The Role of Blockchain in the Energy Transition

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moderated by

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Tonight’s twitter hashtag:
#BlockchainEnergy
@GCRI_NY  @HS_Fresenius
The Role of Blockchain in the Energy Transition

6/18/2018

Prof. Dr. Jens Strüker
SÜWAG Foundation Professorship of Energy Management, Fresenius University of Applied Sciences
Managing Director of the Institute of Energy Economics (INEWI)
What is a Blockchain?

It’s “everything you don’t understand about money combined with everything you don’t understand about computers”

John Oliver
Last Week Tonight, published on Mar 11 2018
What is a cryptonetwork?

- A Cryptonetwork is a **decentralized network** built on top of the internet that **provides** a wide variety of **digital services**.

- **Tokens** are the **internal currency** of cryptonetworks, and the **incentive mechanism** which enables them to function.

- A **blockchain** is the **underlying technology**.

Source: Nick Grossmann, USV: What are Cryptonetworks and Why are Tokens Fundamental?

Prof. Dr. Jens Strüker, Managing Director of the Institute of Energy Economics (INEWI)
If blockchain is the solution, what is the problem?

Prof. Dr. Jens Strüker, Managing Director of the Institute of Energy Economics (INEWI)
Intermediation
Direct Exchange in Real-time

- Integrity through immutable data records
- Exchanging physical transactions and a financial value in real-time
- Sharing and ownership transfer

Digital Token = physical value of energy
The system can not yet take advantage of DERs

Prof. Dr. Jens Strüker, Managing Director of the Institute of Energy Economics (INEWI)
No Data Sovereignty
Network Effects and the Bootstrapping Problem
Traditional Network Effect

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Token Network Effect

Financial utility

Overall utility = financial application utility

Application utility

Prof. Dr. Jens Strüker, Managing Director of the Institute of Energy Economics (INEWI)
Shared Investments

Blockchain

Smart Contract

Blockchain
Enabling 100% Clean Energy for All: The Role of Blockchain in the Energy Transition

Ashley Pilipiszyn
SLAC National Accelerator Lab

June 18, 2018
Blockchain in Energy Exploded Over the Past Year

$450 Million invested in blockchain in energy

>150 Companies working in blockchain in energy

>50 Projects happening globally
As of Q1 2018, 40 Deployed and 33 Planned Public Demonstrations, Pilots and Projects

Source: GTM Research
In a series of pilots, Oslo2Rome pilot with 7 industry partners. EV drivers tested the interoperability of a single e-mobility wallet for charging across multiple countries.

- Hardware: multiple vendors’ EV chargers
- Implementor: MotionWerk
- Blockchain: Ethereum

39 companies have been taking part in the wholesale trading pilot to replace wholesale market middlemen with a cheaper blockchain-based trading platform.

- Implementor: Ponton
- Blockchain: Tendermint

TSO TenneT will be able to send signals via blockchain to manage residential storage systems as a way to provide flexibility in the energy market.

- Hardware: sonnen batteries
- Implementor: IBM
- Blockchain: Hyperledger Fabric
**DISTRIBUTION MANAGEMENT**

Omega Grid software is operating on-site at the Stone Edge Microgrid to test the blockchain-based software’s ability to calculate optimal power flow and locational price for each asset on 5-minute interval and accept the best bids from assets to control load.

- Implementor: Omega Grid
- Blockchain: In-House

**CYBERSECURITY**

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June 18, 2018
A reimagined energy marketplace
Local community microgrids

Prosumers:
• Make their generation available to the local market
• Price signals delivered to influence self-consumption and asset performance

Consumers:
• Set preferences for energy mix and prices
• Purchase local clean energy
DSO-operated demand response and grid services platform that exposes the Value Stack and moves towards a system based on grid efficiency.
By 2040, 1 billion households and 11 billion smart appliances could actively participate in interconnected electricity systems.

The Role of Blockchain in the Energy Transition

Andrew Reid, Senior Planning Analyst, Utility of the Future
June 18, 2018
### NY Reforming the Energy Vision

**Track One: Implementation**

*Distribution-level market design, technical platform, integrated system planning & operation, new utility business models, ownership of DER (Order issued Feb 2015)*

**Utilities will be the Distributed System Platform (DSP)**

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<th>Core DSP Components</th>
<th>Integrated Distribution System Planning</th>
<th>Grid Operations</th>
<th>Market Operations</th>
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<td>Hosting Capacity Maps</td>
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<th>Supporting Functions</th>
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<td>Advanced Metering Infrastructure</td>
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<td>Digital Customer Experience (DCX)</td>
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<td>Maintaining Cybersecurity</td>
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<td>Alignment with Corporate IT Strategy (e.g., CIS, GIS)</td>
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Note: This list is not collectively exhaustive, but represents of the core components of the DSP that are likely to be implemented in the near, medium and long term – [Distributed System Implementation Plan](#).
Blockchain’s properties closely matches the needs of the future DSP

**SECURITY**
Blocks of data are *linked and secured using cryptography*, creating an “immutable” add-only ledger

**ROBUSTNESS**
Ledger is stored, maintained and updated simultaneously across many different participating computers, *eliminating point of failure* and ensuring continuity

**TRANSPARENCY**
Transactions on ledger are *reviewed and visible to all participants*, ensuring trust and mitigating fraud

**SCALABILTY**
*High leverage features* such as smart contracts allow users to automate granular processes, allowing for “set up and leave” actions

**DEMOCRATIZATION**
Decentralized and broad nature of participation *encourages user engagement* and *promotes buy-in*

Power generation is decentralized in units throughout the network. Complex load-generator relationships. Large volume of real-time digital information exchange.
Blockchain, Blockchain, Blockchain ...

I THINK WE SHOULD BUILD A BLOCKCHAIN

DOES HE UNDERSTAND WHAT HE SAID OR IS IT SOMETHING HE SAW IN A TRADE MAGAZINE AD?

WHAT COLOR DO YOU WANT THAT BLOCKCHAIN?

I THINK MAUVE HAS THE MOST RAM.
Blockchain can help address challenges and capture opportunities capabilities can help meet its priorities and strategic objectives

Internal SME Engagement & Roadmapping

Utility Collaboration

A ROADMAP FOR IMPLEMENTING BLOCKCHAIN AT CON EDISON
MAY 2018

Slide Share – Utility Applications of Blockchain
Thank you!

Andrew Reid, Senior Planning Analyst, Utility of the Future

June 18, 2018
How are you using blockchain to reimagine your industry?

In this Transformative Age, looking at digital from every angle will unlock new opportunities.

ey.com/fsinsights #BetterQuestions

The better the question. The better the answer. The better the world works.