

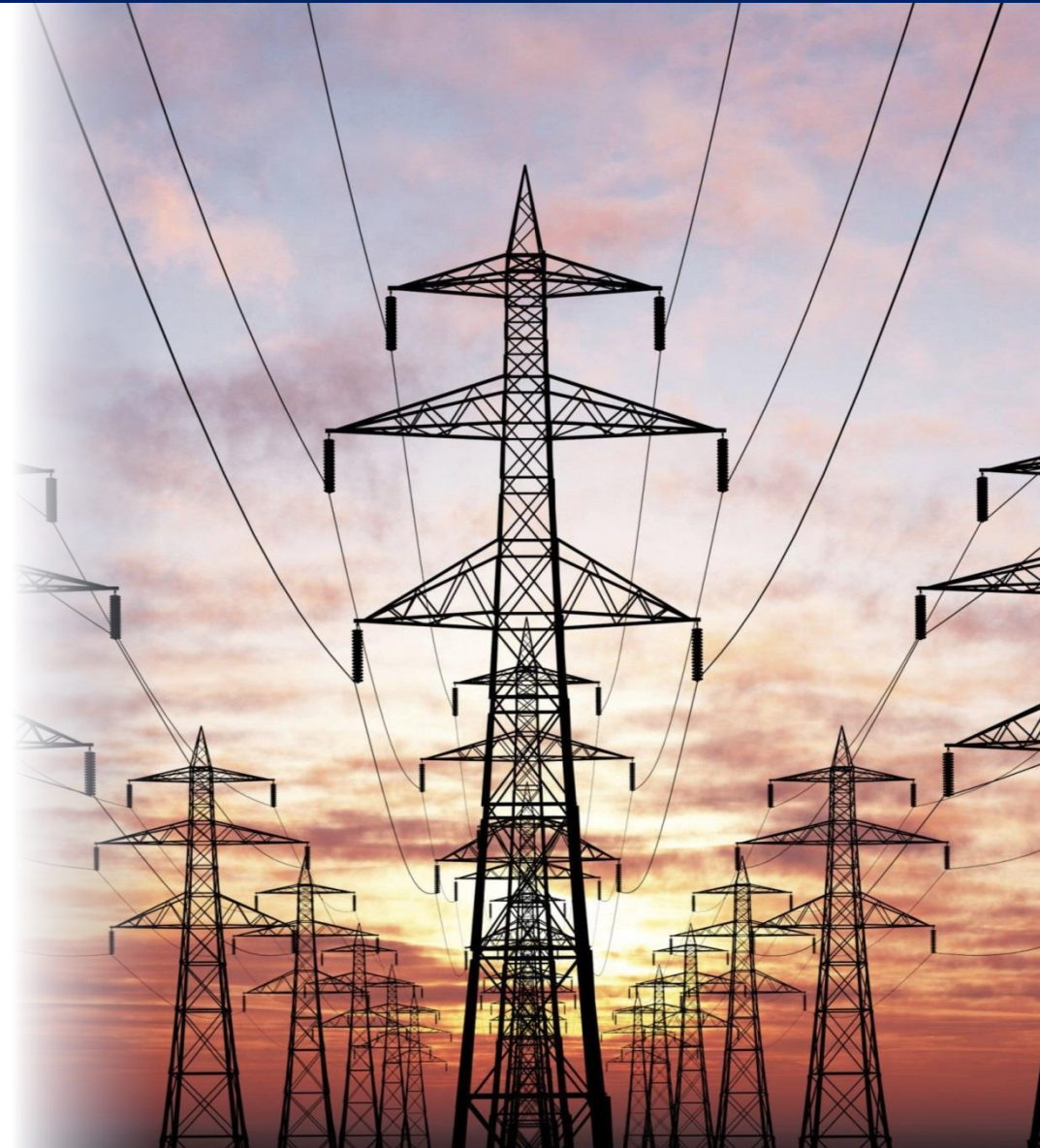
Securing Critical Energy Infrastructure – Electricity markets and trends

energypact

VIENNA CYBER SECURITY WEEK 2018

Jordan Georgiev,
Managing Director

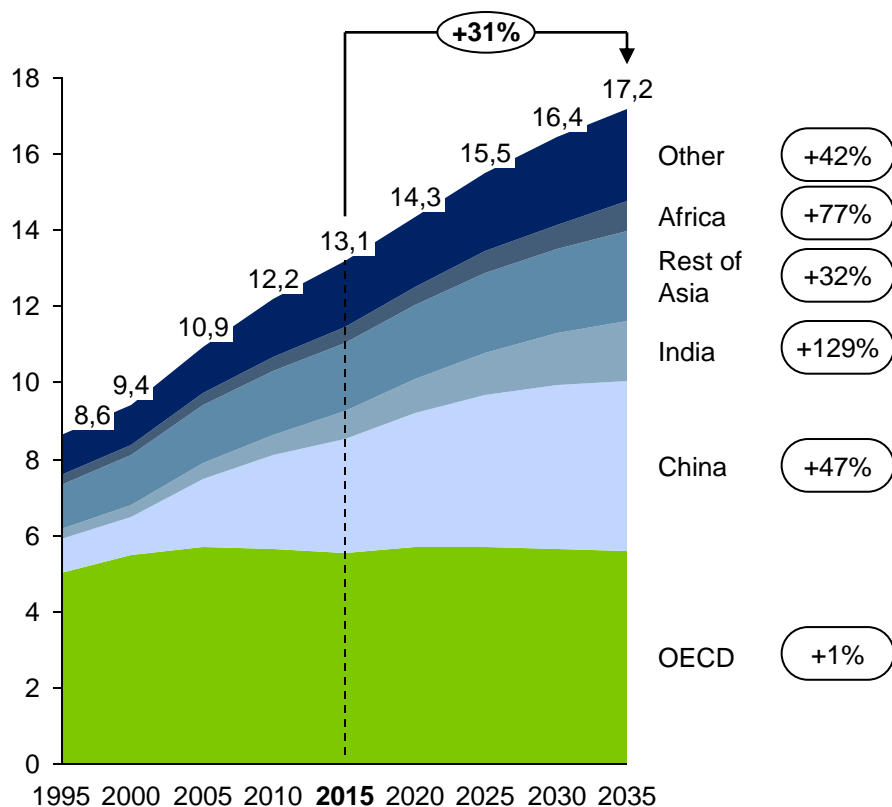
Vienna, February 1st 2018



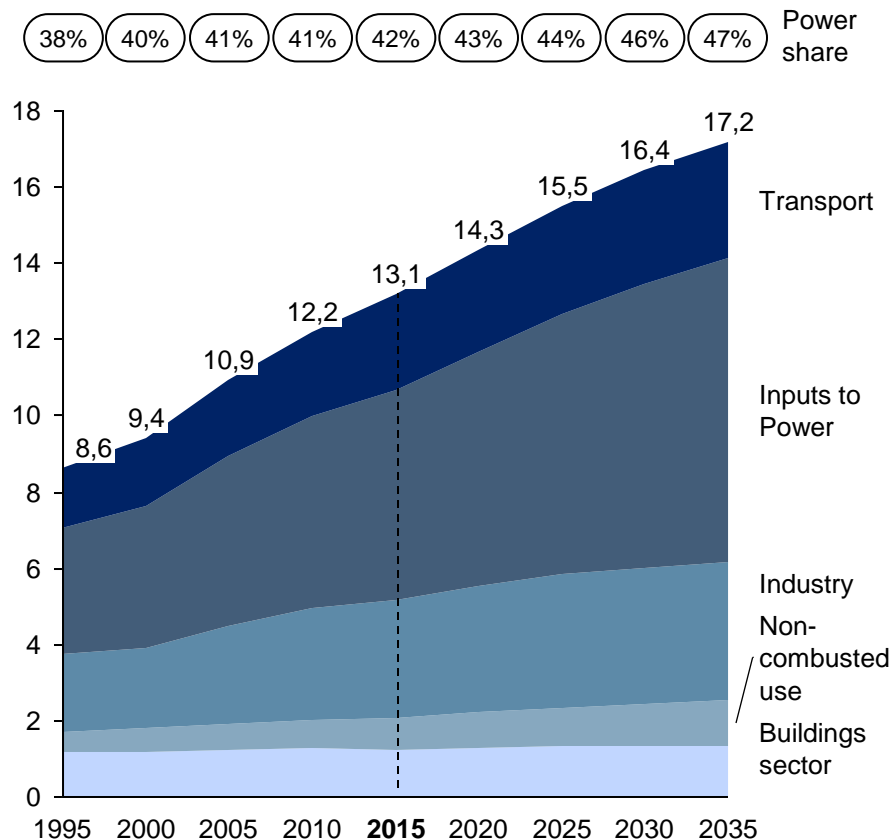
We will still consume more energy and particularly electricity in the future – the share of power generation is increasing

Energy consumption by region [bn toe]

Δ 2015



Energy consumption by sector [bn toe]



We already spend a lot of energy for technological advancements, which were non-existent a few years ago

Bitcoin energy consumption index

46 TWh

Bitcoin's estimated annual electricity consumption

501 KWh

Energy consumed by a single Bitcoin transaction

0,21%

Of the entire world's energy consumption is used by Bitcoin

53

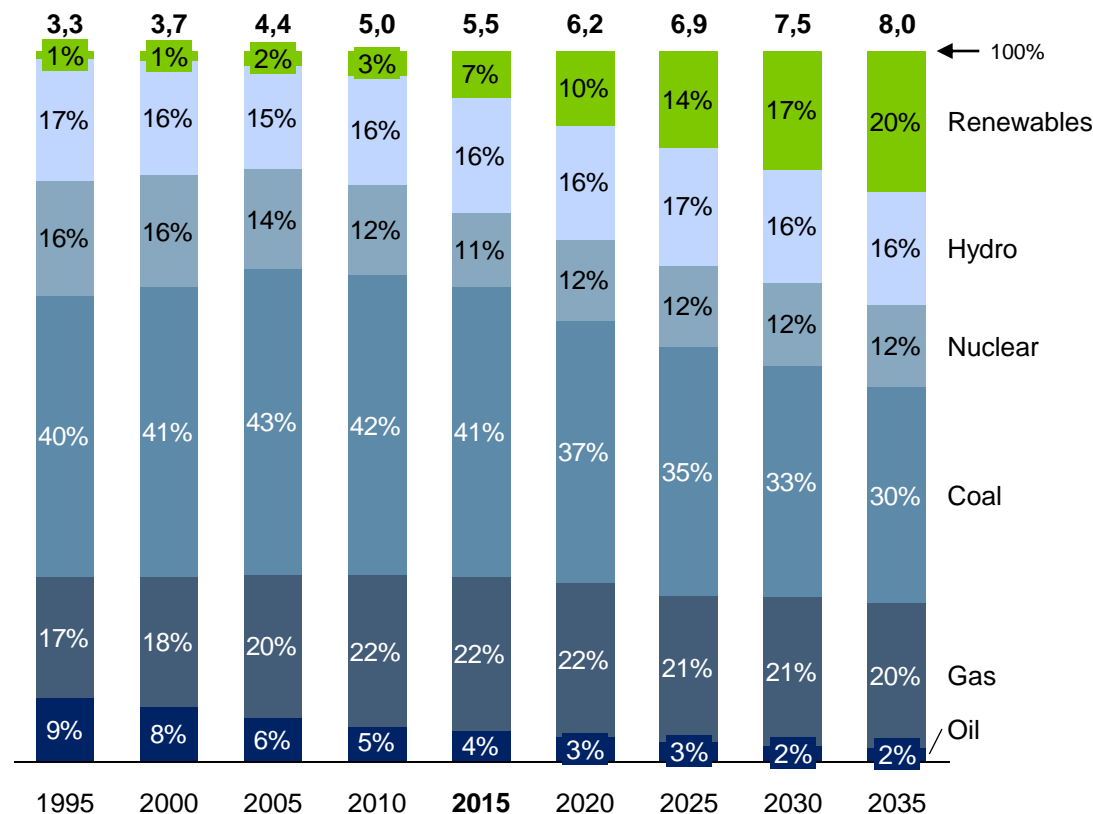
If Bitcoin was a country, it would rank right next to Singapore

4,3 m

US households could be powered with the energy used by Bitcoin

The rise of renewables energy sources in power generation is expected to continue

Power generation by source [bn toe]

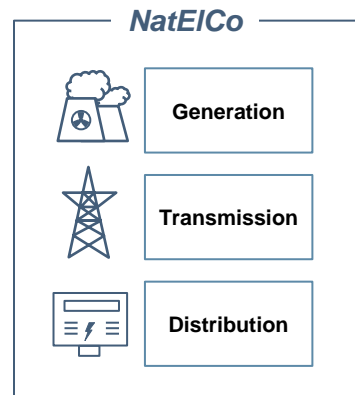


Comments

- Growth in the world economy requires more energy, extent of the increase is mitigated by falls in energy intensity
- Strong catch-up process, with energy consumption per head in developing economies increasing rapidly
- Increasing global access to electricity in Africa and developing Asia
- Consumer preferences towards electricity as a fuel – cleaner and more convenient at the point of use
- Around half of the electricity generated in 2035 is expected to come from renewables, hydro and nuclear
- China is expected to invest heavily in renewables and reduce coal consumption due to ecological considerations

The traditional “incumbent” model of power utilities is changing – customer preferences and technology shifts fuel the evolution

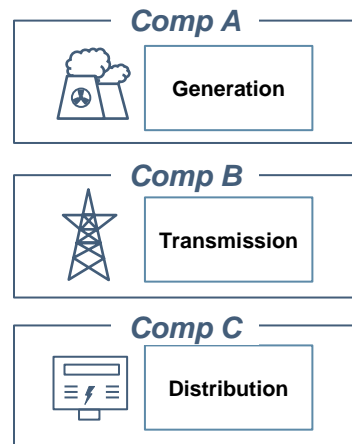
National incumbent



- All activities along the value chain
- One company (natural monopoly)

1970 – 1980s

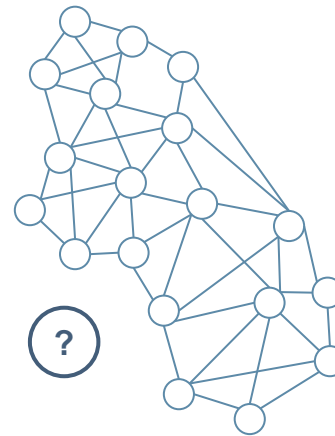
Unbundled utility



- Network separated from generation and distribution
- Regulatory push

1990 – 2000s

Open network (P2P)



- Decentralized networks (P2P) & distributed gener.
- Technology push

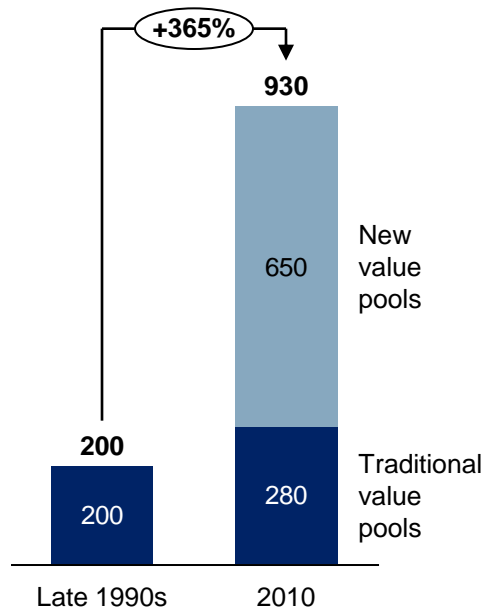
2010s - ?

Development drivers

- Price drops and efficiency gains in PV and wind generation accelerate renewables shift
- Energy efficiency increase and rapid digitalization
- Smart home devices enable customers to have better control and optimize their consumption
- Prosumers emerge – households and industries are able to produce and sell their surplus electricity
- Battery technology is improving and becoming affordable
- Electric vehicles entering the mainstream market (grid potential)
- Traditionally slow approach of utilities towards innovation

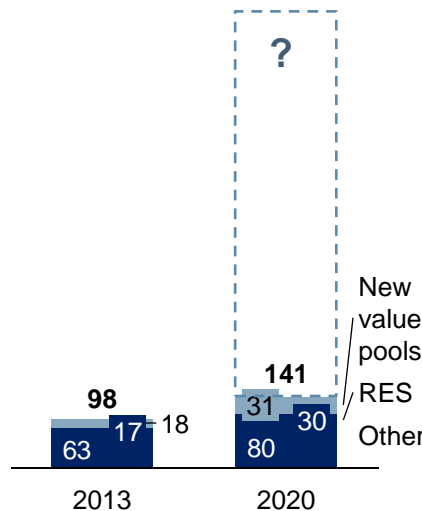
Clear parallels between telecommunication and energy companies are visible – will the later be able to handle the shift?

Global mobile revenues [bn USD]



- Traditional value pools captured by incumbents mainly
- New value pools largely captured by new entrants

EPNG Europe, EBIT [bn EUR]

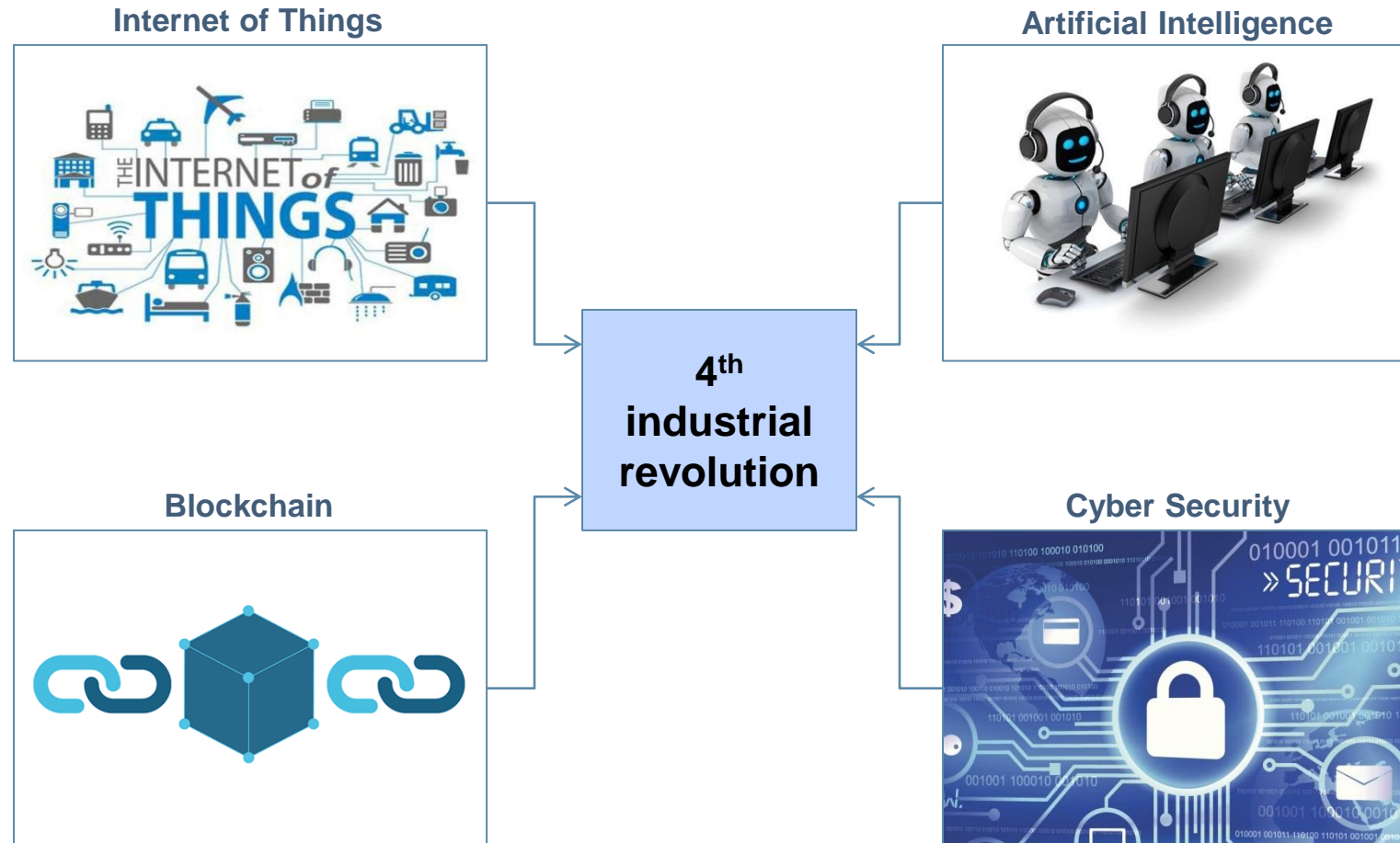


- What to believe in – fully electric world with electricity as ultimate customer data / behavior source

Comments

- Both sectors started as national monopolies and were unbundled by the regulators
- Telecom and energy companies both rely on networks, have large investments into capital-intensive assets and serve large customers bases in a similar way
- Telecoms faced a technological revolution in the 90s (GSM, data) and regulatory pressure to open their networks to third parties
- Fast experimenting with different business models and focusing on core competences was necessary
- Energy companies are facing similar challenges nowadays from customer, technological and regulatory side
- Digital and customer-driven value pools could be the new growth engine for energy companies
- Need to decide where to play (assets, data)

Key technologies enable the 4th industrial revolution – the electricity sector has to adapt quickly



Combining technologies and teaming up with startups can create a disruption to the market

Crypto-currency	Ethereum	Coin				Solar Coin	Bitcoin Ripple ...
Energy company	RWE	International energy companies	VATTENFALL				
Developers / Tech. firms	Slock.it	oneUP		LO3 ENERGY	LO3 ENERGY CONSENSYS TRANSACTIVEGRID	Solar Coin	M-PAYG theSunExchange Nasdaq
Projects	Block-Charge Blockchain applications in the area of electric mobility/EV charging	POWR Pilot project trialling a decentralised energy system	Power-peers Peer-to-peer marketing of electricity	Exergy Distributed servers to provide heat for homes, with supply billed via blockchain	Brooklyn Microgrid Pilot project connecting 10 households in Brooklyn through a blockchain-based microgrid	Solar Change Platform for the exchange of Solar Coins	Singularity Slock.it oneUP CONSENSYS LO3 ENERGY bankymoon

Having in mind the potential of the machine economy – can we also imagine a world without utility companies?

THE FUTURE OF MOBILITY



Bitcoin icon + UBER + A.I.

The
self-owning
car

THE FUTURE OF POWER GENERATION?



Bitcoin icon + smart contracts + A.I.

The
self-owning
PV plant



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