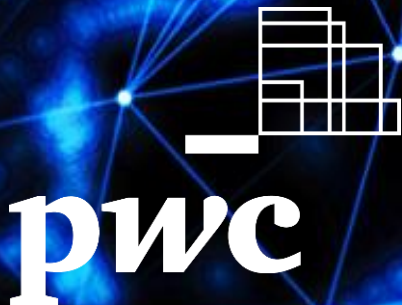# Paving the way for the energy world of tomorrow

Keynote by Felix Hasse, PwC
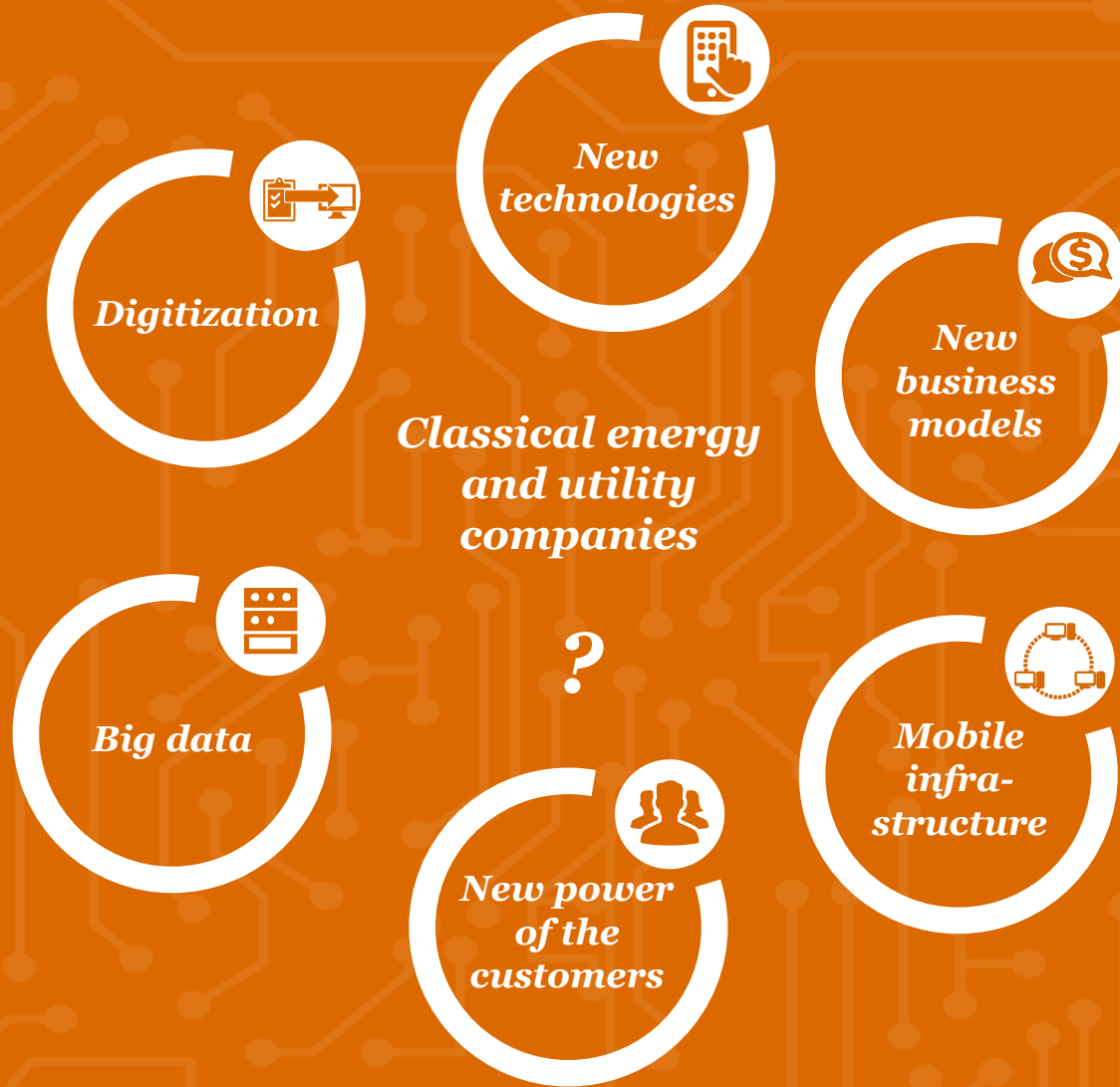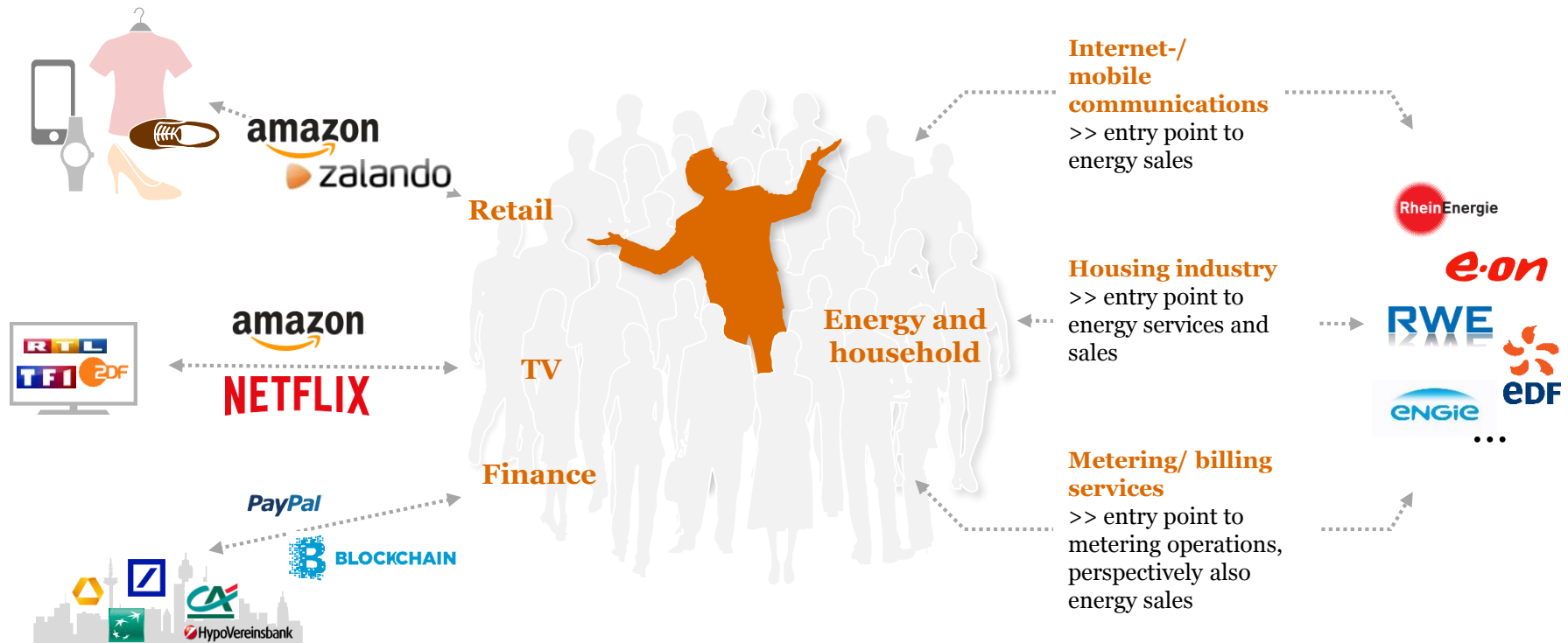
Berlin – May 11, 2017

# *Agenda*

- Digitization in the energy world

- Data are the gold of the 21$^{\text{st}}$ century

- Develop new business models along
  the customer journey

- A look ahead into the future: Blockchain,
  the revolution of the energy sector?

- Outlook – Digital agenda for status quo and
  strategy development

# The energy world of tomorrow...

New technologies

Digitization

New business models

Classical energy and utility companies

?

Big data

New power of the customers

Mobile infra-structure

# *Digitization has transformed many industries, now the energy sector is also forced to become digital*

**„Publishing Crisis"**
Axel Springer invests massively in digital business models

**idealo**
**zanox.**

FINANCIAL TIMES
Closed down

Publishing group Weltbild bankrupt

**amazon**
Internationalization, € 10bn revenues

**QUELLE.**
**KARSTADT**
*Schöner shoppen in der Stadt*
bankrupt

eCommerce market share 10%

**zalando**
€ 6bn IPO

*Digitization is permeating ever deeper into further aspects of our daily lives*

**Publishing**

**Retail**

| 2005 | 2006 | | | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | | | 2020 |
|------|------|--|--|------|------|------|------|------|------|------|------|--|--|------|

**Finance**

**Energy and Home**

**Klarna**
Offers payment solutions to online shop operators

FinTech-Boom starting

**Square**
**LendingClub**
**KICKSTARTER**
**TransferWise**

**BLOCKCHAIN**

Breakthrough for Smart Home?

**Google Home**
google.com/home

**amazon echo**
amazon.com/echo

**PayPal**
eCommerce payment market leader

**RWE**
Smart Home launch

**nest**
**Google**

**E-world**
*energy & water*

Significant increase in start-up activity

**Thermondo**
Einfach zur neuen Heizung

20 m € financing round

**OPOWER**
Takeover by Oracle for €480M (Largest cloud offering in energy sector)

**verivox**
*prime*
Automatic tariff optimizer

**united internet**
Founded 1&1 Energy GmbH, to digitalize the German Energy market

Tesla enters the energy market with battery storage

# *New players squeeze in between customers and previous vendors – now also in the energy industry*



Retail

TV

Finance

Energy and household

**Internet-/ mobile communications**
>> entry point to energy sales

**Housing industry**
>> entry point to energy services and sales

**Metering/ billing services**
>> entry point to metering operations, perspectively also energy sales

# The digital transformation of society leads to new customer requirements and new bargaining power for customers

| ANALOG WORLD | TRANSFORMATION | DIGITAL NORMALITY |
|---|---|---|
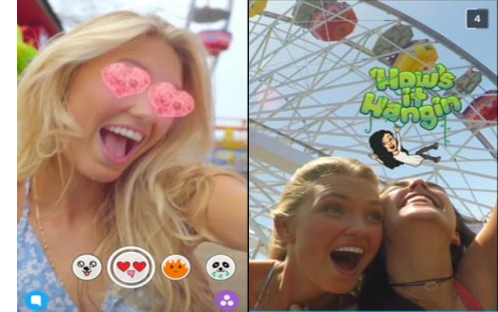


**"Old school"**
-
But already entry to the digital age

**Digital transformers**
-
Usage of established tools

NETFLIX

DriveNow
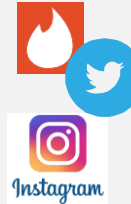
**Digital Natives**
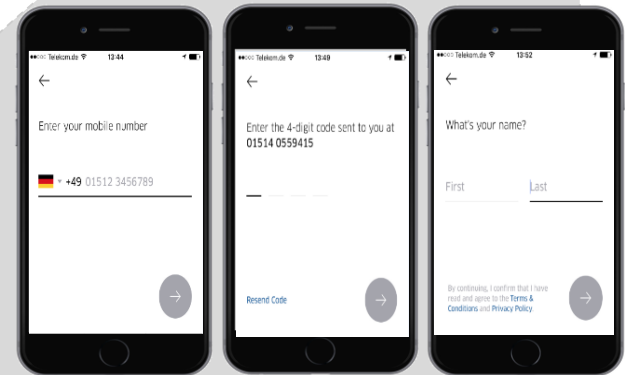-
Completely digitized

Instagram

2006    2008    2010    2012    2014    2016    2018    2020    2022    2024
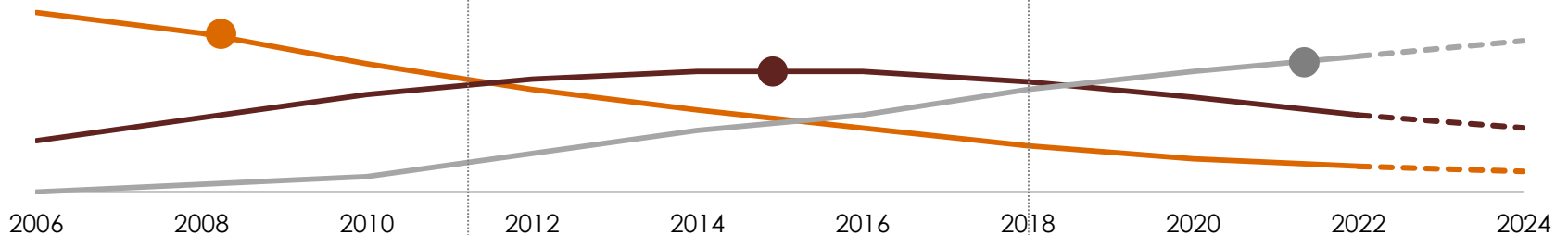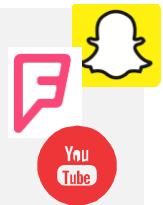
# *Easy handling is a key essential for successful products – energy companies are on the way but still behind*

- Appealing, **highly user-friendly** app design
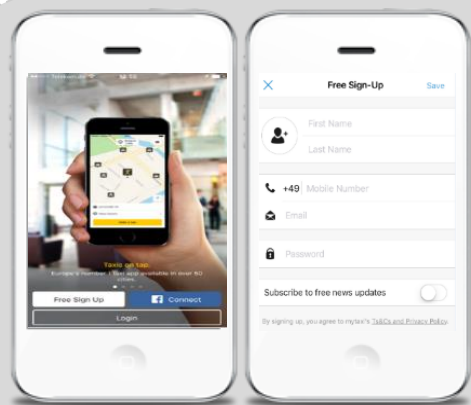- **Extremely simplified registration procedure**

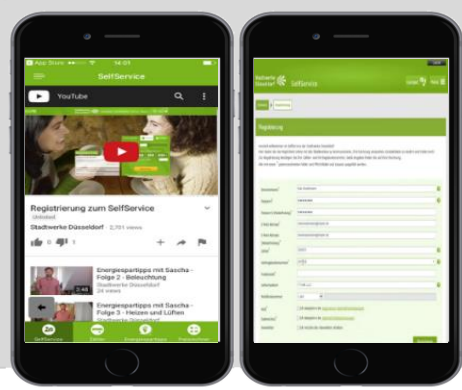- **Easy** registration on one screen
- **Social media login**

- **Very traditional app design**
- **Introduction movie necessary** to fully understand the registration process
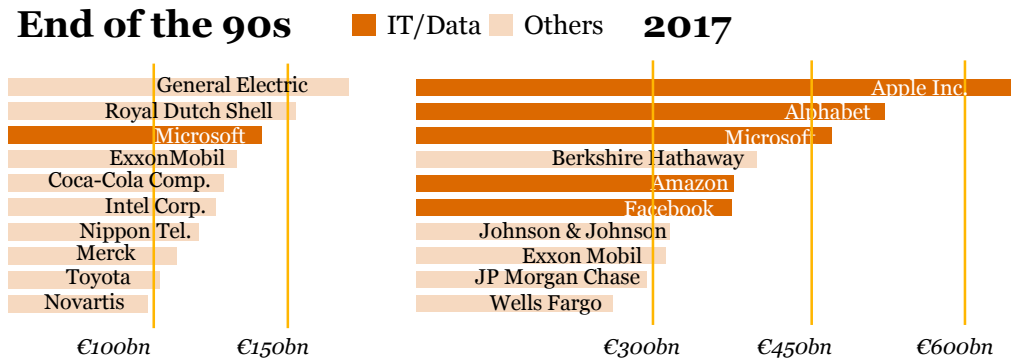
Energy company apps

# *IT and data driven companies rapidly grow in value and influence*

## The 10 **highest valued** companies **on the stock markets**

### End of the 90s

■ IT/Data  ■ Others

General Electric
Royal Dutch Shell
Microsoft
ExxonMobil
Coca-Cola Comp.
Intel Corp.
Nippon Tel.
Merck
Toyota
Novartis

€100bn          €150bn

### 2017

Apple Inc.
Alphabet
Microsoft
Berkshire Hathaway
Amazon
Facebook
Johnson & Johnson
Exxon Mobil
JP Morgan Chase
Wells Fargo

€300bn      €450bn      €600bn

- **Only one** IT company in the top 10

- **Stock market value of IT companies** in FT500 (top 10) = **10%**

- **Top 3** companies are **IT/data companies**

- **Stock market value of IT companies** in FT500 (top 10) = **60%**

## Value of today's IT companies

| **Established capital-intensive companies** | | **Rising IT/data driven companies** | |
|---|---|---|---|
| BMW | **Automotive** €53bn | UBER | **Transport/mobility** €63bn |
| Hilton | **Hilton** €18bn | | **Flat rental services** €28bn |

| EDF | **Energy** €19bn | | |
| e·on | **Energy** €13bn | **?** | *Probably a data driven company* |

➢ **Today, data are already an important driver of entrepreneurial success** in the 21st century

# *Energy and utility companies are actively pushing to develop new data related business models and services*

News    27.04.2017

Kooperation von TenneT und CLENS ermöglicht effizientere Nutzung der erneuerbaren Energien

Der Übertragungsnetzbetreiber TenneT und der Energiedienstleister Clean Energy Sourcing (CLENS) arbeiten bei der Nutzung von Winderzeugungsdaten zusammen. Mithilfe der durch CLENS zur Verfügung gestellten Daten zur Ist- und prognostizierten Erzeugung aus Windanlagen wird TenneT das Engpassmanagement weiter optimieren. Die Kooperation wirkt sich positiv auf die Stromkosten und die Systemintegration der Erneuerbaren Energien aus.

27. April 2017, Leipzig, Bayreuth. In Zeiten hoher Stromeinspeisung kommt es in Deutschland aufgrund zu geringer Netzkapazitäten und eines noch immer zu inflexiblen Energiesystems zu punktuellen Überlastungen des Stromnetzes. Insbesondere in Schleswig-Holstein, das den nördlichen Teil der TenneT Regelzone

Für Stromleitungsbetreiber

## VW-Fahrer sollen Wetterdaten sammeln

Wieviel Strom speisen die Solaranlagen in Deutschland wann und wo ins Netz ein? Das fragt sich der Leitungsbetreiber Tennet – und will mit Hilfe von VW-Fahrern Wetterdaten sammeln. Und was ist mit dem Datenschutz?

23.04.2017

THE EUROPEAN BUSINESS DAILY

**Handelsblatt**
**GLOBAL**

**Companies & Markets**   Finance   Politics   Opinion   Specials   Magazine

HANDELSBLATT EXCLUSIVE

## E.ON, Google Strike Solar Energy Partnership

Germany's largest utility is partnering with Google to introduce Sunroof, a solar-energy data platform, outside the US for the first time.

Jürgen Flauger                                              02. May 2017, 20:11

- European TSO TenneT cooperates with energy service provider CLENS for **better usage of wind data**

- TenneT also uses VW **car sensor data** to predict solar power generation

- E.ON introduces Google's solar-energy data platform Sunroof in Germany: analysis of the shape of the roof and local weather patterns to determine how solar power potential the roof has

# *There are numerous use cases for energy and utility companies to better leverage their data*

## *Applications data analytics in the energy sector*

Development customer portal, integration CRM

Churn analysis

Customer segmentation, customer value analysis

Prospect analysis


**Customer relationship**


**New business models**

Smart home

Cross-selling potential analysis

Sub metering – metering and billing services for heating and additional charges

Decentralized blockchain-based energy systems

Digital metering

Workforce management

Optimized procurement

Digitization of asset management


**Process optimization**


**Intelligent networks**

Predictive maintenance

Virtual power plants

Identify energy losses

Prediction of failures

# An "eco system" of new providers and business models originates around the customers' houses and data

**Own power supply** by PV or CHP through leasing or purchasing models

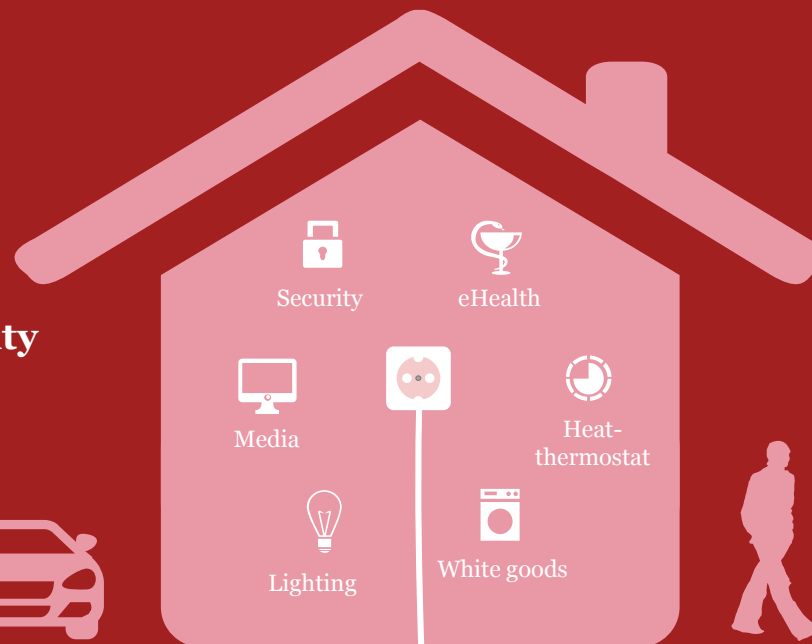**Energy monitoring** for analysis of consumption and cost

**Special electricity rates** for landlords and tenants

**Home automation** (e.g. smart home, e-mobility)

**Heating and cooling** by efficient (e.g. heat pump, combined heat & power)

**Vacancy and facility management**

Security

eHealth

Media

Heat-thermostat

**Metering and billing services** for heating and additional charges

**Control and billing of charging operations**

Lighting

White goods

Portfolio management for balancing the actual load (consumption/feed-in) and provision of system services

**Energy supply and network operations**

PwC

11

# A customer journey analysis generates new ideas through a very focused view on processes from the customers' perspective

## Example for method "Customer Journey"
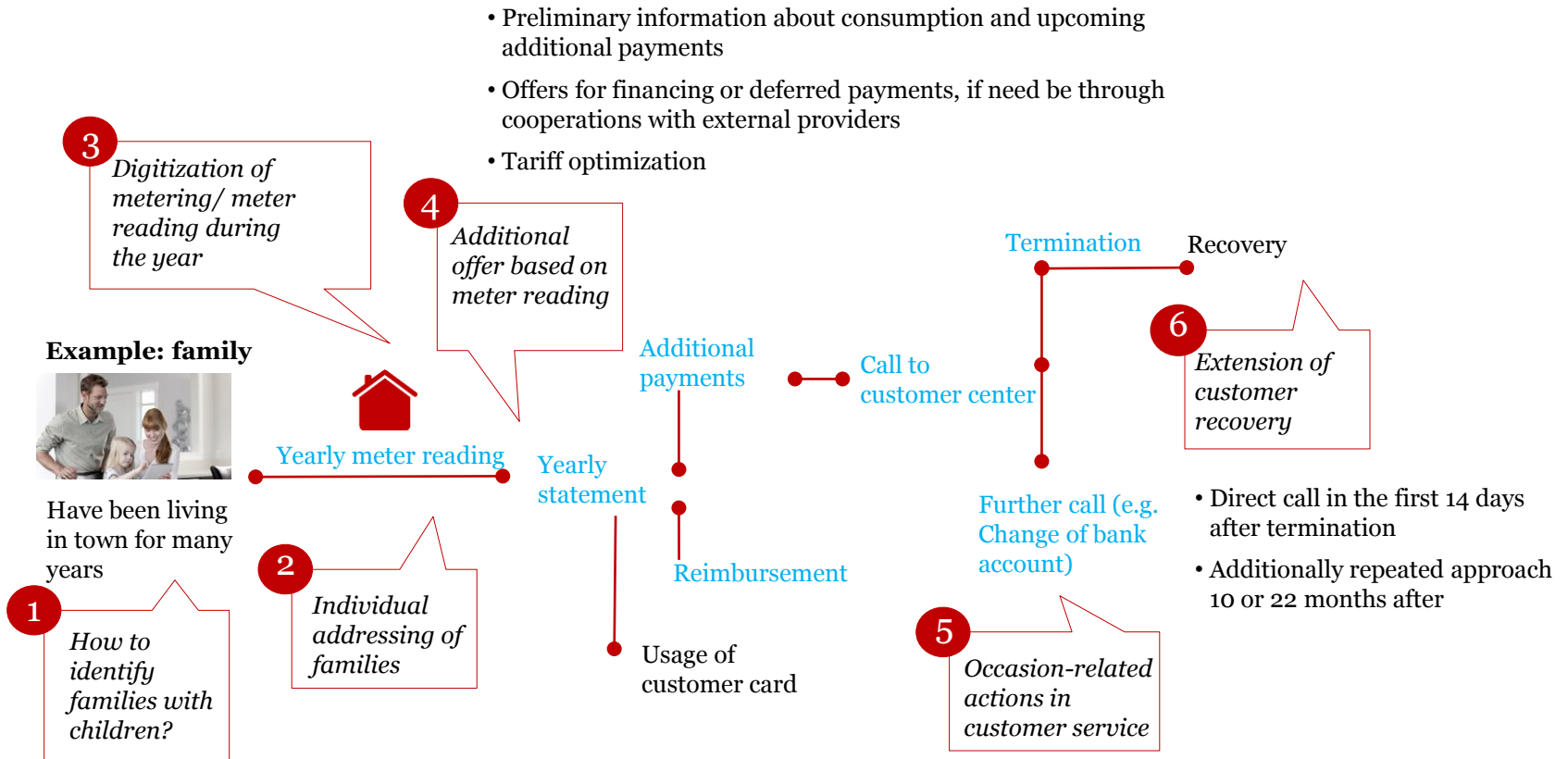
• Preliminary information about consumption and upcoming additional payments

• Offers for financing or deferred payments, if need be through cooperations with external providers

• Tariff optimization

**3** *Digitization of metering/ meter reading during the year*

**4** *Additional offer based on meter reading*

Termination    Recovery

**6** *Extension of customer recovery*

Additional payments

Call to customer center

**Example: family**

Have been living in town for many years

Yearly meter reading

Yearly statement

Further call (e.g. Change of bank account)

• Direct call in the first 14 days after termination

• Additionally repeated approach 10 or 22 months after

Reimbursement

**2** *Individual addressing of families*

**1** *How to identify families with children?*

Usage of customer card

**5** *Occasion-related actions in customer service*

• Voluntary indication in customer portal?

• Info from customer service?

• Increased consumption or changed mobility?

# *Through digitization of consumption data, many new services are possible*

## *Digital services for housing industry and landlords*
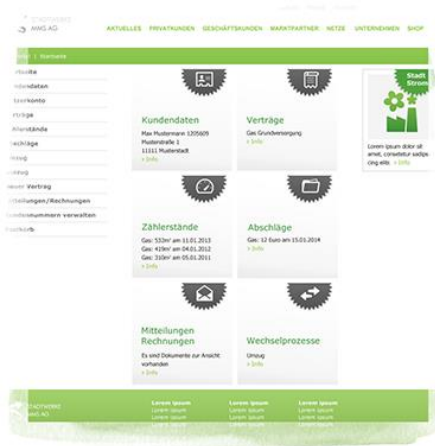


**1 Real-time visualization and analysis**
- Energy consumption and production of the building, inclusion of decentralized production (PV, CHP, …)
- KPIs compared to history or comparable objects (Benchmarking)

**2 Consumption analysis, prediction function, avoidance of payment defaults**
- Preview of upcoming additional payments caused by higher consumption of single tenants
- Heads-up to tenants, e.g. via SMS

**3 Control function**
- Control of building management, charging infrastructure if need be
- Digital inclusion facility management/ service center
- Inclusion of video surveillance
- Fast error localization

**4 Contract management and documentation**
- Digital filing of all contracts with service providers (e.g. snow clearing, house cleaning)
- Digital billing archive
- Documentation energy performance certificate, certifications etc.

# °Thermondo *finds suitable heating offers out of 7.000.000 solution bundles within seconds*

### Der Heizungsbauer.

*Thermondo advertises to create heating offers incl. Hardware, service and installation based on a product database in real-time*

- In 5 minutes to your offer

- Price guarantees through fixed price offers: Changeover as all-inclusive bundle

- Broad guidance & support

- Application for governmental subsidies included

- „Our offers are up to €2,000 cheaper than our competitors' comparable offers."

Source: Thermondo

# *After hitting the financial industry by storm, Blockchain technology now takes on the energy sector*

## *Just a hype or starting point of a revolution?*



**ENERGIE & MANAGEMENT**
ZEITUNG FÜR DEN ENERGIEMARKT

Stadtwerke
Frank Tramit im E&M-Gespräch
über die neue Notwendigkeit,
die Welt für den Kunden zu
organisieren **5**

Smart Meter
Neue Geschäftsmodelle – neue
Produkte und neue Tarife vor
dem Hintergrund des Smart
Meter Rollouts **9-14**

Ihre E&M als ePaper
https://epaper.energie-
und-management.de

INHALT

**Revolution oder Rohrkrepierer**

Welches Potenzial hat Blockchain, die
heutige Energiewelt umzukrempeln?
Intermanternehmer wollen mit in die
großen Energiekonzerne die neue
Technologie nutzen. VON RALF KÖPKE

### Süddeutsche Zeitung

## Wenn der Strom vom Nachbarn kommt

Brooklyn Microgrid heißt ein Projekt in New York, das die Energiewelt revolutionieren könnte: Bürger, die eine Solaranlage betreiben, versorgen auch andere direkt – die traditionellen Konzerne bleiben außen vor. Doch die Technik ist kompliziert

VON VARINIA BERNAU UND KATHRIN WERNER

Düsseldorf/New York – Die Sonne brennt auf Patrick Schnells Solaranlage. Die Sommer sind lang und sonnig hier, auf dem ... schon, aber noch im kleinen Stil. Fünf Häuser auf der einen Seite der Straße haben Solaranlagen auf dem Dach und verkaufen Strom seit April an die Nachbarn auf der anderen Straßenseite. Bald soll es weiter wachsen, 130 Hausbesitzer haben schon In... gebote machen – auch wenn dies gewiss nicht einfach wird in einem Land, das neuen Technologien nicht so aufgeschlossen gegenüber steht wie die Menschen in Brooklyn.

**Blockchain-Technologie**

11. August 2016

## Solaranlagenbesitzer werden zu digitalen Stromhändlern

**Wirtschafts Woche**

In Solaranlagen erzeugter Strom könnte dank Blockchain gewinnbringend verkauft werden.

Bild: dpa

von Dirk Wohleb

**Besitzer von Photovoltaikanlagen können ihren Strom in Zukunft direkt selbst verkaufen und abrechnen. Möglich machen das Transaktionen über die Blockchain.**

Die Kunden der Energieversorger werden flügge. Sie wechseln nicht mehr nur ihren Strom- oder Gasanbieter, sondern erzeugen auch selbst Strom, der sie unabhängiger macht. Aus ehemals passiven Konsumenten werden Produzenten, die mit ihrer Photovoltaikanlage ihre eigene Energie erzeugen.

### Frankfurter Allgemeine
ZEITUNG FÜR DEUTSCHLAND

## New York probt die Abschaffung der Energieversorger

Ein kleines Modellprojekt versetzt die Energiewirtschaft in große Aufregung. Haushalte versorgen andere mit Solarstrom – ohne dass ein Versorger dafür nötig wäre. Die Digitalisierung macht es möglich.

*Von Andreas Mihm*

BERLIN, 1. August. New-York-Besuchern wird der Stadtteil Gowanus in ... siert die Beratungsgesellschaft PWC.

Was die Berater so nüchtern hinschreiben, lässt bei Stromversorgern die Alarmglocken klingen. Denn wer braucht ihre Dienste noch, wenn Verbraucher und Erzeuger im digitalisierten Strommarkt ihre Geschäfte dezentral und allein untereinander abwickeln?

An dem New Yorker Modell nehmen zwar nur zehn Haushalte teil, doch hat es sich schon weit herumgesprochen. Unlängst ließ sich die parlamentarische Staatssekretärin im Bundesumweltministerium Rita Schwarzelühr-Sutter (SPD) des Bürgerstromprojekt vor Ort erklären ... ten auf allein beteiligten Rechnern gespeichert werden, sollten sie manipulationssicher sein. Jeder Befugte hat jederzeit Zugriff darauf, niemand kann behaupten, er hätte weniger Strom bezogen oder weniger Geld bekommen als abgemacht.

Die Blockchain-Technologie wurde erstmals im größerem Umfang für die Digitalwährung Bitcoin genutzt. Vor allem in der Finanzindustrie sorgt sie inzwischen für manche Aufregung. Schließlich könnten Banken als Organisatoren des Zahlungsverkehrs glatt überflüssig wer...

**PwC Blockchain Study available in German, English and French**

Office franco-allemand pour la transition énergétique
Deutsch-französisches Büro für die Energiewende

La blockchain :
Une opportunité pour les consommateurs d'énergie ?

Blockchain – Chance für Energieverbraucher?, Juli 2016

Traduction: Décembre 2017

TRADUCTION

Contact : Philipp Stavenhagen, OFATE
philipp.stavenhagen.extern@bmwi.bund.de

Soutenu par :

PwC

# *Blockchain technology offers a variety of use cases across different sectors*







## Financial market transactions, especially currencies

Direct transactions between sender and receiver (Bitcoin and other currencies) – no intermediary needed

*e.g.*

*Coinbase, BitPesa, Billion, Ripple, Stellar, Kraken*

*Enercity (Bitcoin payment)*

## Ownership registration, registry functions

Decentral and secure storage of ownership information ("decentral land registry")

*e.g.*

**Luxury goods:** *Blockverify*
**Land registry:** *ChromaWay*
**Art:** *Ascribe; ArtPlus*
**Diamonds:** *Everledger*
**Logistics:** *Blockfreight*
**Data:** *Stampery*
**Energy:** *ElecriCChain*

## Peer-to-Peer Transactions, *e.g. energy supply*

Non-financial transactions without an intermediary

*e.g.*

**Energy supply:** *Brooklyn Microgrid, Co-Tricity, Enerchain, Powerledger, ...*
**Renewable energy certificates:** *Grünstromjeton, ElectriCChain, Solarcoin*
**Electromobility / Peer-to-peer Mobility:** *Blockcharge, La'Zooz, Arcade City*

*Relevance for energy sector*

# *Blockchain also offers disruptive potential for the energy sector*

**The decentral Blockchain model may make metering companies, energy traders and banks redundant**

### *Today's value chain*

Conventional power plants

Wind energy

Storage

PV and other renewable energies.

energy and utility companies

EVU

Ban

Traders

Grid operators

Banks and payment services

Metering companies

1043.27

- - - - Electricity
- - - - Payments
- - - - Blockchain: payments and transaction data

Domestic and commercial consumers
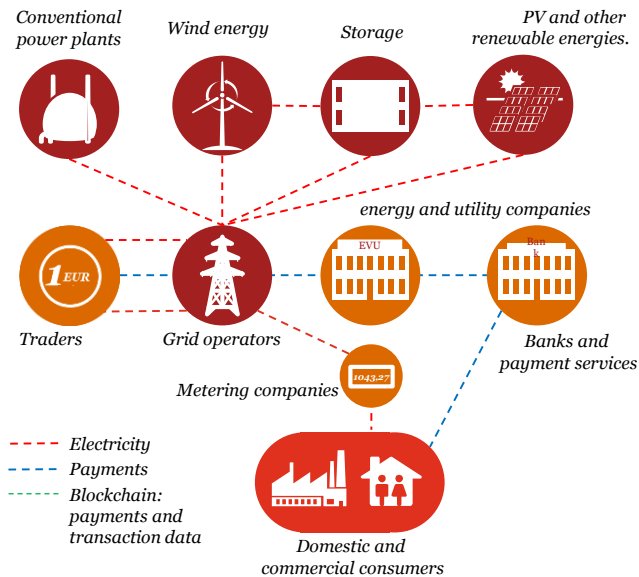
### *The energy world with Blockchain*

Conventional power plants

Wind energy

Storage

PV and other renewable energies.

Blockchain

Grid operators

Domestic and commercial consumers
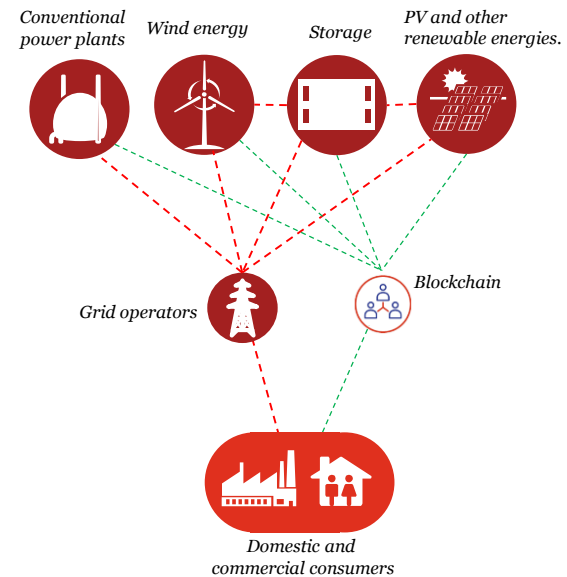
# *Blockchain Radar* – *Overview of companies, projects and initiatives currently active* – *Status April 2017*

## Overview of companies and projects active in Blockchain technology in energy

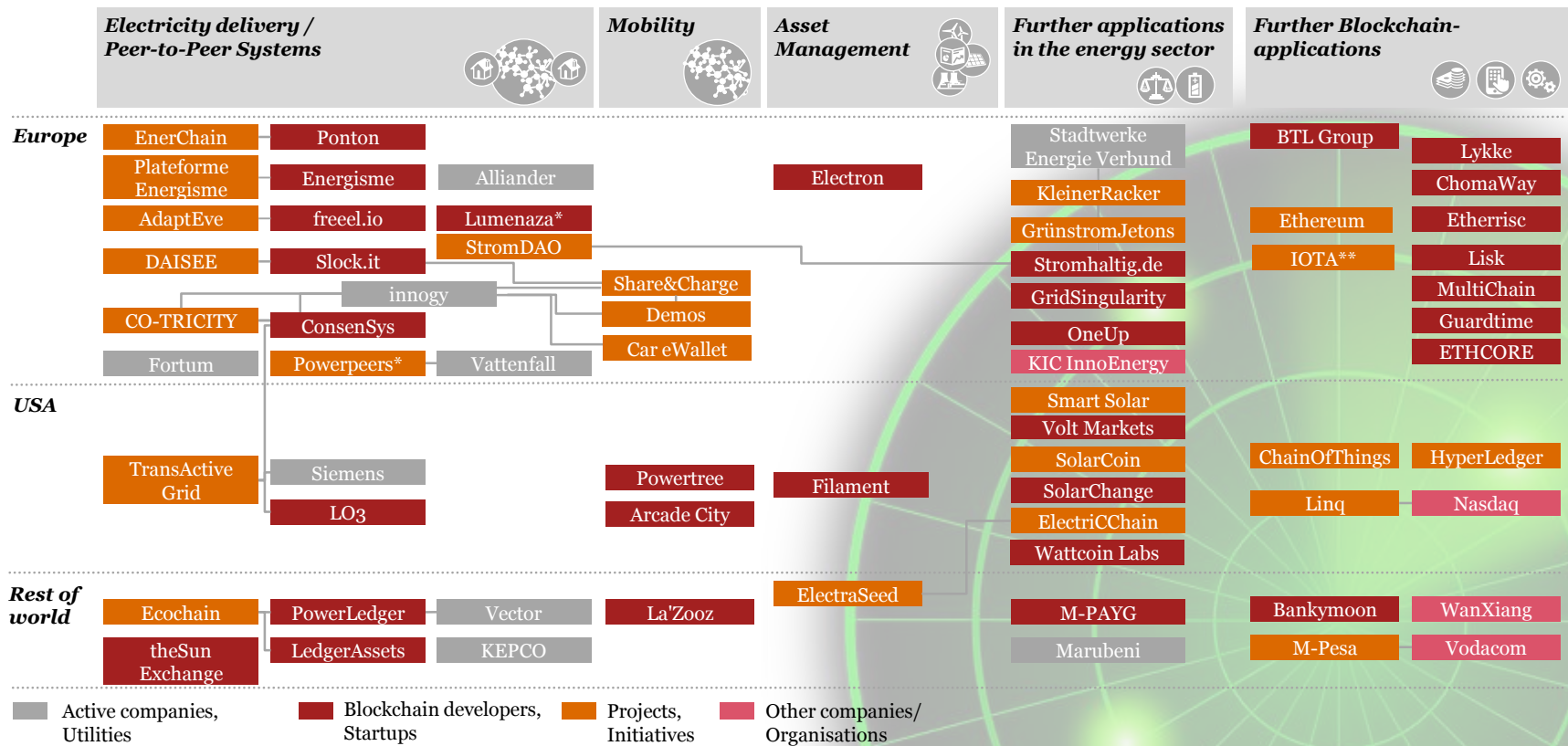| Electricity delivery / Peer-to-Peer Systems | | | Mobility | Asset Management | Further applications in the energy sector | Further Blockchain-applications | |
|---|---|---|---|---|---|---|---|
| **Europe** | | | | | | | |
| EnerChain | Ponton | | | | Stadtwerke Energie Verbund | BTL Group | Lykke |
| Plateforme Energisme | Energisme | Alliander | | Electron | KleinerRacker | | ChomaWay |
| AdaptEve | freeel.io | Lumenaza* | | | GrünstromJetons | Ethereum | Etherrisc |
| DAISEE | Slock.it | StromDAO | | | Stromhaltig.de | IOTA** | Lisk |
| | innogy | Share&Charge | | | GridSingularity | | MultiChain |
| CO-TRICITY | ConsenSys | Demos | | | OneUp | | Guardtime |
| Fortum | Powerpeers* | Vattenfall | Car eWallet | | KIC InnoEnergy | | ETHCORE |
| **USA** | | | | | Smart Solar | | |
| | | | | | Volt Markets | | |
| TransActive Grid | Siemens | | Powertree | Filament | SolarCoin | ChainOfThings | HyperLedger |
| | LO3 | | Arcade City | | SolarChange | Linq | Nasdaq |
| | | | | | ElectriCChain | | |
| | | | | | Wattcoin Labs | | |
| **Rest of world** | | | | ElectraSeed | | | |
| Ecochain | PowerLedger | Vector | La'Zooz | | M-PAYG | Bankymoon | WanXiang |
| theSun Exchange | LedgerAssets | KEPCO | | | Marubeni | M-Pesa | Vodacom |

- Active companies, Utilities
- Blockchain developers, Startups
- Projects, Initiatives
- Other companies/ Organisations

\* Interesting Peer-to-Peer-Model, currently without using Blockchain
\*\* Not based on a Blockchain, but on a Distributed Ledger, which, by its own account, overcomes the Blockchain´s inefficiency.

Source: PwC Research, company statements    Without guarantee of correctness and completeness

## *"Digital" can have many different facets for energy companies – it's important to get started*

**Focus!** – decide on a **few core areas of action** (e.g. data, smart home, blockchain or new business models) and put a lot of attention to them; do not spread your resources on too many projects

**Test! Test! Test!** – do not spend too much time on market research and R&D. **Build prototypes fast and let the customers decide** early on

**Cooperate!** – do not try to do everything internally, **use partnerships** to always stay ahead of competition

**Digital requires cultural change!** – Allow more slack, **more flexibility**, interactive collaboration tools

# The digital maturity displays status quo and possibilities for development

## Digital maturity for energy and utility companies

### SCOPE

- **Enterprise-wide consideration is possible and necessary**, exact scope to define
  - different subsidiaries
  - sales and distribution, system operation, generation, …
  - power, gas, water, public transport

- Evaluation of **digital maturity** and differentiated by subdomain

### APPROACH

- Standardized interview guideline, **interviews with relevant executives and selected experts**

- **Presentation and evaluation of status quo** as well as completed and planned **measures** for digitization

### RESULTS

- **Snapshot of "digital maturity"** inside the company

- Extensive **overview over current digital initiatives**, business models, strategic goals and applied technologies

- Direct **visualization of results**

- **Sensitization of executives**
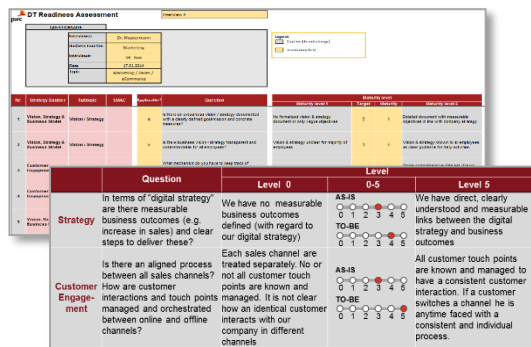


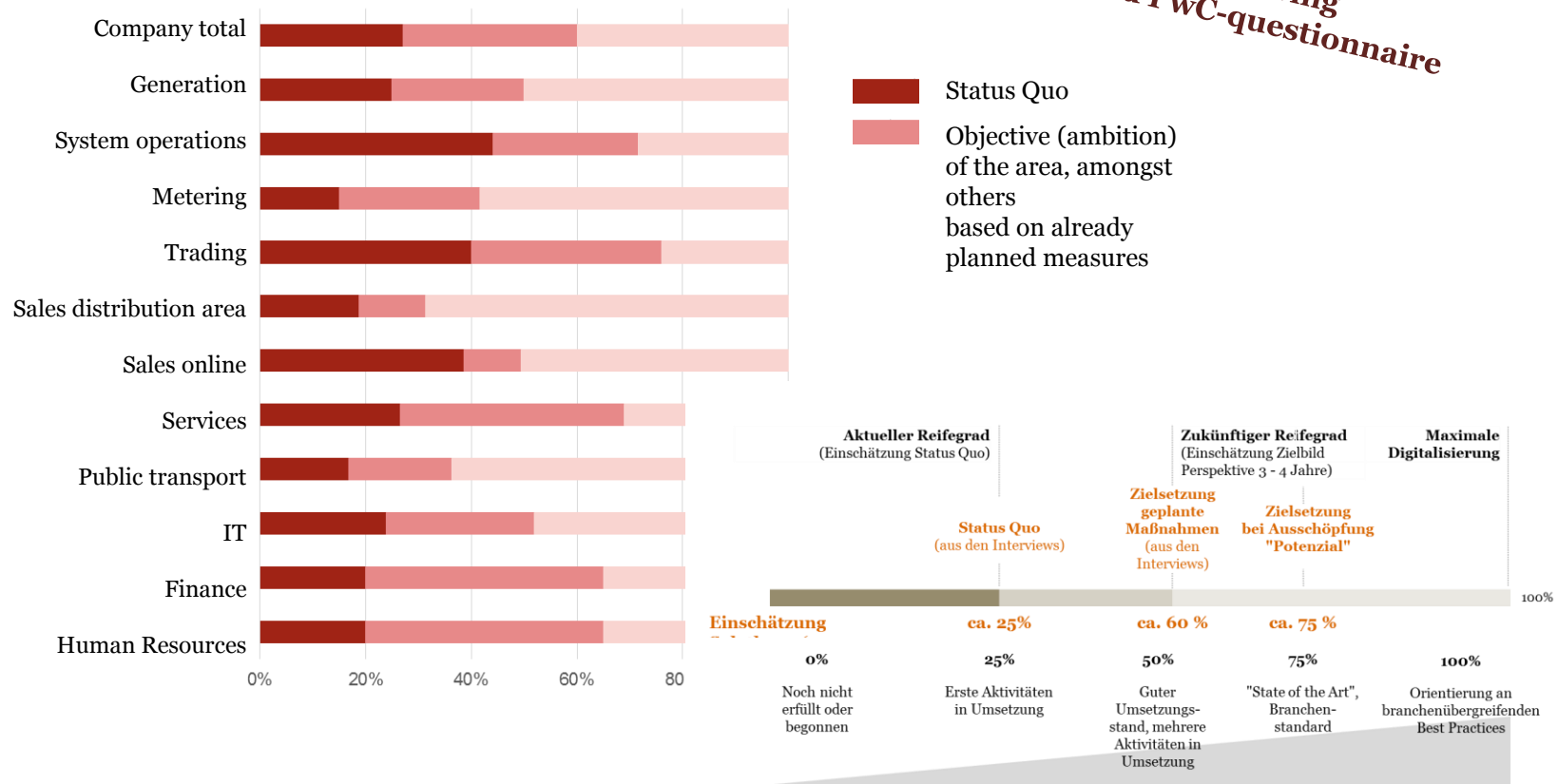*PwC Tool "Digitaler Reifegrad von EVUs"*



*Visualization of the current level of maturity (example)*
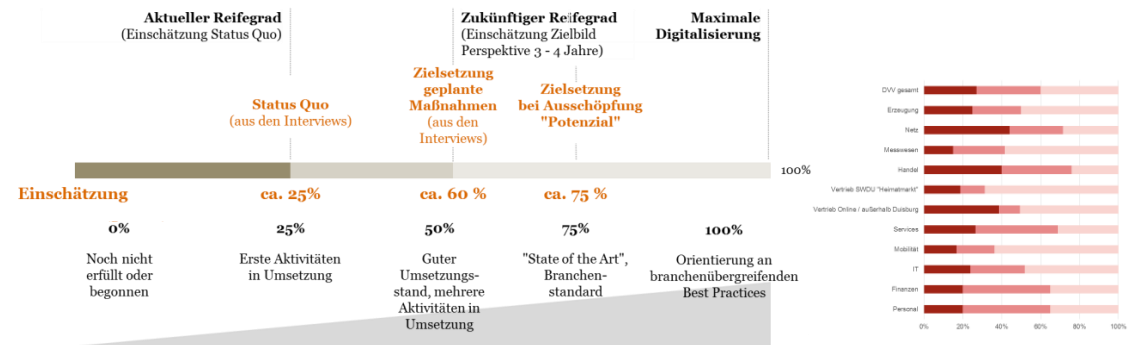
# *The level of maturity– status quo and objective – is measured individually per area or value-added step*

## *Digital maturity – example project*

*Collection through personal interviews following a standardized PwC-questionnaire*



Status Quo

Objective (ambition) of the area, amongst others based on already planned measures

| | Aktueller Reifegrad (Einschätzung Status Quo) | | Zukünftiger Reifegrad (Einschätzung Zielbild Perspektive 3 - 4 Jahre) | | Maximale Digitalisierung |
|---|---|---|---|---|---|
| | | **Status Quo** (aus den Interviews) | **Zielsetzung geplante Maßnahmen** (aus den Interviews) | **Zielsetzung bei Ausschöpfung "Potenzial"** | |
| **Einschätzung** | | ca. 25% | ca. 60 % | ca. 75 % | 100% |
| 0% | | 25% | 50% | 75% | 100% |
| | Noch nicht erfüllt oder begonnen | Erste Aktivitäten in Umsetzung | Guter Umsetzungs-stand, mehrere Aktivitäten in Umsetzung | "State of the Art", Branchen-standard | Orientierung an branchenübergreifenden Best Practices |

*Visualization of the current level of maturity (example)*

**pwc**

**www.pwc.de/digital-energy**
**www.pwc.de/energiewirtschaft**

*Felix Hasse*

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*felix.hasse@de.pwc.com*