with the crowdsale as well as the mechanisms related to the use of cryptocurrencies (including the storage).



10. The Purchaser shall carefully review the Token Documentation so to understand the risks, costs and benefits associated with the purchase, storage and use of BLS Token.

D. RISKS

11. Acquiring BLS Token and storing them involves various risks, in particular (but not limited to) the risk that BitLumens GmbH may not be able to launch its platform and/or its operations, to develop or exploit its blockchain and/or to provide the services to which the BLS Token relates or is forced (in particular due to changes in the legal environment and/or issuance of new laws or regulations and/or new leading interpretation of current legal framework and/or case law, which might also have a retroactive effect) to stop its operations or change its business model.

Therefore, and prior to acquiring BLS Token, any user should carefully consider the risks, costs and benefits of acquiring BLS Token in the context of the crowdsale and, if necessary, obtain independent legal and tax advice in this regard.

12. Any interested person who is not in the position to accept or to understand the risks associated with the activity (including the risks related to the non-development of the BitLumens platform) or any other risks as indicated herein or in the Token Documentation) shall not acquire the BLS Tokens.

E. NO INVESTMENT INVITATION

13. This White Paper shall not and cannot be considered as an invitation to enter into an investment. It does not constitute or relate in any way nor should it be considered or interpreted as an offering of securities in any jurisdiction.

14. The White Paper does not include nor contain any information or indication that might be considered as a recommendation or that might be used to base any investment decision.

15. This document does not constitute an offer or an invitation to purchase shares, bonds, securities or rights relating to BitLumens GmbH or to any related or associated company (the "BitLumens Group").

F. NO SECURITY

16. BLS Token are not convertible in shares or certificates of the Company or BitLumens's Group and do not grant any right to receive any such share or certificate.

17. BLS Tokens do not confer any direct or indirect right to BitLumens GmbH's or BitLumens GmbH's Group capital or income and, in particular, do not grant any right to dividends or interests or to any other share or participation to the BitLumens GmbH or BitLumens GmbH's Group revenue or earnings.

18. BLS Token is not proof of ownership of any assets belonging to the Company or BitLumens GmbH's Group or of a right of control over BitLumens GmbH or BitLumens GmbH's Group and does not grant to the owner any right to assets of BitLumens GmbH or BitLumens GmbH's Group.





19. BLS Token are not shares or participation certificates and do not give any right to participate to, or vote in, the general meeting of BitLumens GmbH or BitLumens GmbH's Group or to influence in any way the respective corporate governance or the decisions of the corporate bodies of the Company or BitLumens GmbH's Group.

20. Subject to Article G. below, based on the above, at the date of the ICO Placement, the Company considers that BLS Token does not have the legal qualification of a security pursuant to Swiss Law and does therefore not qualify as an "Asset Token" in Switzerland as interpreted by FINMA in the Guidelines.

21. Pursuant to the Guidelines and current practice, the BLS Token is a utility token which can be used only on gives access to the BitLumens platform and is not intended to be used as an investment.

22. The offering of BLS Token on a trading platform is done to allow additional users to use and/or to access to the BitLumens platform and not for speculative purposes and does not change the legal qualification of the token as a utility token.

G. CHANGES IN THE LEGAL ENVIRONMENT

23. The ICO Placement and the purchase of BLS Tokens is taking place within a legal environment that is still under development. Regulatory authorities are carefully scrutinizing businesses and operations associated to cryptocurrencies in the world.

24. Regulatory measures, investigations or actions may impact BitLumens GmbH's business and even limit or prevent it from performing or developing its operations.

25. Any person acquiring BLS Token shall be aware that BitLumens 's business model and the Token Documentation may change because of new legal, regulatory and compliance requirements from any applicable laws in any jurisdictions, even with retroactive effect. In such a case, Purchasers and anyone acquiring BLS Token acknowledge and accept that neither BitLumens GmbH nor any of its affiliates shall be held liable for any direct or indirect loss or damage caused by such changes.

26. BitLumens GmbH is, as of the date of issue of this White Paper, not a financial intermediary according to Swiss Law and is not required to obtain any authorization for Anti-Money Laundering purpose. This qualification may change at any time if the services offered by BitLumens GmbH will be considered as a financial intermediation activity pursuant to applicable law. Notwithstanding the aforesaid, the purchase of the BLS Token may be conditional upon the positive conclusion of an AML/KYC identification process and the Purchaser may be required to provide to BitLumens GmbH all requested documents and information necessary or useful to BitLumens GmbH to complete the AML/KYC process.

H. THIS IS NOT AN OFFER – NO INVESTMENT ADVISE – NO REPRESENTATIONS AND WARRANTIES

27. This White Paper shall not be construed as an offer, personal recommendation or solicitation to conclude a transaction and should not be treated as giving investment advice.

28. BitLumens GmbH is not to be considered as an advisor in any legal, tax or financial matters. Any





information in the white paper is given for general information purpose only and BitLumens GmbH does not provide any representation and/or warranty as to the accuracy and completeness of the information included in the White Paper.

29. Given the lack of qualification of the crypto-token in most countries, the Purchaser is strongly advised to carry out a legal and tax analysis concerning the purchase and ownership of BLS Token according to his/her/its nationality and place of residence.

I. IMPORTANT INFORMATION AND DISCLAIMER

30. BitLumens GmbH will do its utmost to launch all of its operations and to further develop the BitLumens GmbH platform and/or provide the services highlighted in this White Paper. Anyone undertaking to acquire BLS Token shall be aware that BitLumens GmbH does not provide any guarantee that it will be able to fully achieve the project highlighted in this White Paper.

31. By subscribing BLS Token the Purchaser acknowledges and accepts that the BitLumens GmbH assumes no liability or responsibility for any loss or damage that would result from or relate to the Purchaser failure to receive (or to timely receive) the BLS Tokens or to the incapacity to use BLS Tokens, as well as for any failure or malfunction of the respective Smart Contract, except in case of intentional misconduct or gross negligence directly attributable to the Company.

32. BLS Token is based on the Ethereum protocol. Any malfunction, unplanned function or unexpected operation of the Ethereum protocol may cause the BitLumens GmbH network or BLS Token to malfunction or operate in a way that is not expected. Moreover, the native Ethereum Protocol account unit may itself lose value in a similar way to BLS Tokens, and also in other ways. BitLumens GmbH assumes no liability or responsibility in this respect except in case of intentional misconduct or gross negligence directly attributable to the Company.


33. BitLumens GmbH assumes no liability or responsibility whatsoever for any loss of BLS Token or situations making it impossible to access BLS Token, which may result from any actions or omissions of the User, as well as in case of hacker attacks.

J. USER REPRESENTATIONS AND WARRANTIES

34. By participating in the ICO Placement and by purchasing BLS Tokens the Purchaser confirms that he/she/it:

- has read and understood the Token Documentation and accepts to be legally bound by its terms;
- has sufficient knowledge about the nature of the cryptographic tokens and has significant experience with, and functional understanding of, the usage and intricacies of dealing with cryptographic tokens, cryptocurrencies and blockchain-based systems and services;
- has fully understood and accepts the risks connected with the purchase of the Token outlined in the Token Documentation, including those related to possible changes in the legal environment;
- is familiar with all related regulations, in particular (but not limited to) in the specific jurisdiction in which the Purchaser is based, and has received competent advice that participating to ICOs and purchasing cryptographic tokens is not prohibited, restricted or subject to additional conditions of any kind;



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- is entitled to purchase [Tokens] in the ICO Placement without requiring any local authorization and is in compliance with the local, state, and national laws and regulations when purchasing;
 - is authorized and has full power to purchase BLS Token;
 - is not and will not be at the time of the ICO Placement a U.S. citizen, resident or entity (a "US Person") nor is the Purchaser purchasing BLS Tokens on behalf of a US Person;
 - is not and will not be at the time of the ICO Placement a Chinese resident or entity nor is the Purchaser purchasing BLS Tokens or signing on behalf of a Chinese resident or entity;
 - will not use the ICO Placement for any illegal activity, including but not limited to, for money laundering and/or the financing of terrorism;
 - the purchase and storage of the Token will not constitute a violation or breach of any applicable law by the Purchaser, in particular in his country of residence or citizenship;
 - purchases BLS Token because he/she/it wishes to have access to the BitLumens GmbH platform; and
 - is not purchasing BLS Token for the purpose of speculative investment or usage.

K. GOVERNING LAW – ARBITRATION

35. The Token Documentation, the BitLumens GmbH ICO operation and the purchase of the BLS Tokens shall be governed by and construed in accordance with the substantive laws of Switzerland without regard to the conflicts of law rules and without regard to the rules of the Vienna Convention on the International Sale of Goods dated 11 April 1980.

36. Any dispute, controversy or claim arising out of or in connection with the Token Documentation, the ICO Placement and/or the purchase of the BLS Tokens, shall be finally settled in accordance with the Swiss Rules of International Arbitration of the Swiss Chambers' Arbitration Institution in force on the date on which the Notice of Arbitration is submitted in accordance with these Rules. The number of arbitrators shall be 3 (three), the arbitrators to be appointed in accordance with the said Rules. The seat of the arbitration shall be Lugano, Switzerland. The language of the arbitration shall be English.