

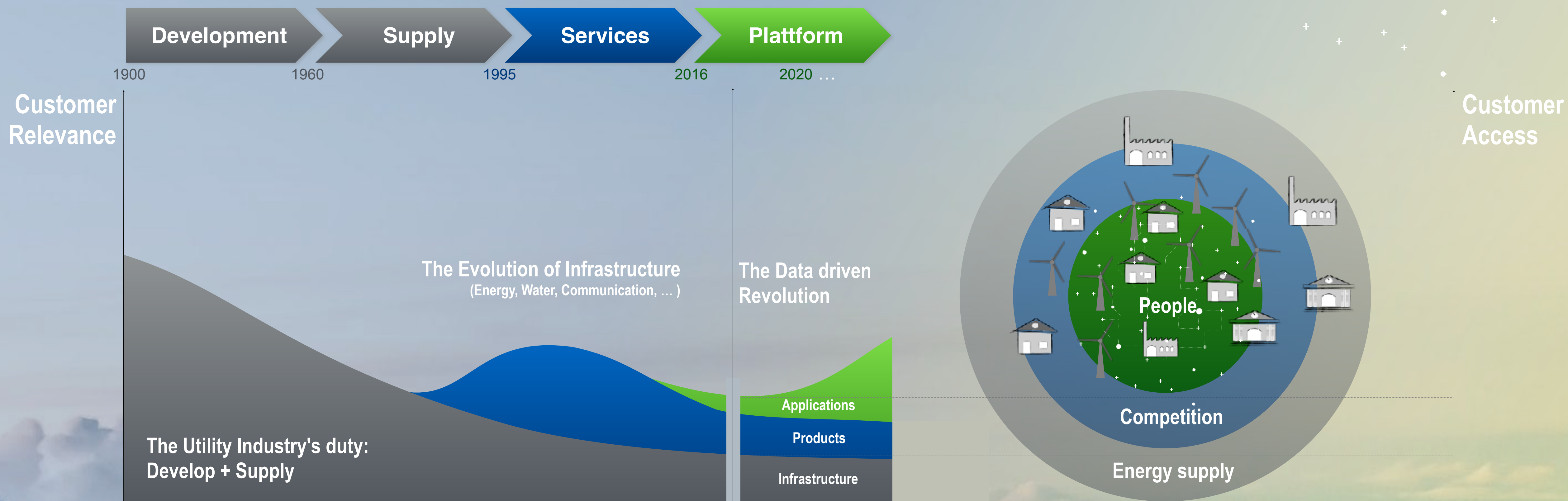
An abstract circuit diagram in white, featuring a central square with various lines, dots, and plus signs extending outwards, resembling a network or energy flow diagram.

ENERGY OF VALUE

THE DECENTRALIZED DIGITAL DISRUPTION IN THE GERMAN UTILITY LANDSCAPE

#POWEROFCOLLABORATION

THE PATHWAY OF ENERGY REVOLUTION



THE IMPACT OF LIBERALIZATION

GERMAN POWER MARKET

2.537 TWh
Power Volume
Forward Market

200 TWh
Power Volume
Forward Market

2002

2015

RENEWABLE ENERGY

32 %
of renewables
today

2017

TARGET 80%
of renewables

2050

GERMAN POWER MARKET

52%

Taxes & other
Expenses

2016

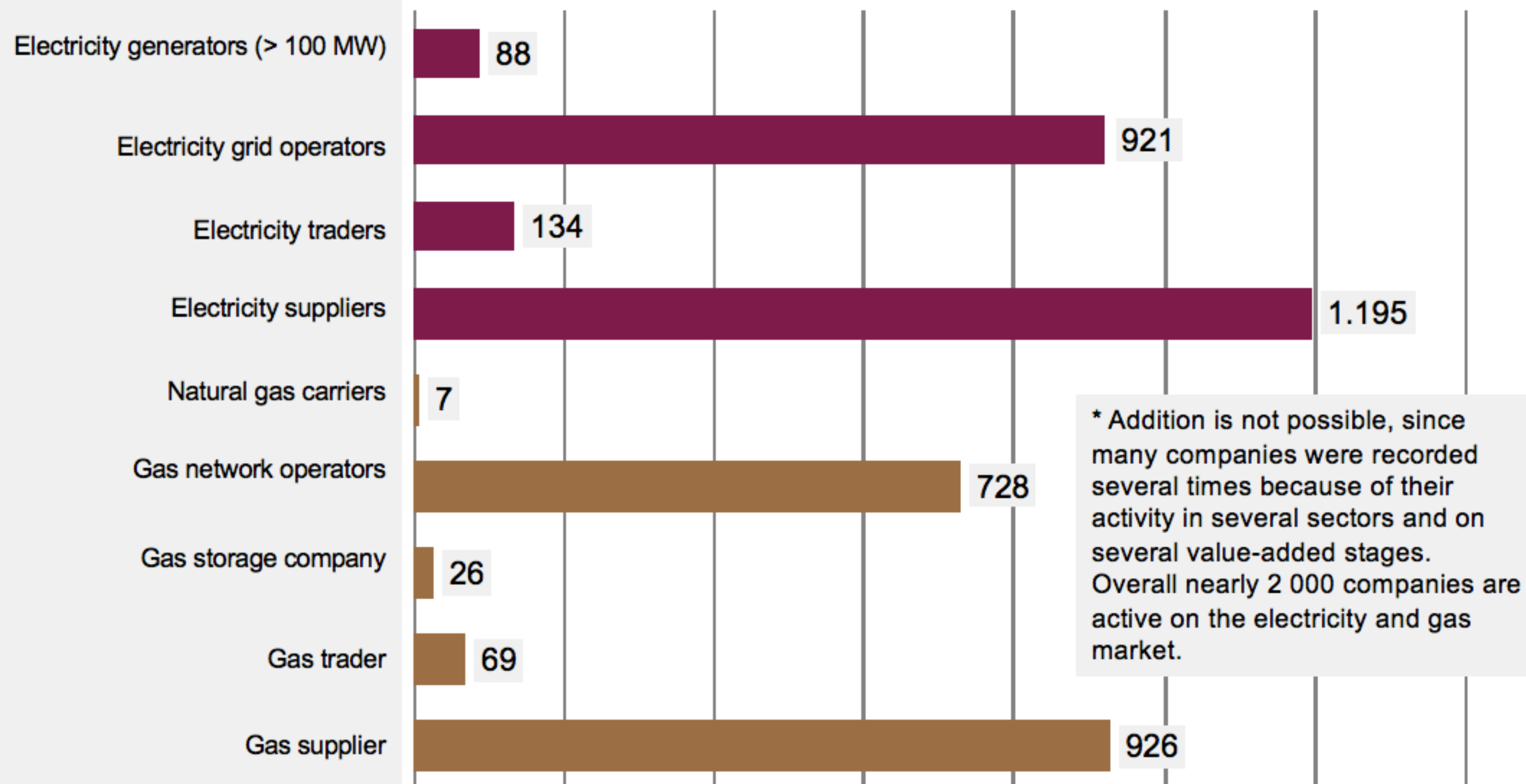
49%

decrease of power
price „Futures“

2010 - 2016

DIVERSITY IN THE GERMAN ENERGY MARKET

Number of companies in individual market areas *

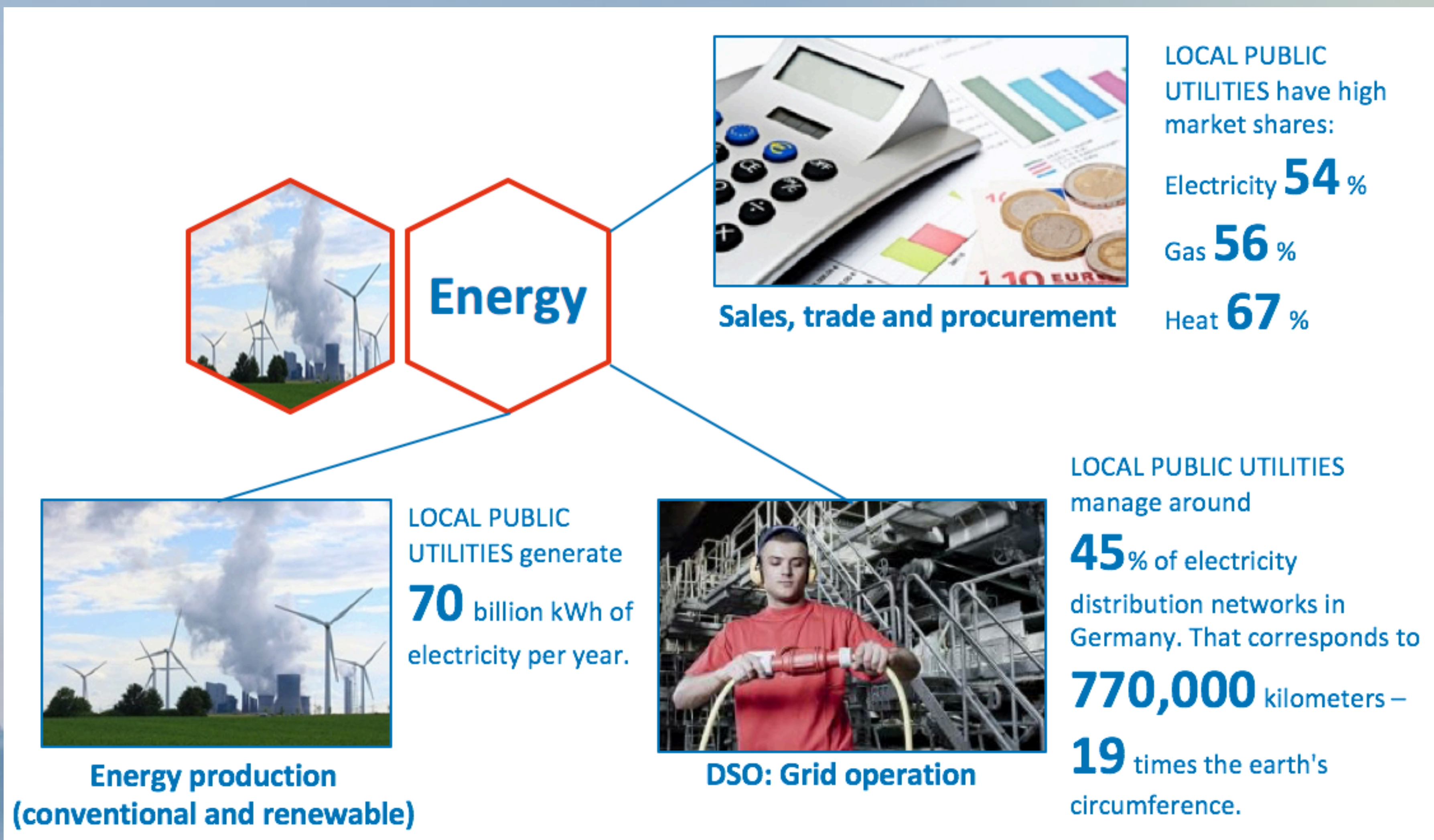


Source: BDEW (Status: 12/2016)

FIELDS OF ACTIVITIES OF LOCAL UTILITIES



ACTIVITIES OF PUBLIC UTILITIES IN THE ENERGY SEKTOR

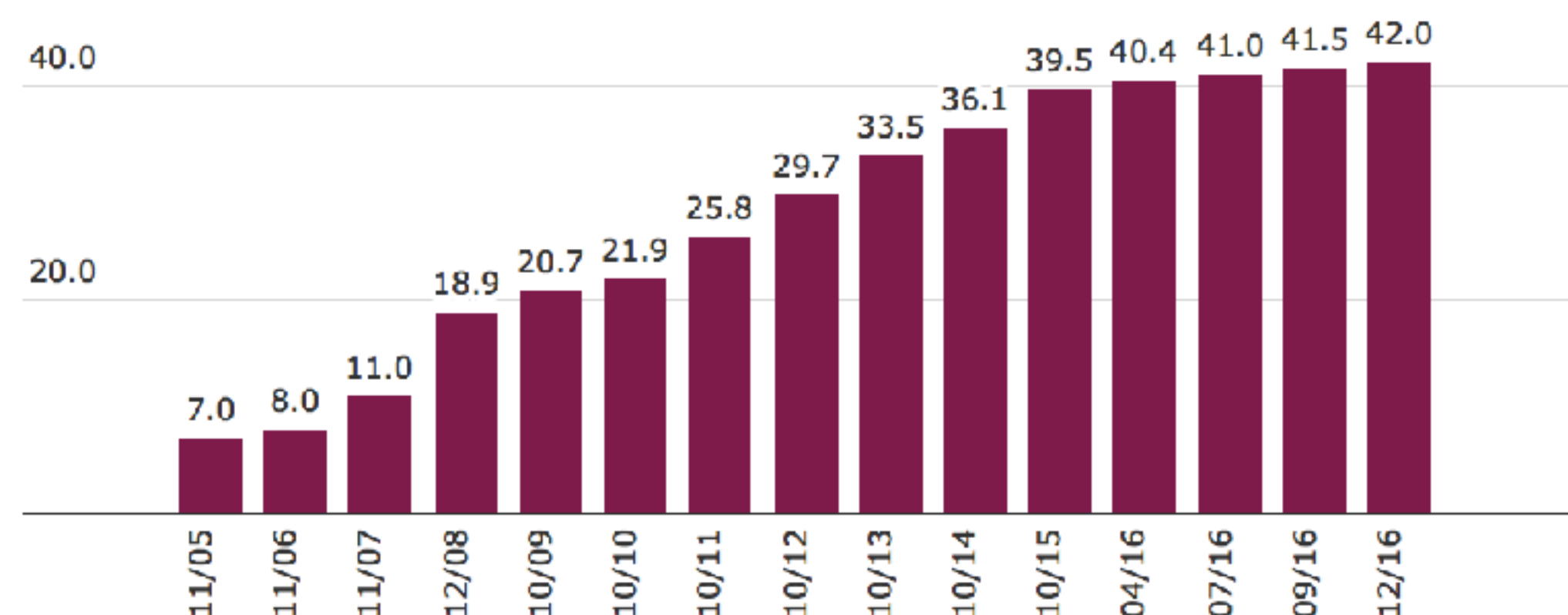


COMPETITIVENESS OF GERMAN ENERGY MARKET

Lieferantenwechsel im Strommarkt

Lieferantenwechsel im Strommarkt

Versorgerwechsel der Haushalte in der Stromversorgung
 (kumulierte Wechselquote seit der Liberalisierung)



Angaben in Prozent
 12/16 = 4. Quartal 2016

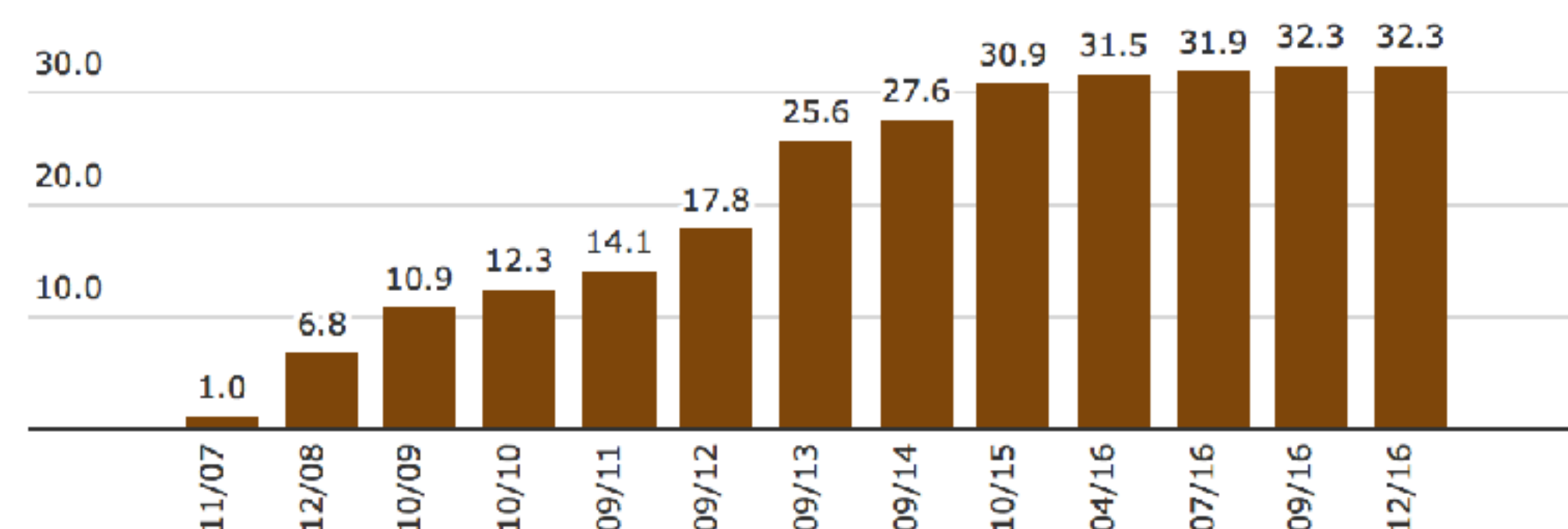
Quelle: BDEW-Kundenfokus, BDEW-Energietrends
 Daten Einbetten Grafik

bdew
 Energie. Wasser. Leben.

Lieferantenwechsel im Gasmarkt

Lieferantenwechsel im Gasmarkt

Versorgerwechsel der Haushalte*) in der Gasversorgung
 (kumulierte Wechselquote seit der Liberalisierung)

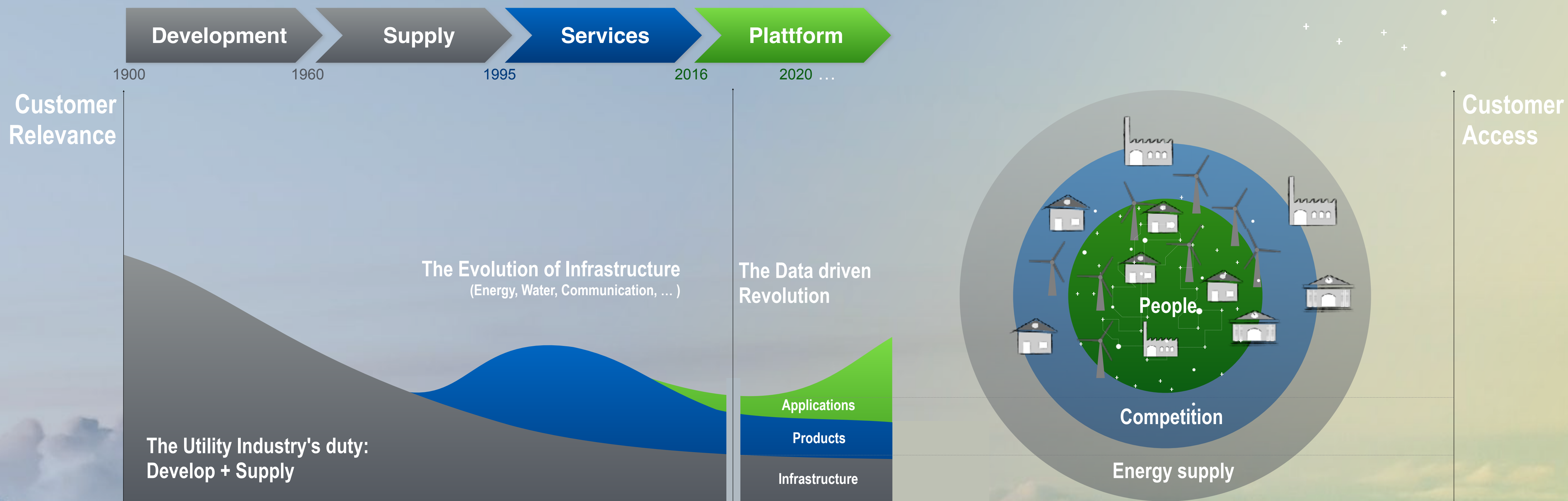


Angaben in Prozent
 *) Haushalte mit eigenem Gaszähler und direktem Vertragsverhältnis mit dem Gasversorger
 12/16 = 4. Quartal 2016

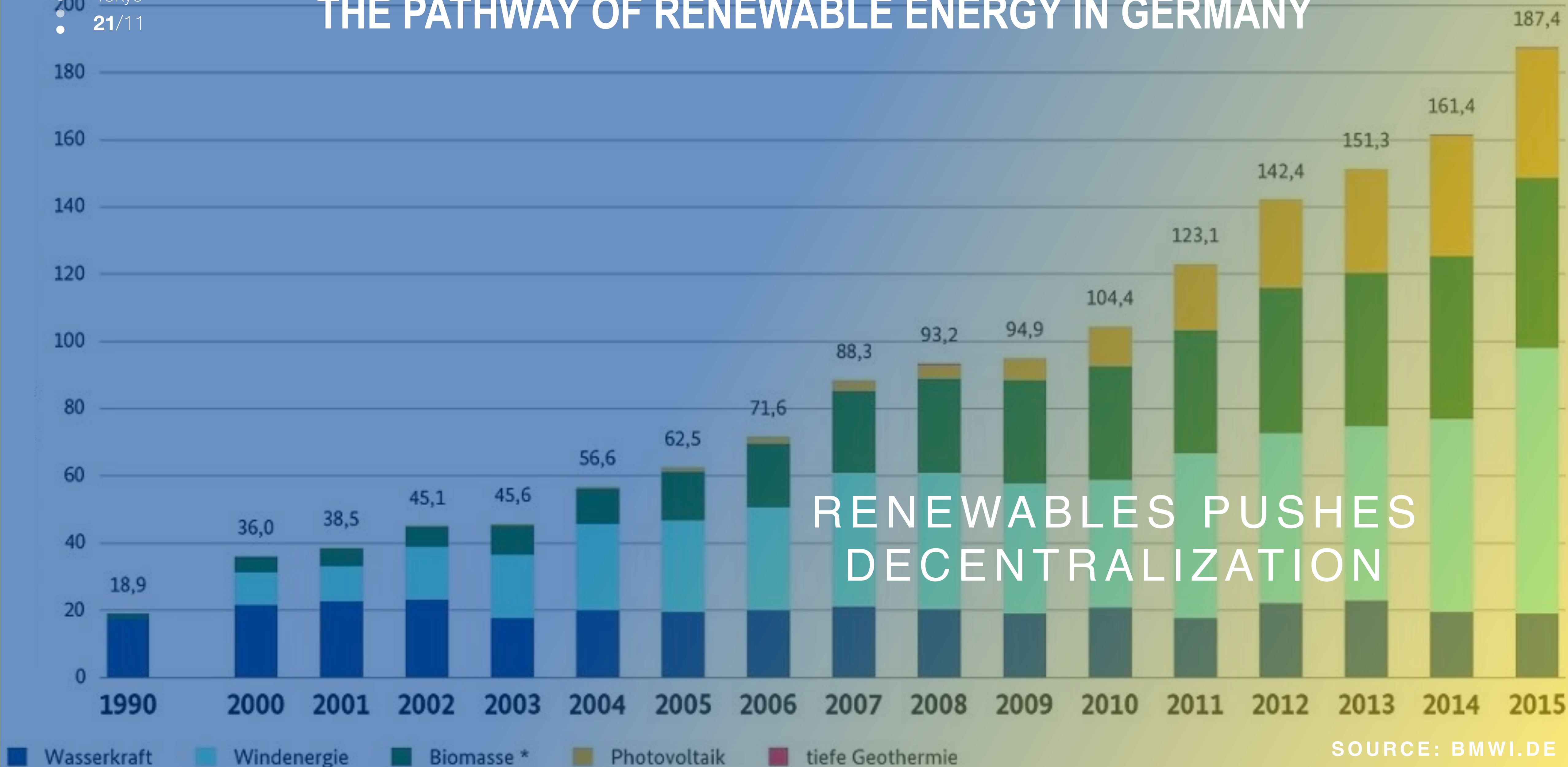
Quelle: BDEW-Kundenfokus, BDEW-Energietrends
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bdew
 Energie. Wasser. Leben.

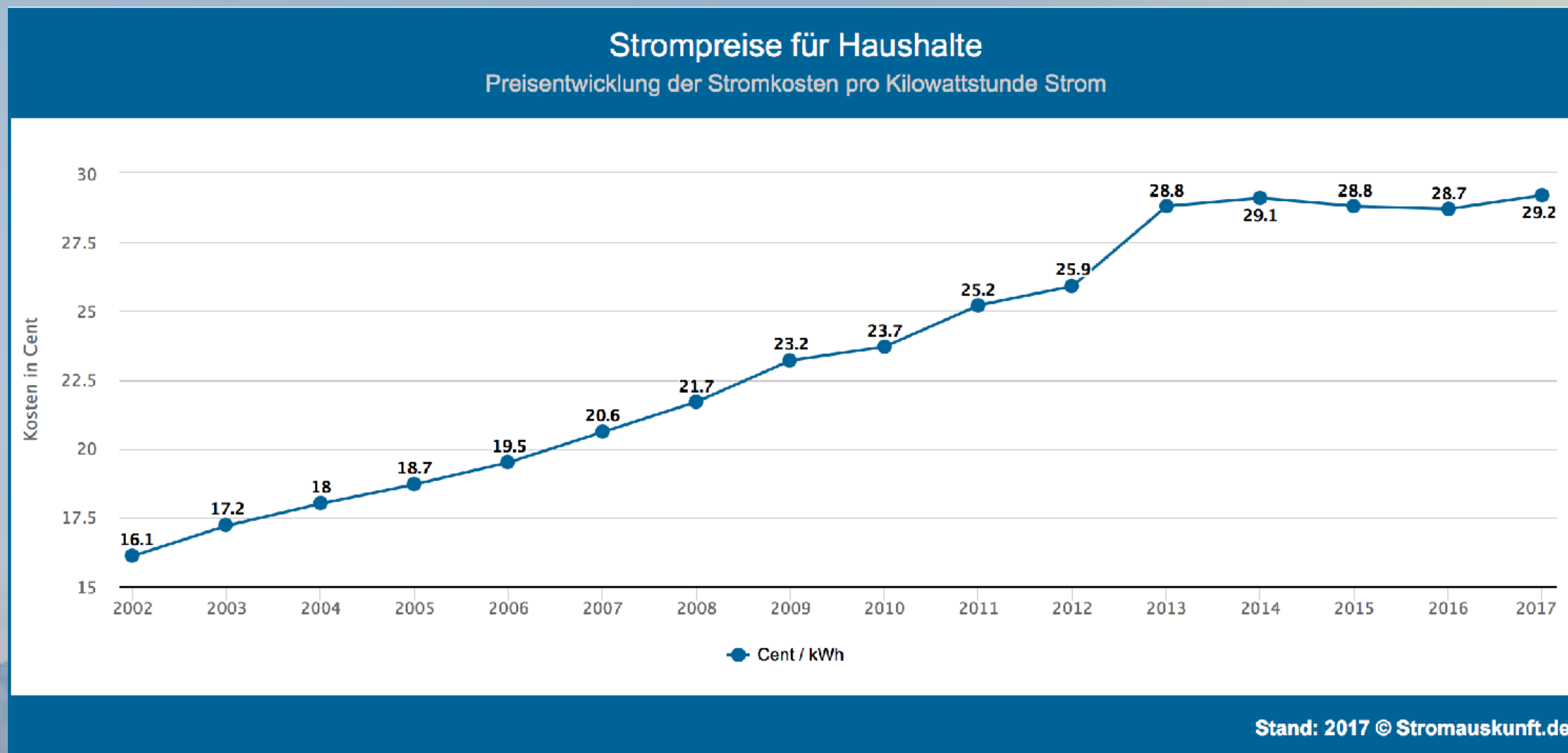
THE PATHWAY OF ENERGY REVOLUTION



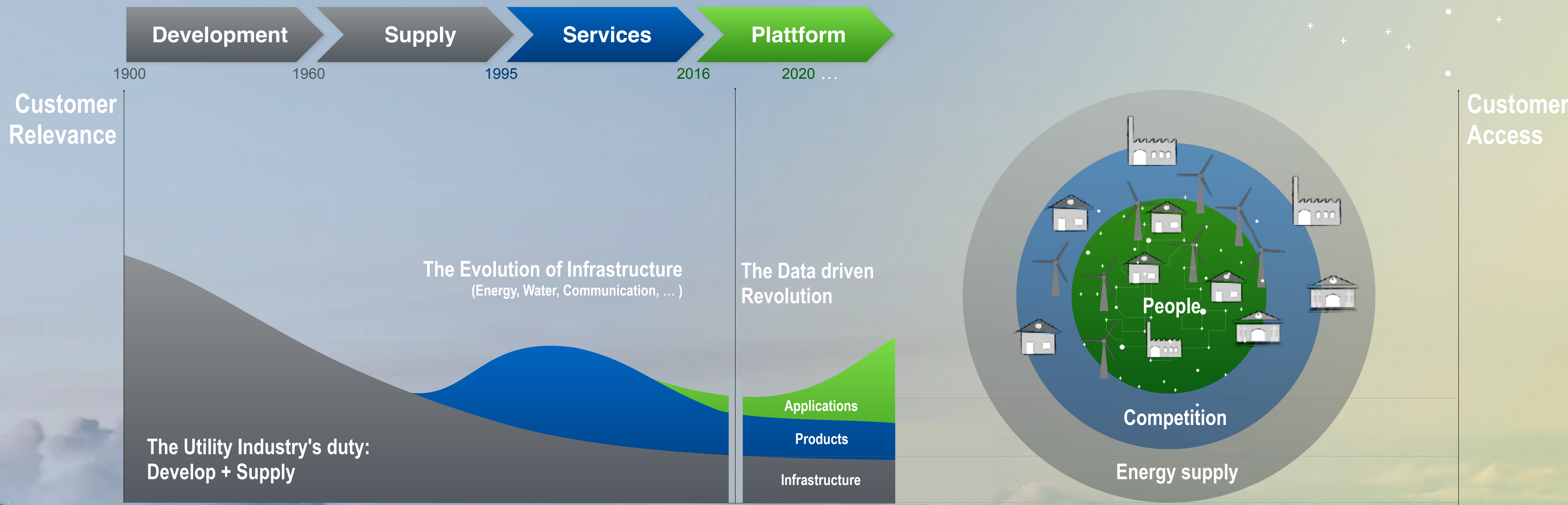
THE PATHWAY OF RENEWABLE ENERGY IN GERMANY



POWER-PRICE HAS INCREASED SINCE 2002



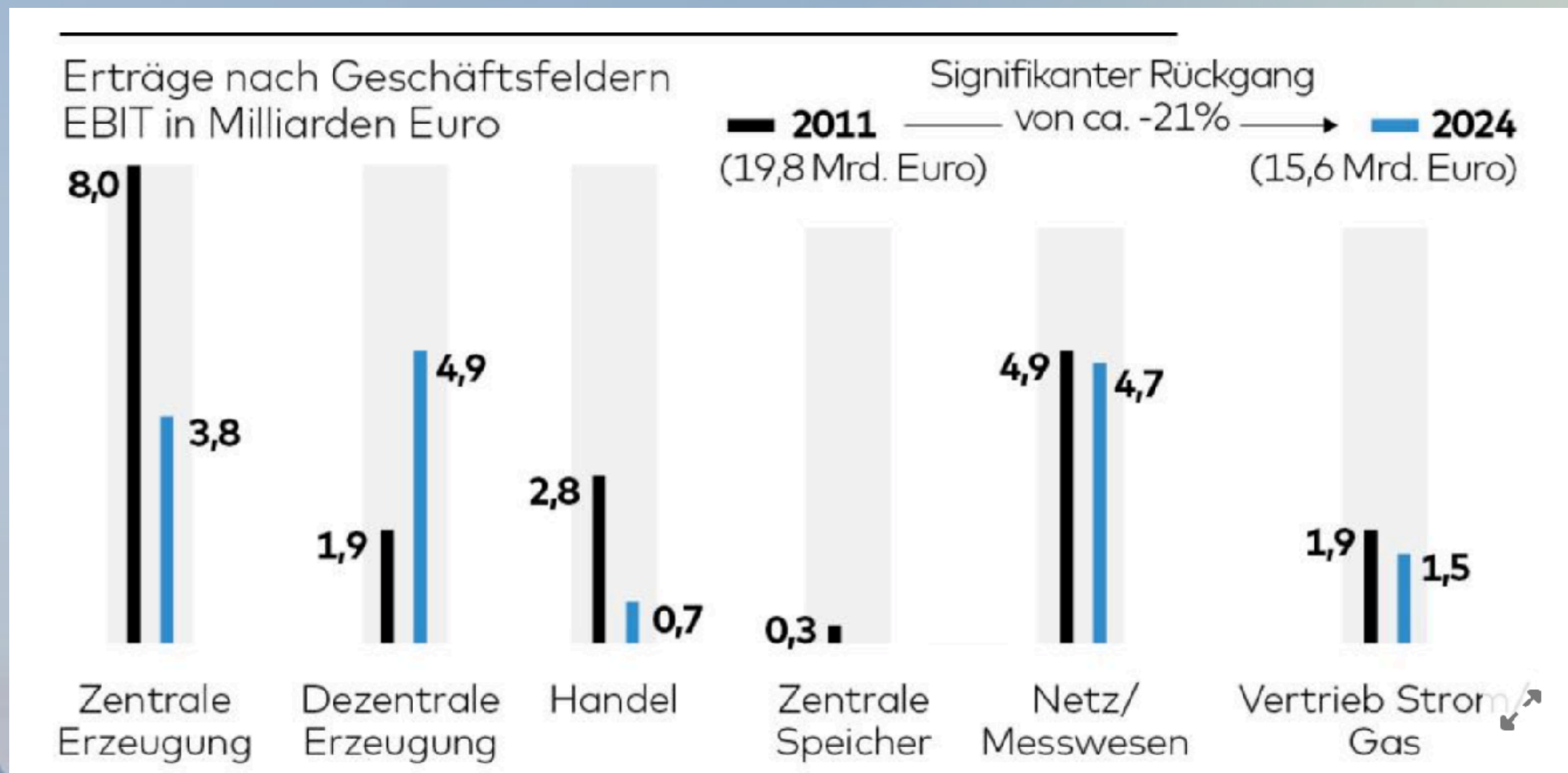
THE PATHWAY OF ENERGY REVOLUTION



THE GORDIAN KNOT ?

CHALLENGES IN ALL
SECTORS

CHALLENGES IN ALL SEKTORS



SOURCES | GRID | CUSTOMERS

REVOLUTION OF SOURCES

FROM COAL▶ RENEWABLES.....▶ X

DECENTRALIZED & VOLATIL

GERMANY

4.7 TWh
of curtailed energy

TARGET 80 %
of renewables

32 %
of renewables
today

2016

2050

EWE AG

82 %
of renewables

2016

ENERA

170 %
of renewables

2016

GRID REVOLUTION

OLD ARCHITECTURE -> STATIC, CENTRALIZED
WE INTEGRATED RENEWABLES IN OLD ARCHITECTURE

.....▶ **REDESIGN OF ARCHITECTURE**

DIVERSITY IN THE GERMAN ENERGY MARKET



Where we are coming from!

- < 1.000 power plants
- < 7.000 automated and remote-controlled substations
- Low impact on loads
- Infrastructure = copper plate
- Static, well known operating model „top-down“
- System operation based on detailed planning and minimization of uncertainties
- **The energy system's duty: Supply**



Where we are going to be!

- > 1.300.000 decentralized energy producers
- 550.000 substations in Germany, in EWE network: ~ 20.000 (enera: ca. 4.000)
- Up to 40.000.000 households
- Infrastructure = highly dynamic system
- Developing functionality: „load reversal → top-down vs. bottom up“
- System must be able to deal with bigger uncertainties
- The energy system's duty has been changed by the energy turnaround!
- **The energy system's duty: Moderation**

FROM SYSTEM OPERATOR TOWARDS SMART GRID MODERATOR

01

refinement of the
passive infrastructure



02

smart meter as a
anchor point

03

smart grid operator
to moderate the new
energy system

Establishing SGO Capabilities are required to maintain system security at distribution level

GRID-SIDE STORAGE SOLUTIONS ACCELERATES RENEWABLE ENERGY TRANSITION @SGO LEVEL



DR. MAGNUS PIELKE
BE.STORAGED GMBH

@M_PIELKE

01

MULTI PURPOSE
Business Modell
Capabilities

03

Highly MARKET integrated
Ancillary Services like PCR
Further Flexibility Options



HENDRIK BROCKMEYER
BE.STORAGED GMBH

@HENBRO

02

DIGITALIZATION as a anchor point
Bridge building by combining grid
Services an E-Mobility

DIGITALIZATION

DO WE HAVE THE RIGHT PERSPECTIVE?



CUSTOMER REVOLUTION

DATA DRIVEN
NEED DRIVEN
SHARING & PROSUMERS

.....▶ **EMPOWER THROUGH DIGITALIZATION**



HOW TO EMPOWER A GENERATION

TO SIT AT THE FOREFRONT OF ENERGY REVOLUTION

WHILE OUR CUSTOMERS ARE CONNECTED TODAY OUR COMPANIES ARE NOT!

64% OF OUR CUSTOMERS EXPECT COMPANIES TO RESPOND AND INTERACT WITH THEM IN REAL TIME...

+50% OF CUSTOMER SAY THEY'RE LIKELY TO SWITCH BRANDS IF A COMPANY DOESN'T ANTICIPATE THEIR NEEDS...

AND 74% FEEL THE SAME IF THE COMPANY DOESN'T PROVIDE AN EASY CHECKOUT PROCESS...

TODAY'S CUSTOMER IS DEMANDING AND EXPECTS THE COMPANY TO KNOW THE NEXT STEP IN THE CUSTOMER JOURNEY...

CUSTOMERS EXPECT A LOGICAL EXPERIENCE, AND THE COMPANY TO BUILD THIS JOURNEY IN A WAY THAT MAKES SENSE...

PERSONALIZED, TAILORED, REAL-TIME COMMUNICATION

IN FACT SOME CUSTOMERS ENJOY TALKING INTO THEIR APPLE WATCH TO SEND A TEXT MESSAGE...

CAN YOU IMAGINE IF A CUSTOMER WERE ABLE TO SEND A VOICE MESSAGE TO ASK A COMPANY A QUESTION?

OR, EVEN ENGAGING WITH AN AGENT FROM THE PRODUCT ITSELF, THROUGH A SPEAKER OR SCREEN?

TODAY'S CONSUMER TO BUSINESS TEXT COMMUNICATIONS ARE RARE, UNLESS... AIRBNB OR UBER!

IT'S LESS EASY TODAY TO CONNECT WITH COMPANIES THAN IT IS WITH FAMILY AND FRIENDS...

IS IT ALL ABOUT TECHNOLOGY & ALGORITHMS?

TECHNOLOGY | ALGORITHM

HUMANITY | ALGORITHM

TECHNOLOGY IS NOT WHAT WE SEEK
BUT

IT`S ABOUT HOW WE SEEK...

INVEST IN BOTH!

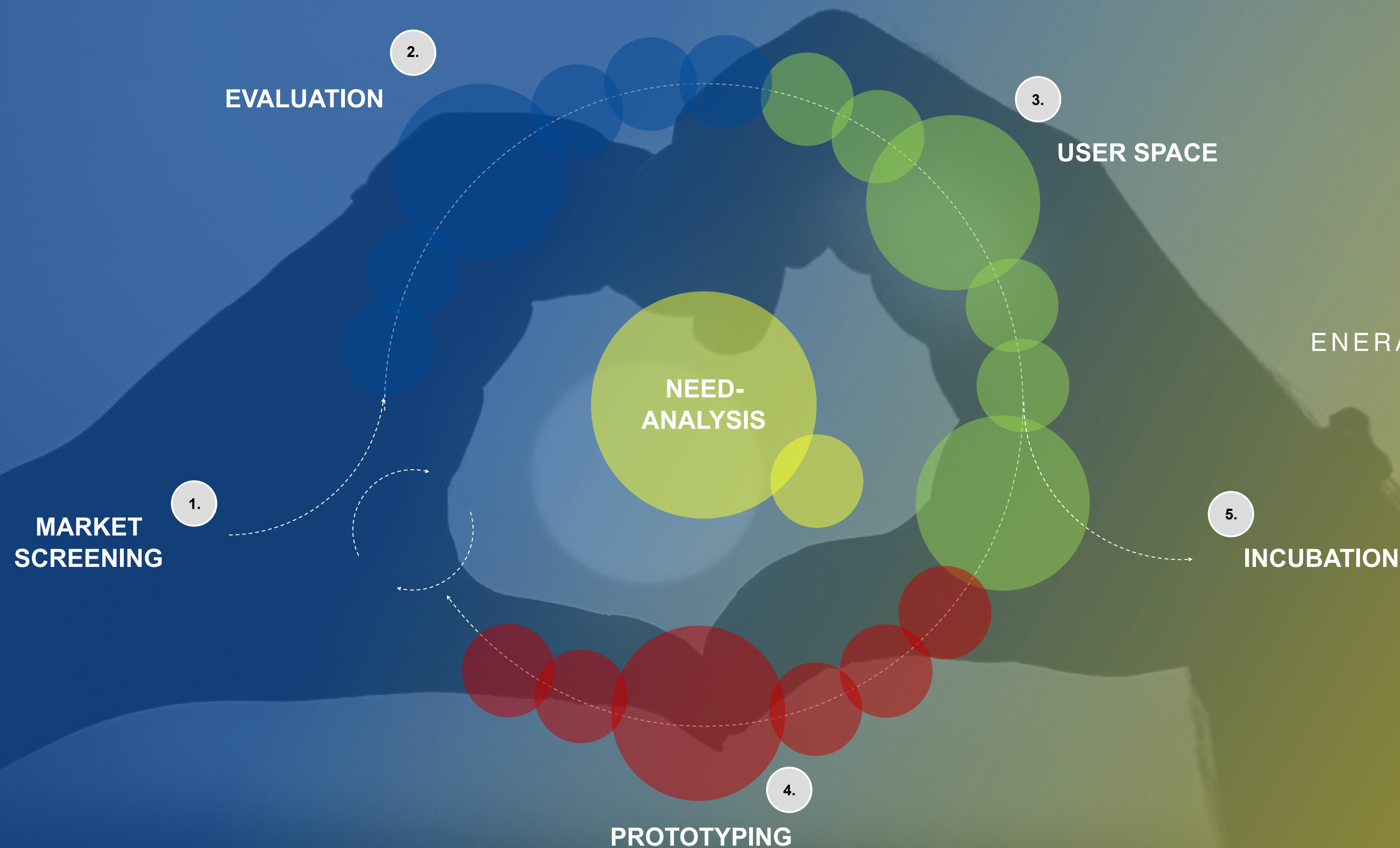
TOMORROW EMOTIONAL LIFECYCLE

THE ENERA TECHLAB APPROACH



BERNARD WESSELS
ENERA TECHLAB, EWE AG

@BOERNI_W



FLORIAN FISCHER
ENERA TECHLAB, THE PEAK LAB.

@FLORIANF

GAME OVER!?

“Alexa, turn on
Welcome Home”

“Alexa, turn on my
Chill Time”

“Alexa, turn off my
Bedroom Sonos”

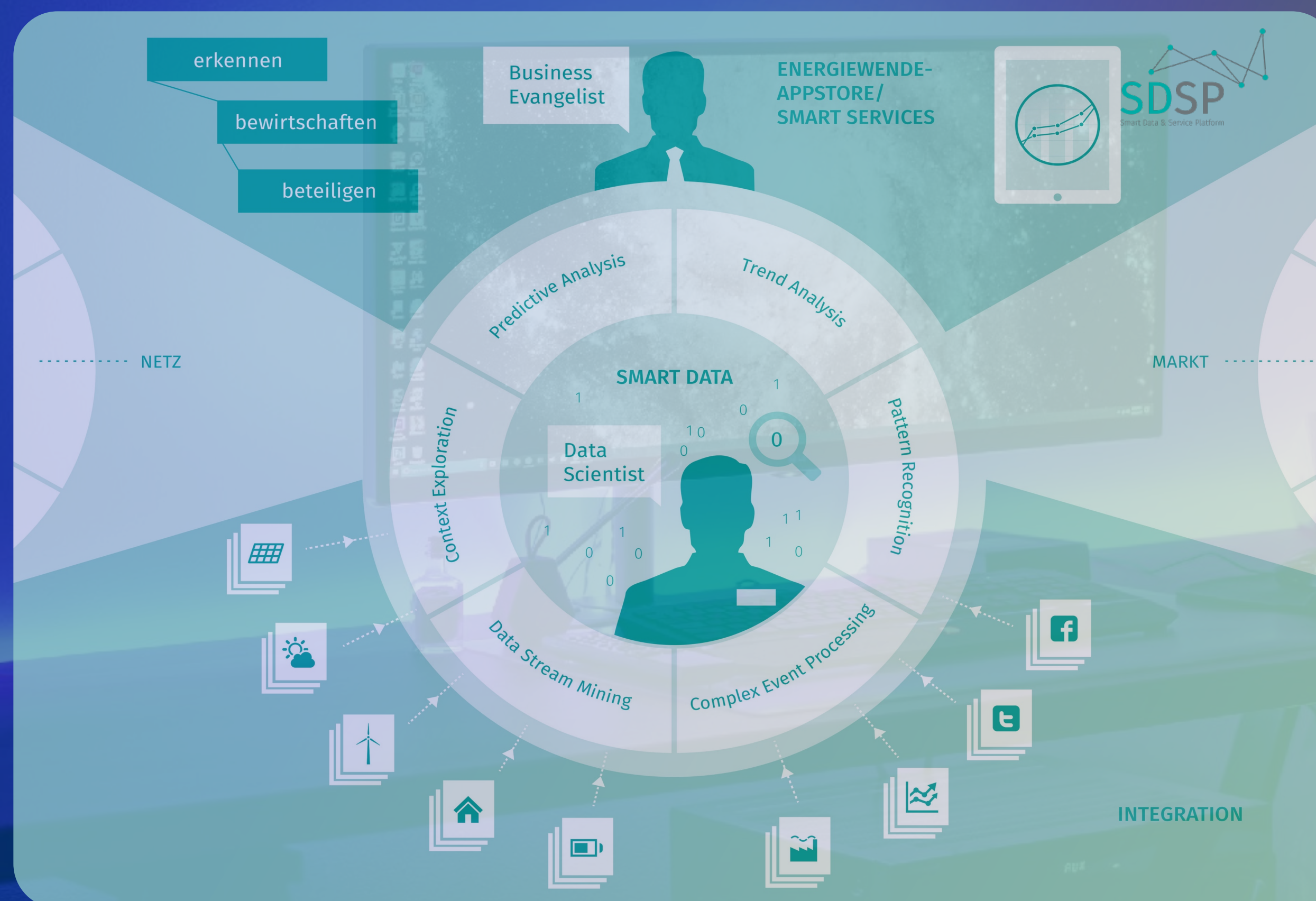
“Alexa, turn on
the TV”



POWER 2 COIN

ETHEREUM MINER BRINGS DIGITALIZATION AND FLEXIBILITY TOGETHER

SMART BUSINESS NEEDS SMART CAPABILITIES



LET'S PUSH DIGITAL ENERGY REVOLUTION



THANK YOU



CHRISTIAN ARNOLD
SVP, BUSINESS INNOVATION EWE AG

#POWEROFCOLLABORATION

@GREENC4GREEN; @E_VERNETZEN