



Forschungszentrum für Umweltpolitik/
Environmental Policy Research Centre



Dr. Kerstin Tews
ktews@zedat.fu-berlin.de

PROGRESSIVE TARIFFS FOR RESIDENTIAL ELECTRICITY CONSUMPTION. AN OPTION FOR GERMANY?

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CONTENT

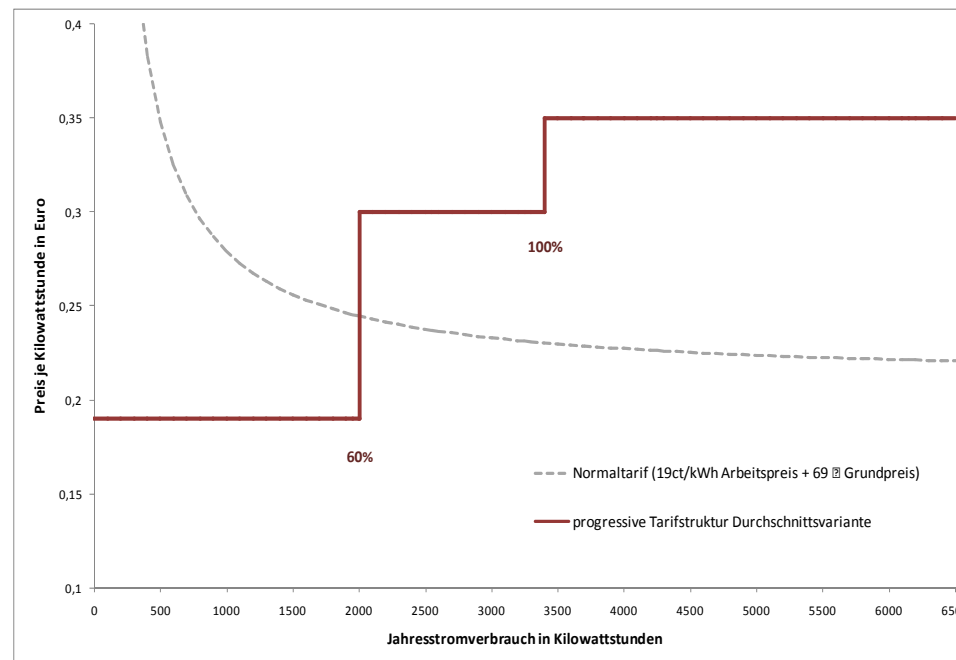
- The basic instrument approach: What should progressive tariffs provide?
- Effects of progressive electricity tariffs:
 - Saving potentials: empirical evidence
 - Distributional effects and
 - design matters
- Mandatory or optional?
- Lessons from other countries
- Option for Germany and outlook
 - desirability and feasibility
 - complementary approaches

INSTRUMENT APPROACH: WHAT SHOULD PROGRESSIVE TARIFFS PROVIDE?

- *Clear* price signals to influence the *demand* for electricity
- Set incentives for private consumers to change consumption pattern or investment decisions by
 - rewarding savings
 - *penalising* higher consumption

more clearly than the (declining) tariff model which is most common in Germany

Example: declining vs. progressive tariff structure



Effect of a fixed base fee (Grundpreis) : the more I consume the less I pay per unit of consumption in average (kWh)

Effect of a progressive model: the more I consume , the higher the price for usage per tier

EFFECTS OF PROGRESSIVE TARIFFS I: FINDINGS REGARDING ELECTRICITY SAVINGS

- savings depend on price-elasticity of electricity demand
 - Findings: residential energy is one of the most inelastic goods in economy, but: in the long run significant consumer response to price signals observable (energy = φ derived demand φ) (OECD 2008)
- limited evidence about the real savings induced by progressive tariffs
- few US-American studies on the predicted impact of progressive tariffs:
 - *simulations* of the effect of the real Californian progressive tariff structure and
 - broader *models* of different tariff designs and their effects for the Californian context show:
 - **progressive tariffs might reduce consumption in private households between 6-10% in the medium term and up to 20% over the long run; households could reduce electricity bills up to 25 %** (Reiss and White 2004; Faruqui 2008) (*but consider: average electricity consumption in private households in California: ~ 6000kWh/a; Germany: ~3400kWh/a*)
- Predicted electricity savings and cost effects depend crucially on **tariff design!!!** (e.g. definition of tiers/blocks, price differences between tiers etc.)

EFFECTS OF PROGRESSIVE TARIFFS II: DISTRIBUTIONAL EFFECTS

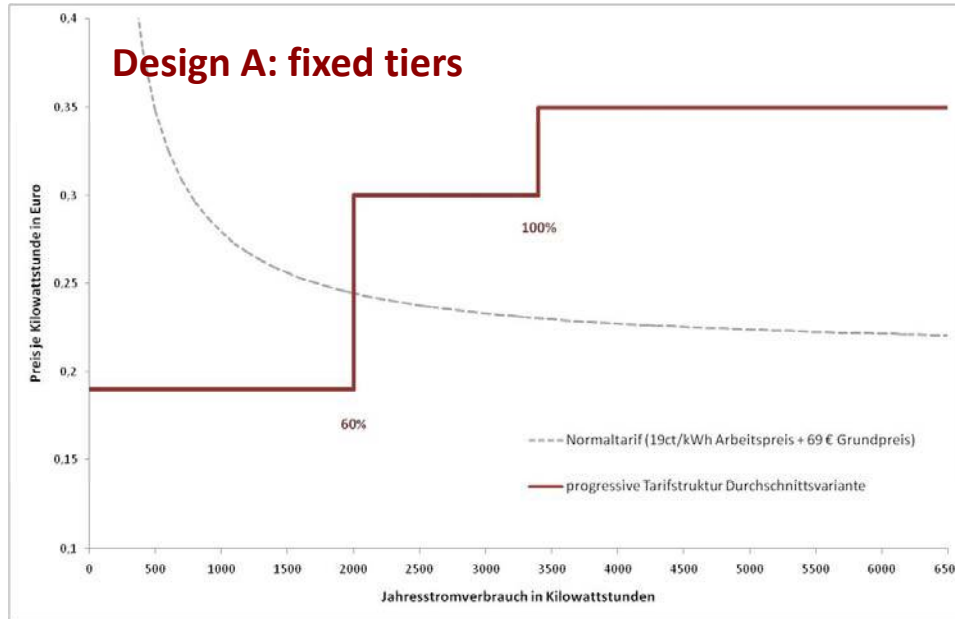
- Cost effects of a progressive tariff differ considerably among households as a function of their respective annual consumption of electricity
 - A household's consumption depends on:
 - *influenceable variables* (e.g. stock and efficiency of electric appliances, behavioral pattern) and
 - *non-influenceable/structural variables* (e.g. type of heating, hot water production - especially for tenants, household size, ?)

 - A closer look at distributional effect is necessary
 - for social reasons and
 - for their impact on the revenues of the retailers with different customer structures
- and needs to be reflected (to a certain degree) in the tariff design

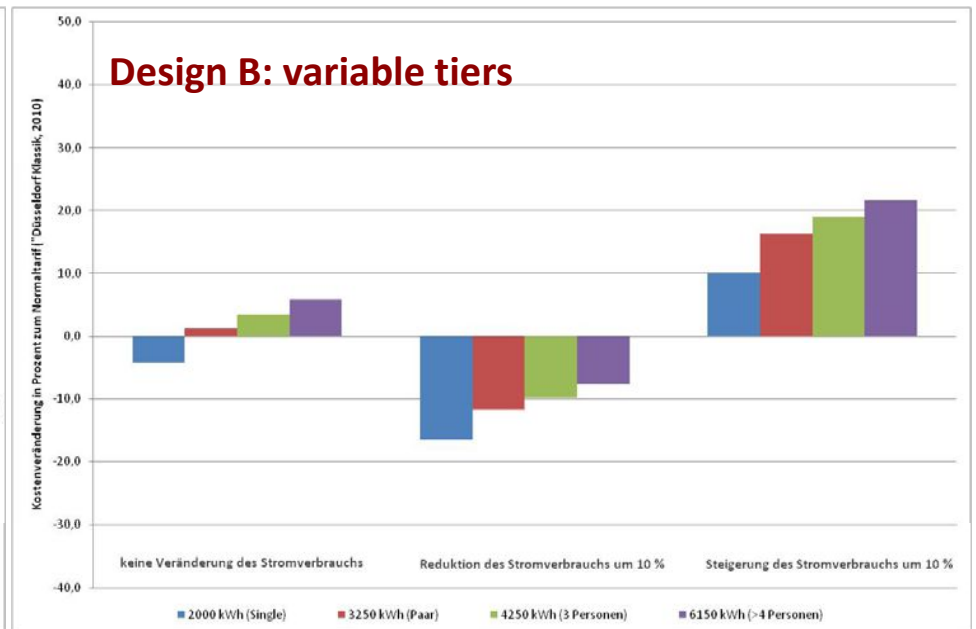
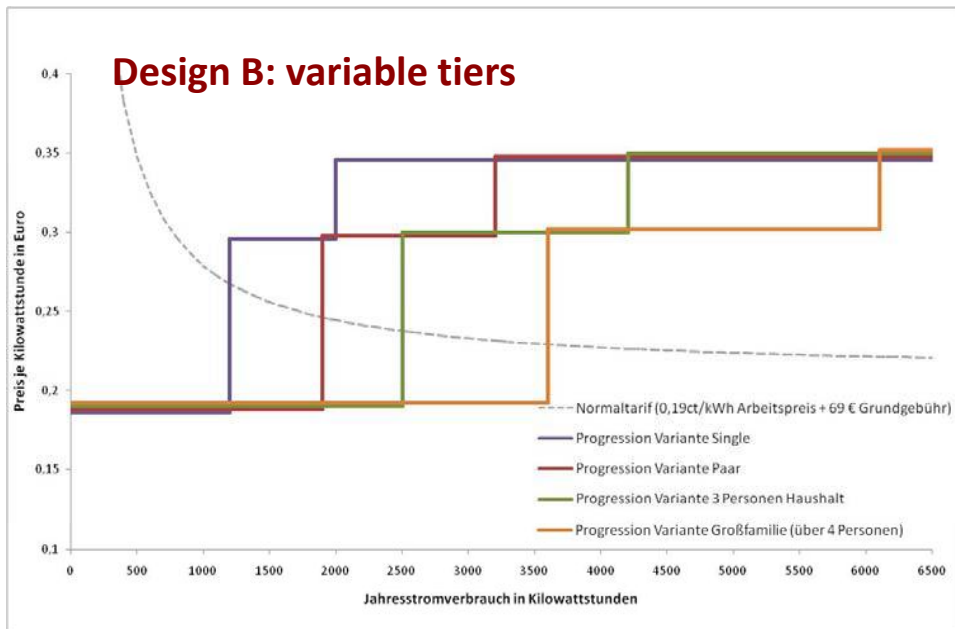
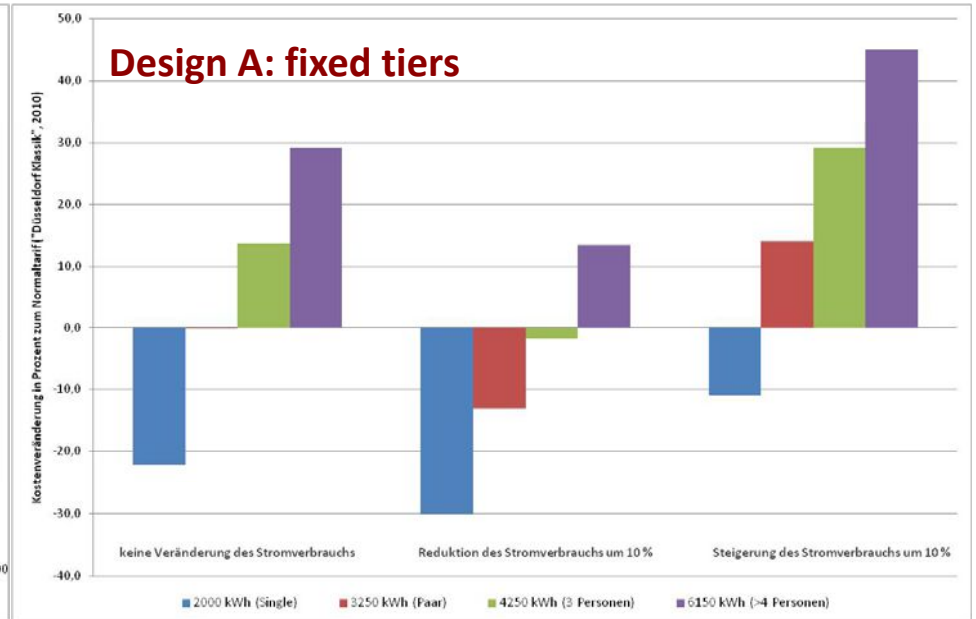
MODELLING DISTRIBUTIONAL EFFECTS ACCORDING TO DIFFERENT TARIFF DESIGNS

- Two (simple) tariff designs
 - **Design A:** fixed 3-tier model (tiers are defined according to the average consumption in German households (3400 kWh/a)
 - Tier 1: > 60% (of annual average consumption)= 19 ¢/kWh
 - Tier 2: 61-100% = 30 ¢/kWh
 - Tier 3: < 100% = 35 ¢/kWh
 - **Design B:** variable 3-tier model according to average consumption per household type
 - four household types with the respective average consumption, single, couple, small family (3 persons), large family (≥ 4 persons)
 - Formal definition of tiers and prices as in Design A (> 60%, 61-100%, >100%)
- **Cost effects** compared to a standard tariff (69 ¢/a + 19 ¢ per kWh consumed) considering three types of consumer responses:
 - Unchanged consumption
 - Reduction of consumption by 10%
 - Increased consumption by 10%

Tariff design



Cost effects



MANDATORY OR OPTIONAL TARIFF STRUCTURE

In a liberalized market the implementation of efficiency tariffs faces following barriers:

- *Consumer*: incentive to switch tariff or even provider, when prices increase (exit option)
- *Electricity Provider*:
 - Fear of revenue losses - due to the exit option of customers
 - Accounting rules concerning residential consumers in Germany: *standard load profile (SLP)*:
 - SLP is used for approximating customer's electricity consumption, i.e. the consumption pattern is fixed
 - providers cannot adapt their electricity procurement to reflect "induced" savings of their customers due to this standardized procedure (SLP) , that means:
 - Providers have no advantages in procurement to pass on to customers
 - the lack of "smart" metering infrastructure to "individualize" consumption pattern prevents from developing attractive efficiency tariff options
 - *background*: comprehensive roll out of advanced metering infrastructure was defined by the German legislator as the instrument necessary to design intelligent/dynamic tariffs - but: market approach is inadequate to diffuse this technology (measurement economically inefficient compared with SLP-customers consumption)



In a liberalized market with the consumer's freedom to choose providers and tariffs there are rarely economic incentives to offer a progressive tariff. The predicted saving potentials of progressive tariffs can only be tapped when the tariff structure is mandatory.

LESSONS FROM OTHER COUNTRIES

- Only very few experiences in developed countries ([California](#), [Italy \[focus here\]](#), [Japan](#))
 - History: Italy and California adopted this instrument already in the 1970s as a consequences of the oil crisis to reduce demand and for social reasons
 - Today: **Progressive tariff structure is mandatory** (no exit option):
 - for all households irrespective of the provider in Italy
 - only for customers of the big utilities (IOU) in California (77 % of all households): BUT no freedom to choose the provider (due to utility service territories) = no liberalized market / no competition for customers among utilities!
- Italy has managed to transform the tariff design to make it compatible with conditions of a liberalized market
 - Mandatory progression only in those components of the electricity price which are not subject to competition:
 - **Network charges (4 tiers)** (all households pay uniform networks charges per tier, provider has to transfer it to a equalization fund [*cassa conguaglio*], grid operators get paid for grid operations according to their real costs from this fund)
 - **electricity tax (2 tiers)**

AN OPTION FOR GERMANY?

Task:

Analysis of the political, legal and technical feasibility of those features of a progressive tariff design which make it operate and which are compatible with the conditions of liberalized markets (policy transfer analysis):

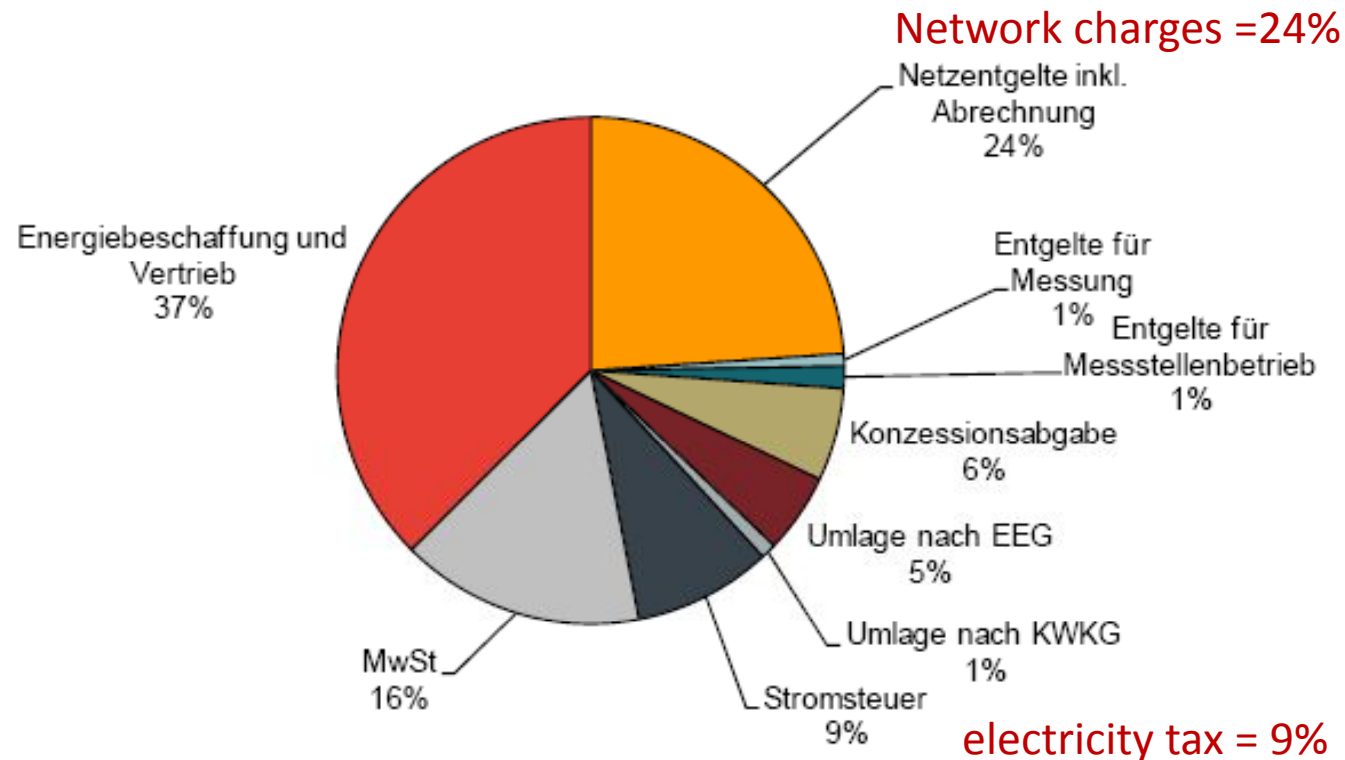
- Legally binding character?
- Progression in electricity tax?
- Progression in network charges?

LEGALLY BINDING CHARACTER?

1. German law does not prescribe any legally binding tariff structure
 - According to *Energy Industry Act* (Energiewirtschaftsgesetz §40(3)/now 5): **Suppliers have to offer a tariff which provides incentives for a control or for a reduction of energy consumption as far as economically justifiable and technically possible** (to realize efficiency gains both on the supply side (time/load-variable tariffs- explicitly mentioned in EnWG)) and on the demand side (e.g. progressive tariffs).
 - not every tariff offered by a supplier must fulfill these criteria (only additionally required).
 - supplier have a high degree of freedom to design tariffs (due to the only vague defined policy goals)
2. Politically there is a rather broad consensus among parties *against state interventions* in electricity pricing (strong market paradigm of the German liberalization process)
 - efficiency tariffs for consumers are broadly welcomed by CDU/CSU/FDP and SPD but *only as additional* tariff options
 - The Greens are in favor of efficiency tariffs but vague regarding the binding or non-binding character of a tariff *structure*
 - The left wing party /**Die Linke** favors state interventions in tariff design for social reasons

OPTIONS FOR GERMANY: PROGRESSIVE ELECTRICITY TAX AND PROGRESSIVE NETWORK CHARGES?

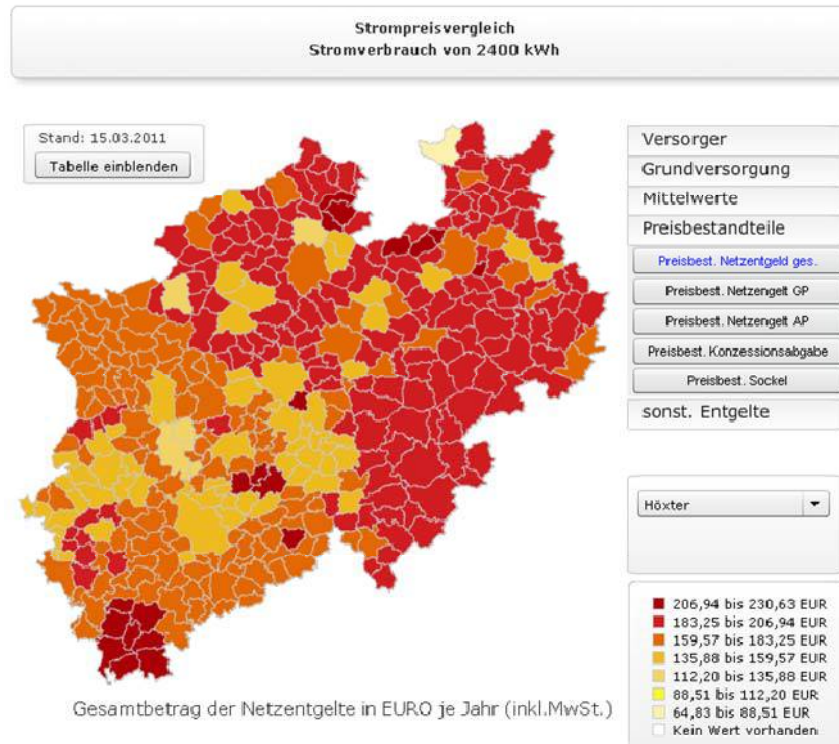
Components of the electricity price in 2009 for a German average household (3500kWh/a)



Source: Frontier/EWI 2010 nach BNetzA Monitoringbericht 2009

PROGRESSION IN NETWORK CHARGES IN GERMANY?

Example: regional variety of network charges in NRW



Source: VZ NRW, Energiepreisatlas: <http://www.vz-nrw.de/UNI130095846522730/energiepreisatlas>

- Network charges and structure of network actors differ considerably from the Italian model
 - High number actors operating the grids (4 transmission grid operators, more than 800 distribution grid operators (compare: 1/134 in Italy), which all charge according to their costs
 - No uniform network charges for consumers - instead significant regional differences
- Optimal starting condition to integrate progression would be uniform charges for customers:

Challenges are:

- Uniform charges for customer are not compatible with current regulations
- transaction costs and administrative costs of a redistribution of funds according to the costs of network operations would be much higher than in Italy (number of actors)
- Inner logic of "revenue cap regulation": regulator wants the *operator* to be cost efficient with the aim to reduce network charges. Progressive network charges aim at setting signal to the *consumer* to reduce consumption (different goals and logics of intervention)

- ▶ **Fundamental shift in regulation would be necessary to integrate a progression in network charges**

CONCLUSION AND OUTLOOK I

Limited feasibility of progressive tariffs

- Adoption of a progressive tariff structure would require far reaching and complex adjustments of the regulatory framework (e.g. tariff structure, network charges, accounting rules for electricity procurement; provision of smart meters, billing rules for residential consumers). Additionally, the legal framework of social transfers for low income households must be adjusted - due to an increased burden on low income households.
- These adjustments would imply corrections or even alteration of the demand orientated and market approach in the design of policy measures addressing electricity efficiency targets
- There is no political consensus concerning these corrections

But increasing pressure for efficiency measures

- The transformation of the electricity system does not only require grid extension (core of the discussion in Germany) , but
 - as the need for grid extension is determined by the demand for electricity -



- **strategies and measures to reduce the demand for electricity must become an explicit focus of the policy to transform the energy system in Germany.**

Ideas circulating and offering opportunities to integrate elements of progressive tariffs

Demand for changes in the regulation of network charges calculation:

- Demand for uniform network charges to prevent from competition distortions (initiative of some Bundesländer-Dezember 2010/Bundesrat- June 2011)
- Integration of efficiency factors in the revenue cap regulation (network charges)

Strengthening the role of distribution network operators as key efficiency actors:

- *Background:* Distribution network operators are the technical and organizational interface between customer and supply side (renewable energy producers, electricity provider) and there is a *stable* relationship between electricity users and distribution network operators (customer cannot change operator)
- *Proposal:* to run standardized efficiency programs (e.g. conversion of electric heating/hot water; bonus schemes for high efficient appliances) at this local level, which *are financed by a levy on low-voltage network charges*

Assumption concerning acceptance of higher/ progressively higher network charges:

- Earmarked network fees for efficiency measures in households can be assumed to be more acceptable - especially against the background of the broad consensus for the phase out of nuclear energy - compared with an unspecified increase of electricity prices
- Communication strategy and transparency efforts are necessary as flanking measures

THANK YOU FOR YOUR ATTENTION!

The study is online available:

Tews, Kerstin (2011): Stromeffizienztarife für Verbraucher in Deutschland? Vom Sinn, der Machbarkeit und den Alternativen einer progressiven Tarifsteuerung. Berlin.

Download:

[http://edocs.fu-berlin.de/docs/servlets/MCRFileNodeServlet/FUDOCS_derivate_00000001666/Tews FFU Report 05_2011.pdf](http://edocs.fu-berlin.de/docs/servlets/MCRFileNodeServlet/FUDOCS_derivate_00000001666/Tews_FFU_Report_05_2011.pdf)

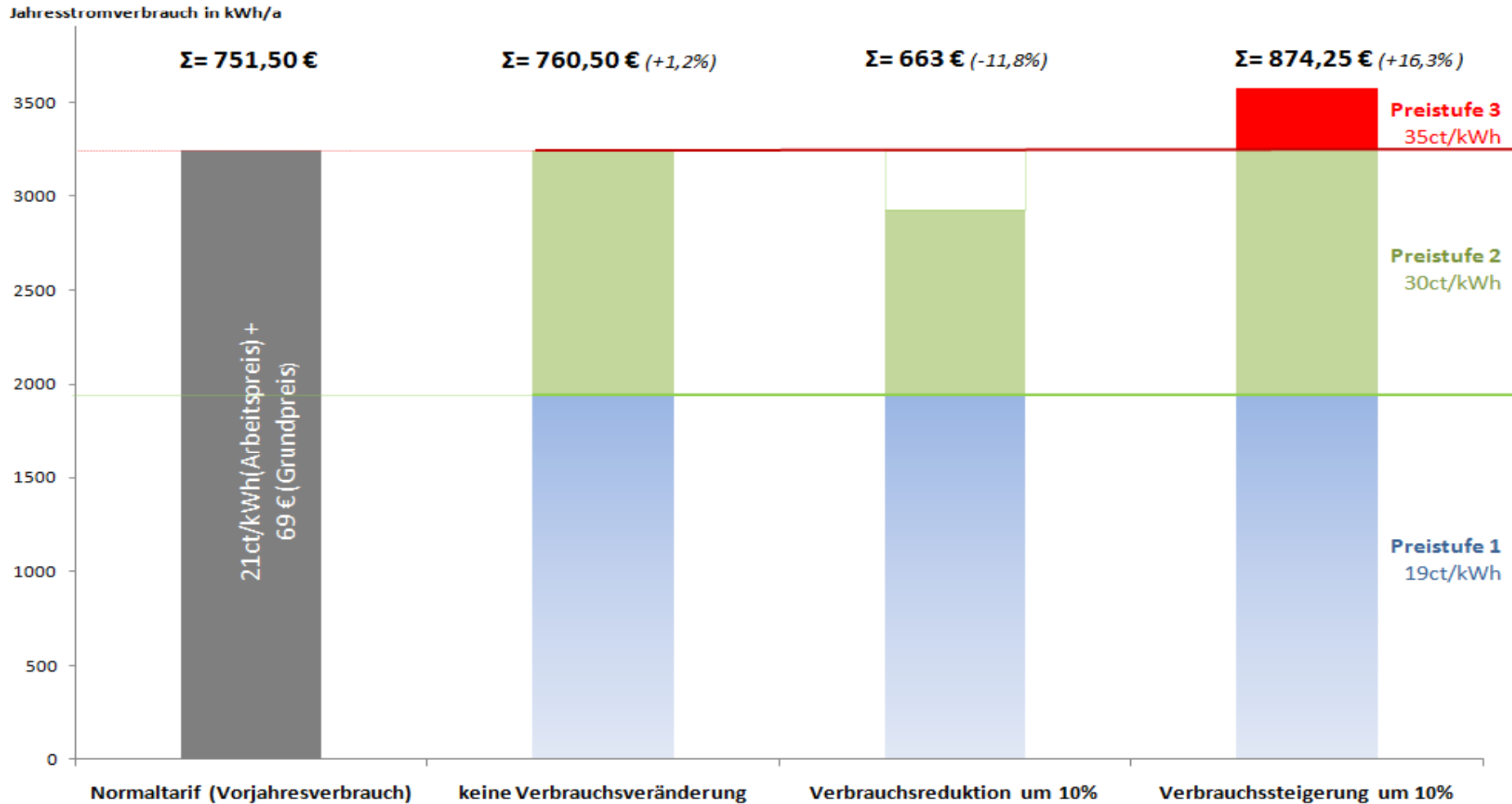
KOSTENEFFEKTE EINES PROGRESSIVEN TARIFS AM BEISPIEL EINES TYPISCHEN 2-PERSONENHAUSHALTES (3250 kWh/a)

Fiktive Annahmen:

Stufe 1: bis 60% des Durchschnittsverbrauchs

Stufe 2: > 60%–100% des Durchschnittsverbrauchs

Stufe 3: > 100% des Durchschnittsverbrauchs



ITALY: PROGRESSION FOR CONTRACTS WITH LOAD LIMIT <3KW)

Tabelle 2: Festlegung der Stromkosten nach Preisbestandteilen laut AEEG 2011/1.Quartal für Leistungsanschlüsse unter 3KW (D2)

Verbrauchsabhängige Kosten (<3KW)					
Verbrauchsmengen (kWh/a)	Preisbestandteile				
	Energieerzeugung * (€/kWh)	Netzentgelte (€/kWh)	Allgemeine Systemkosten (€/kWh)	Gesamt ohne Steuern (€/kWh)	Stromsteuer (€/kWh)
0-1800	0,08811	0,0043	0,01337	0,10578	0
1801-2640	0,09473	0,0374	0,01932	0,15145	
2641-4440	0,10185	0,0730	0,02735	0,20220	0,023290
> 4441	0,10947	0,1110	0,02735	0,24792	
Verbrauchsunabhängige Kosten (< 3KW)					
Anschlusspreis €/a	8,5376	6,000	-	14,53760	-
Leistungspreis €/KW/a	-	5,134	-	5,13400	-

Quelle: AEEG 2011: <http://www.autorita.energia.it/it/dati/condec.htm>; * gelten nur für den geschützten Markt. Alle Preis ohne Mehrwertsteuer (10%).

ITALY: PROGRESSION FOR CONTRACTS WITHOUT LOAD LIMIT >3KW)

Tabelle 3: Festlegung der Stromkosten nach Preisbestandteilen laut AEEG 2011/1.Quartal für Leistungsanschlüsse über 3KW (D3)

Verbrauchsabhängige Kosten (<3KW)					
Verbrauchsmengen (kWh/a)	Preisbestandteile				
	Energieerzeugung* (€/kWh)	Netzentgelte (€/kWh)	Allgemeine Systemkosten (in €/kWh)	Gesamt ohne Steuern (in €/kWh)	Stromsteuer (€/kWh)
0-1800		0,02180		0,13640	
1801-2640	0,08725	0,03740	0,02735	0,15200	0,0251
2641-4440		0,07300		0,18760	
> 4441		0,11110		0,22570	
Verbrauchsunabhängige Kosten (< 3KW)					
Anschlusspreis €/a	19,26870	22,5073	-	41,77600	-
Leistungspreis €/KW/a	-	14,06510	-	14,06510	-

Quelle: AEEG 2011: <http://www.autorita.energia.it/it/dati/condec.htm>; * gelten nur für den geschützten Markt. Alle Preis ohne Mehrwertsteuer (10%).