Blockchain applications in the energy sector An assessment beyond the hype

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# Blockchain applications in the energy sector: Research questions and methods

1) In which fields do executives see the greatest potential and hurdles for implementing Blockchain solutions in the energy sector?  $\Rightarrow$  Quantitative global survey among professionals in jobs related to the energy sector, n=92 Multiple apps Municipal utility / distribution Other Company or grid operator organization offering services to the Energy association / NGO energy industry Grid operator Focus of solution Think-tank Producer or marketeer of renewable energies Single app Electric utility Research institute or university

2) How do business models in energy applications and platforms differ between single providers and consortia?

⇒ Qualitative interviews with providers from the energy sector, and non-energy firms, in particular finance/ fintech, n=5



Integrated in a research project called ETIBLOGG (Energy Trading vIa Blockchain-Technology in the LOcal Green Grid), funded by the German Federal Ministry of Economic Affairs and Energy





## We found that depending on frequency and complexity, different types of DLTs are developed as platforms to exchange information



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## Analyzing platforms, we can observe a move towards small scale player integration with Blockchain as IT solution

	Energiewende 1.0	Energiewende 2.0	Energiewende 3.0	
	Grid-based and connected	Partially autonomous	Fully autonomous	
Business models	Platform models			
	Power exchanges	<ul><li>Aggregators</li><li>Demand response</li></ul>	<ul><li>Peer-to-peer trading platforms</li><li>Wholesale trading platforms</li></ul>	
	Wholesale markets	Aggregators	Microgrids	
	>eex 🎝 pjm	next sympower	Power Ledger	
		Demand response		
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## Specialized IT providers and BigTech incumbents develop Blockchainbased transaction platforms to offer complex services and products



## Transaction platforms developed by company



#### Beyond commoditization

"Today's existing power exchanges were designed for forward trading of a **fungible commodity**, here the kWh, in large chunks. But we want to build an exchange, on which you can trade other things beyond the kWh that are more valuable on this new decentralized, zero marginal cost grid.

We call those **attributes**. An attribute could be I want generation at this time, which is what you can already do, but then also in this location or with these specific properties. You can pay a premium for **green and or local**, for example."

> Specialized provider of Blockchainbased transaction platforms



#### Transactions platforms developed by Blockchain-as-a-Service provider





## Our survey unveiled three main obstacles for establishing Blockchainbased transaction platforms



#### 1) Regulatory complexity

"If you have this multilateral trading facility (MTF), which simply said is like an exchange, you have a bunch of **regulatory requirements to fulfill** and that is a very complex situation."

Developer of a Blockchain-based trading app

#### 2) Multi-Homing

"And the second pain point has absolutely **nothing to do with the technology**. ...there have been brokers who attempted to establish a new platform and they all **failed in dragging liquidity** from the existing platforms.."

Developer of a Blockchain-based trading app

#### 3) Technological complexity

"Our affiliates tend to **use the Blockchain as little as possible**, because it costs money to use the Blockchain. So, usually it's being used for coordination purposes, for access rights, for value transactions, for a recording of provenance, and so forth. But as little as possible."

Founder of a Blockchain-based trading and innovation platform



## Both, transaction platforms and Blockchain-as-a-Service tend to converge to innovation platforms





### Providers of innovation platforms follow two differing strategies

#### **Tokenized ecosystem strategy**

#### **Business model**

"It will be combination of cash flow based business models, the Red Hat business model and a mixture of token economics."

#### Competitive differentiation

"And so far in our space, in the corporate Blockchain space, most of applications are running on completely closed chains, private chains, and the public aspect of our chain has a very big advantage that it enables innovation, a lot of startups actually came because of this reason to us."

Co-founder of a specialized innovation platform in the energy sector



#### **Innovation Platforms**



#### **Enterprise solution strategy**

#### **Business model**

"It is a heterogeneous approach with services offerings coming out of different areas within the company, like consulting, architectural services, software as a service cloud, and so on."

#### Competitive differentiation

"Blockchain startups have little experience into enterprise software development, about what are the requirements of utilities, and you clearly see that in the maturity level of the solutions. They have not reached the level that an IT and CIO utility requires. This maturity level is not reached."

Representative of a multinational IT and consulting company



### Example tokenized ecosystem strategy: Energy Web Foundation



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### Open questions on platform war in energy markets



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### Limitations of current research / literature

## Limitations of current research

- Blockchain applications in the energy sector still remain in niches, compared to other industry sectors (Decentralized Finance, Non-Fungible Tokens)
- Few commercially successful use cases (e.g., Certificates of Origin)
- Legal uncertainties beyond regulatory sandboxes

## Literature (selection)

- Andoni, M., et al. (2019). Blockchain technology in the energy sector: A systematic review of challenges and opportunities
- Burger, C., and Weinmann, J. (forthcoming). The Evolution of Blockchain-based platform models in the energy industry

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- Burger, C. et al. (2020). Decentralised Energy a Global Game Changer
- Cusumano, M. A., et al. (2019). The Business of Platforms: Strategy in the Age of Digital Competition, Innovation, and Power
- Rossetto, N., et al. (2019). New Business Models in Electricity: the Heavy, the Light, and the Ghost
- Steinmetz, F., et al. (2020). Blockchain and the Digital Economy: The Socio-Economic Impact of Blockchain Technology

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