Bundesnetzagentur

How can we ensure sufficient investment in the distribution networks?

Jean-Marc Behringer, Bundesnetzagentur

Distribution networks for the energy transition: Legal framework and practical experience

Paris, 24. November 2016

Presentation overview

- Amendment of the Incentive Regulation Ordinance (ARegV)

- System of network charges in Germany

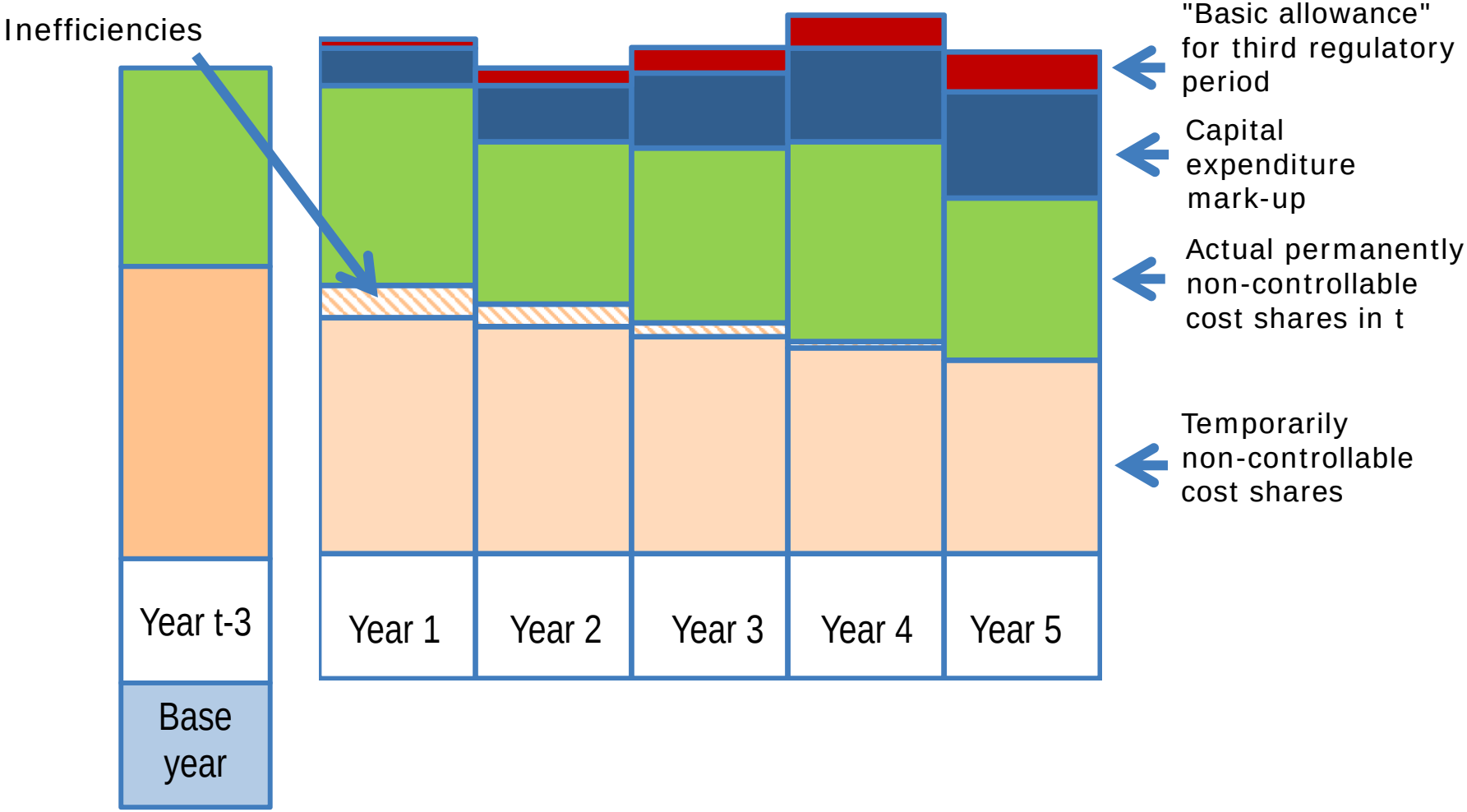
Amendment of the Incentive Regulation Ordinance (ARegV)

- legal substantiation
- design
- background and timeline
- investment incentives
- efficiency incentives
- innovation incentives

Amendment of the Incentive Regulation Ordinance: Legal substantiation

- *"To be able to meet the new challenges, the distribution system operators will need to expand and adapt their networks. A modernised regulatory framework must enable and encourage new investment, in particular in **intelligent networks**."*
- *"The Incentive Regulation Ordinance is designed to promote new **investment from the distribution system operators**. The **efficiency incentives** are being increased to guarantee technology neutrality."*
- *"Economic efficiency and **transparency** for the network operators' customers, and in particular for the consumers, remain the aim of rates regulation in a monopoly sector."*

Overview of mechanism



Amendment of the Incentive Regulation Ordinance: Background and timeline

Bundesnetzagentur	**Evaluation of incentive regulation** **Results: Evaluation report**	Nov 2013 - Jan 2015
Federal Ministry for Economic Affairs and Energy	**Key elements paper** **by Federal Ministry**	March 2015
Federal Government	**Draft for consultation with associations**	April 2016
Federal Government	**Draft as per Cabinet decision**	June 2016
Bundesrat	**Consent with provisos**	8 July 2016
Federal Government	**Adoption with Bundesrat's provisos**	3 August 2016
Federal Law Gazette	**Entry into force**	17 Sept 2016

Amendment of the Incentive Regulation Ordinance: Background and timeline (2)

Key elements 2015	Consultation with associations	Cabinet decision	Bundesrat
No new scheme • Retain and reform expansion factor • Investment measure for DSOs particularly affected	New scheme: • Abolish expansion factor and introduce capital expenditure true-up with basic allowance for investments for 2008-2016	New scheme: • Abolish expansion factor and introduce capital expenditure true-up with basic allowance for investments for 2007-2016	New scheme: • Abolish expansion factor and introduce capital expenditure true-up with basic allowance for investments for 2007-2016
No changes to period for reducing inefficiencies	Shorten period for reducing inefficiencies to 3 years	Shorten period for reducing inefficiencies to 3 years	No shortening of period for reducing inefficiencies
No changes to regulatory period length	Shorten regulatory period to 4 years	No shortening	No shortening
Best of two of two	Best of four	Best of four	Best of four
Constant economies of scale	Constant economies of scale	Constant economies of scale	Constant economies of scale
Efficiency bonus	Efficiency bonus	Efficiency bonus	Efficiency bonus
Halve threshold values for simplified procedure	No reduction	No reduction	No reduction
Adjust flat rate for permanently non-controllable cost shares in simplified procedure	Adjust flat rate for permanently non-controllable cost shares in simplified procedure	Adjust flat rate for permanently non-controllable cost shares in simplified procedure	Adjust flat rate for permanently non-controllable cost shares in simplified procedure

Amendment of the Incentive Regulation Ordinance: Investment incentives

- Capital expenditure mark-up enables immediate recognition of revenues (projected costs)
- Internal rate of return for investments (in the case of an efficient investment) is always higher than the composite rate of return ("stairs function")
  - Example calculation in evaluation report:
    IRR = 5.43% relative to a composite rate of return of 5.04%
    (depreciation period: 35 years)
- Efficiency benchmarks may only take effect in t-7, depending on the time of investment
  (post-base year effect?)
- "Base effects" that will no longer exist are not relevant to future investments
- But: Would old investments be devalued by the absence of "base effects"?

Amendment of the Incentive Regulation Ordinance: Efficiency incentives (1)

- Discontinuation of the budget principle: Incentives provided by the budgets no longer exist for capital expenditure
- The efficiency benchmarks themselves were not generally tightened in the amendment
  - No abolition of the "best of four" method
  - No shortening of the period for reducing inefficiencies
  - No reduction in the threshold values for the simplified procedure
- Discontinuing the mandatory parameters is not to be seen as tightening the arrangements, rather it provides a better "fit" for the benchmark model
  - Avoidance of endogenous parameters does not necessarily result in lower average efficiency levels

Amendment of the Incentive Regulation Ordinance: Efficiency incentives (2)

- The assumption of constant economies of scale in the efficiency benchmarking has been retained
  - Reduction in the efficiency level for 26 electricity DSOs by an average 3% (calculation based on 2011 benchmark)
  - Reduction in the efficiency level for 16 electricity DSOs by an average 1% (calculation based on 2010 benchmark)
  - *"We frequently hear it said that there is a connection between size and efficiency – to the detriment of the large number of – often small – distribution system operators. That is absolutely not the case [...]" (Association of Local Utilities – VKU)*
- The introduction of the efficiency bonus may well increase the efficiency incentives but it also improves the network operators' overall position with regard to revenues (no-one will be worse off)
- The question is whether or not these measures can actually compensate for the discontinuation of the budget principle

Amendment of the Incentive Regulation Ordinance: Innovation incentives (1)

- *"A modernised regulatory framework must enable and encourage new investment, in particular in intelligent networks."*
- Immediate adjustment of the revenue caps, including those for capital expenditure for investments in intelligent networks.
- For investments after the base year, t-7 applies until efficiency benchmarking takes effect.
- There is no doubt that the new Ordinance enables investments in intelligent networks as well.
- With regard to the incentive effect, however, the Bundesnetzagentur expressed doubts in the course of its evaluation.
  - *"The question as to whether this model can, overall, leverage the potential savings identified in the distribution networks study conducted for the Federal Ministry for Economic Affairs and Energy –which were primarily based on innovations (reducing the total investment of around €23bn by €4.6bn) – is open, but this is rather unlikely."*

Amendment of the Incentive Regulation Ordinance: Innovation incentives (2)

- Innovative resources usually compete with new lines – ratio between CAPEX and OPEX of the alternative options varies (depending on the circumstances in each individual case).
- The investment decision is, however, distorted in each case since
  - capital expenditure can be passed on by the network operator
  - operational expenditure is covered by the network operator's profits
- This results in obstacles with respect to innovative technologies, which involve mainly operational expenditure.
- The call for a capital expenditure true-up was justified (by the network operators as well) by necessary investments in innovative technologies. Will the network operators now actually make the necessary investments in intelligent networks?

System of network charges in Germany

- principles of the regulatory system
- historical development of network charges
- future development of network charges
- requirements placed on the system of network charges
- possible changes

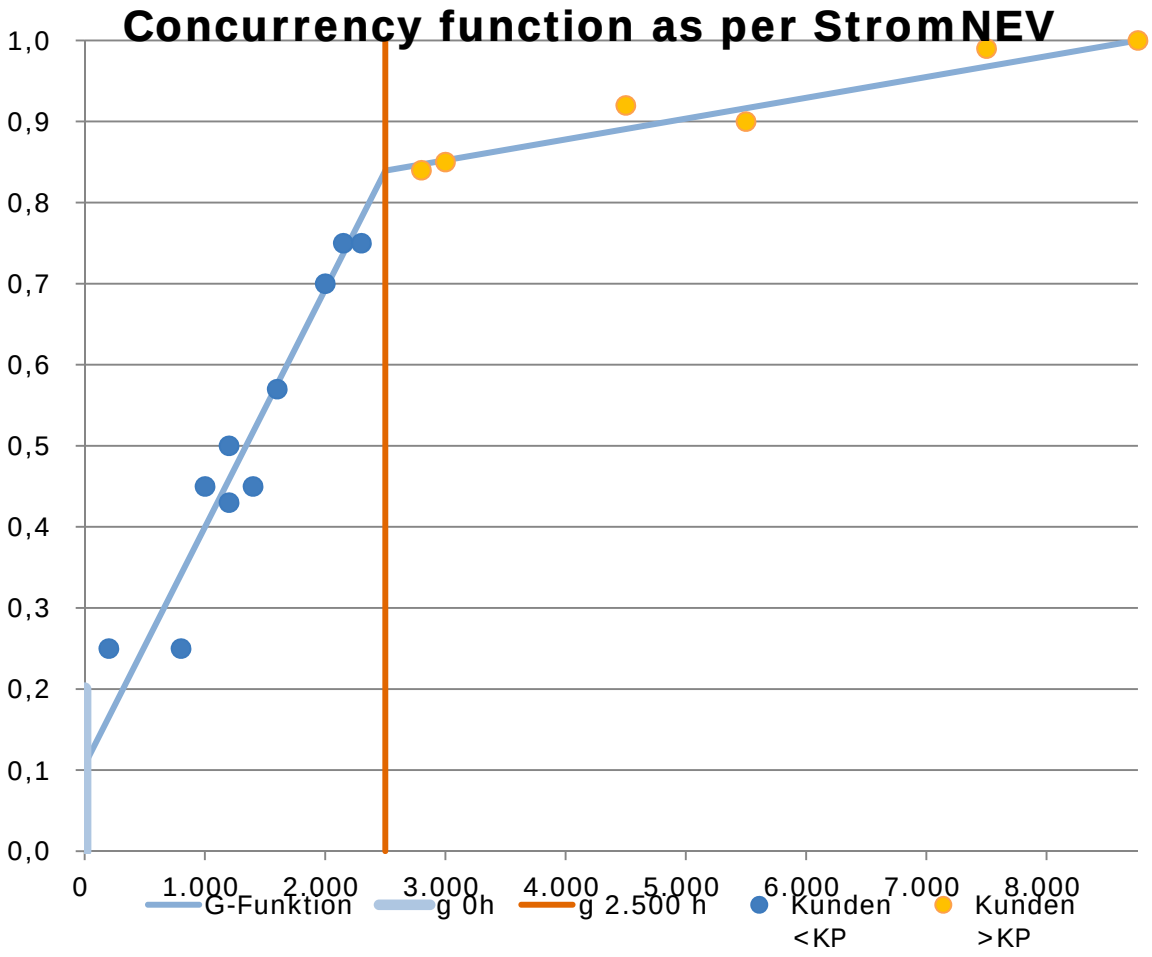
Cost allocation

- Cost accounting aims to assign incurred costs as precisely as possible to the cost units (network charges).
- Accounting is done through cost component calculations (cost category accounting, cost centre accounting (Annex 2 Electricity Network Charges Ordinance (StromNEV)) and cost unit accounting (Annex 3 StromNEV))
- Cost category accounting is the allocation of the costs incurred within the billing period to the factors of production.
- Using cost centre accounting, cost categories are allocated to (the cost centre) where the costs were incurred (eg personnel costs are allocated to the main cost centre of the low voltage level).
- Cost unit accounting is used to calculate the unit costs of the "products sold" (network charges). In this regard, the cost centres are allocated to the cost units according to the principle of causation. The cost units are in part identical to the cost centres.

Determination of the Briefmarke / concurrency function

- Using cost unit accounting, the specific annual costs (Briefmarke) are determined by dividing the annual costs of a level by the annual peak load of each network or substation level. The annual peak load is the cost driver.
- The result, ie the Briefmarke, indicates the price of a kilowatt (kW) of the annual peak load.
- The Briefmarke is divided into the price components given in section 17 StromNEV.
  - capacity-based price$_{<2500}$ = $g_{0\,h}$ * Briefmarke
  - energy-based price$_{<2500}$ = (($g_{2500\,h}$ – $g_{0\,h}$) / 2500) * Briefmarke * 100
  - capacity-based price$_{>2500}$ = (1 – (1 – $g_{2500\,h}$) * (8760 / (8760 – 2500))) * Briefmarke
  - energy-based price$_{>2500}$ = ((1 – $g_{2500\,h}$) / (8760 – 2500)) * Briefmarke * 100

System of network charges in Germany: Principles of the regulatory system (3)



- Using the concurrency function, a network operator attributes a **concurrency degree** to each network user.
- The concurrency degree indicates the probable share that an individual network user contributes to the annual individual peak load.
- The concurrent annual peak load is the key cost driver for the networks.
- The concurrency function sets high capacity-based prices and low energy-based prices for a high number of usage hours.

System of network charges in Germany: Principles of the regulatory system (4)

Distribution of the revenues of the capacity-based price / energy-based price system at the network level for 2015

- For the sake of simplicity, the shares of each network and substation level have been combined in the tables.

voltage level	revenues <2.500 h	revenues >=2.500 h	Total
extra-high voltage (EHV)	1.5 %	7.4 %	9.0 %
high voltage(HV) (+EHV/HV)	1.6 %	**23.8 %**	25.4 %
medium voltage (MV) (+HV/MV)	3.7 %	**22.4 %**	26.2 %
low voltage (LV) (+MV/LV)	1.7 %	3.7 %	5.3 %
low voltage without load metering	-	-	**34.1 %**

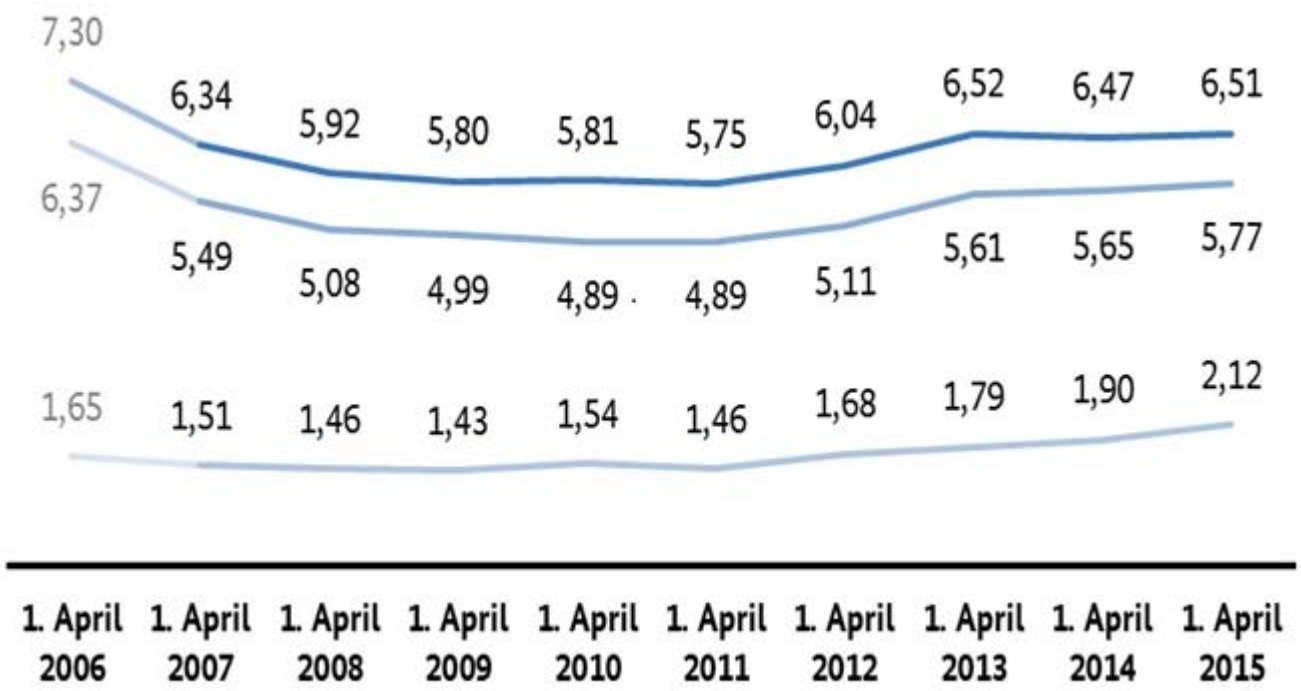
System of network charges in Germany: Principles of the regulatory system (5)

The capacity-based charge / base price as a percentage of the charge for each voltage level for 2015 (averages for network operators regulated by the Bundesnetzagentur)

voltage level	share of capacity-based price / energy-based price <2.500 h	share of capacity-based price >=2.500 h
extra-high voltage (EHV)	25.5 %	**83.4 %**
high voltage (HV)	29.4 %	**74.3 %**
medium voltage (MV)	19.8 %	**72.2 %**
low voltage (LV)	18.4 %	57.1 %
low voltage without load metering	11.8 % (base price)	

System of network charges in Germany: Historical development of network charges (1)

Development of electricity network charges (ct/kWh)



2016

Household customers 3500 kWh

6.71 ct/kWh

Commercial customers 50 MWh

5.85 ct/kWh

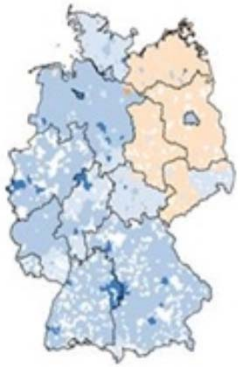
Industrial customers 24 GWh

2.06 ct/kWh

System of network charges in Germany: Historical development of network charges (2)

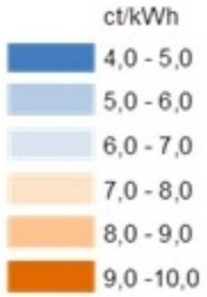
Regional differences in network charges

Household 2009 (Dc)

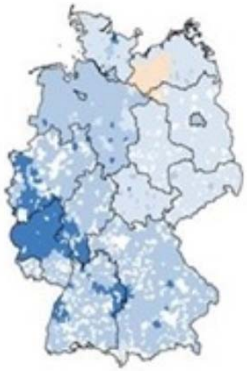


Commercial 2009 (Ib)

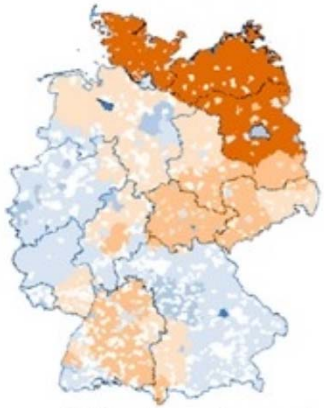
Household (Dc) and commercial (Ib)



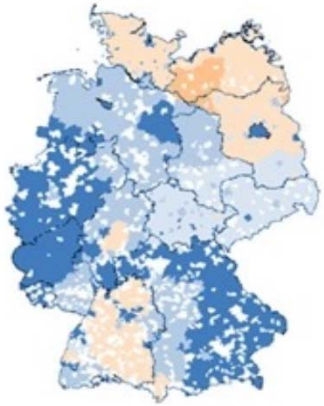
Industrial 2009 (Ig)



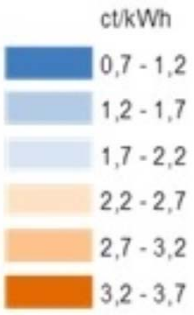
Household 2016 (Dc)



Commercial 2016 (Ib)

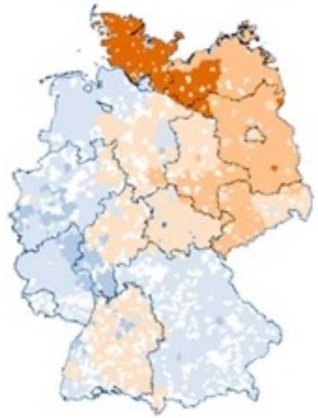


Industrial (Ig)



network operators under the authority of the Bundesnetzagentur

Industrial 2016 (Ig)



System of network charges in Germany: Future development of network charges

- **Network charges increased in 2016 compared to 2015**
  - Typical household customer: increase of around 6%
  - Typical customer in the medium voltage network: increase of around 12%
- **The network charge will continue to increase**
  - Avoided network charges
  - Decreasing volumes of sale
  - Redispatching / feed-in management
  - Network reserve
  - Network expansion - transmission network and distribution network level
- **Costs are divided between transmission and distribution networks:**

[€bn]	2006	2009	2010	2011	2012	2013	2014	2015	2016
Transmission system operator (TSO)	2.4	2.5	2.2	2.2	2.6	3.0	3.1	3.5	3.8
Distribution Network Operator (DSO)	13.7	14.0	14.2	14.6	16.0	17.8	17.7	17.1	17.7
Number of DSO	234	234	234	229	252	265	202	202	191

System of network charges in Germany: Requirements placed on the system of network charges

- **Network charges should:**
  - ensure that the principle of causation is followed
  - ensure that distribution is fair and just
  - set price signals that foster economical use of a scarce resource: the "network"
  - stay transparent and clear
  - ensure a level playing field for all market players
  - support a balance between electricity supply and demand to the greatest possible extent
- **It is *impossible* to achieve all of these aims in full at the same time**
- **=> varying price signals resulting from a scrarcity of network and electricity resources of have to be accepted**

System of network charges in Germany: Possible changes

- **A uniform network charge for all of Germany**
- **Adjustment / elimination of avoided network charges**
- **Strengthening of capacity components / the base price**
- **Involvement of prosumers**
- **Factoring out peak loads**
- **Individual network charges (section 19(2) StromNEV)**
- **Feed-in charges**
- **Storage**

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How can we ensure sufficient investment in the distribution networks?

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Appendix

Amendment of the Incentive Regulation Ordinance: Design

- Capital expenditure true-up based on actual investment and depreciation
  - Transitional arrangements
  - No OPEX flat rate
- Introduction of efficiency bonus
- Adjustment of flat rate for permanently non-controllable cost shares for companies participating in the simplified procedure
- Extension of the deadline for non-wage labour costs
- Simplified arrangements for the regulatory account
- Adjustments to the investment measure
- Network interconnections
- More transparency

Excursus: Basic allowances (1)

- The basic allowances provided for in the "old Ordinance" were designed (together with other instruments) to enable new investments to be pre-financed
- Capital expenditure is now recognised without a time lag – the new scheme means that basic allowances are no longer required
- The claim that discontinuing the basic allowance for old investments devalues assets does not take account of the fact that pre-financing resources were available for these investments (in particular through positive basic allowances and expansion factors) – and so the negative allowance has already been balanced out for these investments.
- The network user contributed to these resources in the legitimate expectation that they would be used for investments. If legitimate expectations are to be protected, then this should apply to all sides.

Excursus: Basic allowances (2)

- Were the pre-financing resources perhaps not sufficient?
  - Positive allowances for old assets (activated prior to 2006 and therefore without negative allowances)
  - Expansion factors
    (in most cases actual costs were lower than those allowed for)
  - Investment measures
  - Flat-rate investment mark-up (2009-2013)
- To date there is no proof that these resources were not sufficient!

➢ As things stand at present, therefore, it <u>cannot be said that investments will be devalued</u>

- A uniform network charge for all of Germany (1) -

The Bundesnetzagentur's position:
A uniform network charge for all of Germany at the distribution network level is not desired

- Considerable complexity and bureaucracy involved
- High liquidity reserves necessary
- The responsibility of an individual network operator for high network charges would cease to exist

Alternative A:
a nationwide levy for costs caused by the energy transition:
in practical terms, a distinction between expansion/replacement costs and costs resulting from renewable expansion **is not possible**

Alternative B: Making the network charges more uniform by eliminating distortions:

- through a uniform transmission system operator (TSO) charge
- by eliminating or gradually reducing the avoided network charges
- by revoking other exemptions
- through new sources = feed-in charges that apply wherever a producer creates a factor ***affecting the network***

- A uniform network charge for all of Germany (2) -

What is at issue?

- Regional differences in network charges are growing
  - TSO 1.01 ct/kWh (EHV/HV, 6000h, 50 MW, as of 2015)
    => 50Hertz 1.15 ct/kWh (+14%) / Tennet 1.07 ct/kWh (+6%) /
    => TransnetBW 0.93 Ct/kWh (-8%) / Amprion 0.78 ct/kWh (-23%)
- At its core, the TSO business model focuses on comprehensive system services

The Bundesnetzagentur's position

- A uniform network charge at the TSO level
  - A uniform TSO charge would be preferable as it does not involve a horizontal cost rollover
  - Increasingly collaborative task of the TSOs
  - The individual TSO retains responsibility for dealing with costs (cost examination, efficiency benchmarking)
  - Regional differences in network charges slightly smaller from the perspective of end consumers.

➡ Through the concurrent abolition of avoided network charges and the introduction of a uniform TSO network charge for all of Germany, regional differences would be levelled out to a noticeable effect.

- Adjustment / elimination of avoided network charges (1) -

What is at issue?

- Avoided network *charges* are something completely different than avoided network *costs*
- The expansion of the transmission network is unavoidable. This is due to decentralised generation, which in turn drives network expansion (reverse feed-in)
- Avoided network charges can set allocative disincentives and trigger spiralling price increases
- Upstream networks "run dry": costs remain, charges increase, avoided network charges further increase
- Rising transmission network costs (especially for offshore connections, system services) drive avoided network charges
- Avoided network charges intensify the regional spread of network costs

- Adjustment / elimination of avoided network charges (2) -

Avoided network charges (€m):

	2011	2012	2013	2014	2015	2016
Avoided network charges under the authority of the Bundesnetzagentur	1.064	1.216	1.279	1.489	1.558 (Planning figure)	1.733 (Planning figure)
Avoided network charges for renewable energy installations	394	593	654	754	843	850 (Planning figure)

The Bundesnetzagentur's position

- Complete elimination of the avoided network charges

Possible compromise:

- Factoring out cost positions that are not linked in any way with the connection in the lower level (offshore connection, system services, etc pp)
- The freezing and gradual reduction of avoided network charges

- Strengthening of capacity components / the base price -

What is at issue?

- The already high capacity-based price share of customers with load metering
- The introduction of an appropriate fixed share for standard load profile (SLP) customers (households/small business)

The Bundesnetzagentur's position

- An appropriate base price for SLP customers is required to represent concurrency to an approximate degree
- A flat rate carries with it doubts as not all users contribute to the annual peak load of the network concurrently
- Capacity tariff (taking the Netherlands as an example) also raises doubts. Its implementation is questionable as 40m households are presently equipped with oversized fuses
  - **However**:
    customers with load metering*effectively have* a flat rate for their consumption below the annual peak load already
  - New theories on cost drivers can put capacity tariffs in a new light

- Involvement of prosumers -

What is at issue?

- Prosumers that have a network to eventually fall back on should pay an appropriate contribution to funding network costs
- At present, just below **10 %** (**50 TWh**) of Germany's net demand for electricity is covered by self-supply with an upwards trend
  - **Industry self-supply is around 46.5 TWh (around €950m)**
  - **Private self-supply is around 3.5 TWh (around €230m)**

The Bundesnetzagentur's position

- No network charge for self-supply
- Customers with load metering: Normal network charges for >2500h are appropriate; Privileges through so-called network reserve charges should be removed
- Non-metered customers: Introduce a charge for network provision
  - Require energy prosumers to bear an appropriate share of the network costs
  - Calculation similar to that of providing an insurance policy conceivable
  - Positive effects of distribution

- Factoring out peak loads –

What is at issue?

- The provision of negative balancing reserve through loads can result in the provider reaching an individual peak load therefore leading to higher network charges
- The provision of negative redispatching through loads can also lead to peak loads and with it higher network charges
- Prices for negative system balancing energy are relatively high
  The provision of negative redispatching could be higher in Northern Germany

The Bundesnetzagentur's position

The factoring out of network-oriented peak loads is not necessary if the provider can factor in the costs in its prices

- The factoring out of network-oriented peak loads can be justified because competing power plants do not pay network charges and this would therefore eliminate market distortion that would otherwise a burden on the loads
  No factoring out of network-oriented peak loads because of a risk that new network congestion would follow
- Disregarding peak loads in times where loads are low is highly problematic because of incomplete unbundling, problems linked to refinancing caused by user reactions and unequal treatment.

- Individual network charges (section 19(2) StromNEV) (1) -

What is at issue?

- Section 19(2) StromNEV is designed to grant privileges to final consumers who are able to make an individual contribution to lowering and/or avoiding network costs through their consumption behaviour
  - **Atypical use (section 19(2) first sentence)**
  - **Intensive use (section 19(2) second sentence)**
- However: Certain deadweight effects and questionable results in respect of benefits for the network

[€bn]	2012	2013	2014	2015	2016
Section 19(2) first sentence StromNEV	123.1	190.1	271.3	266.5	310.6
Section 19(2) second sentence StromNEV	280.7	409.6	413.4	531.2	586.9
Total	403.8	599.6	684.8	797.7	897.5
Charges approved retrospectively for 2012/2013	211.9				

- Individual network charges (section 19(2) StromNEV) (2) -

The Bundesnetzagentur's position on section 19(2) first sentence StromNEV:

- Materiality threshold: Only those final consumers who actually have a material influence on the peak and subsidiary load of the network operator concerned and who are therefore in a position to provide a real benefit for the network operator's network should be granted privileges.
- Peak load time windows: Peak load time windows are set one year in advance by the network operator. Network operators should at least have the possibility to change peak load time windows at short notice in line with network operation requirements. Linkage to section 14a of the Energy Act (EnWG) (possibly supplemented) could also be considered, ie the possibility for the network operator to control the consumption unit could be considered as a requirement.
- Taking into account the generating capacity: In future the fact should be taken into account that in many network areas distributed generation and feed-in is the main deciding factor and that basing the peak load time windows on offtake alone can therefore result in misguided network control.
- Division into intra-network zones: Totally different conditions may prevail at one and the same time within an individual network. It should therefore be possible for network operators to divide their network areas up into different zones for the purpose of setting different peak load time windows.

- Individual network charges (section 19(2) StromNEV) (3) -

The Bundesnetzagentur's position on section 19(2) second sentence StromNEV:

- High and even consumption by electricity-intensive users is no longer beneficial to the network given the increase in volatile generation
- "Door opener" for privileges should no longer be the permanent load
- The aim is not additional revenue for the network but rather appropriate compensation in return for the reduced network charges
- Flexible load behaviour as an essential requirement for claiming privileges
  (eg participation in the system balancing energy market,
  offer to TSOs for adjustment measures under section 13(1) EnWG)
- No double privileges through other regulations
- Uniform rules with the Interruptible Loads Ordinance (AbLaV) and interruptible consumers (section 14a EnWG)

- Feed-in charges -

What is at issue?

- Only final consumers finance network costs
- Producers feeding in energy are also network users and play a significant role in network costs
- Feed-in charges can help to influence decisions on where to locate generating facilities – this reduces the need for network expansion

The Bundesnetzagentur's position

- No general, nationwide introduction
- Regional feed-in charges are conceivable only for distribution networks in which feed-in represents the primary cost driver
- However, risks depending on the design
  - Distortion of merit order
  - Danger of barriers to investment or increase in the renewable energy surcharge
  - Potential for discrimination

- Storage facilities -

What is at issue?

- Call for extensive exemption for electricity storage technologies
- Complaint about supposed "double burden" with network charges

The Bundesnetzagentur's position

- "Double burden" for storage facilities is a pure myth: it does not exist
- Privileges for storage facilities violates the principle of technology neutrality; in particular in respect of developing flexibility instruments

The issue has now been settled by the legislature

- New storage facilities and upgraded pumped storage stations receive full exemption from charges for a fixed period under section 118(6) EnWG
- Other operators of electricity storage facilities pay a solely capacity-based charge in accordance with section 19(4) StromNEV based on the proportion of the electricity drawn that is not fed back into the network.
  - Storage facilities with lower losses therefore pay lower network charges than facilities with higher losses
  - The fact that no energy-based charge is paid means that storage facilities can market full flexibility without additional costs