Blockchain and Smart Contracts in the Energy Industry: A European Perspective

& Bird & Bird

Dr. Matthias Lang

Bird & Bird LLP, Düsseldorf, Germany

April 11, 2019

Table of contents

I. Introduction

I. Introduction

Blockchain & Energy Digitalization

- Blockchain part of broader energy digitalization challenge
- Modern technology meets existing energy law landscape not originally designed to address specific challenges and opportunities of digital world
- Digital, internet driven industries historically did not heat homes or produce the power to run the computers
- Tech & Comms legal framework not geared towards very long term investments in industrial assets, with different security of supply concepts

I. Introduction

Blockchain & Energy Digitalization

- Emerging digitalization is relevant not only in the renewables industry, but also in oil & gas sector:
  - Smart oil fields
  - Smart gas meters
  - Big data & analytics
  - Robotics & drones
  - Internet of Things
  - Blockchain

I. Introduction

Blockchain & Energy Digitalization

- Energy digitalization means combining two previously separate, strongly regulated worlds with different rules
- Challenge: Ensuring that legal system work in such a way that secure, inexpensive, efficient and consumer and environmentally friendly energy will be available also in tomorrow's digital world

II. Blockchain and Smart Contracts in a Nutshell

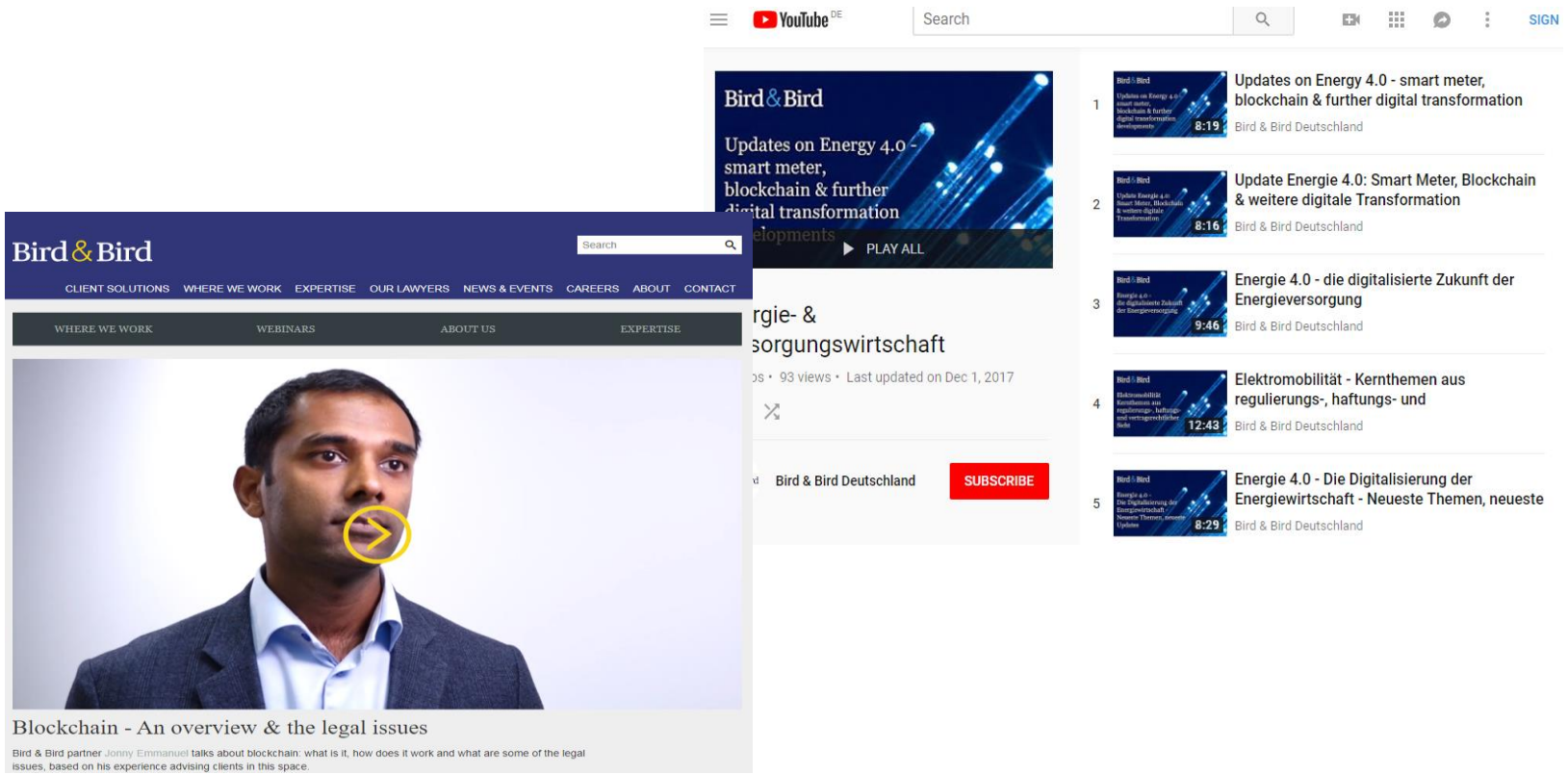
II. Blockchain and Smart Contracts in a Nutshell

Blockchain & Nutshell

- Blockchain is a distributed, decentralized ledger
  - Enables peer-to-peer transfers of value
  - No need for an intermediary
  - For details, see Satoshi Nakamoto

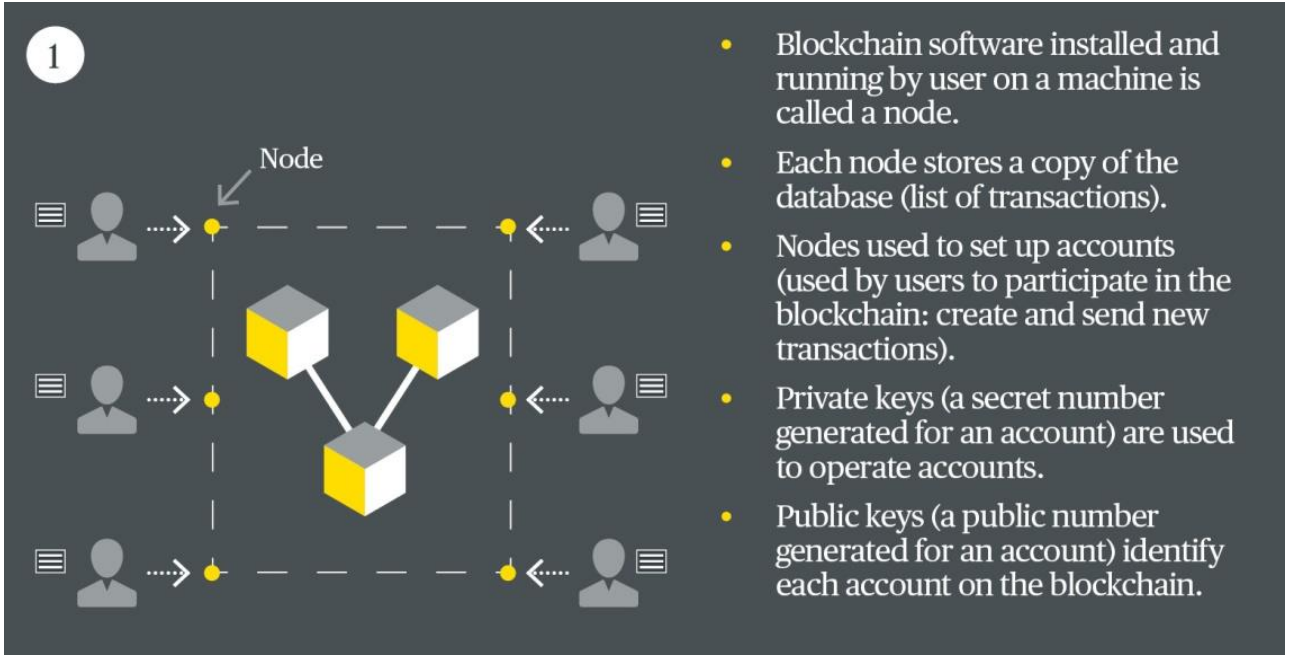
- Seen as the main technical innovation of Bitcoin and other cryptocurrencies
  - But not limited to cryptocurrencies

II. Blockchain and Smart Contracts in a Nutshell



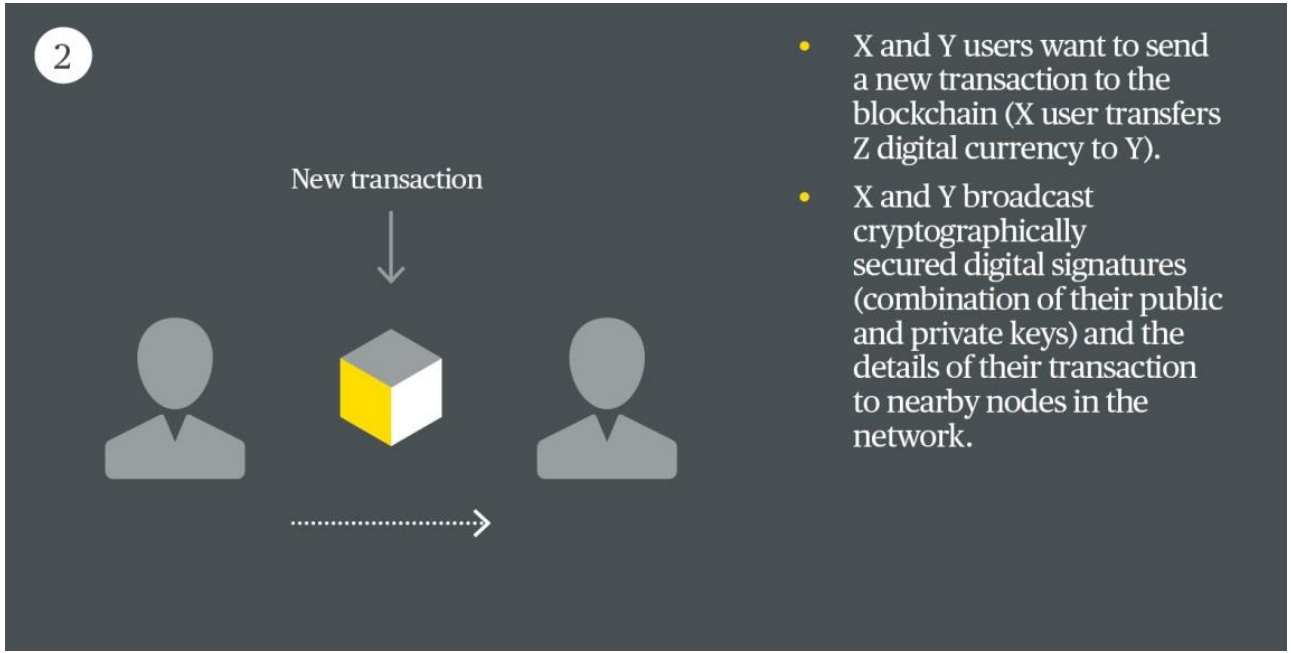
II. Blockchain and Smart Contracts in a Nutshell

Nodes



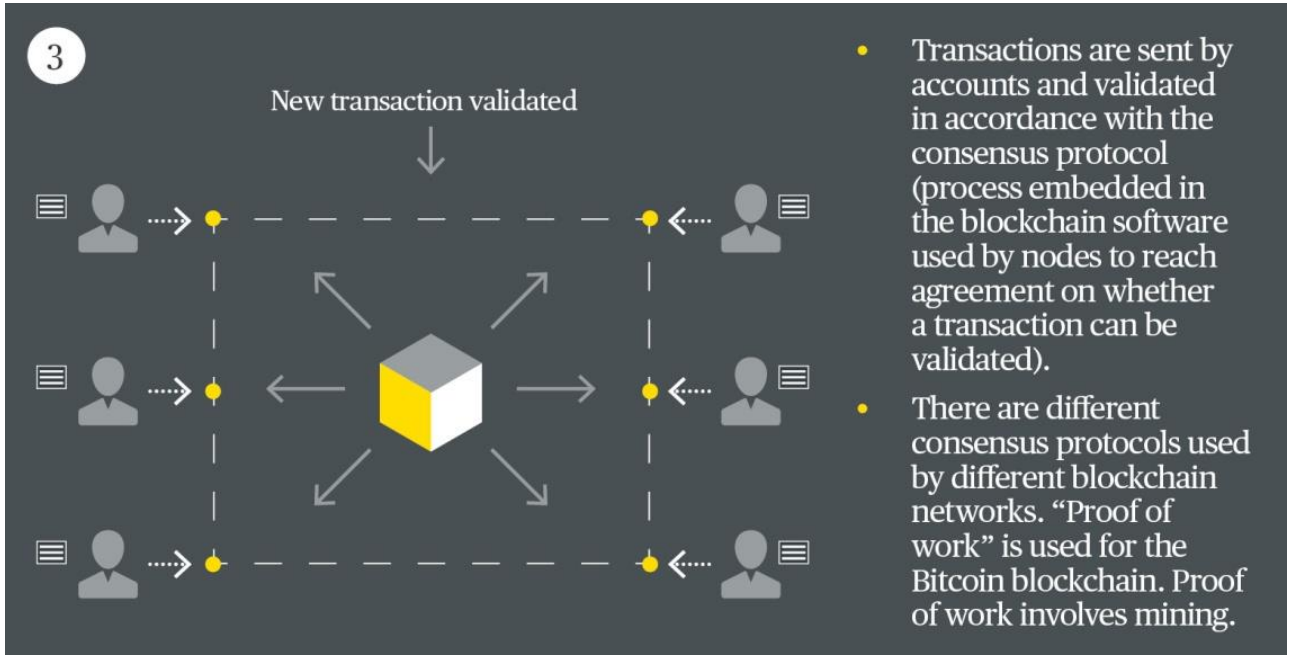
II. Blockchain and Smart Contracts in a Nutshell

New Transaction



II. Blockchain and Smart Contracts in a Nutshell

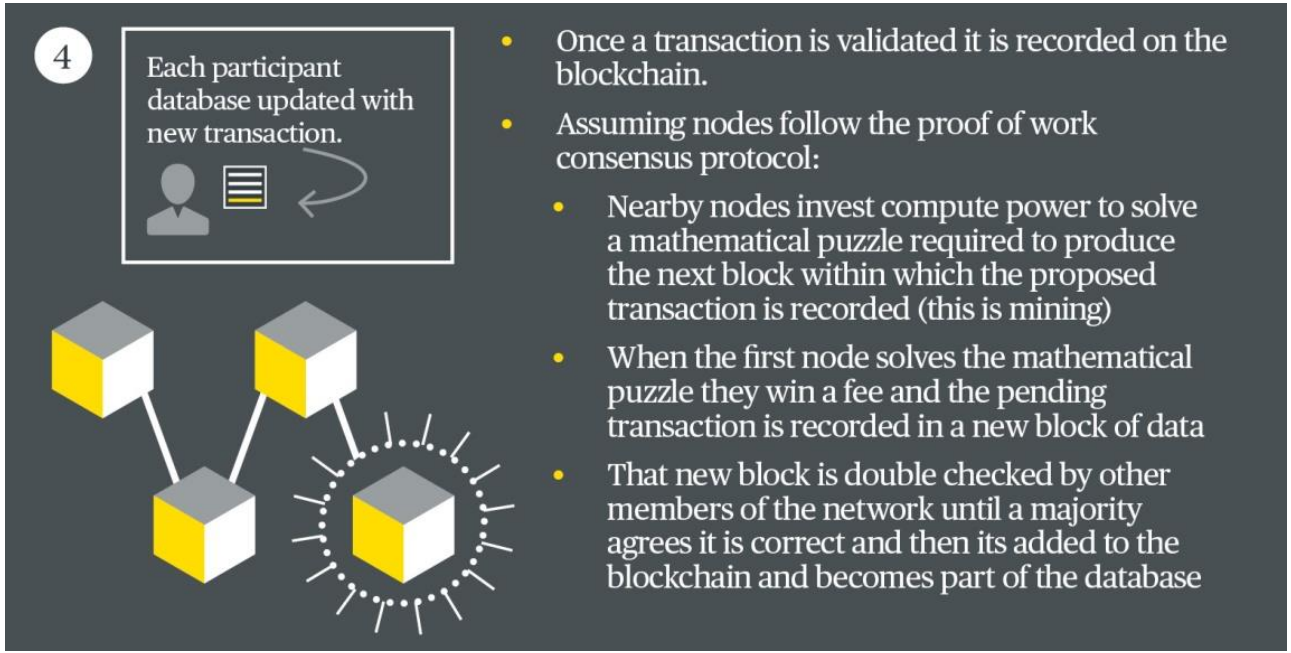
Validation



- Transactions are sent by accounts and validated in accordance with the consensus protocol (process embedded in the blockchain software used by nodes to reach agreement on whether a transaction can be validated).
- There are different consensus protocols used by different blockchain networks. "Proof of work" is used for the Bitcoin blockchain. Proof of work involves mining.

II. Blockchain and Smart Contracts in a Nutshell

Blockchain Record



II. Blockchain and Smart Contracts in a Nutshell

Types of Blockchain

Public Blockchain	Private Blockchain
• Open: anyone can participate • Decentralized • Special consensus mechanisms, e.g. proof of work / proof of stake • Needs substantial amount of (computational) power, slower	• **Consortium Blockchains**: pre-selected, trusted nodes control the concensus process • **Fully private Blockchains**: write permissions in the hand of centralized organization • Less resource-intensive, faster

II. Blockchain and Smart Contracts in a Nutshell

Smart Contracts

- Promises in digital form, performed by the parties within protocols
- E.g. vending machine – or far more complex
- Ethereum combines Blockchain and Smart Contracts
  - Platform with Turing-complete programming language
  - Suitable for any transaction that can be defined mathematically

source: https://www.ethereum.org/

II. Applications in the Energy Industry

III. Applications in the Energy Industry

Blockchain & Physics

- Blockchain moves/stores data, not power
- Energy is physical, requires generation/production, storage, transformation, transportation and delivery
- "Energy supply is not a computer game, but the real world"
- Someone needs to make sure that the energy physically gets to where it is supposed to go, really, reliably, lawfully, always

III. Applications in the Energy Industry

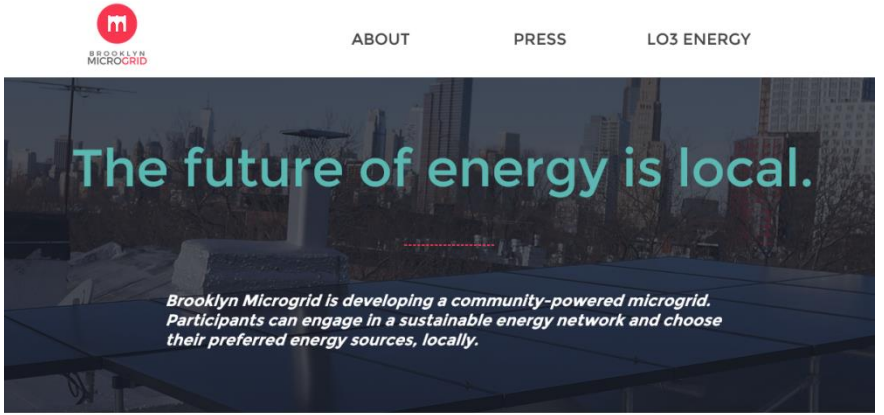
Blockchain & Physics

- On the other hand:
  - Renewables have lead to vast increase in number of decentralised, intermittent producers, with ever increasing need to balance supply and demand, ever increasing data requirements to match supply and demand
  - Data ever increasingly relevant to supply power, really, reliably, lawfully, always
- Need to understand interdependence to understand and resolve legal issues

III. Applications in the Energy Industry

Brooklyn Microgrid

- Owners of PV systems sell their power in the neighbourhood using Ethereum Blockchain
- Communal energy network, with utility provider still maintaining and balancing the electrical grid, the actual energy is generated, stored, and traded locally by members of the community
- Similar projects in Europe: OneUp (Netherlands), Conjoule (Germany)



Source: https://www.brooklyn.energy/

III. Applications in the Energy Industry

Enerchain

- True P2P wholesale electricity and gas trading based on Blockchain with major European companies participating

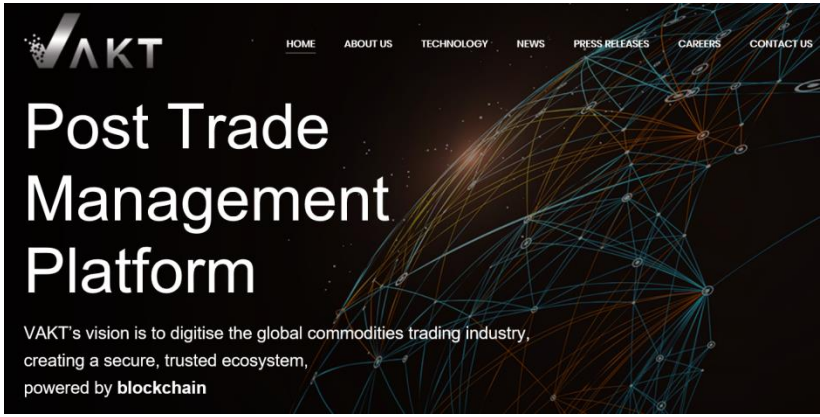
- Potential to bypass trading platforms and brokers on the wholesale electricity market

Source: https://enerchain.ponton.de/

III. Applications in the Energy Industry

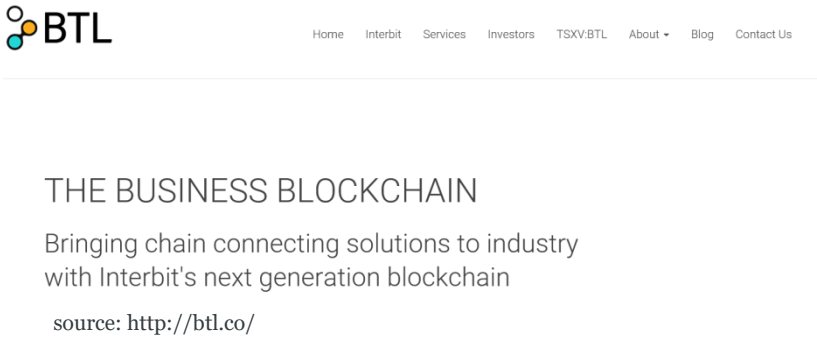
Applications in Oil & Gas Trading

- Vakt: Blockchain platform facilitates trade in crude oil and other commodities by digitizing and centralizing post-trade processes



source: https://www.vakt.com/

- BTL Interbit platform speeds up reconciliation processes in gas trading



source: http://btl.co/

IV. Legal Issues of Blockchain-based Solutions in the European Union

IV. Legal Issues of Blockchain-based Solutions in the European Union

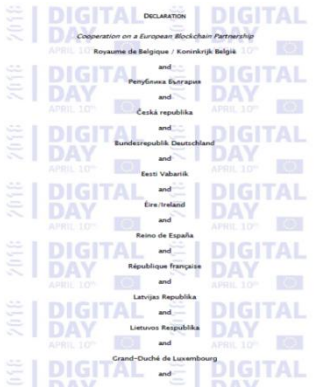
1. Energy Law: Basics of EU Energy Law & Policy

- Main goals: open, liberalized internal energy market, security of supply, energy efficiency & saving, promotion of renewable energy and interconnection of networks
- EU shares legislative competence with member states
- Range of regulations and directives regulate electricity and natural gas markets
- Latest legislative proposal: "Clean Energy for All Europeans" (Winter Package, EU Commission)

IV. Legal Issues of Blockchain-based Solutions in the European Union

1. Energy Law: Basics of EU Energy Law & Policy

- No specific laws on Blockchain/Smart Contracts
- October 2017: European Council asked Commission to look into Blockchain
- February 2018 Commission launches EU Blockchain Observatory and Forum
- 10 April 2018 Blockchain Partnership Declaration
  - Signed by 25 EU Member States
  - Shall support the delivery of cross-border digital public services, with the highest standards of security and privacy



IV. Legal Issues of Blockchain-based Solutions in the European Union

1. Energy Law: Current regulatory issues

- Prosumers likely to be considered "suppliers" → numerous obligations
  - Terms and conditions, billing, information on energy mix to be made available to consumers
  - Obligation to contribute to grid balancing / managing their own balancing group?
  - In some countries: suppliers' licenses and universal service obligations
- Supplier changes within max. three weeks vs. supplier changes within minutes in Blockchain-based electricity trading

IV. Legal Issues of Blockchain-based Solutions in the European Union

1. Energy Law: Current regulatory issues

- High regulatory burden for P2P electricity trading: EU energy law was not drafted with Blockchain & Smart Contracts in mind
- Blockchain-based P2P electricity transactions between prosumers only feasible if external service provider fulfils obligations on behalf of prosumers
  - Blockchain as a tool to avoid the need of an intermediary?

IV. Legal Issues of Blockchain-based Solutions in the European Union

1. Energy Law: Winter Package – a way forward?

- "Active customers": entitled to generate, store, consume and sell self-generated electricity in all organized markets **without being subject to disproportionately burdensome procedures** (Electricity Directive Recast)
- "Peer to peer trading": sale of renewable energy between market participants by means of a **contract with pre-determined conditions governing the automated execution and settlement of the transaction** … directly between market participants (Renewable Energy Directive adopted in Dec 2018)

IV. Legal Issues of Blockchain-based Solutions in the European Union

1. Energy Law: Winter Package – a way forward?

- "Renewables self consumers": **right to sell their excess electricity through P2P trading arrangements** without being subject to discriminatory or disproportionate procedures, charges and unjustified regulatory barriers (Renewable Energy Directive)

➲ Winter Package tries to ease the burden for P2P electricity trading

➲ But: actual impact will depend on transposition in national law. Namely: Which procedures are disproportionate? Which regulatory barriers are unjustified?

IV. Legal Issues of Blockchain-based Solutions in the European Union

2. Contract Law

- The attractive part: automatic performance and enforcement of legal obligations
  - "*no room to bring an action for breach when breach is impossible*" (Werbach & Cornell 2017)
- The difficult part: Things go wrong. Drafting a contract (and code) that takes into account all possible contingencies and states all their responses is not possible
- Coders will have to cooperate with lawyers to ensure legally sound design of the contract & reasonably bulletproof contract code

IV. Legal Issues of Blockchain-based Solutions in the European Union

3. Consumer Protection Law

- Extremely developed in the EU: unfair contract terms, information requirements, cooling-off periods, withdrawal rights in "distance contracts
- Are prosumers traders or consumers?
  - Probably both, depending on their role
- Does all consumer protection law apply to smart consumer contracts?
  - Cooling-off periods in smart contracts don't make sense
  - Exception for "automatic vending machines" may apply to smart contracts: automated exchange of goods

IV. Legal Issues of Blockchain-based Solutions in the European Union

4. Data Protection Law

- EU General Data Protection Regulation (GDPR), in force since 2018
- Broad territorial scope: controllers/processers who process personal data of EU data subjects, related to offering goods/services in the EU
- "Personal data": any information relating to an identified or identifiable natural person
- Even pseudonymized information, e.g. IP addresses
- Blockchain: transactional data linked to a person & pseudonymized public key can be personal data

IV. Legal Issues of Blockchain-based Solutions in the European Union

4. Data Protection Law

- Rights of data subjects (examples):
  - Access personal data and information relating to data processing (Art. 15)
    - Enforcement in the Blockchain: Who is the data controller? Difficult without a platform operator (public Blockchain): Each node?
  - Right to rectification of inaccurate personal data (Art. 16) and right to erasure of personal data (Art. 17)
    - Blockchain is an immutable, append-only ledger…

IV. Legal Issues of Blockchain-based solutions in the European Union

4. Data Protection Law

- Solutions for GDPR compliance within a Blockchain
  - Interpretation: Does supplementary statement qualify as rectification of data?
  - Technical modifications:
    - storing personal transactional data off-chain, so it can be modified retroactively
    - Private Blockchains governed by rules on data processing and third parties validating transactions (rather than mining)
    - Zero-Knowledge-Proof: transactions that don't make any of the parties identifiable

IV. Legal Issues of Blockchain-based solutions in the European Union

4. Data Protection Law

- To what extent Blockchain is compatible with GDPR remains uncertain
- Draft Proposal for a new ePrivacy Regulation and proposal for recast of the Electricity Directive do not address the issue

IV. Legal Issues of Blockchain-based solutions in the European Union

5. Financial Markets Regulation

- Directive on Markets in Financial Instruments (MiFID II)
  - Authorization requirements for provision of investment services (i.e. trading of options, futures, swaps, forwards, other derivative contracts relating to commodities)
  - May be relevant for Blockchains enabling wholesale electricity trading
  - Do virtual currencies qualify as "financial instruments" under MiFID II?
    - Either way, the use of a virtual currency as a means of payment alone does not trigger obligations under MiFID II

IV. Legal Issues of Blockchain-based Solutions in the European Union

5. Financial Markets Regulation

- Regulation on Wholesale Energy Market Integrity (REMIT)
  - Prohibits insider trading and market obligations; extensive reporting obligations
  - Who is responsible for ensuring compliance in Blockchain based P2P trading systems?
  - Enerchain requires each participant to report trades in accordance with REMIT

V. Conclusions

V. Conclusions

- Very different forms of Blockchain & smart contract based applications in the energy industry
- Compatibility with EU (energy) law depends largely on their specific design: private Blockchains are easier to reconcile with legal framework, but lack features of Blockchain prototype
- EU "Winter Package" addresses issues related to Blockchain and smart contracts, but does not set up a comprehensive legal framework
- But: Blockchain and smart contracts play an increasing role in the energy industry – industry players, computer people and lawyers will need to make them work


V. Q & A

Thank you

& Bird & Bird

Dr. Matthias Lang
Carl-Theodor-Straße 6
40213 Düsseldorf
Tel: +49 (0)211 2005 6293
Mob: +49 (0)174 314 4234
E-Mail: matthias.lang@twobirds.com

Disclaimer

The information given in this document concerning technical legal or professional subject matter is for guidance only and does not constitute legal or professional advice. Always consult a suitably qualified lawyer on any specific legal problem or matter. Bird & Bird assumes no responsibility for such information contained in this document and disclaims all liability in respect of such information.

Any engagement of Bird & Bird arising from the process that incorporates this document shall be on the terms of such engagement.