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

Presentation prepared for the Berlin Seminar on Energy and Climate Policy, 6th October 2011
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
**Instruments 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

*Example: declining vs. progressive tariff structure*

<table>
<thead>
<tr>
<th>Jahresstromverbrauch in Kilowattstunden</th>
<th>Prozent-KWh Leerlauf in Euro</th>
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<tr>
<td>0</td>
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<tr>
<td>500</td>
<td>0.25</td>
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<tr>
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- *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 = *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: ~ 6000 kWh/a; Germany: ~3400 kWh/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 ct/kWh
    - Tier 2: 61-100% = 30 ct/kWh
    - Tier 3: < 100% = 35 ct/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

**Design A: fixed tiers**

Cost effects

**Design A: fixed tiers**

- Design A: fixed tiers
- Design B: variable tiers
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 consequence 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

*Environmental Policy Research Centre, Dr. Kerstin Tews*
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?

Example: regional variety of network charges in NRW

- 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

Source: VZ NRW, Energiepreisatlas: [http://www.vz-nrw.de/UNIQ130095846522730/energiepreisatlas](http://www.vz-nrw.de/UNIQ130095846522730/energiepreisatlas)
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:


Download:

KOSTENEFFEKTEN EINES PROGRESSIVEN TARIFFS AM BEISPIEL EINES TYPISCHEN 2-PERSÖNENHAUSHALTES (3250 kWh/a)

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

Jahresstromverbrauch: in kWh/a

Σ = 751,50 €
Σ = 760,50 € (+1,2%)
Σ = 663 € (-11,8%)
Σ = 874,25 € (+16,3%)

Preistufe 1: 19 ct/kWh
Preistufe 2: 30 ct/kWh
Preistufe 3: 35 ct/kWh

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)

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<tr>
<th>Verbrauchsmengen (kWh/a)</th>
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<tr>
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<td>Energieerzeugung *(€/kWh)</td>
<td>Netzgelte (€/kWh)</td>
<td>Allgemeine Systemkosten (€/kWh)</td>
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<tr>
<th>Verbrauchsunabhängige Kosten (&lt; 3KW)</th>
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<tr>
<td>Anschlusspreis €/a</td>
</tr>
<tr>
<td>Leistungspreis €/KW/a</td>
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</table>

Quelle: AEEG 2011: [http://www.autorita.energia.it/it/dati/condec.htm](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)

| Verbrauchsmengen (kWh/a) | Preisbestandteile |  |  |  |
|--------------------------|-------------------|-----------------|-----------------|-----------------|-----------------|
|                          | Energieerzeugung *(€/kWh) | Netzentgelte *(€/kWh) | Allgemeine Systemkosten *(in €/kWh) | Gesamt ohne Steuern *(in €/kWh) | Stromsteuer *(€/kWh) |
| 0-1800                   | 0,02180           | 0,03740         | 0,02735         | 0,13640          | 0,0251          |
| 1801-2640                | 0,08725           | 0,07300         | 0,02735         | 0,15200          | 0,0251          |
| 2641-4440                | 0,11110           | 0,07300         | 0,18760         | 0,22570          |                 |
| > 4441                   |                   |                 |                 |                 |                 |

<table>
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<tr>
<th>Verbrauchsunabhängige Kosten (&lt;3KW)</th>
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<tbody>
<tr>
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<td>Leistungspreis €/KW/a</td>
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Quelle: AEEG 2011: http://www.autorita.energia.it/it/dati/condec.htm; * gelten nur für den geschützten Markt. Alle Preise ohne Mehrwertsteuer (10%).