



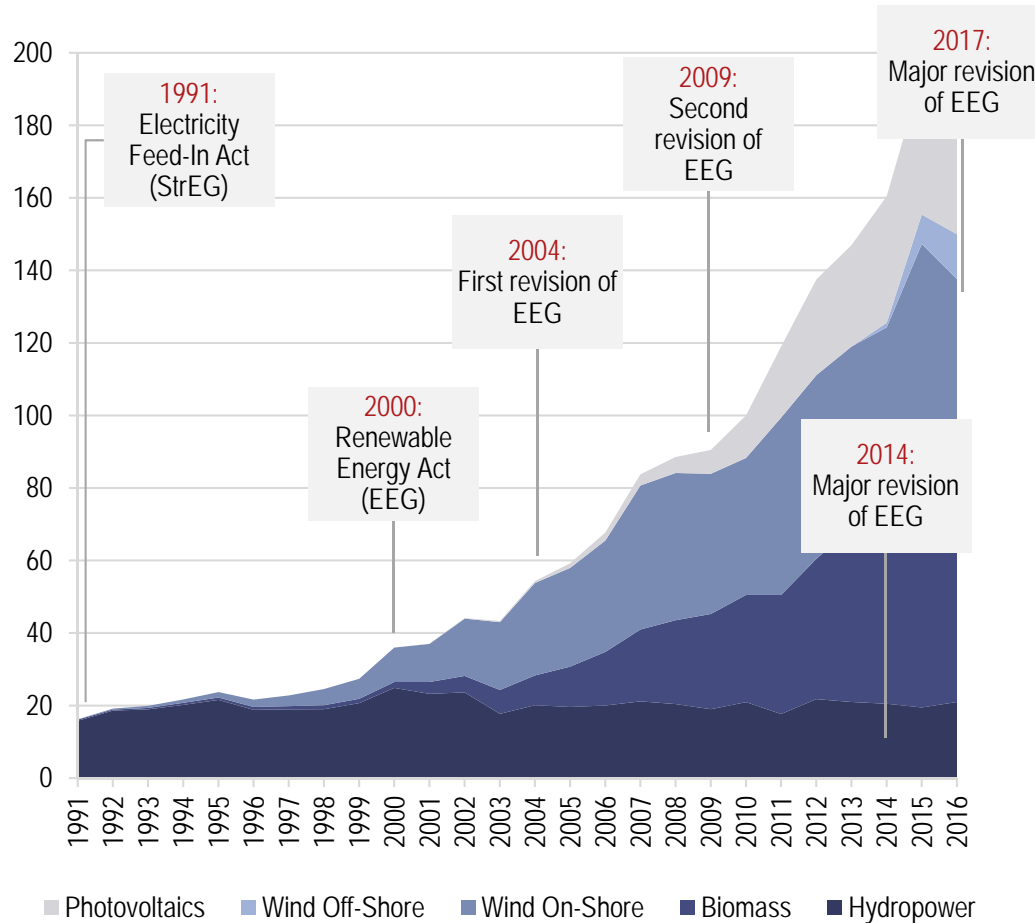
Energy transition in the Federal Republic of Germany: an evaluation and outlook

Christoph Burger
March 2019

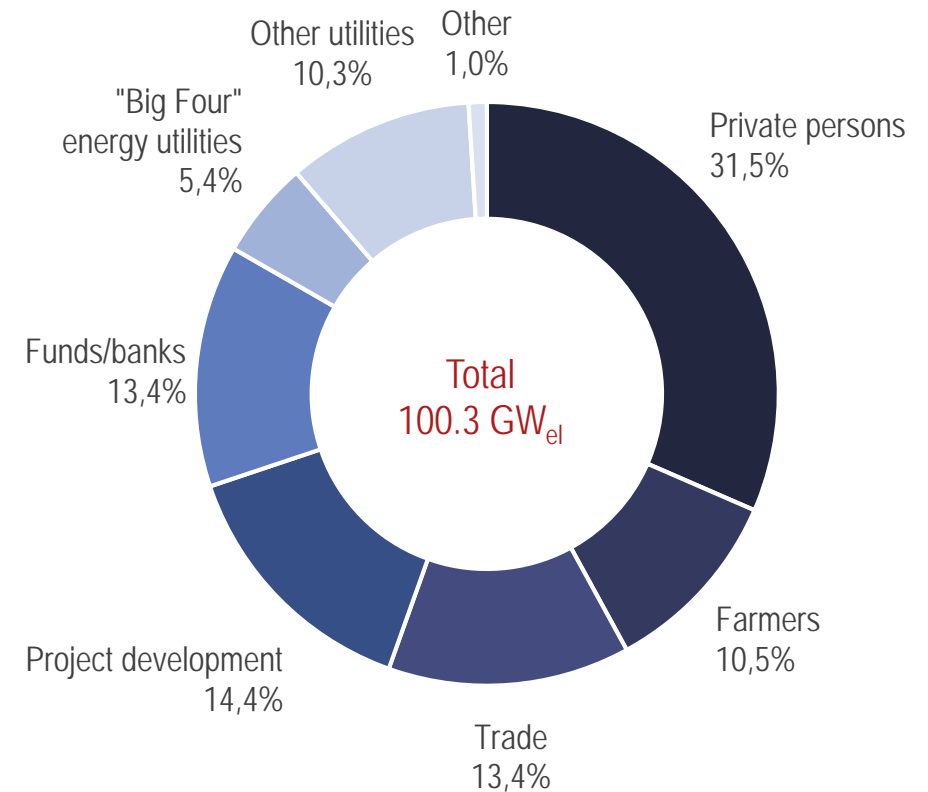
German Energiewende: Starting in the 1990s with a social consensus and driven by civic ownership

Development of renewable power generation

bn kWh (~ 32% of total electricity production in 2016)



Ownership structure of installed renewable power generation capacity (2016)



Source: Agentur für erneuerbare Energien (2016); BDEW (2012), based on Atomgesetz (ATG) §7; Clean Energy Wire 2017

German Energiewende: A look at the pros and cons



- High share of renewables
- Lead market renewables
- Local value creation



- High costs: generation prices falling while levies and grid costs rising
- CO2-emissions due to coal
- No PV lead suppliers

Incumbents suffer – new entrants urge
How to deal with security of supply?

While critics rise, 95% of German population support further expanding renewables

23 Jan 2019, 13:27 Sven Egenter

German Energiewende destroys capital – NZZ

#Energiewende



Neue Zürcher Zeitung

Germany's approach to exiting coal-fired power generation via a phase-out plan suggested by a stakeholder commission will cost the country more than necessary, Christoph Eisenring writes in the Swiss daily *Neue Zürcher Zeitung*. Rising prices from the European Union Emissions Trading System ensured that CO₂ discharge was reduced where it was cheapest. Any forced closure of power plants would not help the climate unless the government was cutting emission allowances, which it could do more cheaply by buying them directly on the market, Eisenring argues. Compensations to power plant operators and support for industry in case of rising prices might drive the cost up further. "Climate action is certainly necessary, but Germany's special approach is highly inefficient and costs therefore more than necessary."

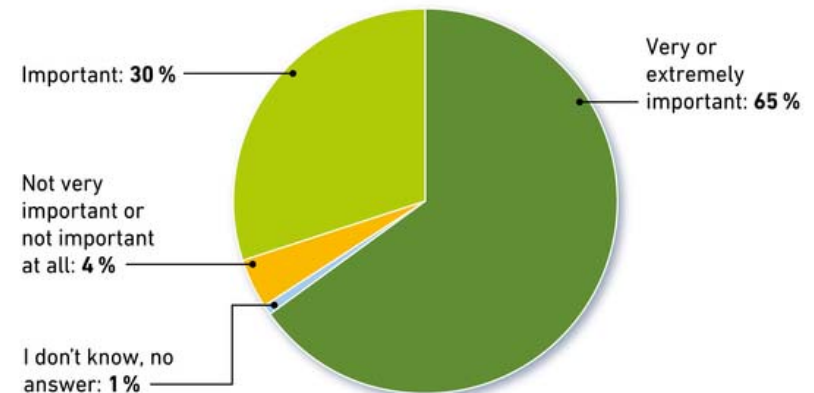
Merkel spricht erstmals von Scheitern der Energiewende

Deutsche Wirtschafts Nachrichten | Veröffentlicht: 12.02.19 10:13 Uhr

Bundeskanzlerin Angela Merkel hat erstmals die Möglichkeit eines Scheiterns der von ihr eingeleiteten Energiewende ins Spiel gebracht.

95% of the German population support further expanding renewable energy

Increased use and expansion of renewable energy is...



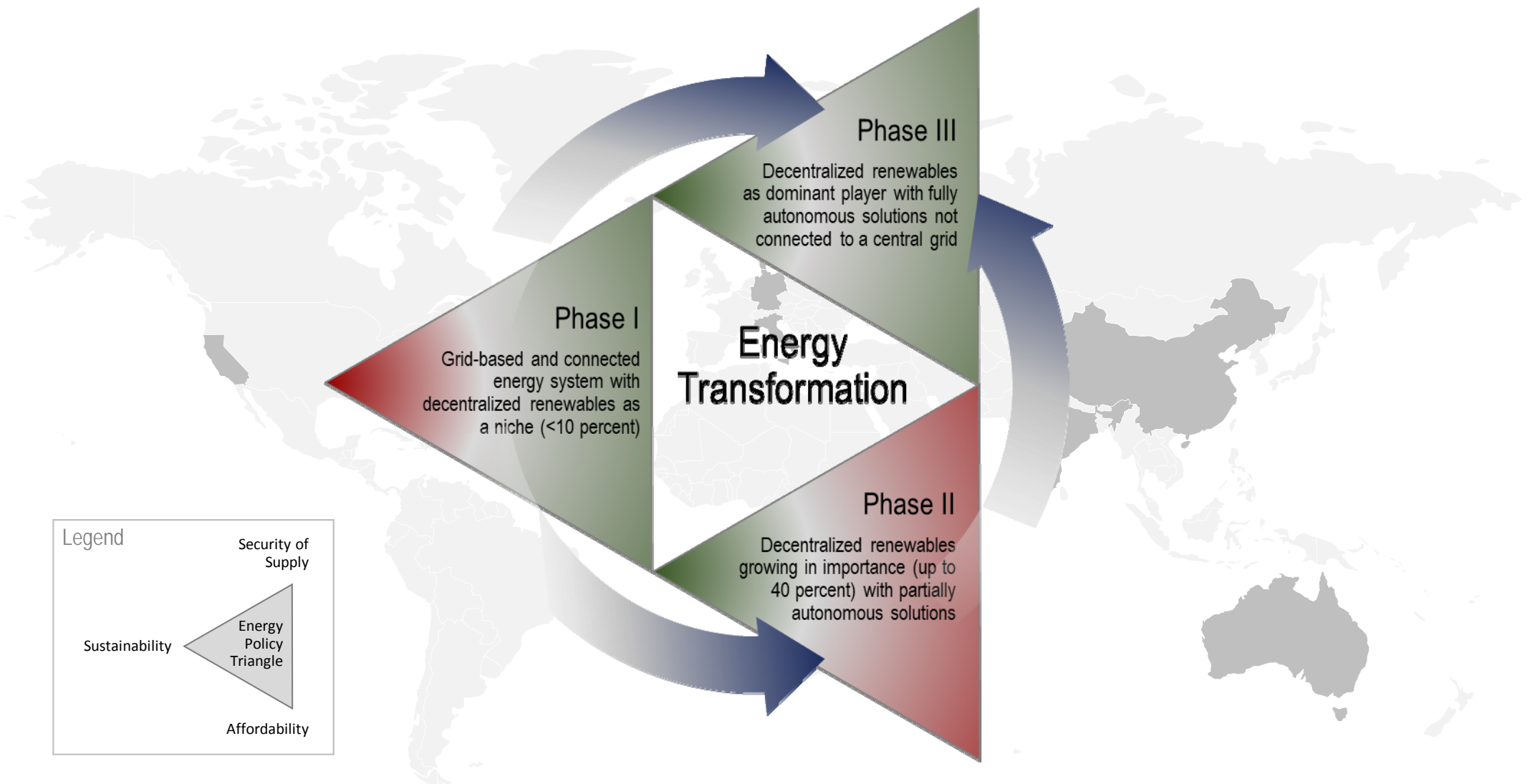
Source: Poll from Kantar Emnid commissioned by the Renewable Energies Agency, 1,016 polled
As of: 7/2017
© 2017 Renewable Energies Agency



Institute for Advanced Sustainability Studies
Strong support of Energiewende **but**

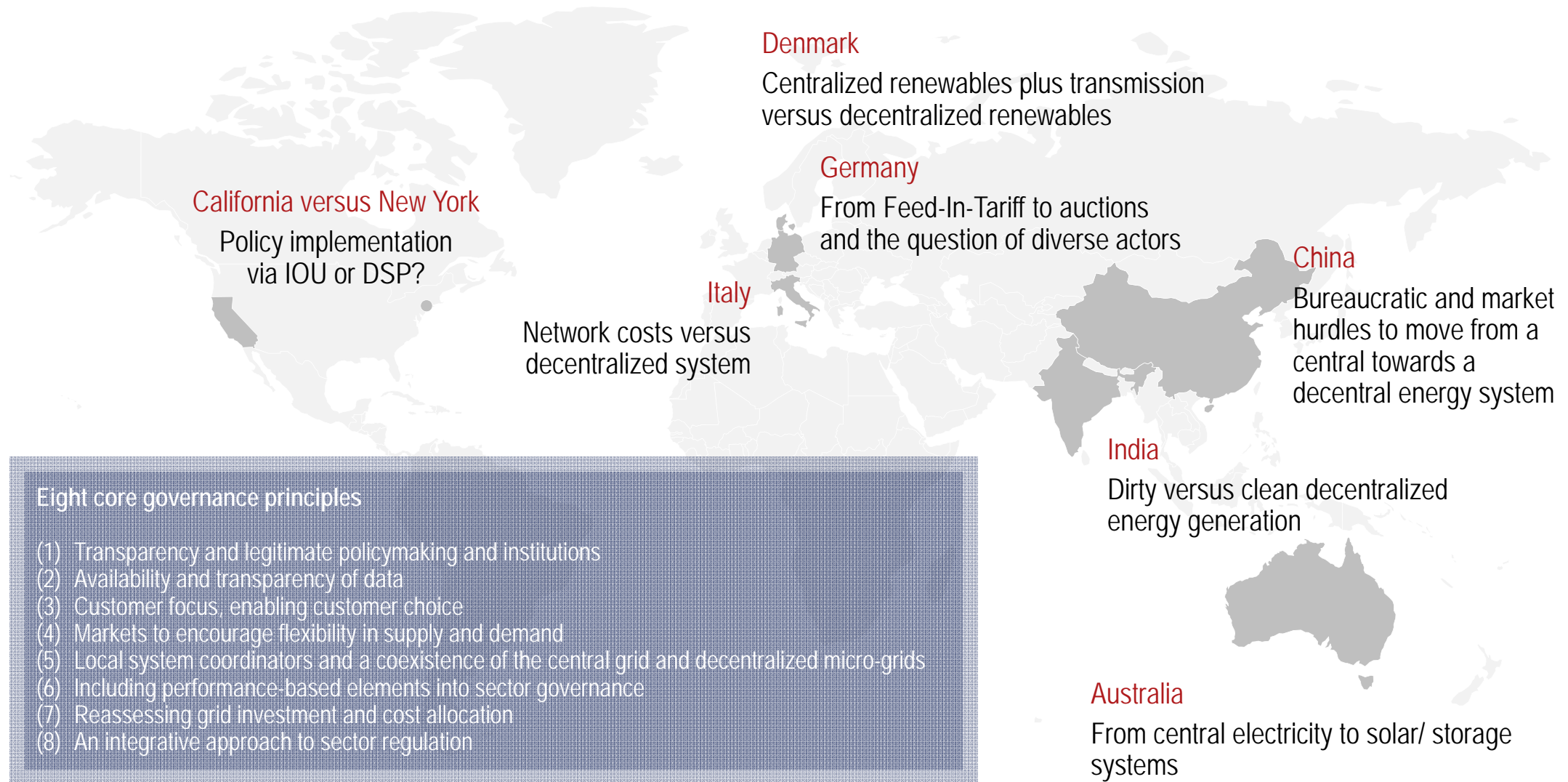
- Not fast enough
- Expensive
- Chaotic, unfair

Analysis of 8 countries on their path within the energy transformation – what are core governance principles to deal with uncertainty?



Source: Burger, Weinmann HBR 2017 <https://hbr.org/2017/04/the-3-stages-of-a-country-embracing-renewable-energy>

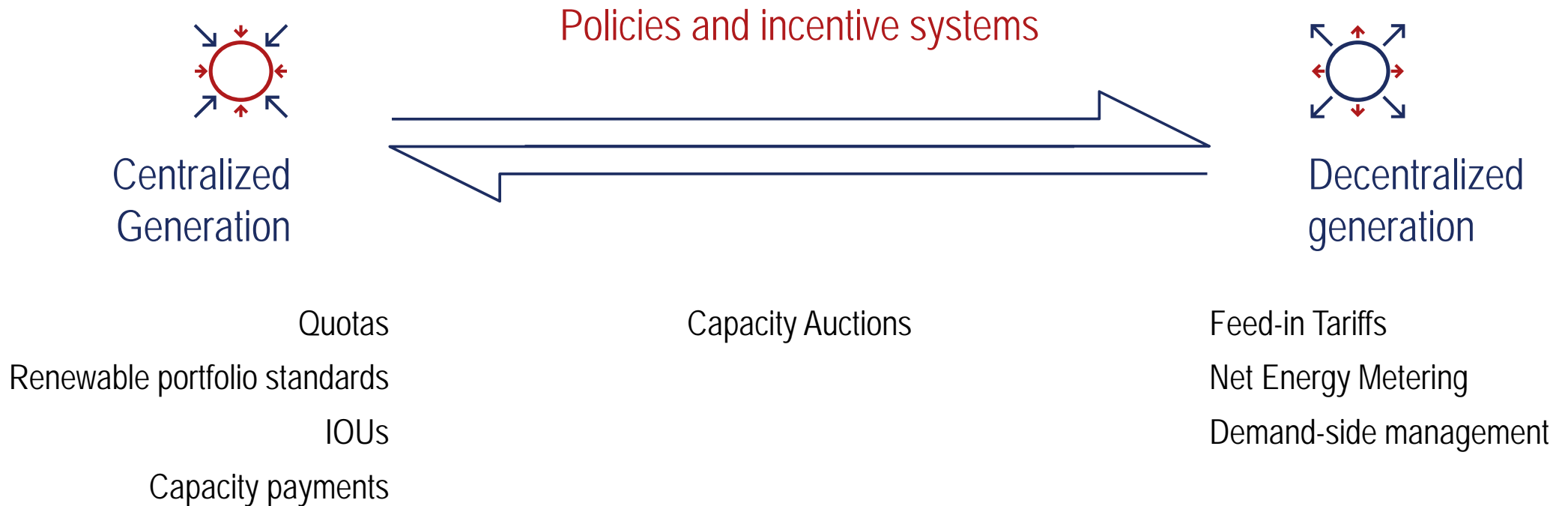
8 core governance principles identified



Eight core governance principles

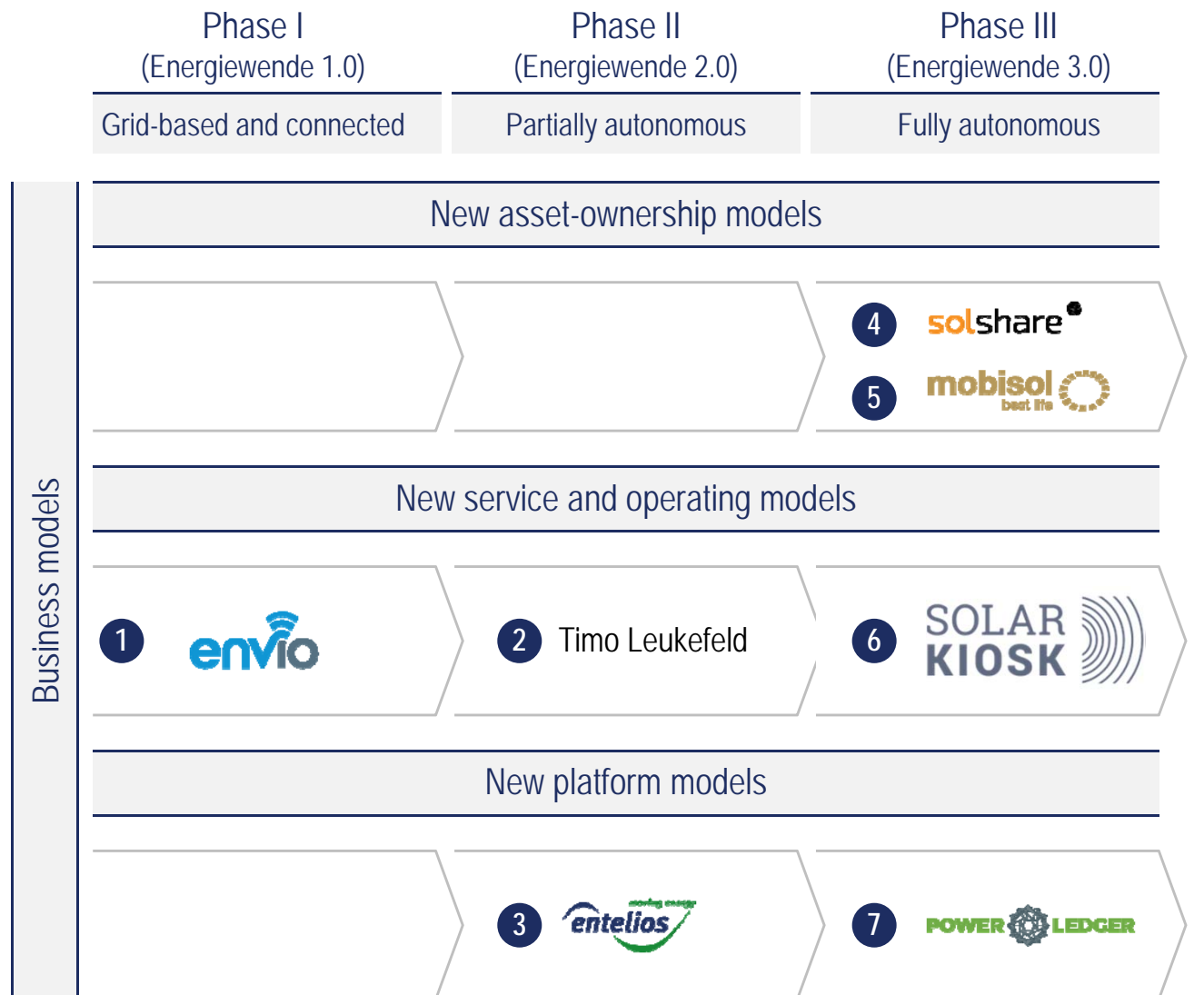
- (1) Transparency and legitimate policymaking and institutions
- (2) Availability and transparency of data
- (3) Customer focus, enabling customer choice
- (4) Markets to encourage flexibility in supply and demand
- (5) Local system coordinators and a coexistence of the central grid and decentralized micro-grids
- (6) Including performance-based elements into sector governance
- (7) Reassessing grid investment and cost allocation
- (8) An integrative approach to sector regulation

Policies and incentive systems applied with significant impact on the infrastructure of the energy system



Analysis of 7 business models – how to make money beyond subsidies?

3 business models and 6 core competencies identified



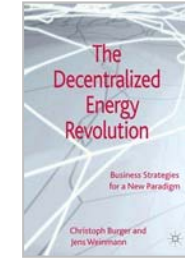
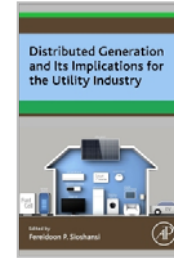
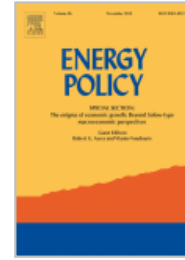
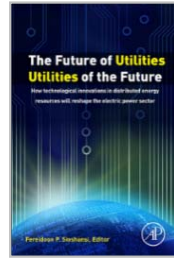
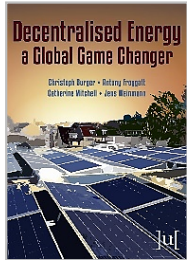
Three business models

- (1) Asset ownership models:
From central to crowdfunding
- (2) Service and operating models:
From bundled to autonomous operations
- (3) Platform models:
From aggregators to open platforms

Six core business competencies

- (1) Digitalization
- (2) Customer-centricity
- (3) Financing and enabling of asset ownership
- (4) Technology leads and product innovation
- (5) Partnerships and bundled services
- (6) Platforms/ecosystems

ESMT expertise in the field of energy: References, research and external functions



Energy-related references

Customized programs for corporate clients

- EnBW
- E.ON
- Gazprom
- RWE
- Uniper

Regular teaching & inputs on energy topics at/for institutions

- Cornwall Energy/Chatham House
- ESCP
- HEC Paris
- London Business School
- KAPSARC
- OMIE

Mentoring & advisory functions

- DB Mindbox, German Tech Entrepreneurship Center (GTEC), Startupbootcamp Smart Transportation and Energy
- Judging Committee at the Product Innovation Awards of European Utility Week, dena Startup Energy Transition Award, GreenTec Awards

Research and publications (selection in English language)

- Decentralised Energy: a Global Game Changer, Ubiquity Press (forthcoming)
- Vulnerabilities in smart meter infrastructure – can blockchain provide a solution?, with A. Trbovich, Dena/ESMT publications (2018)
- The 3 Stages of a Country Embracing Renewable Energy. Harvard Business Review, online edition (2017)
- Blockchain in the energy transition. A survey among decision-makers in the German energy industry, with A. Kuhlmann and P. Richard. Dena/ESMT publications (2016)
- European Utilities: Strategic Choices and Cultural Prerequisites for the Future. in Sioshansi, F., Future of Utilities – Utilities of the Future, Academic Press (2016)
- Innovation Performance of the US American & European Electricity Supply Industry. Energy Policy, 11/2015, vol. 86 (2015)
- The Decentralized Energy Revolution: Business Strategies for a New Paradigm. Palgrave-Macmillan (2013)

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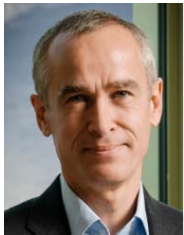
European School of Management
and Technology GmbH

Schlossplatz 1
10178 Berlin
Germany

Phone +49 30 21231 - 0

Fax +49 30 21231 - 1099

www.esmt.org
info@esmt.org



Christoph Burger
Senior Lecturer

christoph.burger@esmt.org
+49 30 21231 - 8040

thank you