CONSENSYS

# University of Rwanda x ACEIoT x Blockchain EXE

August 2018

# ConsenSys

ConsenSys is the largest blockchain company in the world. We are a global team of 800+ entrepreneurs, computer scientists, designers, engineers, and business leaders laying the foundations of a decentralized world.

## VENTURE PRODUCTION

Incubate core developer tools and new companies that develop dApps on the Ethereum blockchain

## CONSENSYS SOLUTIONS

Consult and deliver production ready blockchain solutions for the enterprise and government markets

## CONSENSYS CAPITAL

Token services including diligence, token structuring, investor access, business dev., and more

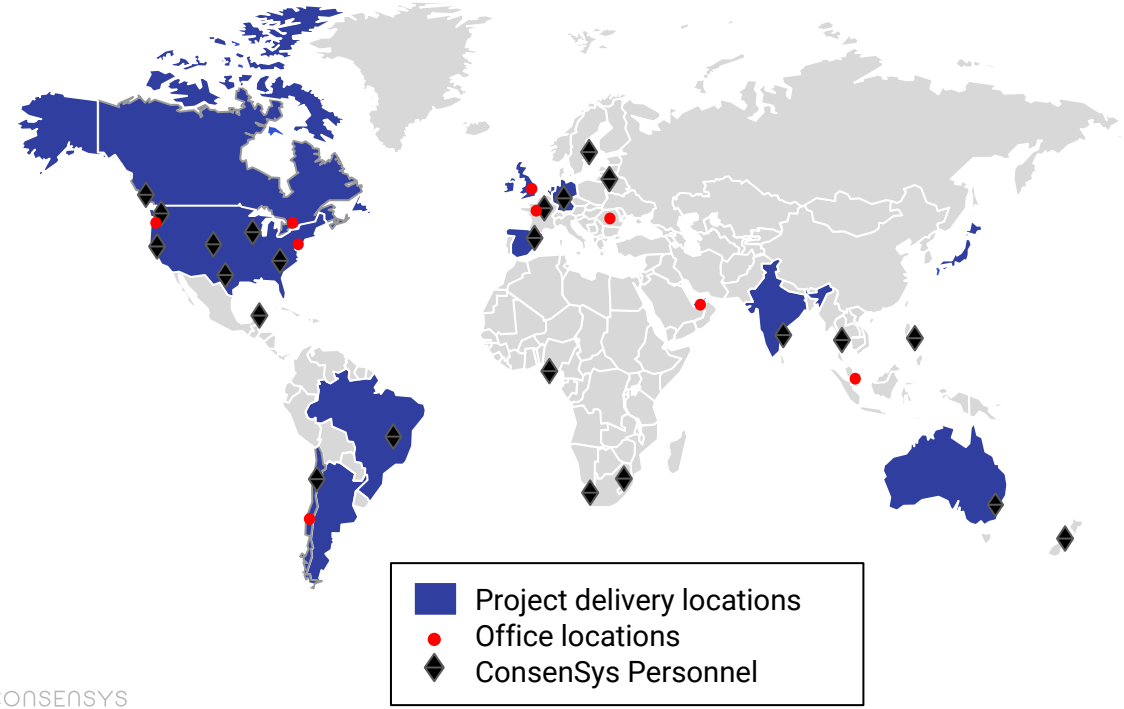
## CONSENSYS ACADEMY

Educate developers and entrepreneurs about Ethereum through structured training programs

**Our mission is to** assemble the tools needed to build and scale the **emerging economic and social system for the planet.**

# ...and global delivery

900+ blockchain experts, entrepreneurs, computer scientists, designers, engineers, consultants, and business leaders with delivery experience across 6 continents




Santander

J.P.Morgan

bhpbilliton

WWF

SMART DUBAI

HAPPY LIVING

MAS

Monetary Authority of Singapore

TOP 5 ENERGY COMPANIES

# Dubai will be the first city fully powered by blockchain by 2020

His Highness Sheikh Hamdan bin Mohammed Al Maktoum
On the launch of the Dubai Blockchain Strategy, October 5 2016

# Where we began

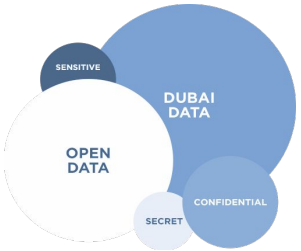
The Winter 2016 cohort of the **Dubai Future Accelerator** had over a *dozen* different blockchain companies participating, including ConsenSys.

مؤسسة دبي للمستقبل
Dubai Future Foundation

حكومة دبي
GOVERNMENT OF DUBAI
مسرعات دبي المستقبل
DUBAI FUTURE ACCELERATORS

ConsenSys' Landstream Registry project, contracted by Dubai Properties and Dubai Holding, not only represents a Blockchain 2020 initiative, but in fact a broader platform for the **Dubai Data Initiative**.

The Dubai Government has embarked upon a programme to transform Dubai into the Smartest, Happiest City in the world. Dubai's vision is contingent upon the **free flow of information**, supported by initiatives such as the Blockchain 2020 Mandate.




دبي الذكية
SMART DUBAI
HAPPY LIVING لحياة أسعد

March 14th, 2017 -- ConsenSys has been named the **official Blockchain Advisor for the City of Dubai**. This is the first ever citywide effort to implement blockchain technology led by the Smart Dubai Office under the leadership of Her Excellency Dr. Aisha Bin Bishr, who serves at the organization's Director General.

# City Advisory Track

## Blockchain Enablement Objectives

- Introduce blockchain technology and roadmap
- Educate entities and enable IT organizations
- Guide entities through technical design for first use cases
- Develop the blueprint for Blockchain Platform as a Service (BPaaS)

2016 | 2017 | 2018

**>60**
**blockchain workshops completed**

**20+**
**use cases designed**

**10X**
**winning use case**

**7+**
**entities dev teams trained**

# Energy

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# Four Key Trends Shaping Energy Markets

**Decarbonization -** As solar comes to represent an increasing proportion of power mix, our supply is increasingly intermittent. Since supply and demand need to matched on a continuous basis, we will need smarter demand side management

**Digitization -** Rapid deployments in smart grid technologies, AI, IoT and other connected devices offer greater visibility and control than ever before. It also creates new requirements for coordination, interpretation and data security

**Decentralization -** Unlike traditional centralized plants, renewable assets are being connected to grid. This introduces new challenges such as two-way power flows and need for greater visibility. This also introduces potential for new pricing models

**Democratization -** Increasing desire for more active role in the energy market will lead to rise of prosumers leading to more parties participating in the energy value proposition

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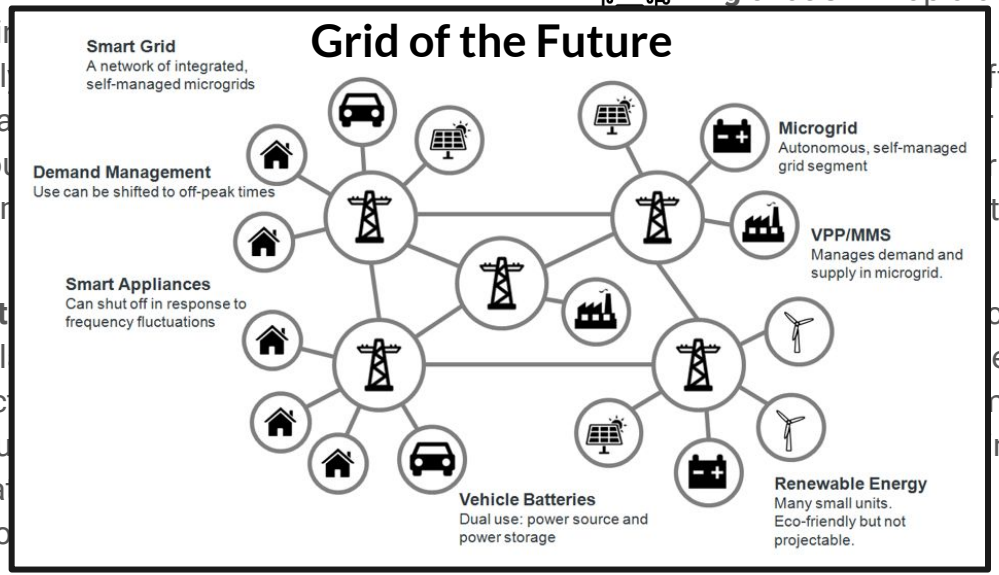


**Energy supply chain is poised to become highly complex to manage in terms of energy assets, transformers, transmission networks, distribution lines, end users, metering entities, system operators, policy makers, and myriad new technologies**

# Blockchain applications throughout the power sector

## Generation

1. **Secure power generation** and **supply data transcribed to blockchains** allow for visibility, security, and accuracy

**Renewable energy credits** based on actual production are autonomously awarded and traded

## Transmission & Distribution

**Wholesale power is traded via smart contracts** that minimize the need for brokers

**Blockchain enabled sensors and controls** allow for secure, centralized data and improved grid resilience

## End User

**Real time customer-utility interactions** facilitate faster payment cycles, more efficient energy use, and streamlined account management

1. P2P microgrids run autonomously with **blockchain managing contracts for energy flows and instant payments**

2. **EV's seamlessly connect with infrastructure** executing transactions through smart wallets

**Smart home appliances coordinate electricity purchase and use with grid**, promoting grid efficiency and extending appliances' useful life

# DERs and Grid Management

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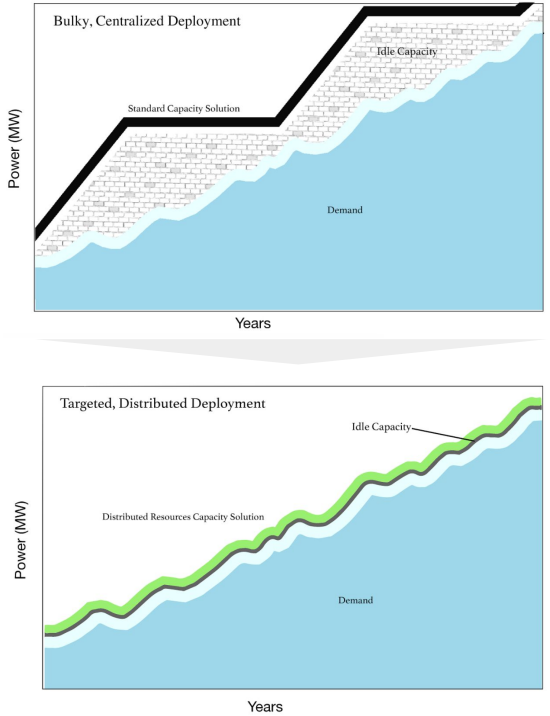
# Blockchain will enable Distributed Energy Resources (DERs)

•Growth of DERs offers the opportunity for increasing grid flexibility and reducing potential costs of wasted capacity

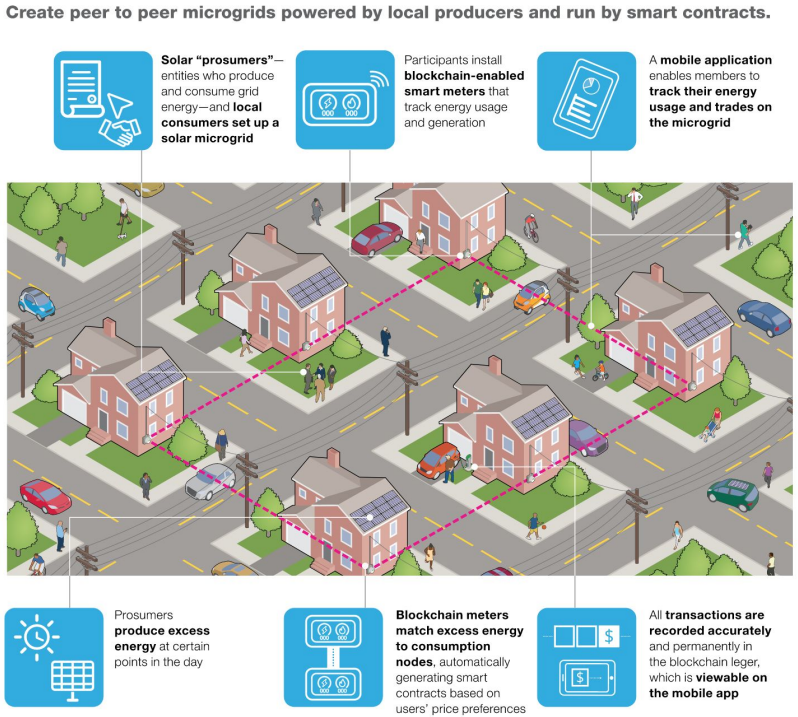
•Globally, Renewable Energy initiatives have allowed consumers to sell surplus electricity back to the grid and thus incentivizing individual power production

•DERs have raised the challenge of metering and billing: both sides need a way to accurately measure how much electricity is provided into the power-grid, and how this impacts the final bill

•Blockchain's low transaction costs allows P2P power generation and distribution system through microgrids: Smart contracts facilitate the real-time coordination of production data from solar panels, and execute sales contracts that allow for two-way energy flows throughout the network



# Blockchain and DERs



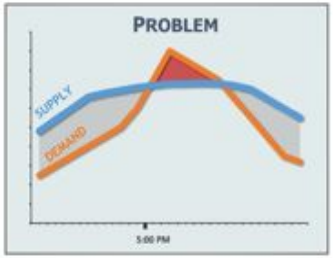

## Value Proposition

- Lower barriers to entry for small prosumers to sell excess energy
- More efficient power allocation based on real time demand
- Greater grid resilience to emergencies and blackouts by diversifying power sources at the edge of the grid
- Limited role of centralized trade exchanges and trade verification agencies

# Blockchain based Grid Management for DERs

•Until now, progressive utilities have implemented event-based Demand Response (DR) system where they request the shedding of load from consumers. This is done through a central server that collects all data and takes centralized management and makes coordination decisions

•Self-enforcing smart contracts are defined and used to implement in a programmatic manner the levels of energy demand flexibility the prosumers may provide during DR events, associated incentive and penalty rates, as well as rules for balancing the energy demand with the energy production




| Issue | Traditional Approach | Blockchain Approach |
|---|---|---|
| Single Point of Failure | Yes | No |
| Energy Profile Anonymity | No | Yes |
| Payment System | Centralized | P2P sales/purchase system |
| Payment Settlement | By Central Authority (multiple days) | Through Consensus between all nodes (near real time) |
| Demand Response Programs | By Central Authority | Autonomous signaling through node cooperation and smart contracts |
| Energy Agreements Verification | By Central Authority | Through consensus between all nodes |

# Electric Vehicle Charging

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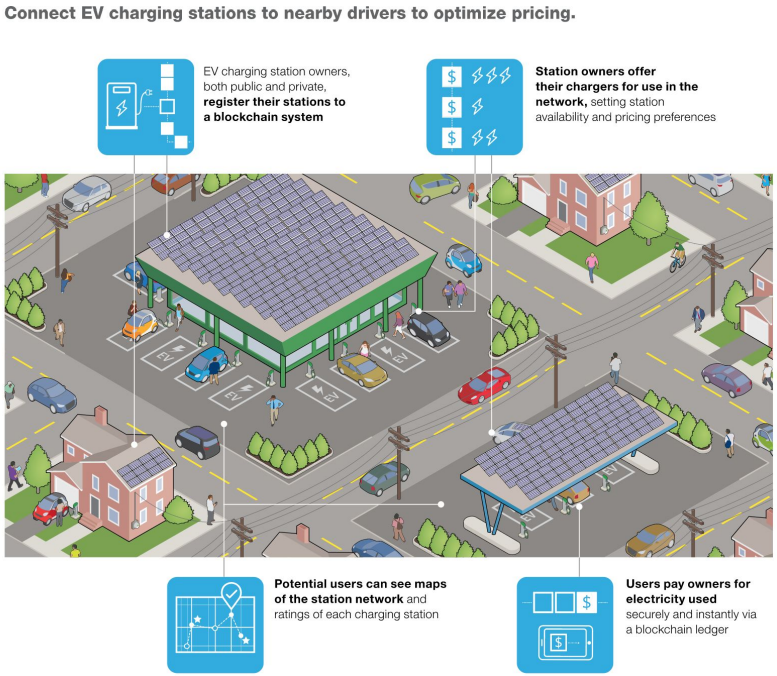
# Blockchain for EV Charging

- Two main factors are preventing a mass adoption of electric vehicles: lack of available charging station infrastructure and lack of interoperability between the existing charging stations
- Decentralizing charging stations will allow individual home owners to install, own and earn revenue by letting other EV owners charge using their charging post in a P2P fashion
- P2P would also enable the use of EVs for Vehicle-to-Grid (V2G) applications



# Blockchain for EV Charging

•Currently users pay for the amount of time spent connected to the charging station – generally an amount in hours

•By operating a smart contract on Ethereum blockchain, the charging station can act as a point at which both customer authentication and processing of payments takes place

•Users now pay for the amount of electricity consumed during the charging process which will save them money through use of microtransactions and electricity would be deployed more efficiently

**Value Proposition**

- Simplified billing
- Decentralized architecture
- Transparency
- Incentive built reservation system
- Open-source helps in onboarding new partners
- Efficient maintenance and repair protocol

# ConsenSys Energy Track Record

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# Track record

36 months of Ethereum energy product development has generated significant IP and has endowed ConsenSys Energy with an advantageous position with regards to the decentralized energy ecosystem

| ***Platform Actors*** | **Prosumers & Consumers** | **Direct marketers** (demand side aggregators) | **Energy suppliers** (supply side aggregators) | **Energy traders** |
|---|---|---|---|---|
| ***Platform Features*** | Exchange & trading engine | Identity management & reputation systems | State channels | |
| | Provenance tracking | Platform APIs | Settlement layer | |
| | Autonomous agents | Physical device integration | Robust registration system | |

May 2015 - Nov 2015

**Brooklyn Microgrid**

- First ever energy focused PoC on Ethereum
- Connected neighbors on a microgrid via smart contract tokens
- Informed direction for future business models

Feb 2016 - Nov 2016

**Co-Tricity**

- Joint development with Innogy
- Business model focused on connecting prosumers to local businesses
- Investigated the combination of futures markets with a prosumer's generative surplus

Nov 2016 - Nov 2017

**Fortune 500 Engagements**

- Robust multi-application development
- Fully decentralized exchange
- Automated trading functionality
- Administrative toolset capabilities
- Smart device on chain registration
- Support for autonomous agents

# Grid +

GRID+

**$50+M**

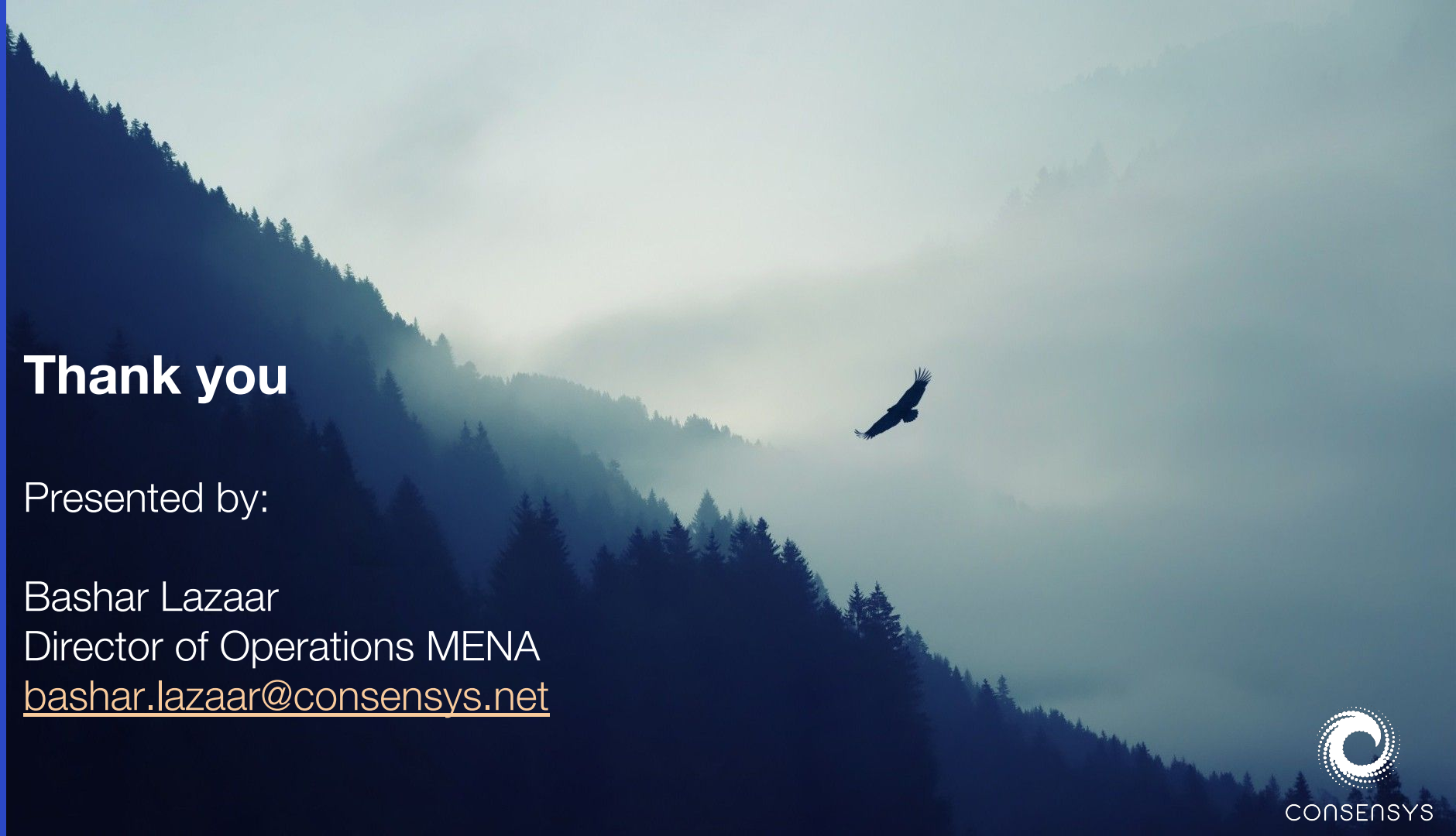
**Raised through a Token Sale in 2017**

**100**

**Household customers by Q4 2018**

**3 Utilities**

**Currently evaluating licensing the technology for their services**



# Thank you

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