Electricity Market Liberalization and the German Energiewende: Switching Points for a Sustainable Electricity System

電力自由化とドイツの”エナジーヴェンデ”: 持続可能な電力システムへの転換

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2015年6月24日

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- Professor at the business school of the University of Applied Sciences in Saarbruecken since 1995

ザールブリュッケン専門大学のビジネススクール教授

- At the same time scientific head of the Institute for Future Energy Systems (IZES), a university based research institute focussing on renewable energies, energy efficiency and decentralised power generation

自然エネルギーやエネルギー効率化ならびに分散的な発電について研究する未来エネルギーシステム研究所にて科学部の長、エネルギー市場部門長を務める

- Author and co-author of several books and articles liberalised electricity markets, feed-in law regulations and instruments for promoting renewable energies in the heat market.

電力自由化、自然エネ導入規制、熱市場における自然エネルギー増加についての著書、共著あり

- Chairman of the Energiebeirat of the state of Rheinland-Pfalz

ラインラント＝プファルツ州の経済省エネルギー審議委員会の議長

- Alternate member of the Administrative Board of ACER (Agency for the cooperation of Energy Regulators)

欧州エネルギー規制当局（ACER）の委員

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3. Network regulation for customer protection and market opening
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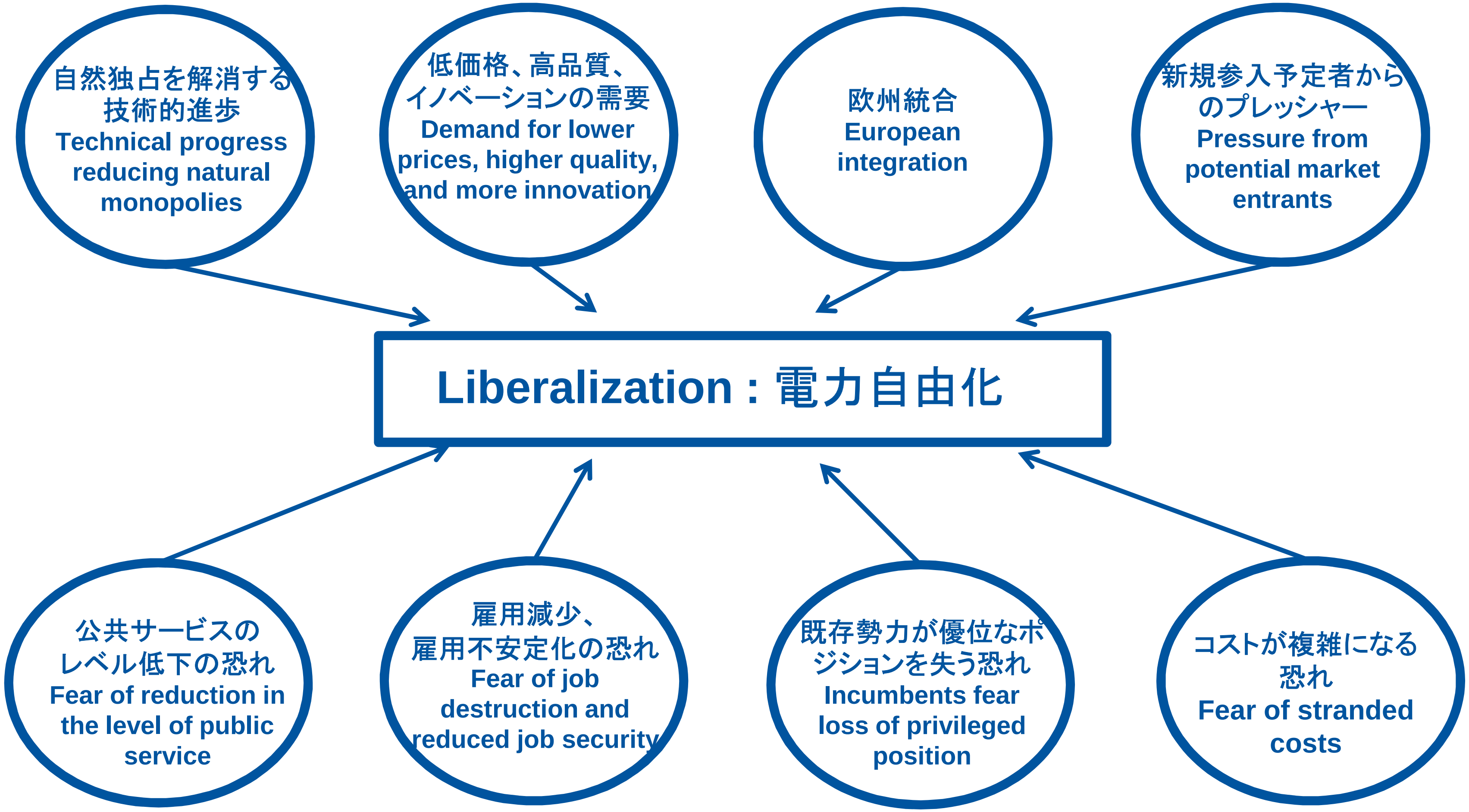
Driving forces and resistance forces towards liberalization and competition

【推進力と抵抗力：電力自由化・競争にむけて】

Driving forces : 推進力

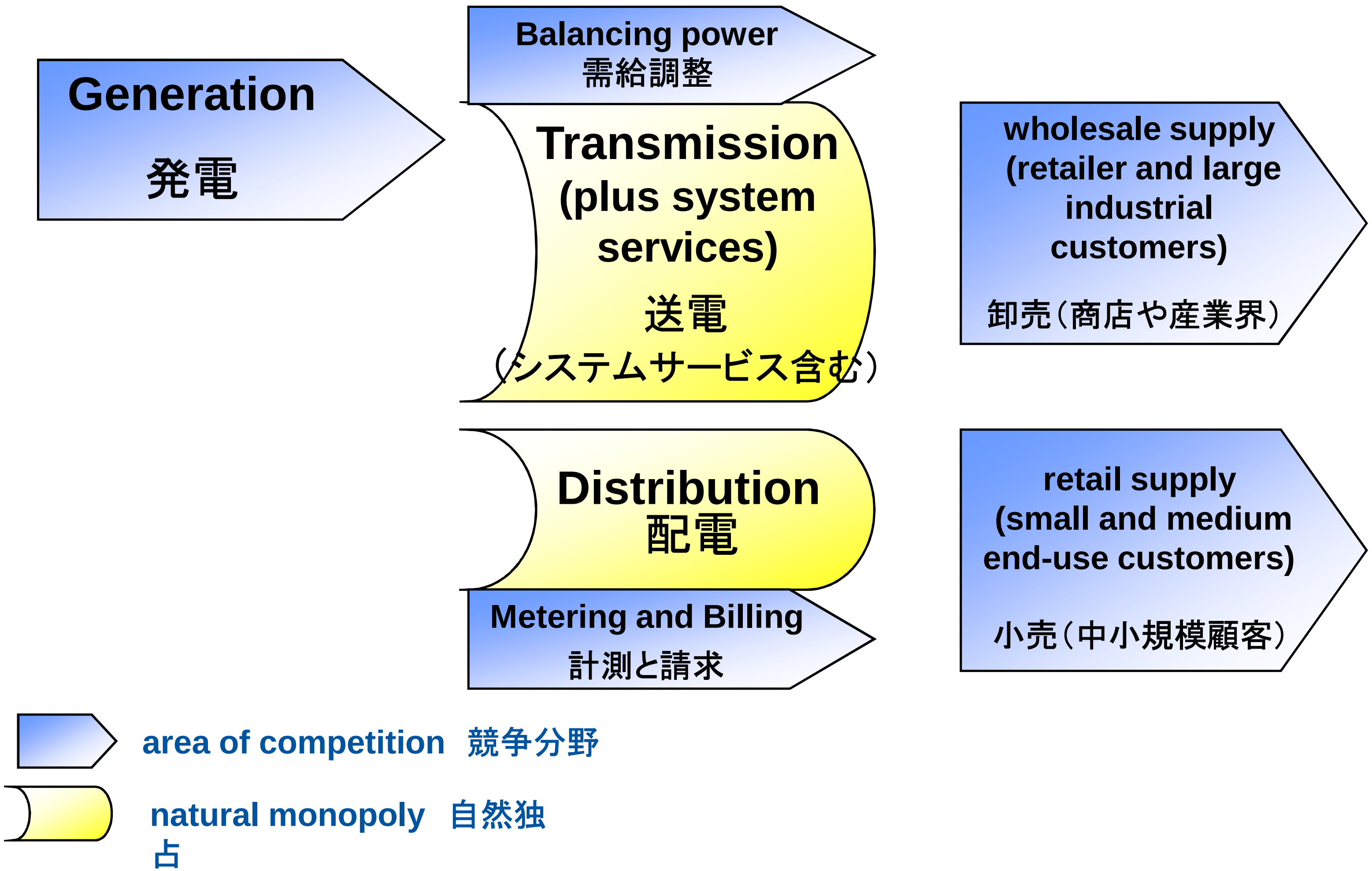


Resistance Force : 抵抗力

Source: European Commission 1999, p.27

The unbundled value chain of the electricity sector

【電力セクターのバリューチェーンの分離】



The German electricity sector at a glance (1)
ドイツ電力セクターのまとめ (1)

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Stage of value chain バリュ-チェ-ン	# companies and other key figures 会社の数やその他の主要データ	Changes through liberalization and other regulations 電力自由化による変化、その他規制
Generation 発電	~500 large power plants, mainly coal; total capacity ~90GW 500ヶ所以下の電力発電所、主に化石燃料; 発電容量計～90GW	Implementation of a power exchange in 2000 2000年、電力取引実施
	nuclear power plants 原子力発電所	Phase-out till 2022 2022年まで段階的に廃止
	~100 GW renewable and CHP/cogeneration 100GW以下の自然エネルギー発電とコジェネレーション	Remuneration through laws (Feed-in law, CHP law) (固定買取制度やコジェネレーションに関する)法による報酬
Transmission and system services 送電とシステムサービス	4 transmission system operators (TSOs) 4つの送電事業者 (TSOs)	2 are totally ownership unbundled since 2009; 1 is almost ownership unbundled since 2009; 1 is legal unbundled 2カ所：2009年から所有権分離、1カ所：2009年よりほぼ所有権分離、残り1カ所：法的分離
	Approx. 40.000km grid 約40.000kmの送電線網	Network changes are regulated since 2005 2005年～ネットワーク変更の規制
		3 balancing markets implemented since 2005 2005年～3カ所の需給調整市場

The German electricity sector at a glance (2)
ドイツ電力セクターのまとめ　(2)

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Stage of value chain バリュ-チェ-ン	# companies and other key figures 会社の数やその他の主要データ	Changes through liberalization and other regulations 電力自由化による変化、その他規制
Distribution **分配**	~900 distribution system operators (DSOs) ～900の配電系統運用者 (DSOs)	Mainly unbundled by management/organization or legally 主に管理/組織により分離、または法的分離
	Approx. 1,6 Mio km grid 約160万kmの配電網	Network changes are regulated since 2005 2005年～ネットワーク変更の規制
	Most of the DSOs are Stadtwerke or regional utilities; a lot of them partly owned by the big4 ほとんどの配電系統運用者は公共もしくは地域電力; そのうちの多くは4大電力会社に部分的に管理される	Metering and billing unbundled from the grid since 2009 2009年～測定や請求は電力網から分離
Supply **供給**	~1000 suppliers ～1000社の電力事業者	Retail competition by law since 1998; actually since 2005 1998年～法律上電力自由化スタート; 実際は2005年～
	Mainly Stadtwerke and regional utilities, but new companies as well 主に公共、地域電力事業。新会社あり	

Key elements of liberalization (1)

【電力自由化の重要な要素(1)】

- Neutralization of the networks ➔ make sure that the network operators are neutral facilitators between generation and supply, through
  送配電網の中立化：以下を通じ、発電と供給をつなぐ送配電事業者の中立性を確保する
  - ownership unbundling between the transmission network and large power plants in order to prevent privileging the own assets
    自らの発電所の優遇を防ぐため、送電網と大規模発電所の所有権を分離する
  - organizational unbundling between the distribution network and the supply in order to allow new suppliers nondiscriminatory access to the customers
    新電力が顧客に競争上の不利なくアクセスできるよう、配電網と供給者間の組織を分離する

Key elements of liberalization （2）

【電力自由化の重要な要素(2)】

- Implementation of a public regulatory agency in order to control the network charges and to design specific markets
  託送料をコントロールし、市場を形成するために、公共の規制機関を設立する
- Setting up a power exchange in order to allow competition between existing power plants on the basis of marginal costs
  限界費用に基づき、既存の発電所間の競争を生み出すために、電力取引所を設置する

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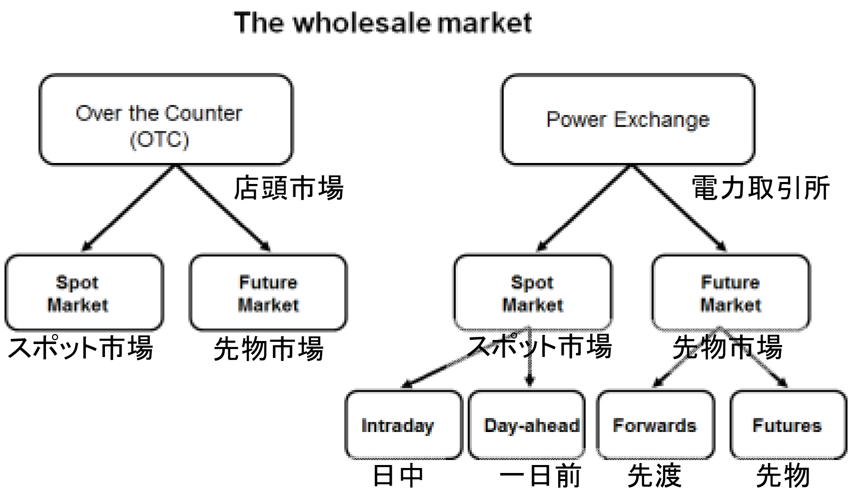
The wholesale markets and marginal-cost pricing
【卸売市場と限界費用】

EEX EUROPEAN ENERGY EXCHANGE

EPEX SPOT EUROPEAN POWER EXCHANGE

The wholesale markets
卸売市場



Marginal-cost pricing at the spot market (day-ahead)
スポット市場の限界費用（一日前）

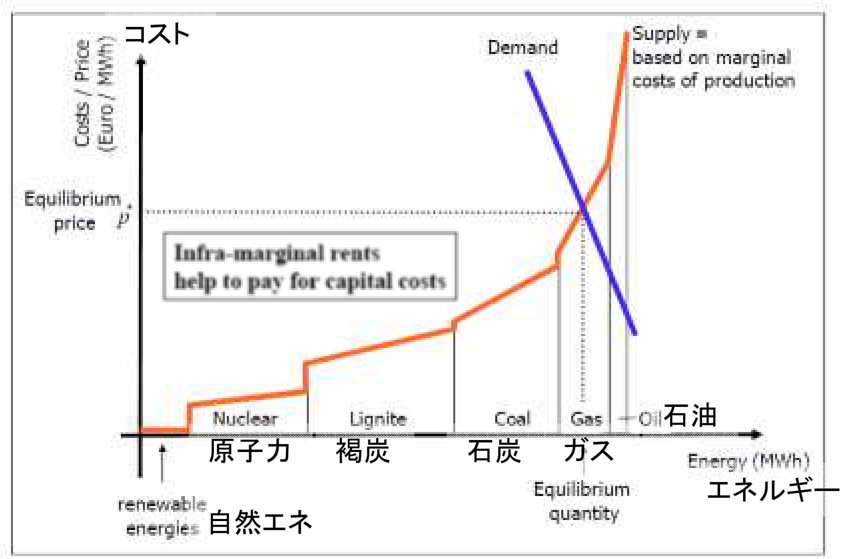


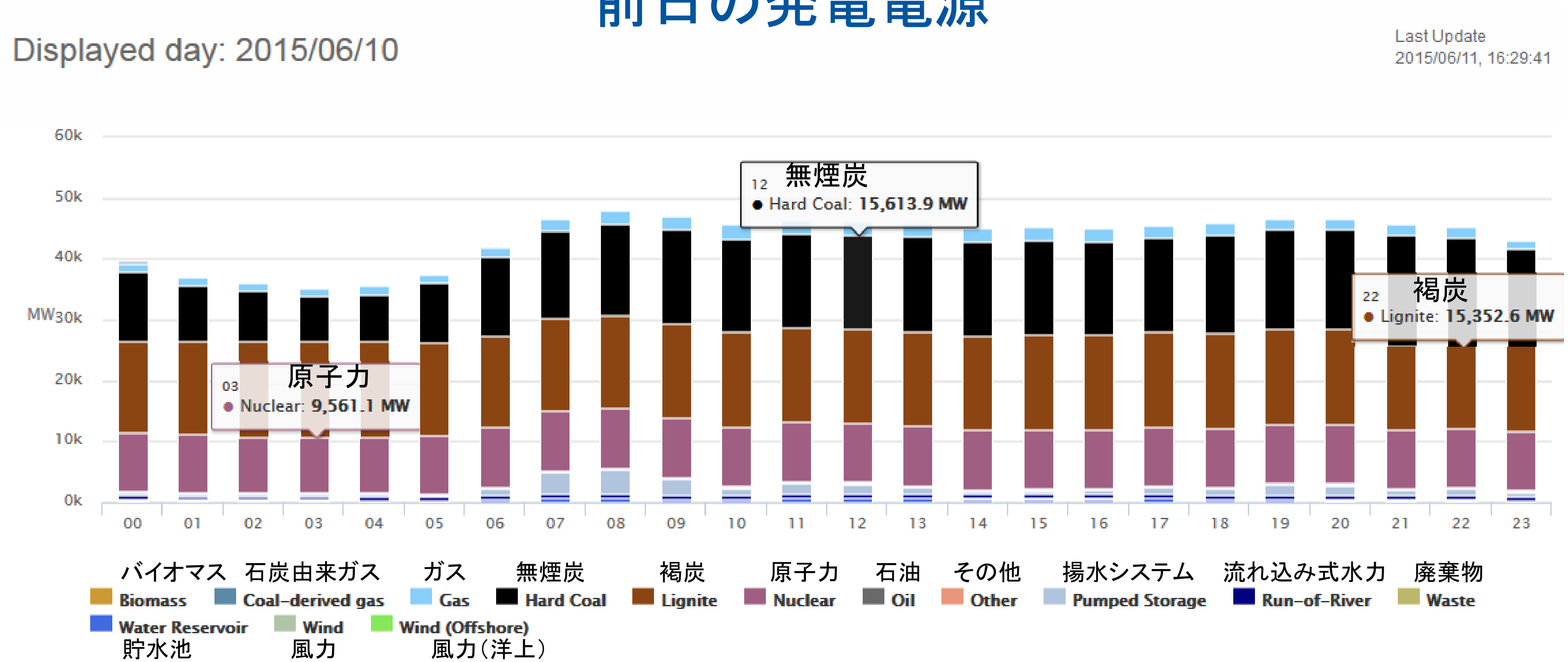
Figure 4: Pricing on the electricity exchange in one hour.

Source: arrhenius Institute 2010, p.11

Market Transparency (1)

【市場の透明性(1)】

Sources of previous-day-generation
前日の発電電源

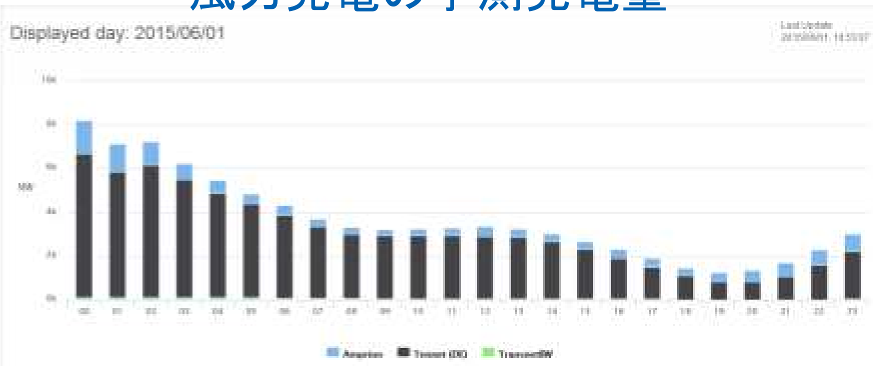


Source: http://www.eex-transparency.com/homepage/power/germany/production/usage/previous-day-generation

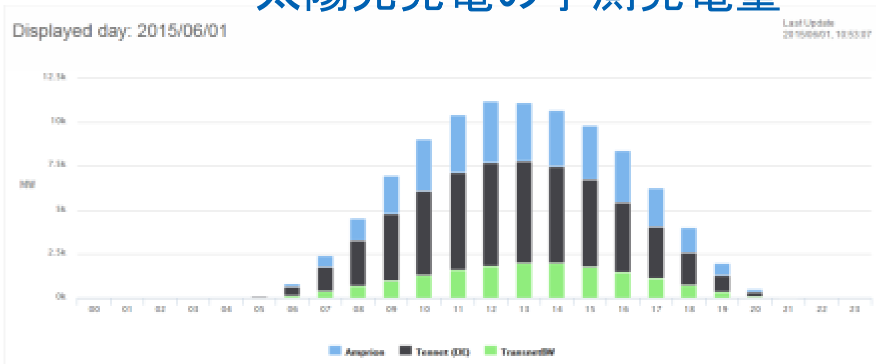
Market Transparency (2)

【市場の透明性(2) ー 送電系統運用者ごとの予測/実際発電量】

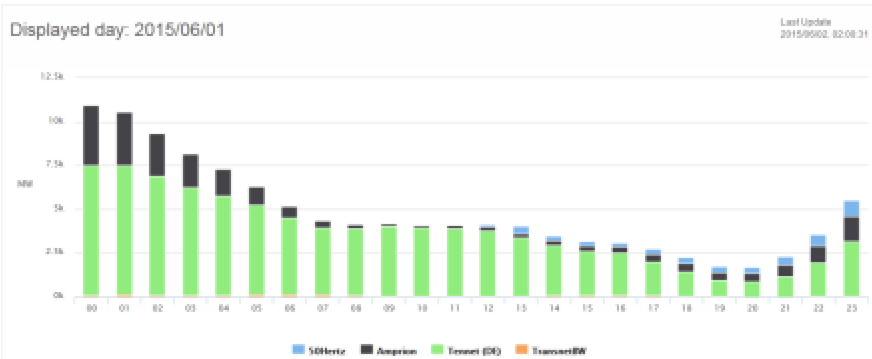
Expected wind power generation
風力発電の予測発電量



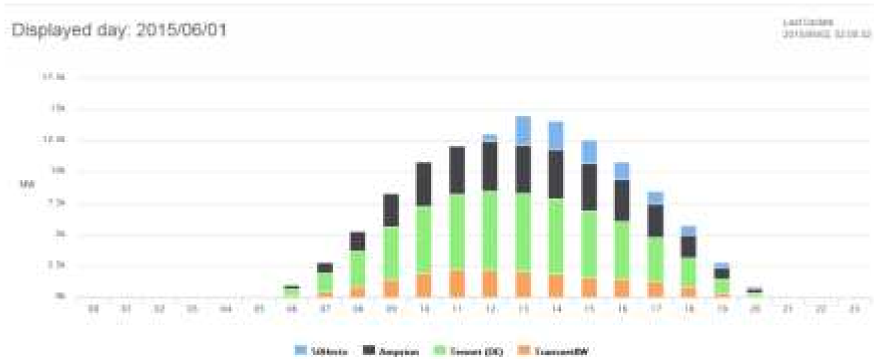
Expected solar power generation
太陽光発電の予測発電量



Actual wind power generation
風力発電の実際発電量



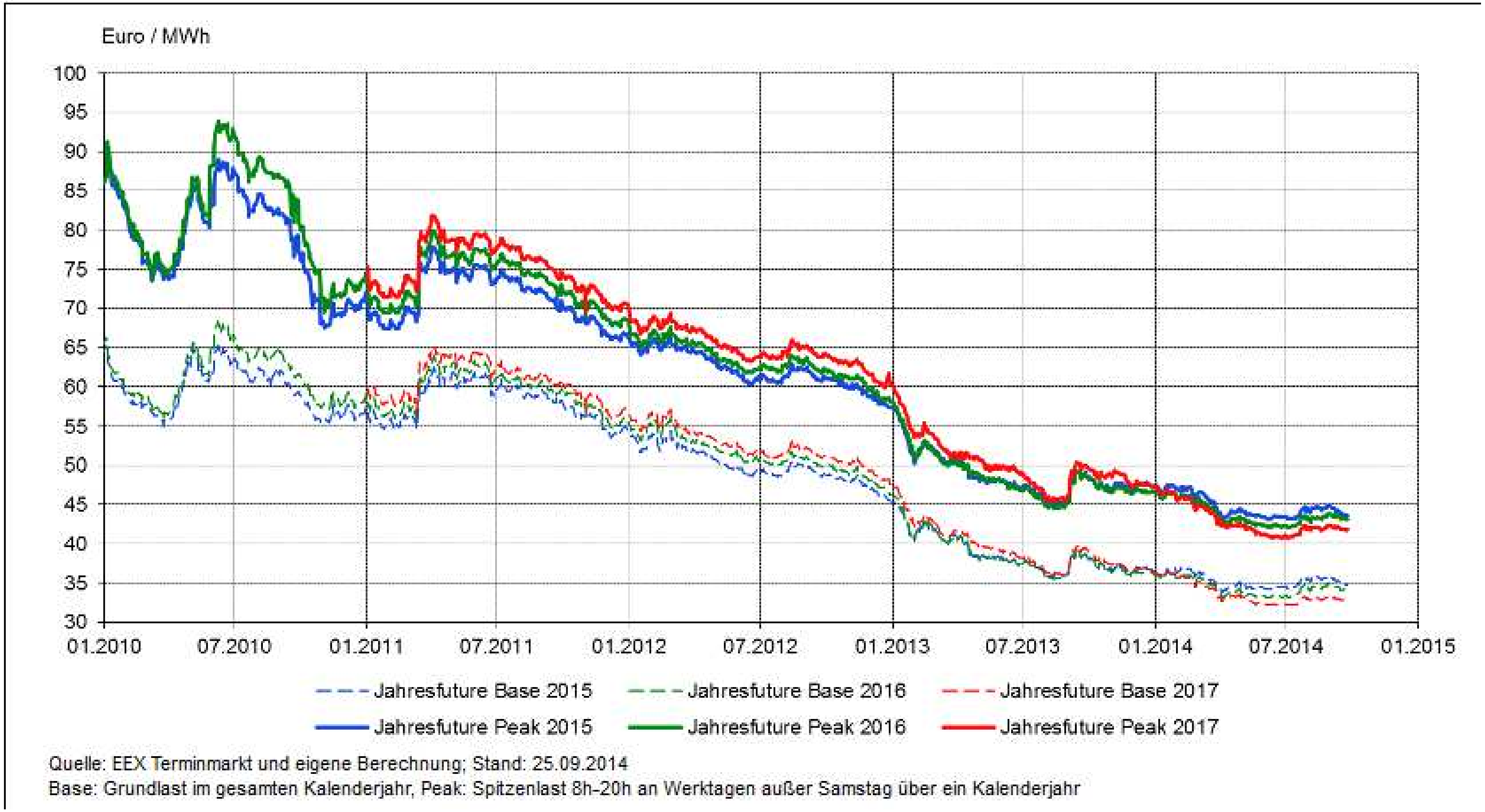
Actual solar power generation
太陽光発電の実際発電量



Source: http://www.eex-transparency.com/homepage/power/germany/production/usage

The development of wholesale prices (here: Phelix base year future)

【卸売価格の推移】



Source: Da.V.i.D. GmbH, Oktober 2014

The shrinking of market power

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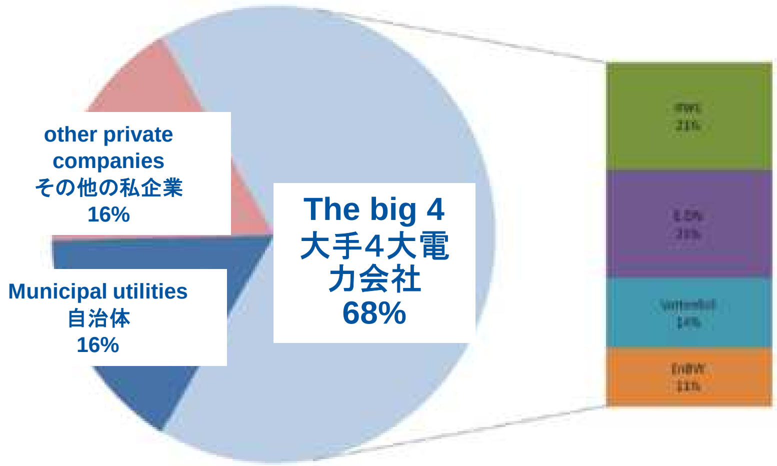
【市場支配力の縮小】

Generators 発電事業者	Capacity 設備容量 2009 (MW)	Generation 発電量 2009 (TWh)
EnBW	14 %	14%
E.ON	19 %	21%
RWE	31 %	31%
Vattenfall	16 %	16%
Sum	**80 %**	**82 %**
Market volume	**100 %**	**100 %**

Source: Bundeskartellamt January 2011, p.18

Ownership structure of conventional electricity generation 2012
原発・化石燃料の発電量シェア(2012)

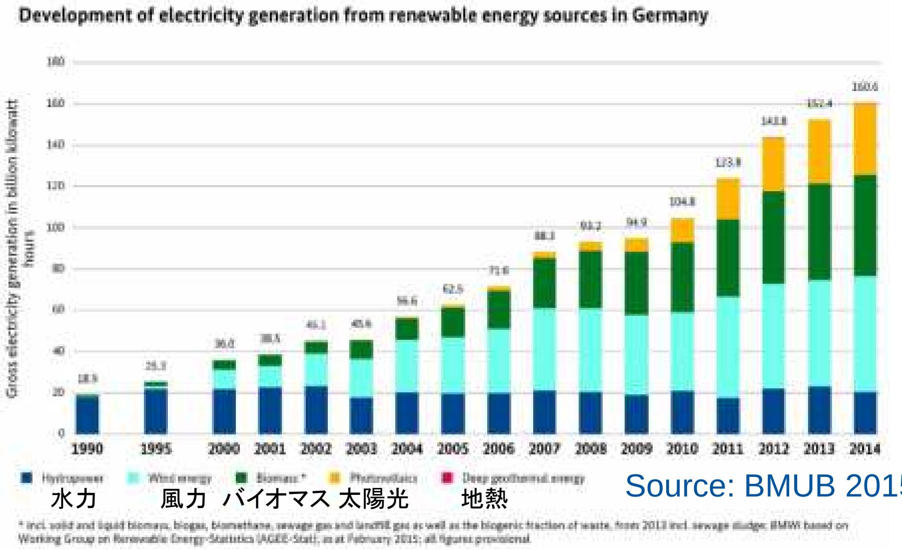


* Überwiegend kommunale Anbieter, jedoch entfallen etwa 1,8 Prozentpunkte auf Mehrheitseigner der öffentlichen Hand (z.B. Freistaat Bayern)

Source: Monopolkommission 2013, p.74

Remuneration Schemes to reach political targets (1)

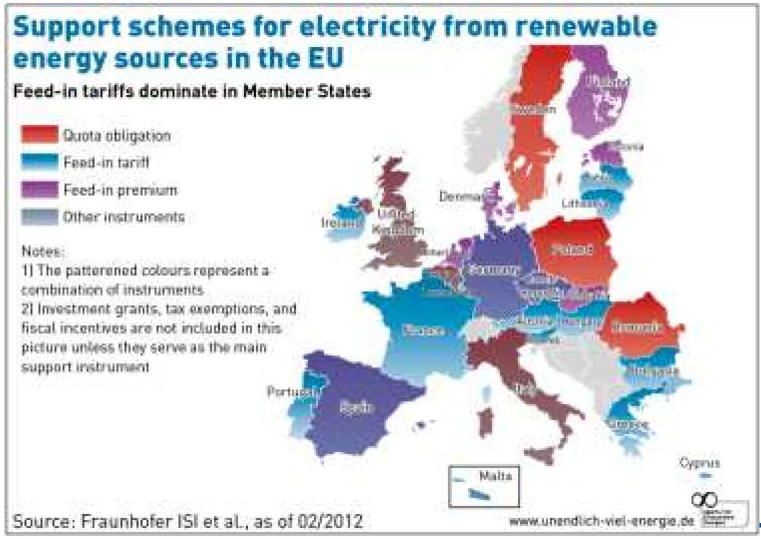
【政策目標到達のための報酬スキーム(1)】



Source: BMUB 2015

Electricity generation from renewables
自然エネルギーの発電

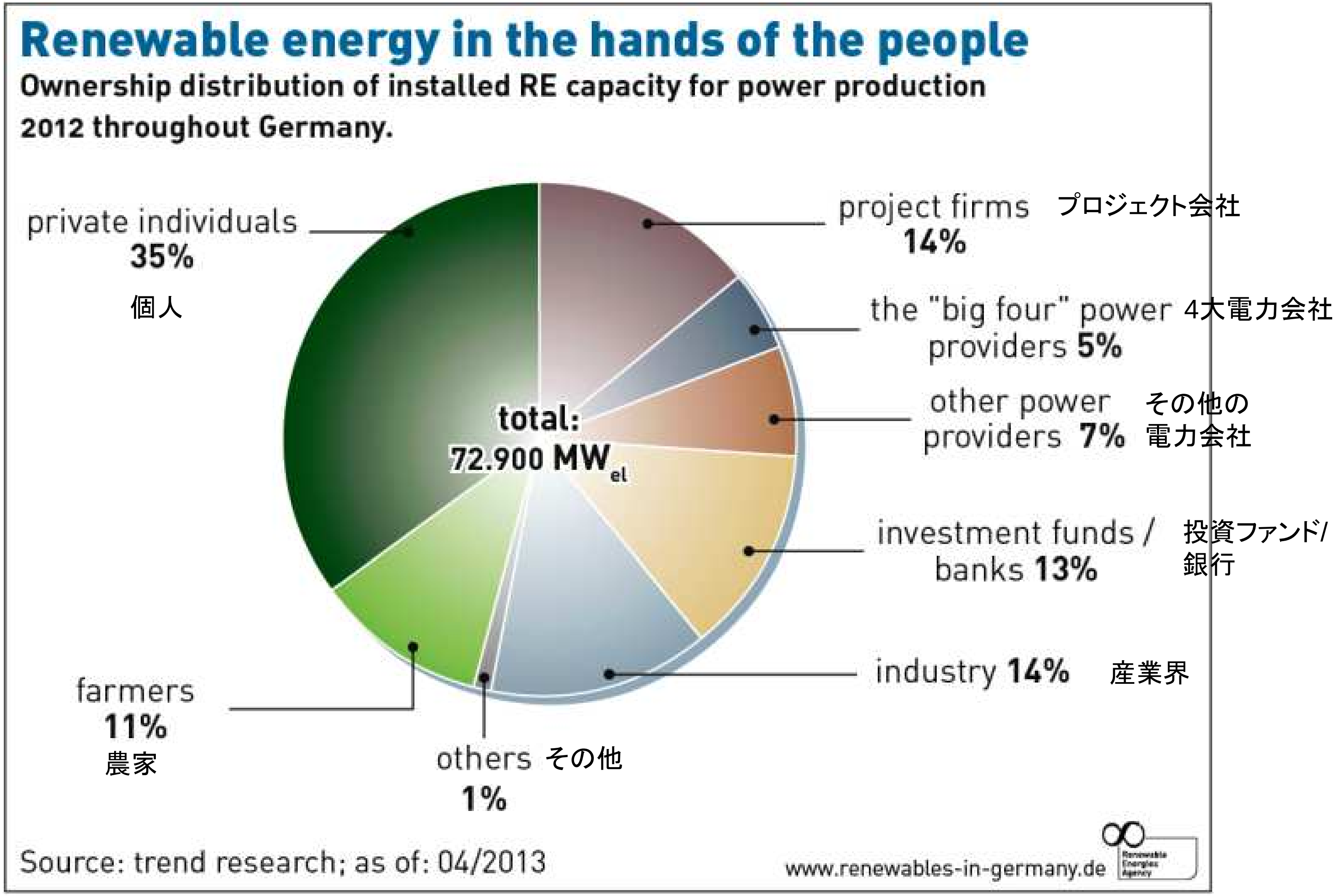
- **in 2014: 27.8%**
- **target for 2025: 40-45%（2025年目標）**



Remuneration scheme in Germany: feed-in premium
ドイツの優遇スキーム：フィードインプレミアム

Citizens' Electricity

【自然エネルギーの所有者(2012年)】



Energy cooperatives

【ドイツ・エネルギー協同組合】

Intermediate Results (1)

【中間まとめ(1)】

- Competition in generation
  電力会社間の競争があることで

  - leads to much more transparency
    さらなる透明性につながる
  - puts pressure on wholesale prices
    卸売価格にプレッシャーを与える
  - shrinks market power
    市場支配力が縮小する
  - puts risks on the investors especially of large expensive power plants
    大規模・高額の発電設備への投資へのリスク増
  - reduces overcapacities
    容量超過を減らす

Intermediate Results (2)

【中間まとめ(2)】

- To reach political targets for
  - renewables
  - CHP / cogeneration plants

  自然エネルギー、熱電併給設備（CHP）の政策目標を達成するために、、

  - special remuneration schemes (laws, etc.) are needed in order to ensure their amortization
    発電設備の償却のため、特別な支援スキーム（法律など）が必要

  - These schemes put additional pressure on the incumbent plant operators
    上記のスキームは既存の発電事業者に追加のプレッシャーとなる

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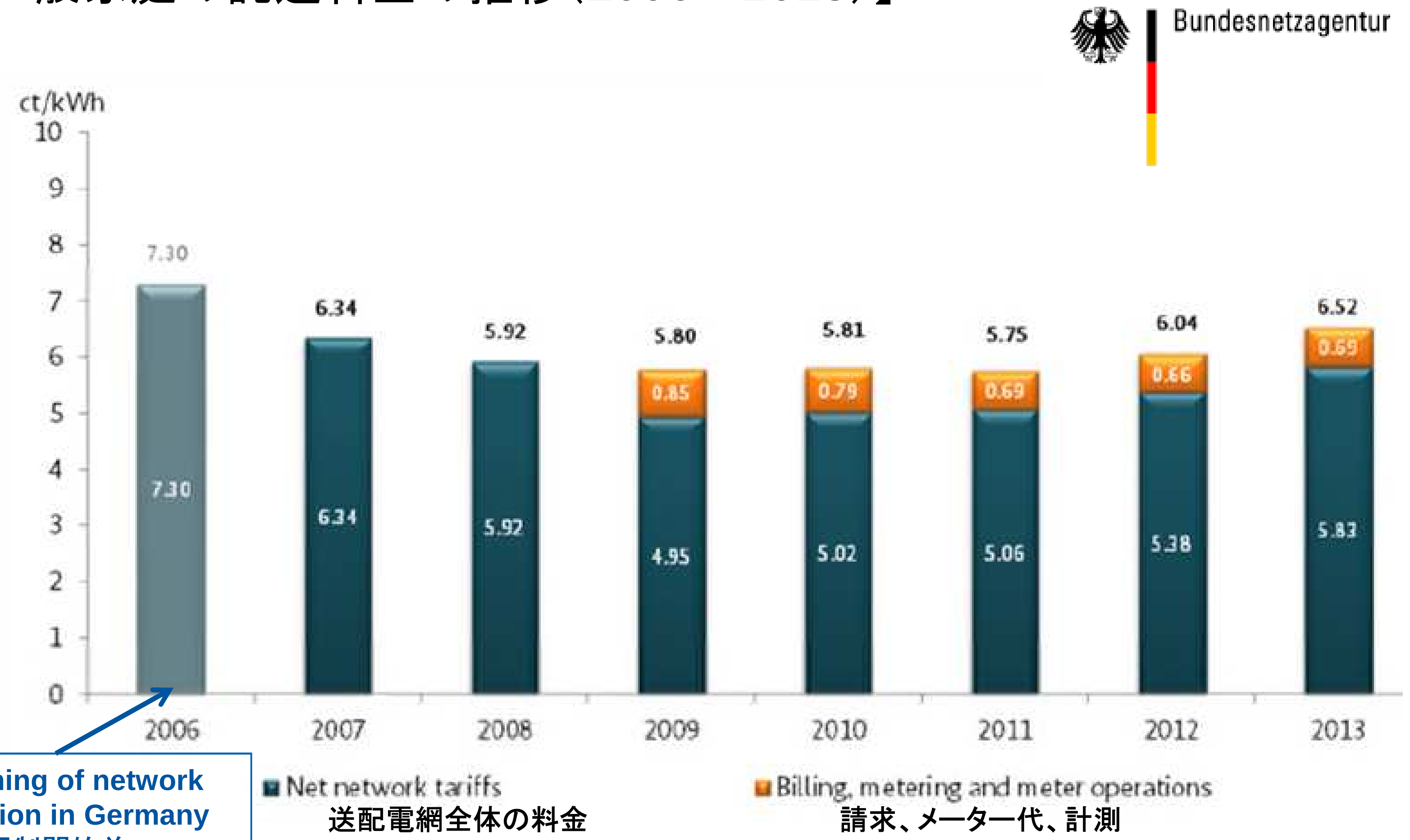
Development of network tariffs for household customers 2006-2013

【一般家庭の託送料金の推移(2006～2013)】



Beginning of network regulation in Germany
規制開始前

Source: Bundesnetzagentur 2013, p.151

Network transparency

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【ネットワークの透明性】

Bundesnetzagentur　Bundeskartellamt

Monitoringreport 2013

in accordance with § 63 Abs. 3 i. V. m. § 35 EnWG
and § 48 Abs. 3 i. V. m. § 53 Abs. 3 GWB
As of January 2014

Bundesnetzagentur für Elektrizität, Gas, Telekommunikation, Post und Eisenbahnen

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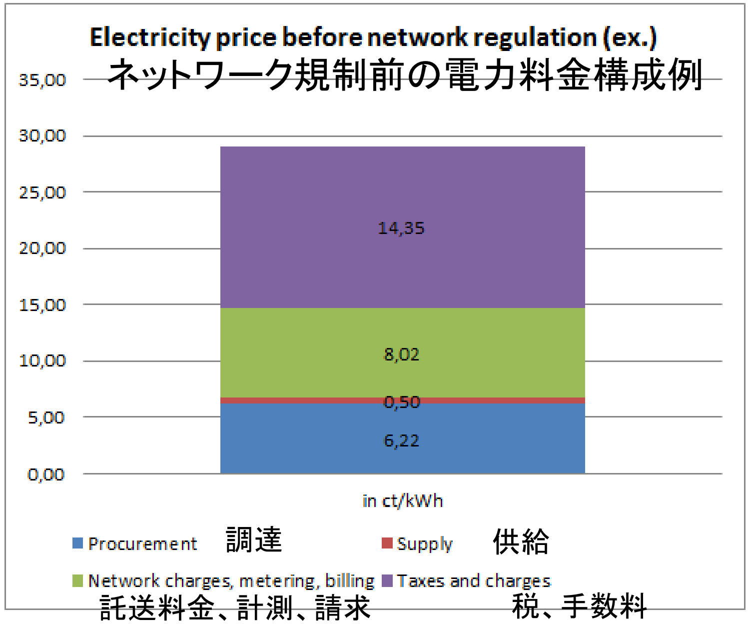
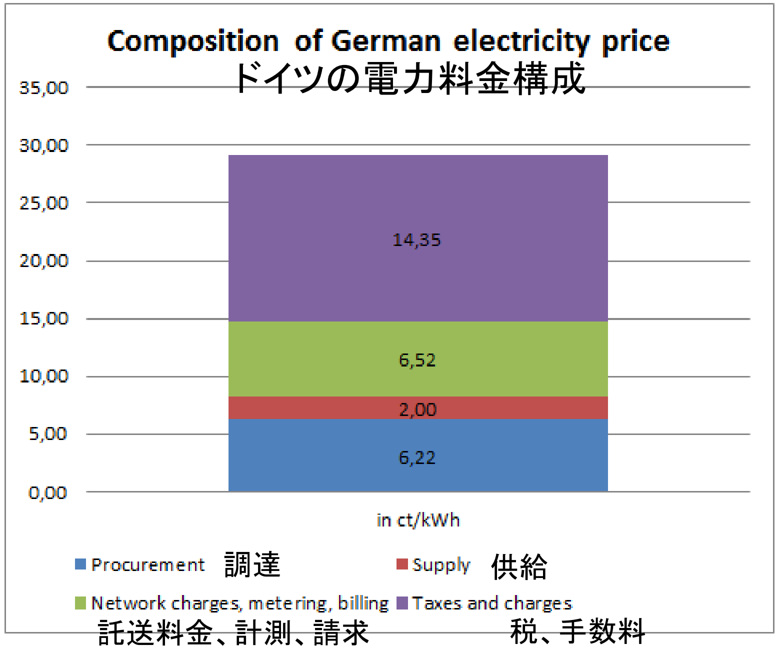
Prevention of cross-subsidization between network and supply

【ネットワークと供給間の内部相互補助の防止】

… as a key for non-discriminatory retail competition and market access for new market players

開かれた小売市場の競争・新電力のマーケットアクセスのカギ





Before network regulation: Nearly no supply margin through cross-subsidization from network charging

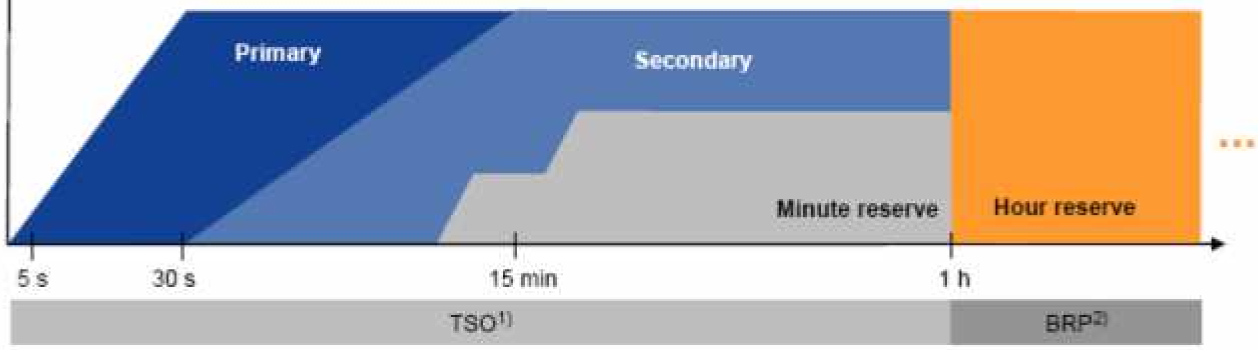
規制前：託送料金の内部相互補助により ほぼ利益なし

Current situation: separate and transparent network charges

現行：分割され、透明性の高い託送料金

Acquisition of control power through TSO tenders with decentralized power plants competing

【送電系統運用者　分散型発電所の競争】



- **Primary**
  - Automatic Control at the generator/ turbine
  - e.g. Thermal power plants
- **Secondary reserve**
  - Automatic Control by the TSO, Load Frequency Control
  - e.g. Pumped storage
- **Minute reserve**
  - Manual activation by TSO
  - Manual e.g. Thermal power plants

1) TSO: Transmission System Operator
2) BRP: Balance Responsible Party

Source: RWE 2008

50hertz amprion TRANSNET BW TenneT

regelleistung.net

regelleistung.net

The German transmission system operators cordially welcome you to the Internet platform for control reserve tendering.

Further tenders	
PRL	**Tuesday, 16.06.2015** for 22.06. - 28.06.2015, run: 1
SRL	**Wednesday, 17.06.2015** for 22.06. - 28.06.2015, run: 1
MRL	**Monday, 15.06.2015** for 16.06.2015, run: 1 **Tuesday, 16.06.2015** for 17.06.2015, run: 1 **Wednesday, 17.06.2015** for 18.06.2015, run: 1
SOL	**Monday, 22.06.2015** for 01.07. - 31.07.2015, run: 1
SNL	**Thursday, 25.06.2015** for 01.07. - 31.07.2015, run: 1
PRL_NL	**Tuesday, 16.06.2015** for 22.06. - 28.06.2015, run: 1

Tender details

From	15.06.2015
To	21.06.2015
Product type	Primary control reserve
Tendertype	Weekly tender
Tendernumber	1
Offering time	09.06.2015 15:00
Allocation time	09.06.2015 18:00

Control reserves demand

Product	Total requirement			
	Deutschland	Niederlande	Schweiz	Österreich
NEGPOS_00_24	578	67	71	67

Intermediate Results (1)

【中間まとめ(1)】

- Network regulation ネットワーク規制は、

  - leads to more cost awareness and eventually to decreasing network charges

    さらなるコスト意識につながり、最終的に託送料金が低下

  - leads to much more transparency through monitoring processes

    プロセスを監視することで、さらなる透明性確保につながる

  - helps to prevent cross-subsidization between network and supply and hence opens the doors for new competitors in the retail markets

    送配電網と供給間の内部相互補助の防止に役立ち、新電力の小売市場への参入チャンスを増やす

Intermediate Results (2)

【中間まとめ(2)】

- Network regulation 送配電規制は、
  - designs markets (e.g. balancing markets) which could be opened to a much broader spectrum of competitors

  より広範囲に競合が参入できる市場デザイン（需給調整市場）につながる
  - needs a regulator that should be independent from the network operators as well as from the government

  規制機関は、送配電事業者と政府の双方から独立であるべき

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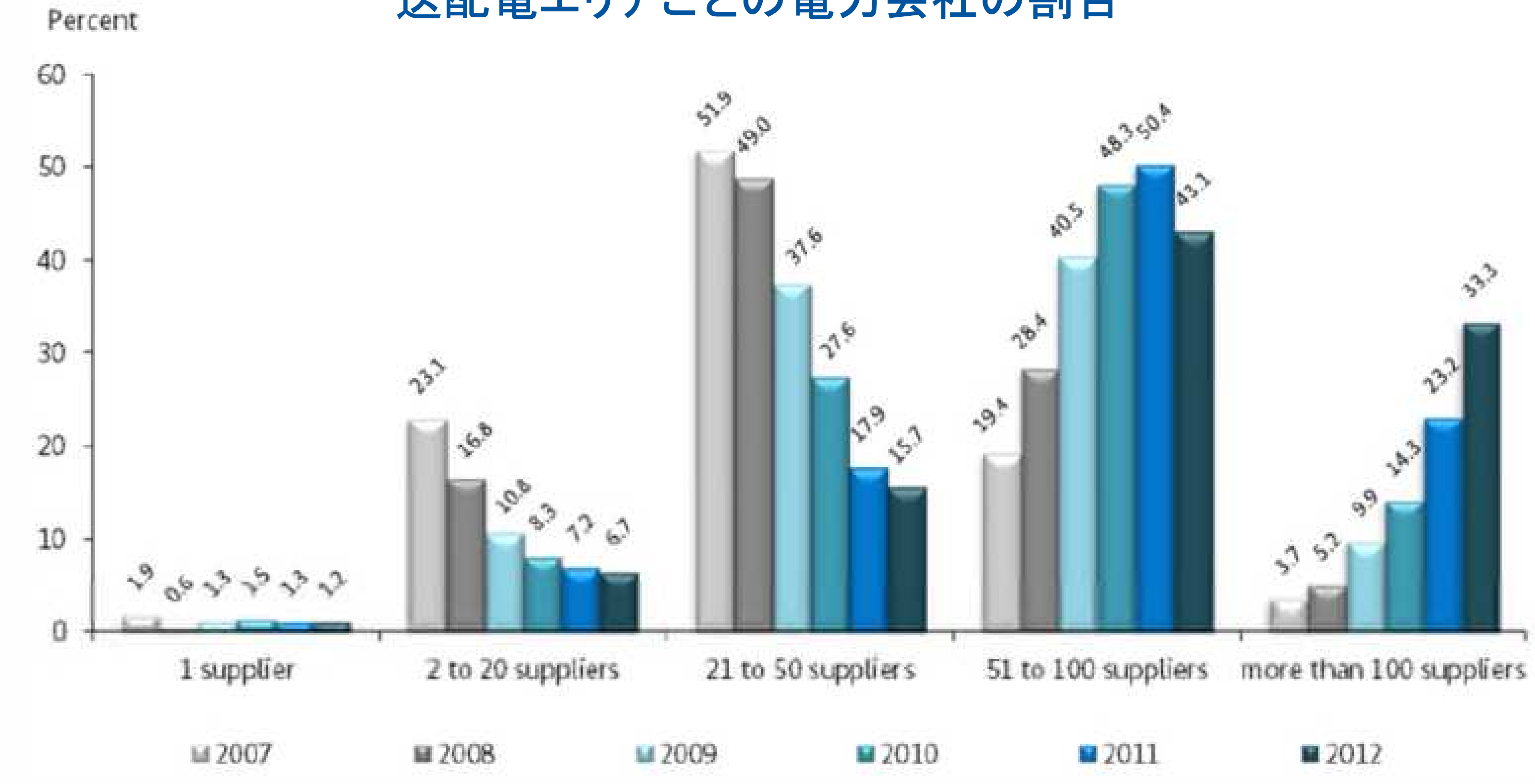
Broad choice for customers

【消費者の幅広い選択肢】

Percentage of network areas in which the represented number of suppliers is active
送配電エリアごとの電力会社の割合

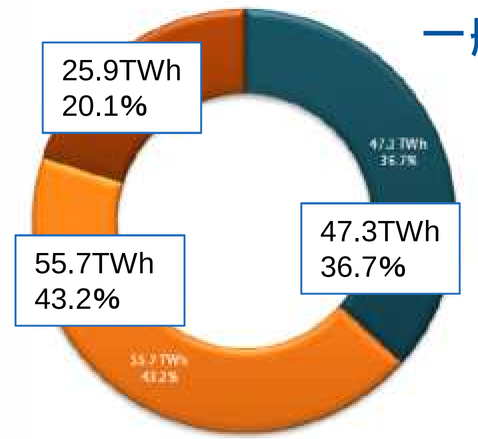


Source: Bundesnetzagentur 2013, p.121

Still a lot of households do not care about competition

【いまだに、多くの一般消費者は競争を気にしていない】

Change of supplier and contract by household customers, 2012
一般家庭の電力会社・契約の変更（2012）



■ Household customers with a default supply contract with a default supplier

電力会社・契約を変更していない一般家庭

■ Change of contract: Household customers with other contract with a default supplier

契約の変更：電力会社は変えていないが、以前と異なる契約をする一般家庭

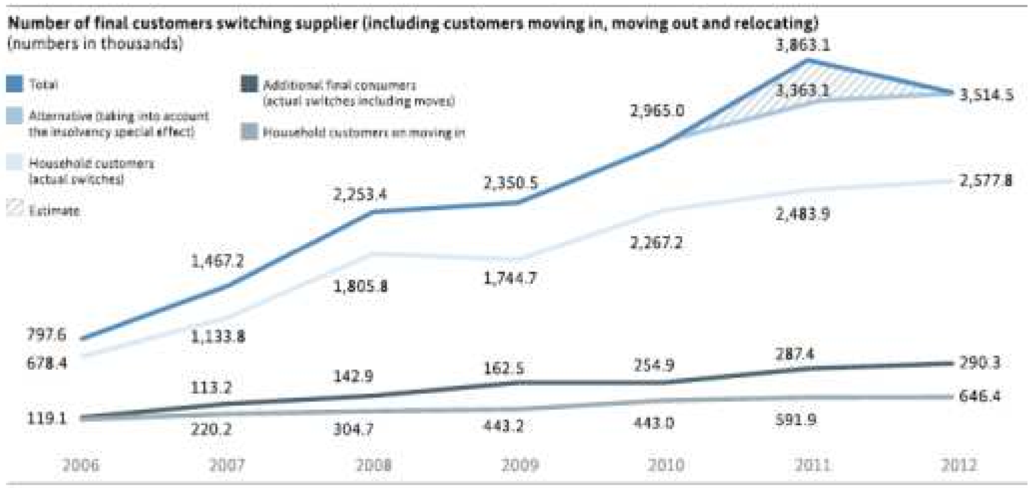
■ Change of supplier: Household customers with a contract with a supplier other than the default supplier

電力会社の変更：異なる電力会社と契約をする一般家庭

Source: Bundesnetzagentur Monitoring Report 2013, p.128

Numbers of final customers switching supplier (including moving in, moving out and staying with the old supplier but with better conditions)

電力会社を乗り換えた顧客数



Source: Bundesnetzagentur Annual Report 2013, p.39

Electricity price comparisons in the Internet

【インターネット上での電気料金比較】

The history of disclosure in Europe and Germany(1)

【ヨーロッパ、ドイツにおける電源構成開示の経緯(1)】

- Starting point: 2nd European Directive on a common electricity market 2003 – first rough framework for mandatory electricity labelling
はじまり: 第2次電力自由化指令（2003年） – 電源構成等の表示義務化の最初の枠組み

- 3rd European Directive on a common electricity market 2009 – obligation on suppliers to specify the fuel mix and its related environmental impact of the electricity they sell to their final customers
第3次電力市場自由化指令（2009年） – 電源構成と環境影響を、最終消費者に示すことが小売自業者の義務に

- 2014: 26 out of 28 EU member states have implemented national legislation on electricity disclosure systems
2014年: EU加盟28カ国のうち26カ国で、電気の情報開示に関する法令を施行

The history of disclosure in Europe and Germany(2)

【ヨーロッパ、ドイツにおける電源構成開示の経緯(2)】

- Germany: First introduction with the new energy law in 2005
ドイツ:エネルギー事業法にて、電源構成等の明示を導入（2005年）

    - requires to give information about fuel mix compared to the national fuel mix
    電源構成開示・表示を義務化、国の全体の平均も示す

    - requires to give information about CO2 emissions and amount of radioactive waste
    二酸化炭素排出量、放射性廃棄物量についても情報開示・表示を義務化

- Discussion about a more precise information about the load related power plants
関連する発電所の電源に関するより正確な情報についての議論

Competition between different categories of supply companies

【様々な電力会社の例】

参考：ドイツ世帯数は4200万

Subsidiaries of the four dominant utilities

4大電力会社の子会社

- subsidiary of EnBW
EnBWなどの小会社
- ca. 1 Mio. customers
約100万世帯の顧客

イエロー・シュトローム社など

Municipal Utilities

自治体の電力会社

- ca. 800 municipal utilities in Germany
約800社
- millions of customers
数百万の顧客

シュタットベルケ・ミュンヘンなど

(New) Suppliers with no relationship to nuclear companies

（新規）原子力と無関係の電力会社

- a few big private shareholders
少ない大株主
- ca. 1 Mio. customers
約100万世帯の顧客

リヒトブリック社など

(New) Suppliers with broad citizen partizipation

（新規）市民電力

- energy cooperative
エネルギー共同組合
- ca. 150.000 customers
約15万世帯の顧客

シェーナウ電力など

Competition between different qualities of electricity

【様々な｢電気の品質･種類｣の例】

Nuclear Electricity
原子力

- offer from RWE

RWEから供給

- branding: Pro-Klima-Strom

Pro-Klima-Strom(気候保護のための)というブランドで販売

Regional Electricity
地域発電

Regionalstrom Franken eG

- offer from a regional cooperative

地域の協同組合から供給

- electricity from regional decentralized plants

地域の発電所から供給された電力

Renewable Electricity
自然エネルギー

NaturEnergie
Strom aus Wasser und Sonne

- subsidiary from EnBW

EnBWの小会社などが供給

- electricity from water power plants and PV (balance sheet)

水力発電や太陽光発電など(電力証書含む)

Green Electricity
｢グリーンな｣電力

Bürger GrünStrom
GRUND GRÜN

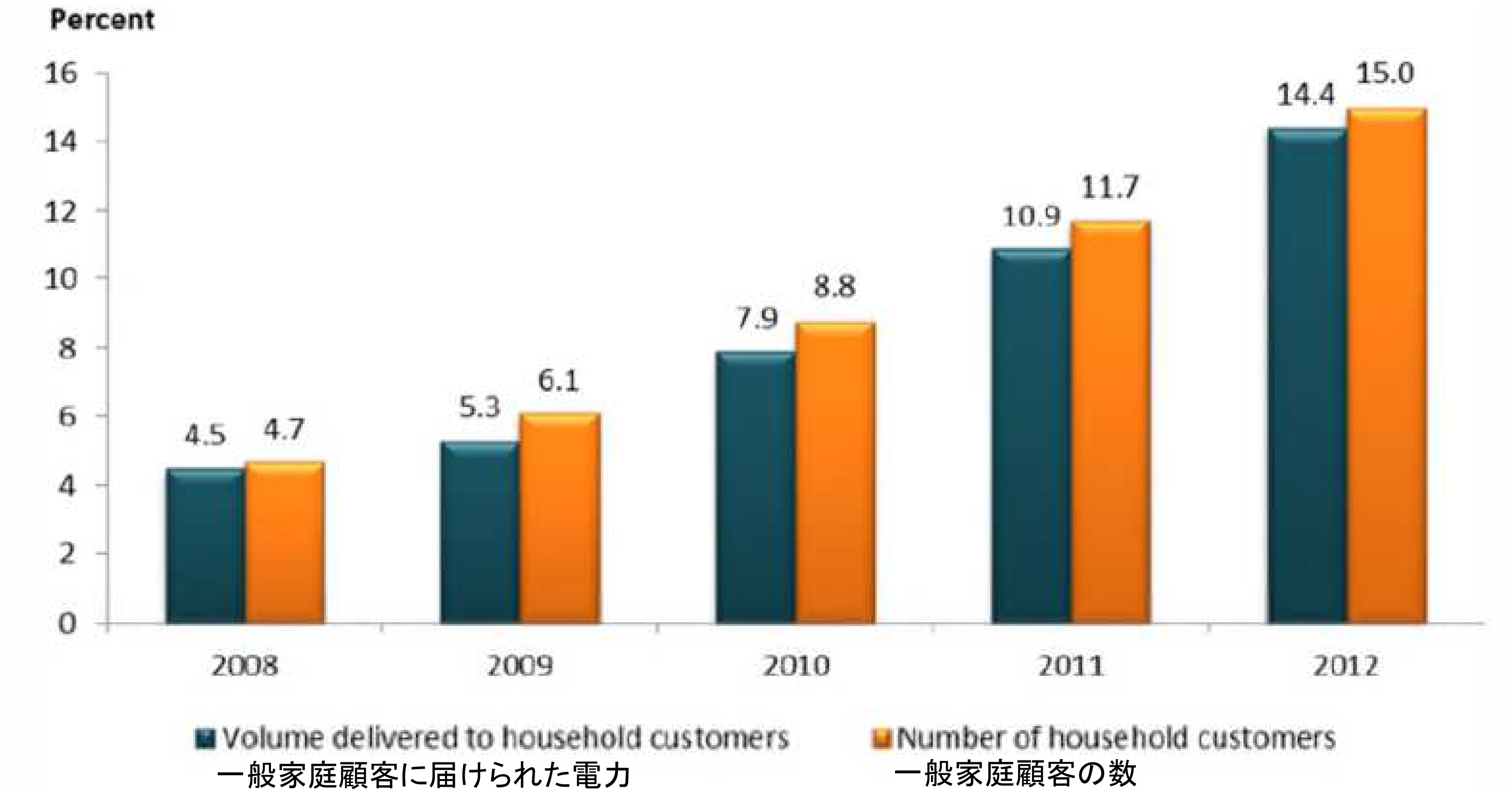
- integration of renewables in portfolios of suppliers/customers (physically)

太陽光などの自然エネルギーに、熱電併給の電気が含まれることもある

“Green” is in, but have a close look how “green” is defined

【「グリーン」の定義について】

Green electricity volumes and household customers
「グリーン電力」の供給量と顧客数について（一般家庭）



Source: Bundesnetzagentur 2013, p.158

Scope and Limits of Electricity Disclosure from a Consumer ‘s Perspective

【消費者視点による、電力の情報開示の範囲と制限について】

- Electricity disclosure should strive to provide neutral information on the fuel mix of the supplied electricity
  供給する電力の電源構成について、中立な情報を提供するよう努力しなければならない
  - Mandatory for all electricity suppliers
    すべての電力会社に課せられた義務
  - „Soft“ consumer information and awareness raising
    消費者への「ソフト」な情報、自覚を促す

Source: Seebach 2015 (RE-DISS projects)

Disclosure in Germany

【ドイツの電源構成等の表示】

Labelling in practice / 実際のラベル

Stromkennzeichnung

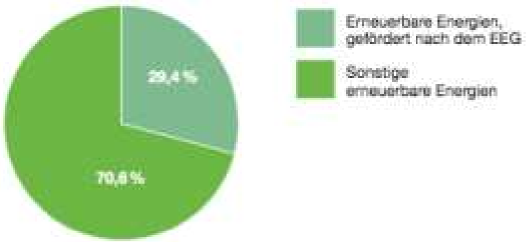
gemäß § 42 Energiewirtschaftsgesetz (EnWG) vom 7. Juli 2005, geändert 2012

GREENPEACE ENERGY

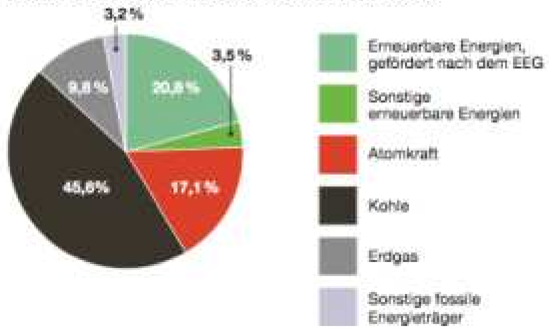
GREENPEACE ENERGY EG, HAMBURG
STROMLIEFERUNG IM ZEITRAUM 1.1.2012 - 31.12.2012

ENERGIETRÄGERMIX

GREENPEACE ENERGY STROMMIX 2012



BUNDESDEUTSCHER DURCHSCHNITTSMIX 2012



Der Ihnen gelieferte Strom besteht zu 100 % aus sauberer Wasser- und Windkraft. Gesetzliche Regelungen zwingen uns jedoch, die nach dem EEG geförderten Mengen, für die wir die EEG-Umlage zahlen mussten, anteilig bei der Stromkennzeichnung in Ansatz zu bringen. Dadurch ergibt sich ein rein rechnerischer Anteil von 29,4 %. Tatsächlich lieferte Ihnen Greenpeace Energy im Jahr 2012 100 % sauberen Strom, den wir direkt aus Wasser- und Windkraftanlagen bezogen haben. Der Anteil der Wasserkraft betrug 94,1 % und der Anteil der Windkraft 5,9 %.

UMWELTBELASTUNGEN

		GREENPEACE ENERGY STROMMIX 2012	BUNDESDEUTSCHER DURCHSCHNITTSMIX 2012
CO_2	Emissionen in g/kWh	0	522
	Radioaktiver Abfall in g/kWh	0	0,0005

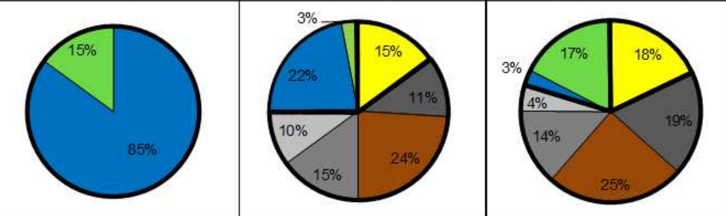
QUELLEN: GREENPEACE ENERGY, BDEW

Source: Greenpeace Energy

Research on further developments of labelling

izes gGmbH
Institut für ZukunftsEnergieSysteme

【電気ラベルの更なる発展に向けた研究】

	Your Product "Green"	Average of your "Sample Supplier"	For comparison: [National] production mix
Nuclear Hard Coal Lignite Natural gas Other fossil Hydro power Other renewable			
High-efficient cogeneration of electricity and heat	5,0%	7,0%	8,5%
CO_2 emissions	0 g/kWh	494 g/kWh	529 g/kWh
Radioactive waste	0 µg/kWh	450 µg/kWh	537 µg/kWh
	The mark (◆) indicates the level of emissions of CO_2 and radioactive waste related to the fuel mix of your product and of the average fuel mix of your supplier compared to national average.		
Additional information with respect to your product **"Green"**	100% of this electricity production has been documented based on Guarantees of Origin.		
	85% of these Guarantees of Origin represent electricity production in [Country A]. 15% of these Guarantees of Origin represent electricity production in [Country B].		
	0% of this electricity production has received public support.		

Draft recommendations for presentation of information

RE-DISS II
Reliable disclosure systems for Europe

- The information on **both the fuel mix and environmental impact** must be provided **directly on or with the bill**
- Information shall be understandable and comparable
  - **standard format**
  - should include a **pie or bar chart** for all key parameters
- Disclosure information has to be provided with reference to the **supplier's overall fuel mix** (required by IEM Directive);
- **If a supplier differentiates different products** for his customers, he shall disclose the information relating to the **specific product to ALL his customers**
- National average mix as **reference**
- Understandable presentation of environmental indicators in relation to reference mixes, including **intuitive colour coding**
- **Central comparable provision** of disclosure information for all electricity products available within an area (e.g. website)
- Baseline: **fuel mix** and environmental impact (**CO_2/nuclear**)
- More detailed fuel categories than just FOS, NUC, RES, ideally based on **12 fuel categories** for RE-DISS residual mix
- Indication of **country of origin** of the underlying attributes as far as this information is available (as is the case for GOs)
- Information on **additionality** for all products with ex-ante claims, ideally backed by label or at least third-party audit
- Weighting of the value of comprehensive consumer information against reduction of complexity for consumers → possibly provision of further information (on bill or website):
  - **Additional environmental indicators**, if available;
  - Information on the **shares of *supported*** electricity
  - Information on the **tracking instrument** (e.g. GOs which are used *independently from* or *together with* physical electricity purchase, national residual mix, own production

Source: Seebach 2015 (RE-DISS projects)

Intermediate Results

【中間まとめ】

- Switching suppliers offers new chances for customers and for innovative newcomers
  電力会社の乗り換えは顧客(消費者)と革新的な新電力に新たなチャンスをもたらす
- However, the majority of the customers in Germany still care more about the price in stead of the quality of electricity or of the company
  しかし、ドイツにおいては、電気や電力会社の質よりも、未だに多くの顧客(消費者)は主に価格に着目している
- Electricity is a homogeneous commodity; product differentiation is not an easy task especially if one wants to avoid cheating
  電気は均質な商品:ごまかしを防ぎつつ差別化をするのは易しい仕事ではない
- Companies are not homogeneous; here it is easier to differentiate
  企業は均質ではない:差別化は容易

Agenda / 目次

1 Liberalization of the electricity sector in a nutshell
電力自由化の概要

2 Competition in generation through a power exchange and market access regulations for new competitors
電力取引所や新電力の市場アクセス規制による競争

3 Network regulation for customer protection and market opening
消費者保護とオープンな市場のためのネットワーク規制

4 Retail competition: more transparency, more companies, more quality
小売競争:さらなる透明性確保、企業、さらなる品質

5 **Lessons learned**
教訓

Lessons learnt / 教訓 (1)

- Liberalization of the electricity sector has a large potential for more transparency, shrinking market power, and stirring competition between suppliers
電力自由化は、さらなる透明性の確保、市場支配力の縮小、電力会社間の競争を引き起こす可能性を持っている
- Key elements of liberalization are ownership unbundling between the transmission network and generation, and the prevention of cross-subsidization between network and supply through an independent regulatory agency
自由化の主要な要素は、発送電間の所有権の分離、系統運用者と電力会社の内部相互補助を防止するための独立規制機関

Lessons learnt / 教訓 (2)

- Retail competition is not solely a competition between different qualities of electricity, but as well between different qualities of companies
  小売競争は「異なる電気の質」の競争だけを指すのではなく、「異なる企業の質」の競争でもある
- Electricity disclosure is a precondition for making the quality of electricity a factor in the customer’s choice
  電気に関する情報開示・表示は、消費者が電気の質を選択する際の前提条件である

Thank you very much for your attention!

ご清聴ありがとうございました

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Reference / 参考資料

Disclosure as an obligation on suppliers in Europe and in Germany

izes gGmbH
Institut für ZukunftsEnergieSysteme

【欧州・ドイツの電力会社への情報開示義務】

DIRECTIVE 2009/72/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 13 July 2009

concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC

(Text with EEA relevance)

欧州議会及び理事会の指令2009／72／EC （2009年7月13日）

Article 3

Public service obligations and customer protection

第3条　共同経済上の義務及び顧客の保護

9. Member States shall ensure that electricity suppliers specify in or with the bills and in promotional materials made available to final customers:

(a) the contribution of each energy source to the overall fuel mix of the supplier over the preceding year in a comprehensible and, at a national level, clearly comparable manner;

(9)　加盟国は、電力供給企業が請求書又はその添付書及び最終消費者向けの広告において、以下のことを表示することを確保する:

a)　理解しやすく国内で明確に比較可能な方法による、供給者が前年に用いた全エネルギー源構成に占める個々のエネルギー源の比率

Electricity disclosure in Germany is regulated by § 42 of the Energy Industry Act (Energiewirtschaftsgesetz – EnWG, in German: http://www.gesetze-im-internet.de/bundesrecht/enwg_2005/gesamt.pdf). It regulates:

1. *Suppliers have to provide the fuel mix of year X latest by 1 November of year X+1 together with the annual invoice, with advertising material and on their website.*
2. *Disclosed fuel mix contains the company's mix, product mix (if any) and (for comparison) the German production mix.*
3. *Disclosed information contains at least the shares of nuclear, coal, natural gas, other fossil, renewables as supported according to German Renewable Energy Sources Act (EEG), other renewables and the respective emissions of CO_2 and nuclear waste.*
4. *Furthermore they must disclose the environmental impacts, at least respective the emissions of CO_2 and nuclear waste*
5. *For shares of unknown origin, the German ENTSO-E mix published by the German Association of Energy and Water Industry (BDEW) has to be used, which shall be corrected "with reasonable effort" in order to avoid double counting (§ 42 (4) Energy Industry Act).*

ドイツ　電力及びガス供給法（エネルギー事業法）

2005年7月7日制定（最終改正2012年12月20日）

42条　電源表示、電力請求書の透明性、法規命令への委任

1. 電力会社は、最終消費者向けの請求書上またはその添付書類、広告媒体、ホームページにおいて、電源構成を示さなければならない

2. 電源構成は企業全体、製品、国全体のものを示す

3. 電源構成は最低でも原子力、石炭、天然ガス、その他の化石燃料、自然エネルギー法によって援助された自然エネルギー、それ以外の自然エネルギーの割合を示す

4. さらに環境影響、少なくともCO2排出量と放射性廃棄物量も開示しなければならない

5. エネルギー源が明確でない電力量については、ドイツのENTSO-E-エネルギー源構成に掲げる再生可能エネルギーによる電力を控除したものを基礎とすることができる。