The Future of Energy
And the role of Distributed Ledger Technology

8th Smart Grids Cleanpower
2017 Conference
Cambridge, UK 19-20 June
www.cir-strategy.com/events

...follow up 9th SGCP18 26-27 June Cambridge

Erwin Frank-Schultz
Technical Leader
Utilities & Infrastructure

June 2017
Agenda

1. Technology disruption
2. Strategic Capabilities for Utilities
3. DLT and Blockchain
4. Case Studies
5. Glimpse Into the Future
Technology Disruption
Utilities are disrupted by four types of technology

I. Energy Technology
- Distributed Energy Resources
- Solar PV
- Fuel Cells
- Microgrids
- Electric Vehicles
- Wind
- Storage

II. Consumer Technology
- Smart Appliances
- Prosumer Enablement
- Convergence of Industries
- Social Networks
- Cognitive Computing
- Blockchain
- Big Data & Analytics
- Mobile
- Cloud

III. Information Technology
- Internet of Things
- Mobile
- Cloud

IV. Grid / Operational Technology
- Automated Demand Response
- Embedded Systems
- Process Equipment
- Smart Grid/Grid Digitization
- Situational Awareness

Disruption
- Lower marginal cost of production
- Empowered consumers have viable alternatives at grid parity
- Digitally enabled business models emerge (asset-light ecosystems)
Energy & Utilities Industry Model Shift
The Energy & Utilities industry model is fundamentally shifting and becoming decentralised. As a result, more and more assets are stranded, raising financial pressures on incumbents.
Future Energy & Utilities Industry Models
Emerging new business models transform the traditional utility value chain by integrating energy on the back of more flexible and digitally enabled ecosystems/business platforms.
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Utility Key Imperatives
Utilities must focus on cost efficiency, and on redefining their future role in the transformed industry model

<table>
<thead>
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<th>1</th>
<th>Optimize Work &amp; Asset Management Performance</th>
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<tbody>
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<td>Long-term investments into capital intense assets requires continued focus on maximizing the commercial returns from the asset base, and on striving for maximum operational efficiency across the entire enterprise.</td>
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<th>2</th>
<th>Innovate Business &amp; Operating Models</th>
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<td>Disrupt or be disrupted – incumbents must embrace the fundamental industry shifts as a strategic opportunity to innovate both their business and their operating models in a transformed industry with a different TSO role.</td>
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<th>Redefine Customer Relationships &amp; Partnerships</th>
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<tr>
<td>Regardless of their specific market role, utilities must engage with empowered customers – prosumers – and partner for capabilities in a decentralized industry model to crystalize new (digitally enabled) opportunities</td>
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Blockchain will fundamentally change business processes

**Traditional**

- Party A’s records
- Clearing House
- Bank’s records
- Auditor’s records

**With Blockchain**

- All parties have same replica of the ledger
- Digitally signed, encrypted transactions & ledger

... Inefficient, expensive, vulnerable

... Consensus, provenance, immutability, finality
Linux Foundation Hyperledger Project participation expands almost 5X since launch in December 2015

Premier

General

Updated Jan 2017
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DLT Use cases in Energy
E&U Example 1: EV charging ´behind the meter´

- Separate handling of EV charging ´behind the meter´ creates new options to EV drivers
- EV drivers can separate EV charging costs from the household consumption (e.g. for allocating it to e.g. company car scheme).
- Using blockchain creates trust by sharing one common truth in the value chain (consumer, MSP, DSO, BRP).
- Companies active in EV services (MSP’s, CPO’s or new entrants) can create new value propositions based on this registration: ´Embedded Energy´
- This can scale along multiple axes.
European Energy Operator, TenneT, To Use Blockchain For Electricity Security Of Supply

May 5, 2017 14:15 by Alexander Lielacher

TenneT unlocks distributed flexibility via IBM Blockchain

- TenneT, sonnen, Vandebron and IBM join forces in two pilot projects aimed at developing first ‘blockchain’ distributed database for managing the electricity grid in the Netherlands and Germany
- Energy transition requires new energy sources to maintain grid stability
- TenneT is first Transmission System Operator (TSO) to use innovative blockchain technology for managing the electricity grid

Tennet Will Use Blockchain Pilots for the Electric Grid in The Netherlands and Germany

By Armando Noguera - May 3, 2017

TenneT, a leading European electricity Transmission System Operator (TSO), clean energy provider sonnen, renewable energy provider Vandebron, and tech giant IBM are teaming up to develop blockchain for electricity grid management in the Netherlands and Germany.
Tennet is already using blockchain
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Applying Watson to reinvent Maintenance and Operations – 70 miles from shore
Final thoughts…

- What would be the Uber – moment for Energy?
- Imagine Distributed Ledger Technology (DLT) enabled peer to peer market

http://www.renewableenergyworld.com/articles/2017/05/will-blockchains-inspire-the-democratization-of-energy.html?
Thank You!