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

Presentation prepared for the
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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?

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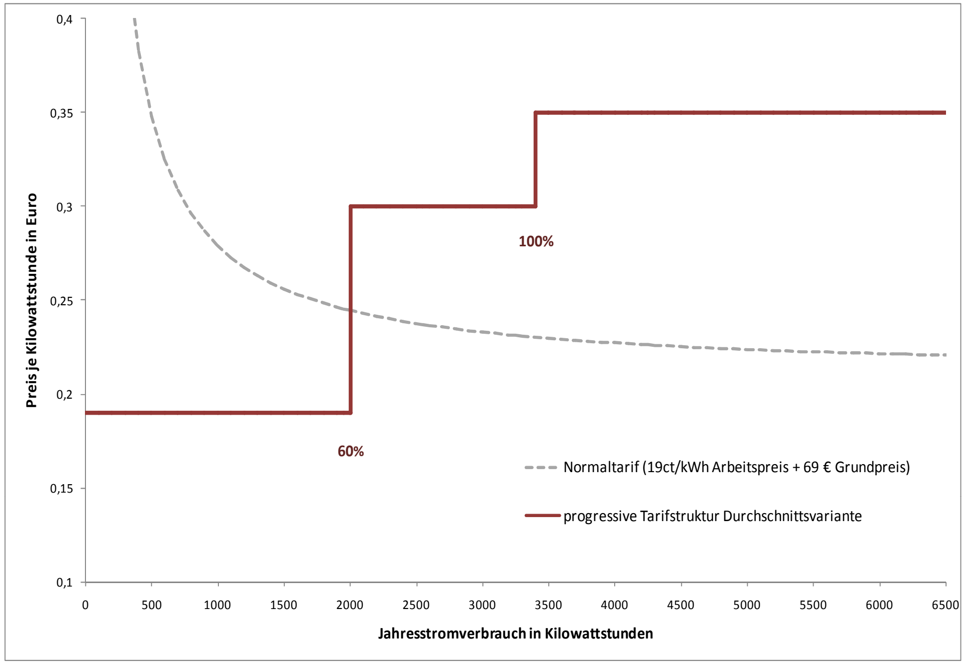
- *Clear* price signals to influence the *demand* for electricity
- Set incentives for private consumers to change consumption pattern or investment decisions by
    - rewarding savings
    - “penalising” higher consumption

    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

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- 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 = „derived demand“) (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 tentants, 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

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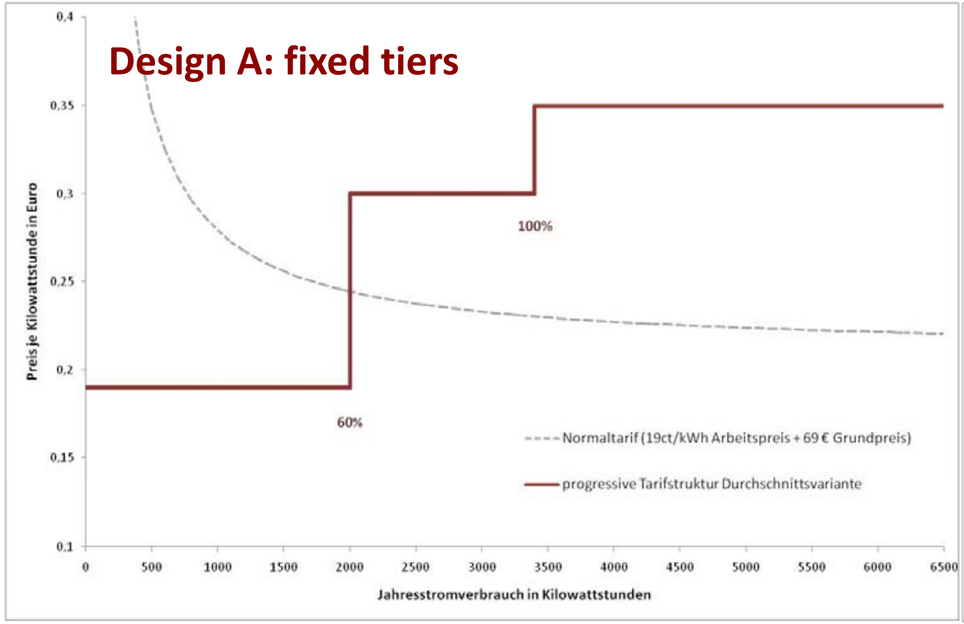
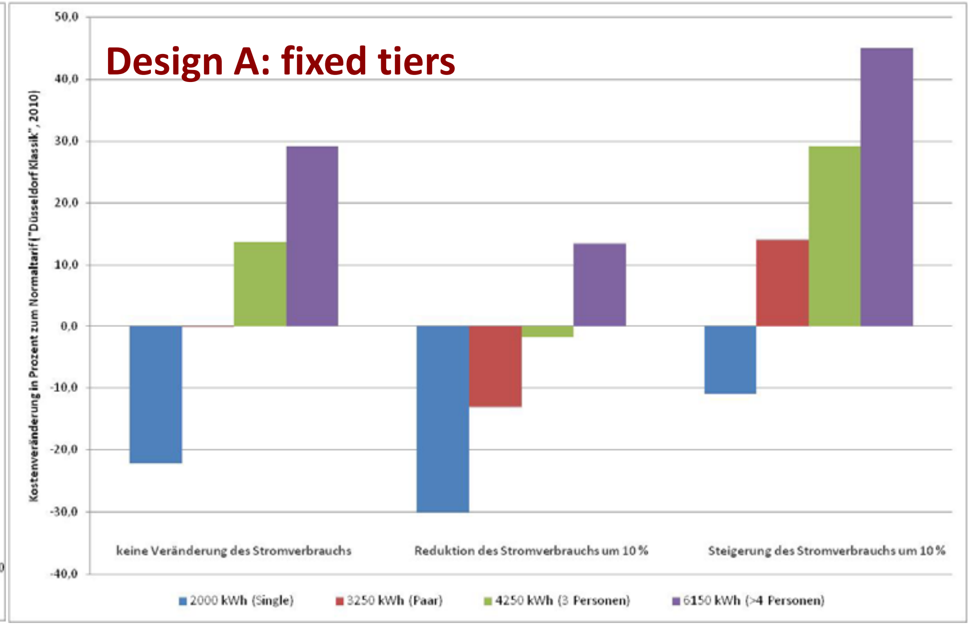
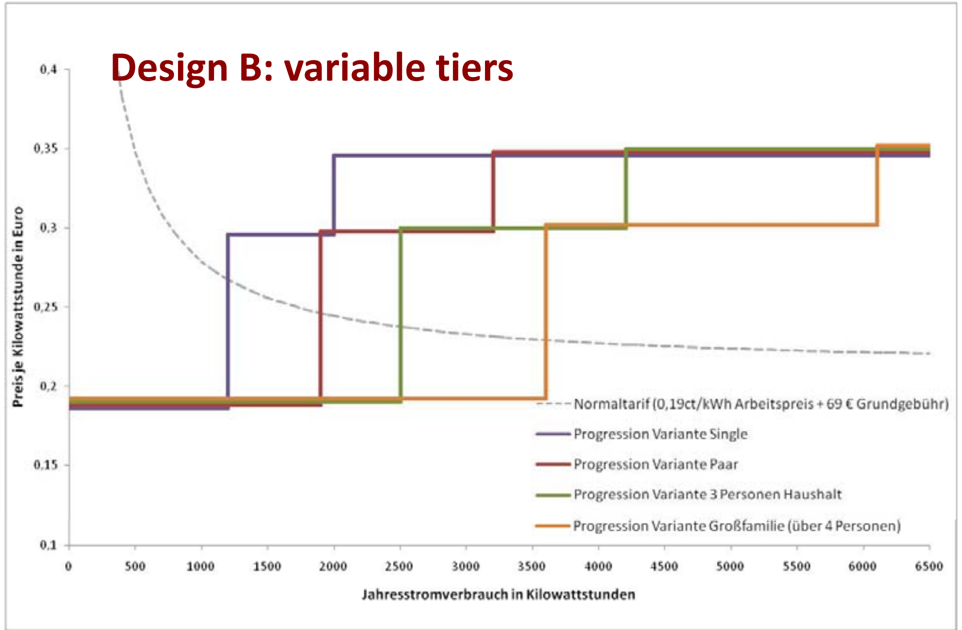
- Two (simple) tariff designs
  - **Design A**: fixed 3-tier model (tiers are defined according to the average consumption in German households (3400 kWh/a)
    - Tier 1: > 60% (of annual average consumption)= 19€ ct/kwh
    - Tier 2: 61-100% = 30 ct/kWh
    - Tier 3: < 100% = 35ct/kWh
  - **Design B**: 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 + 19ct per kWh consumed) considering three types of consumer responses:
    - Unchanged consumption
    - Reduction of consumption by 10%
    - Increased consumption by 10%

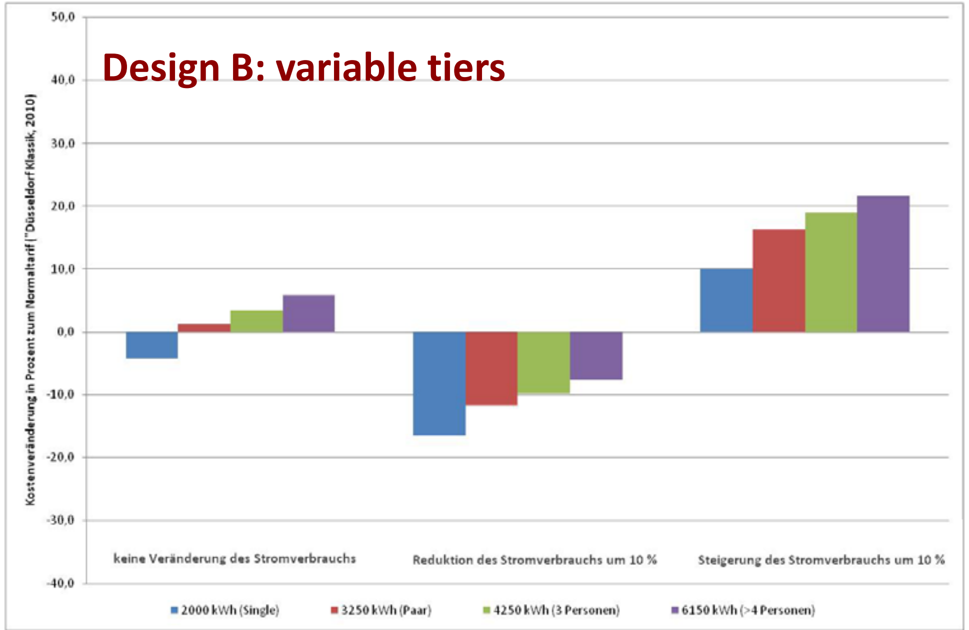
Tariff design



Cost effects







Source: Tews , K. 2011: „Stromeffizienztarife für Verbraucher in Deutschland? Vom Sinn, der Machbarkeit und den Alternativen einer progressiven Tarifsteuerung“. Berlin/ffu

MANDATORY OR OPTIONAL TARIFF STRUCTURE

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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)

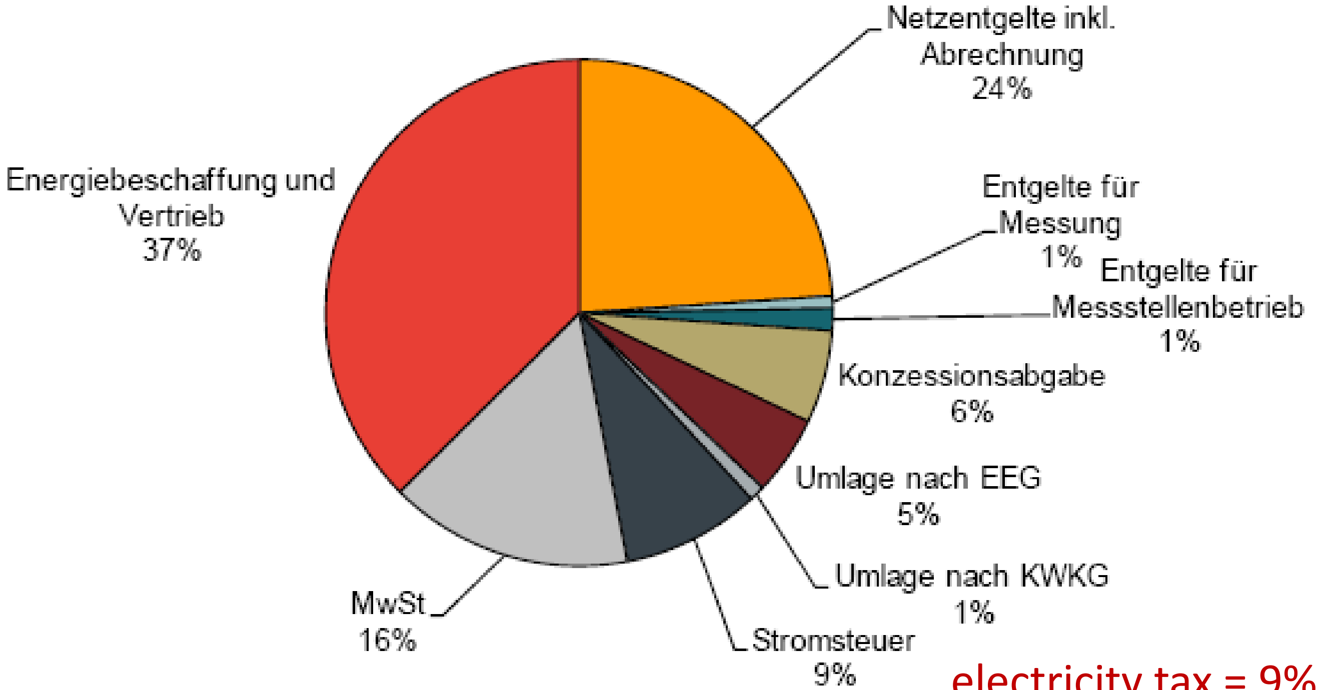
2. Politically there is a rather broad consensus among parties *against state interventions* in electricity pricing (strong market paradigm of the German liberalization process)

   - 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 AX AND PROGRESSIVE NETWORK CHARGES?

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

Network charges =24%



electricity tax = 9%

Source: Frontier/EWI 2010 nach BNetzA Monitoringbericht 2009

PROGRESSION IN NETWORK CHARGES IN GERMANY?

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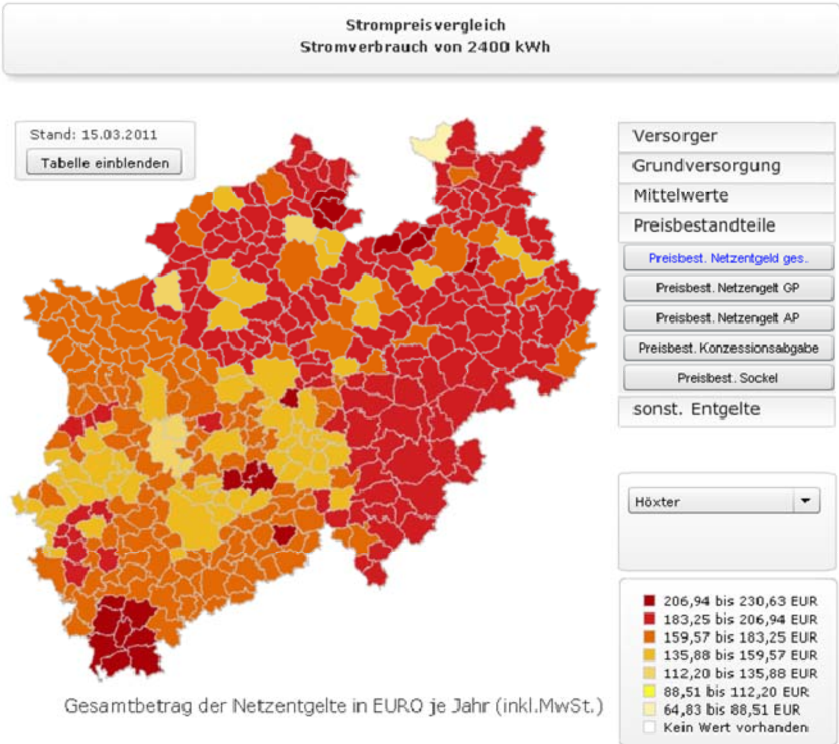
Example: regional variety of network charges in NRW



Source: VZ NRW, Energiepreisatlas: http://www.vz-nrw.de/UNIQ130095846522730/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**.

Conclusion and Outlook II

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_000000001666/Tews_FFU_Report_05_2011.pdf

Kosteneffekte eines progressiven Tarifs am Beispiel eines typischen 2-Personenhaushaltes (3250 kWh/a)

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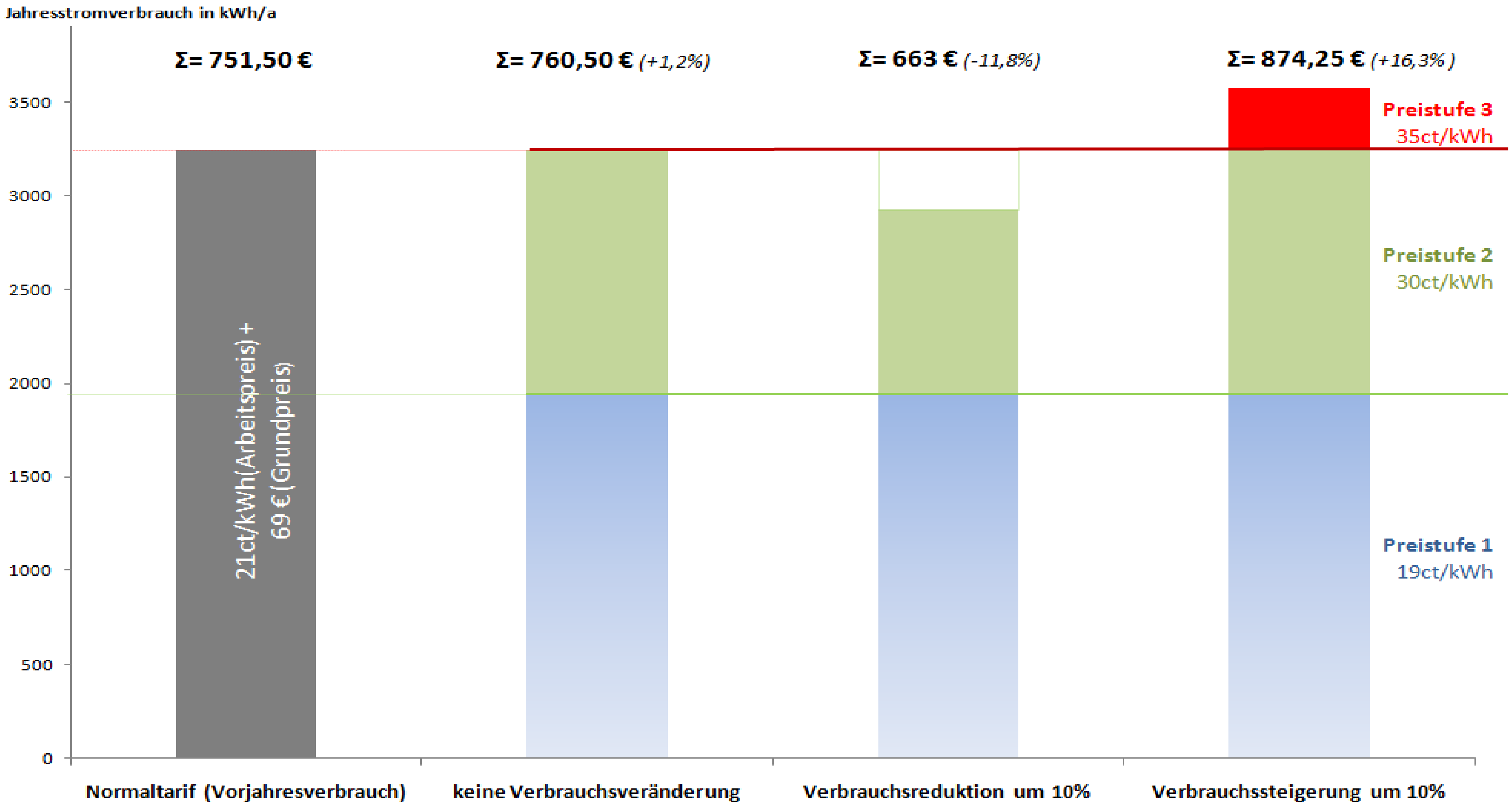
Fiktive Annahmen:

Stufe 1: bis 60% des Durchschnittsverbrauchs
Stufe 2: > 60%-100% des Durchschnittsverbrauchs
Stufe 3: > 100% des Durchschnittsverbrauchs



Quelle: Berechnung und Darstellung aus Tews 2011

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				
	Energie-erzeugung * (€/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	0,023290
2641-4440	0,10185	0,0730	0,02735	0,20220	
> 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)

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

Verbrauchsabhängige Kosten (<3KW)					
Verbrauchsmengen (kWh/a)	Preisbestandteile				
	Energie-erzeugung * (€/kWh)	Netzentgelte (€/kWh)	Allgemeine Systemkosten (in €/kWh)	Gesamt ohne Steuern (in €/kWh)	Stromsteuer (€/kWh)
0-1800	0,08725	0,02180	0,02735	0,13640	0,0251
1801-2640		0,03740		0,15200	
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%).