

Prosumers and disruptive technologies - challenges of the Energiewende

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▶ The future of the energy sector: dramatic pressure for change and new opportunities

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- The Innovator's dilemma is changing our business models
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 - Develop and try out new offers in a process of dialogue with the customer
 - Recognize innovations in time and integrate them into the company
 - Attract partners to implement the innovations
 - Drive politics forwards in the interest of customers

Conclusions



Our Motivation and our Challenge: What Customer Experience and Innovation means

"You have to start with the customer experience and work backwards to the technology!"

Steve Jobs





The customer is becoming "his own man" Consumer goods market is obeying other rationalities



- Economic relationships are being turned upside down:
 - Growth markets are arising by domestic production in buildings and plots of land
 - Greatest added value in the field of installation, maintenance and monitoring of facilities
 - Decisive points of customer contact are shifting to behind the meter



New customer expectation Appreciation and individualisation are in the spotlight



- How do we want to live social trends are changing:
 - Individual life situations are becoming more important than belonging to social strata and milieus
 - Wave of "hyperindividualization" is on the ebb
 - Up to now digitalisation has been appreciated as an enriching factor, in the future more scepticism than enthusiasm can be expected
 - New prosperity model is evolving, away from owning towards using and sharing



Generally a problem: Overcoming the area of the Dilemma Zone



- Technology 1:
 - Combustion engine
 - Steam engine
- Technology 2:
 - Photovoltaics
 - Batteries
- A to D: Typical product cycle
- Disruptive developments
 - Sailing ship/motor ship
 - Rope and pulley excavator/hydraulic excavator
 - Analogue/digital photography
 - CD / iTunes
 - Bank/Paypal(?)



Innovator's Dilemma meets Utilities



- Previous energy world with a central energy supply, fossil fuels etc.
- New energy world with disruptive developments with new technologies of decentralized energy production, renewable energy, digitalization, social change etc.
- Product Lifecycle
 - a. Introduction
 - b. Growth and maturity
 - c. Saturation
 - d. Degeneration
- Challenge the Dilemma-Zone:
 - Established technologies have allowed profitable mature phase behind
 - Development still uncertain of the new technologies in time and scope

Overcoming the dilemma zone as a challenge for power companies.



New opportunities: Huge Market Potentials for Building Integrated Solar Power (BIPV)

Tabelle 14	Technisches	Potenzial dei	r Photovoltaik aut	f Dachflächen nac	h Bundesländern
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	Solar	installierbare PV-	installierbare PV-	PV-Jahresertrag	PV-Jahresertrag
	nutzbare	Leistung ohne	Leistung bei Solar-	ohne Solarther-	bei Solarther-
Bezugsraum	Dachfläche	Solarthermie-	thermienutzung	mienutzung	mienutzung
(Bundesland /		nutzung			
Deutschland)	in ha	in MW	in MW	in GWh	in GWh
Baden-Württemberg	13.803	19.719	11.799	19.857	11.882
Bayern	17.701	25.288	15.482	26.141	16.005
Berlin	2.730	3.900	1.855	3.510	1.670
Brandenburg	3.123	4.462	2.698	4.135	2.501
Bremen	736	1.051	595	912	516
Hamburg	1.534	2.191	1.156	1.855	979
Hessen	8.002	11.432	6.860	10.778	6.468
Mecklenburg-Vorpommern	1.900	2.714	1.591	2.530	1.483
Niedersachsen	11.972	17.103	10.658	15.027	9.364
Nordrhein-Westfalen	21.156	30.223	17.765	26.877	15.798
Rheinland-Pfalz	6.473	9.247	5.794	8.916	5.586
Saarland	1.698	2.426	1.515	2.391	1.493
Sachsen	4.193	5.990	3.290	5.711	3.137
Sachsen-Anhalt	2.862	4.089	2.410	3.745	2.208
Schleswig-Holstein	3.985	5.693	3.529	4.880	3.025
Thüringen	2.669	3.812	2.252	3.533	2.087
Deutschland	104.537	149.339	89.251	140.779	84.147

Quellen: Berechnungen des IE Leipzig auf Basis der Wohngebäudestatistik des statistischen Bundesamtes [StBA 2011], der statistischen Landesämter und Einschätzungen zur Globalstrahlung pro Bundesland nach [DGS 2010].



A future Mass Market: Costs for PV are falling continuously

4.00 BOS 3.50 Modul 3.00 Expected system cost ---development 2.50 2.00 1.50 1.00 0.50 0.00 2049 2050

Development of PV system prices (€/ Wp, ground-mounted system in Germany)





Tipping point in 2 or 3 vears? Costs for PV are falling continuously

Tesla Will Extend Price Advantage, Thank To It's Gigafactory – But Others See Price Reductions Too



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including

and factory



Solar + Batteries: A cost effective solution to implement the Energiewende

Anwendung/ Bereich	Leistung (GW)	Kapazität (GWh)	
Hausspeicher	40	120	
Gewerbe, Handel, Dienstleistungen	23	46	
Regelreserve	5	10	
Zwischensumme stationäre Speicher	68	176	
Elektromobilität <i>inkl.</i> <i>Plug-in-</i> Hybride	125	250	
Summe	193	426	

Batteriespeicher-Potenziale

Quelle: FENES et al. (2014), Weniger et al. (2015)

Tabelle 4:

Basisszenario und PV - Battery -Breakthrough - Szenario für 2033

Szenario für 2033	Basis	PV-Battery-				
	(NEP 2013,	Break-				
	B 2033)	through				
Netzausbau*	verzögert	schnell				
Installierte Leistung (GW)						
PV	65	150				
Hausspeicher	~0	40				
Wind Onshore	66	65				
Wind Offshore	25	7				
Summe Wind	91	72				
Erzeugungsmengen (TWh)						
PV	67	147				
Wind Onshore	190	185				
Wind Offshore	103	29				
Kostendifferenzen ggü. Basisszenario (Mio. €/Jahr)						
EE-Ausbau PV	n.a.					
Speicherausbau	n.a.					
EE-Ausbau Wind	-7.500					
Verteilnetzausbau (HS)	64					
Verteilnetzausbau (MS	-15					
Verteilnetzausbau (NS)	20					
Übertragungsnetzausb	-35					
Residuale Erzeugungsk	-1.600					

* siehe Fußnote 14

Tabelle 1:



Battery storage Requirements analysis for relevant product features

- 1 Steigerung Ihres Autarkiegrades auf 50%
- 2 Steigerung Ihres Autarkiegrades auf 70%
- 3 Steigerung Ihres Autarkiegrades auf 100%
- 4 Notstromversorgung
- 5 App, mit der Sie in Echtzeit die Produktion an Solarstrom, den Eigenverbrauch, die ins Netz eingespeiste Strommenge oder den Ladezustand des Batteriespeichers ablesen und analysieren können
- 6 eine eher funktionale Oberfläche ohne viel "Schnickschnack"
- 7 eine hochwertige Designfront
- 8 selbst installierbar (d.h. Anschluss an die Steckdose genügt, kein Fachmann für den Anschluss notwendig)
- 9 mobil/ transportfähig
- 10 durch den Kauf einer weiteren Batterie modular erweiterbar



Zufriedenheit sinkt, wenn nicht vorhanden

Basis: 806 befragte Batteriespeicherinteressenten

Frage 22: "Im folgenden Teil der Befragung soll es um mögliche Eigenschaften eines Batteriespeichers gehen. Wenn ein Batteriespeicher ...?"

Complete self-sufficiency and the ability to install the battery storage themselves form unique enthusiasm factors in addition to the app and the modular expandability.



Fascinate customers – eg for batteries: Electricity supply off. Really off?



At a glance: Added value is shifting its ground

Growth markets arise through supply integrated into buildings or plots of land

- Potential for building-integrated PV in Germany estimated between 150 GW (roofs) & 450 GW (whole building)
- Investment in PV taking 300 GW and €800/Wp (nominal power) approx. 240 billion Euros
- Investment in batteries with appropriate size & priced € 500/kWh approx. 150 billion
- Over 20 years incl. batteries, etc., this comes to €20 billion per year
- Electricity costs currently around €70 billion per year
- Of this, abt. € 30 billion is taxes, levies, etc.
- ▶ Greatest added value in the field of installation, maintenance and monitoring of facilities
 - High cost and competitive pressures in crafts and trades
- Decisive points of customer contact are shifting to behind the meter
 - Seizing these customer contact points is essential for business success



The dark side: Classic wholesale market is shrinking



No market: self-sufficient production

Renewable, decentralised production on small scale, local markets

Renewable, decentralised production new price approaches

Wholesale market with classical energy industry logic



Assessing challenges

Weighing up the opportunities of digitalisation

- Trends as a result of digitalisation
 - Products are turned into services (car-sharing schemes)
 - Customers create added value (Wikipedia)
 - Platforms take over touchpoints (Amazon)
 - Due to low transaction costs platforms open up new capacity (Uber)
 - Individual solutions are generated from mass-produced goods (Netflix)

Pattern of digitalisation

- Identify disruptive development
- Establish platforms
- Use network effect





Assessing challenges Limits to digitalisation

Disruption

- "Breakthrough innovations" are extremely rare phenomenon, they assume the existence of new markets
- Providers mostly "traditional" industrial enterprises

Platforms

- First phase of the market leads to oligopolies: "murderous" competition
- Subsequent market phase with low barriers to entry: Digitalisation cannibalises platforms again

Network effect

- Fast ramp-up due to low hurdles
- Problem: Self-reinforcing negative feedback





Convinced customers - Example: Analysis of customer preferences for online channels







Use innovations, take note of customer preferences Example: electromobility

Question: Where would do you prefer to charge your electric car preferably?





Use innovations Realize electromobility is an opportunity





MVV Energie

Attracting partners Actively shaping the energy transition with BEEGY



MVV Energie

Conclusion

- New technologies turn the world of energy into small-scale and a consumer good
- Customers become actors and thus the focus of future business models
- Digitalisation facilitates access to the market for all participants
- Politics turns from being the driver to being driven
- New business models:
 - Emerge mainly beyond the meter where they offer considerable potential for growth while at the same time cannibalising the classic business
 - Must offer the customer concrete added value and therefore require more intensive communication with customers
 - Cannot be successfully implemented without new partners outside the energy sector because of the need to fill new stages in the value chain
 - Require a different approach to politics where the aim is not to preserve classic business areas but to pave the way for new ones



Customers want innovations: "Solar tax" as opposed to "erosion of solidarity" not a solution



- Political agenda is changing:
 - Cycle of the "energy transition" is drawing to a close
 - Political priorities are shifting
 - Higher priority being given to new financing and regulatory models





Drive politics forwards Shape the energy transition

- New fields of action for influencing politics
 - Proposals for funding electricity tax, cost allocation, levy system
 - Removing barriers to power supply integrated into buildings or plots of land
- Finance for network infrastructure based on consumption
 - Performance-based network charges as the first stage
 - Perhaps organise long-term as a public institution
- Narrower national or economic analysis of energy matters no longer applies
 - Familiarise energy policy makers with new laws governing the consumer goods sector
 - Recognize PV with battery storage integrated into buildings as a Standard
 - Extend the aims of energy conservation (kWh) to performance (kW)
- Alliances with customers
 - Support customer associations which promote their own production (cf. traffic and car clubs)
 - Permit charging of tenants for electricity (Electricity Regulation analogous to Heating Costs Regulation)
 - Liberalise market barriers (Crafts and Trade Regulation)



Drive politics forwards Effects at EU level

- Climate policy
 - Political pressure continuously being reduced due to technological advances in PV and battery capacity
 - CO2 trading system is being called into question transition to emission limits for end-of-life fossil fuel power plants
- Funding schemes for renewable energies
 - Tenders only for imbalances (target values less own production)
 - Additional specifications to achieve PV integrated into buildings (target: selfsufficient building)
- Open technological competition
 - Waiver of customs barriers on PV modules or batteries
 - More active EU research and development policy







Thank you for your attention!



A company in the Rhine-Neckar metropolitan region

Yours sincerely, MVV Energie AG