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Basic criteria for designing energy tariffs

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Regulatory principles
The three main ones

- Sustainability
  - Guarantee of recovery of all regulated costs so that the electrical power sector is economically viable
- Economic efficiency
  - Tariffs must sent economic signals that promote efficient operation & investment
    - Use marginal costs / prices whenever possible
  - Costs should be assigned to those who are responsible for them
    - Criterion of cost causality
- Additivity
  - Tariffs must collect explicitly every concept of cost
  - Each cost should be recovered through a regulated and differentiated component...

  ... so the tariffs result from the sum of them, avoiding cross-subsidies between activities

Regulatory principles
Other

- Transparency
  - All criteria & procedures employed in the methodology have to be made public
- Stability
  - In the adopted methodology, so that the concerned agents have the least possible regulatory uncertainty
- Simplicity
  - In the methodology & its implementation, as far as possible
- Coherence
  - Consistency with the specific regulatory process of each country
- Objectivity
  - The methodology has to be based on objective variables and criteria, not subject to arbitrariness, stable throughout the regulatory period

Regulatory principles
Hints for pragmatic solutions

- Adopt tariffs with different components, so that it is possible to send several simultaneous signals:
  - Short-term energy signals
    - As close as possible to real-time, meant to promote efficient system operation)
      - The marginal cost of energy (€/kWh)
    - Time-dependent tariffs (since the cost of the system depends on the considered time)
  - Long-term signals
    - Meant to promote efficient investments & to recover total costs of the activity
      - A fixed term (€) &/or a capacity component (€/kW)
  - Locational signals
    - Geographically differentiated tariffs

Structure
Electricity example: cost components

	Spain in 2000 ***Items***	*Share of total cost*
	Production and related costs	**62,00%**
	Production under ordinary system and imports	40,00%
	Production under special system	14,00%
	Capacity payments	6,50%
	Ancillary services	1,50%
	Transmission	**4,50%**
	Distribution	**20,50%**
	Retailing	**2,00%**
Regulatory charges	**Permanent costs**	**6,50%**
	System Operator, Market Operator, CNE	0,20%
	Stranded costs (CTCs)	3,50%
	Incentives to indigenous coal	2,00%
	Subsidies to extra-peninsular system	1,00%
	Diversification & security of supply	**4,50%**
	Nuclear moratorium	3,50%
	Nuclear fuel cycle	1,00%
	Other	0,15%
	Total	**100,00%**

Structure
Access and retail tariffs

- If the model allows for liberalized retailers, tariffs have to be necessarily decomposed in two components
  - Access tariffs (common to every customer)
    - Transmission and distribution network charges
      - Including distributor retail costs
    - Other regulatory charges that apply to all consumers, (examples):
      - Institutions (Market Operator, System Operator, Commission, etc.)
      - Incentives to promote cogeneration and renewables
      - Domestic coal support, nuclear moratorium & other nuclear costs
      - Compensations to isolated territories
      - Stranded costs: competition transition charges

Structure
Access and retail tariffs (ii)

- If the model allows for liberalized retailers, tariffs have to be necessarily decomposed in two components (ii)
  - Retail tariffs (Last-resort tariffs?)
    - Energy costs
      - Energy
      - Ancillary services costs
      - Extra costs due to technical constraints
      - Capacity charge (long term guarantee of supply)
    - Retail service costs (commercialization charges)

Structure
Electricity example

		Winter			Summer		
		Peak	Intermediate	OFF-peak	Peak	Intermediate	Off-peak
LV <1kV	1 tz.	€/kW €/kWh €/customer					
	2 tz.	€/kW €/kWh €/customer			€/kW €/kWh €/customer		
	3 tz.	€/kW €/kWh €/customer		€/kW €/kWh €/customer		€/kW €/kWh €/customer	
MV >1kV y <33kV	3 tz.	€/kW €/kWh €/customer		€/kW €/kWh €/customer		€/kW €/kWh €/custom	
	6 tz.	€/kW €/kWh €/customer	€/kW €/kWh €/customer	€/kW €/kWh €/customer	€/kW €/kWh €/customer	€/kW €/kWh €/customer	€/kW €/kWh €/customer
HV >33kV y <72kV	6 tz.	€/kW €/kWh €/customer	€/kW €/kWh €/customer	€/kW €/kWh €/customer	€/kW €/kWh €/customer	€/kW €/kWh €/customer	€/kW €/kWh €/customer
VHV >72kV y <220kV	6 tz.	€/kW €/kWh €/customer	€/kW €/kWh €/customer	€/kW €/kWh €/customer	€/kW €/kWh €/customer	€/kW €/kWh €/customer	€/kW €/kWh €/customer

A conceptual model for tariff design
The basic procedure

- Step 1. Specify the tariff structure & characterize the consumer types
  - Voltage levels, time zones (seasons / time-of-day), fixed, capacity &/or energy charges, consumer types, etc.
- Step 2. Assign each one of the considered costs
  - to each time zone that has been adopted in the tariffs' structure
    - Ideally each hour of the year
  - or per consumer annual charge (commercialization charge)
  - or just once (network connection charge)
  - or as percentages of the final tariff (a variety of regulatory charges)
- Step 3. Compute each one of the tariffs by aggregation
  - Per unit charges for each consumer type are determined by adding the fixed, energy & capacity components separately for each component of the total cost & each time zone

Methodology to allocate network charges
Capacity and energy charge

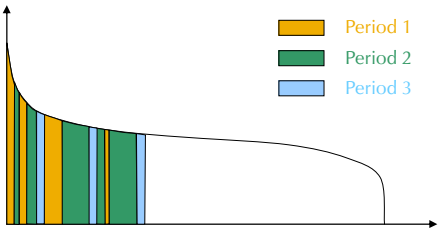
- Based on a Network Reference Model to estimate the proper allocation of the cost of the networks at each voltage level, i
- Step 1: Design the optimal network considering just expected peak consumption
  - Calculate the corresponding cost of this theoretical network, $Cref_i^D$
- Step 2: Design the optimal network considering both expected peak consumption and energy consumption (plus losses and quality of service)
  - Calculate the new (and larger) cost, $Cref_i^{D+E} \geq Cref_i^D$
- The ratio resulting from these two values determines the proportion of the costs to be allocated according to each charge
  - % Energy Charge: $(Cref_i^{D+E} - Cref_i^D) / Cref_i^{D+E}$
- Once the amount of the network costs to be recovered from the energy and capacity charge, they have to be allocated among consumers

Methodology to allocate network charges
Energy charge

- The cost corresponding to each voltage level is distributed according to the energy flowing at each voltage level
  - These energy values result from the Network Reference Model
- Consumers have to pay for using network of the voltage level at which they are connected and the superior ones

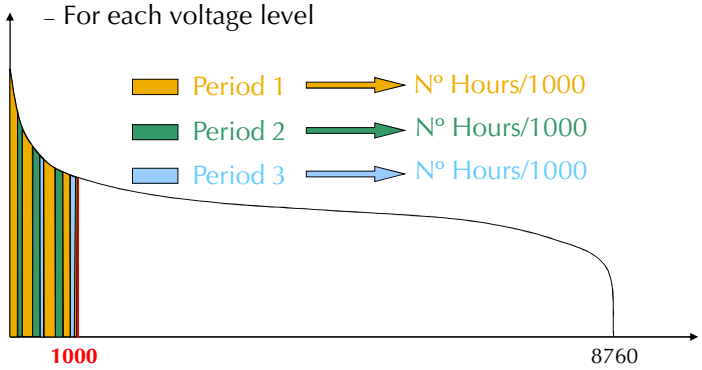
Methodology to allocate network charges
Capacity charge alternatives

- Option 1: According to the system peak consumption
  - Large incentive to reduce consumption at the peak, but…
  - … similar consumers might have different tariffs, tariffs are unpredictable and non cost-reflective
- Option 2: According to the tariff peak period
  - The definition of the tariff periods does not adjust to the load curve, so the contribution of the rest of the periods to the peak



Methodology to allocate network charges
Capacity charge alternatives (ii)

- Option 3: According to the system peak consumption
  - Assigning the capacity charge to the hours of higher demand
    - Calculate which of them pertain to each tariff period
      - Considering 500 or 1000 hours/year
      - For each voltage level



- Consumers have to pay for using network of the voltage level at which they are connected and the superior ones

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