DSO tariffs in Norway

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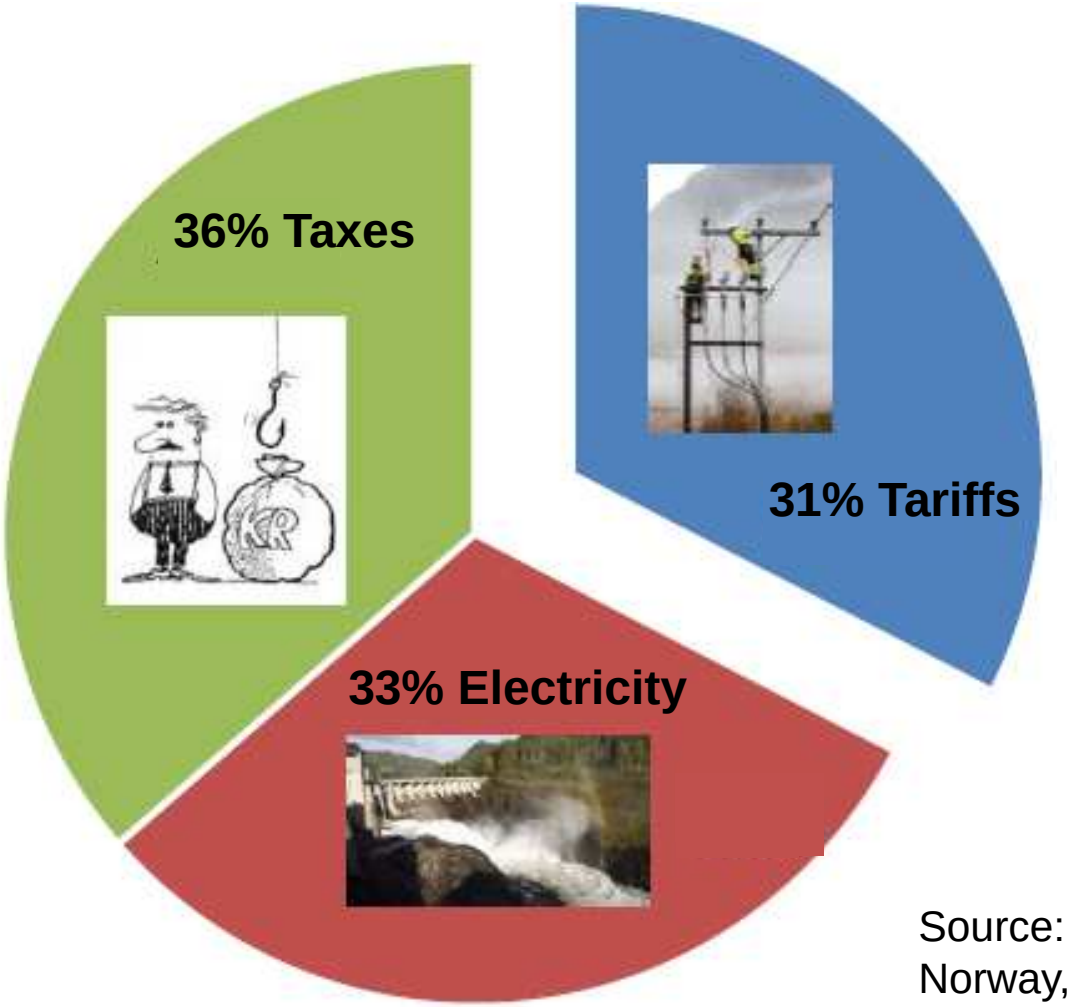
Tariff regulation - Norway

- Tariffs are set by DSOs
  - NVE sets revenue caps
- Tariff Regulation Act
  - Framework for tariffs
- NVE does not approve tariffs
- NVE handles disagreements
- Supervision

Tariff principles

- Point-based – access to the whole grid and power market
- Non-discriminatory
- Efficient utilisation and development of the grid
- Differentiated according to objective and verifiable criteria, based on relevant grid conditions
- Independent of power contracts
- Cover network companies costs within the allowed revenue
- Each household is metered individually

Components of electricity costs, Norwegian households



Source: Statistics Norway, Q2 2016

Distribution tariffs

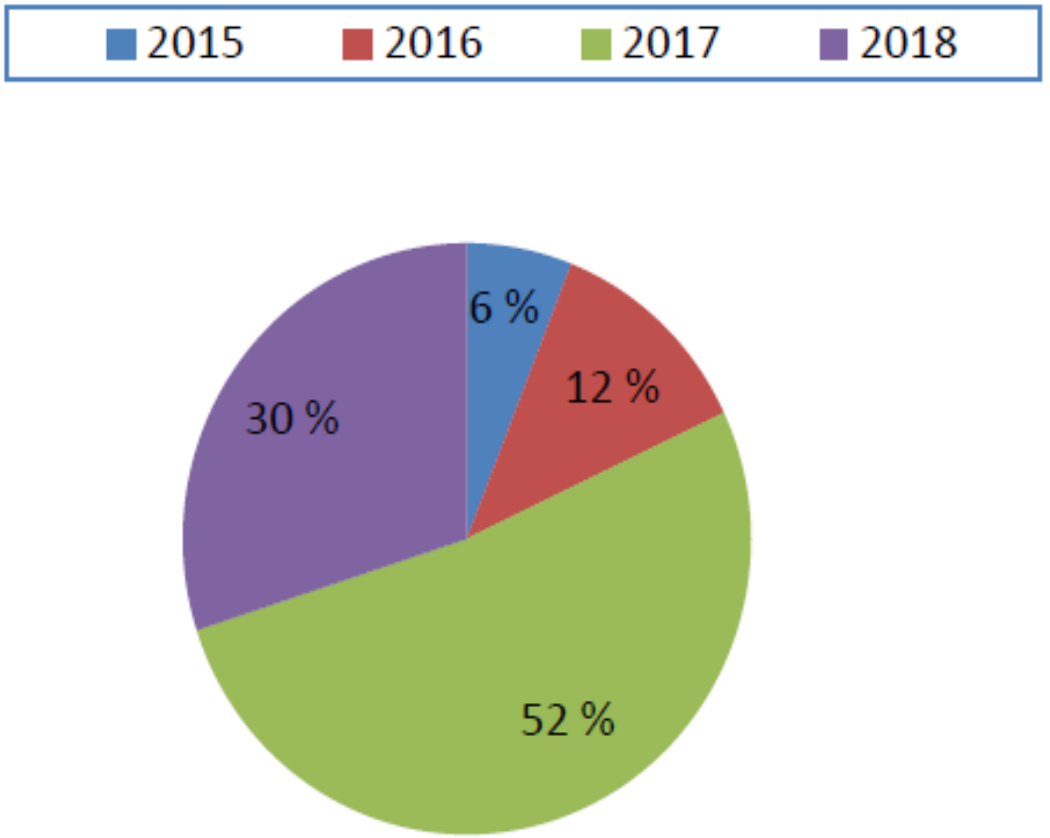
- Minimum
  - Energy charge
  - Fixed charge

- Energy charge (øre/kWh)
  - covers marginal losses as a minimum
  - time differentiation shall be offered
- Fixed charge (NOK/year)
  - covers customer-specific costs as a minimum
- Capacity charge (NOK/kW), normally for customers

> 100 000 kWh/year or > 80 or 125 Ampere

Smart metering (AMS)

- 18% 1.1.2017
- 100% 1.1.2019



Why is tariff design important?

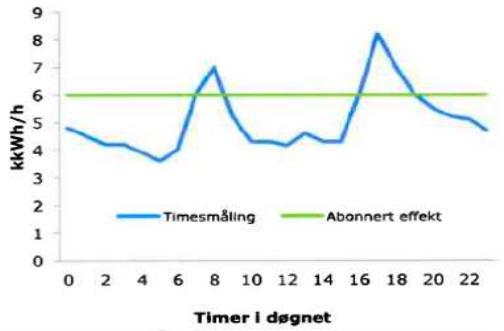
- Price signal – efficient utilisation and development of the grid
- Cost allocation – who should pay and how much?
- New technology, more active consumers

Public consultation on network tariffs

- Customers connected to 22 kV or lower
- More cost-reflective tariffs
  - Energy charge based on marginal loss costs
  - Tariffs should reflect that capacity during peak hours is a cost driver
- Various models for capacity tariffs

Models for capacity tariffs

- Installed capacity
- Subscribed capacity
- Measured capacity usage



- Time of use

Time	Vinter	Sommer
0-1		
1-2		
2-3		
3-4		
4-5		
5-6		
6-7		
7-8		
8-9		
9-10		
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15-16		
16-17		
17-18		
18-19		
19-20		
20-21		
21-22		
22-23		
23-24		

What do consumers want?

- A Norwegian consultancy firm has undertaken interviews with five focus groups

Measured capacity usage – public consultation feedback

- How should settlement be calculated?
  - Customers maximum demand per month?
  - Average of several customer peaks?
  - Different price depending on season/day/night?

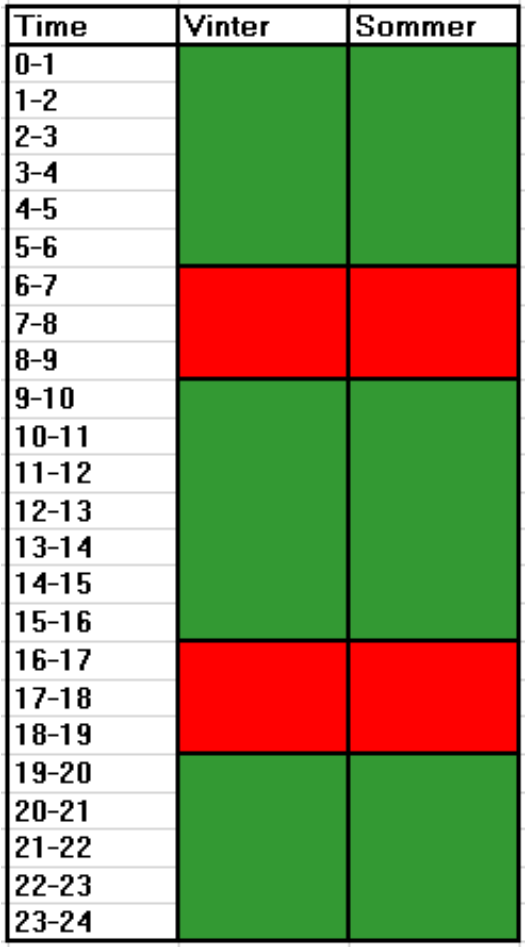
Measured capacity usage – consumer survey feedback

- Complex and upredictable
- Difficult to see implications
- Certain situations may have noticable effects

«Electricity is expensive enough as it is in winter»

Time of use – public consultation feedback

- Simple for customers to relate to
- Attractive - reduces demand for capacity during expensive hours
- Customers make adjustments during off-peak hours



Time of use – consumer survey feedback

- Intuitive and coherent
- The most unfair – punishes inflexibility

«That one was rotten!»

Installed capacity –public consultation feedback

- Indicates how the network is dimensioned
- Not very dynamic
- Predictability cost and revenue for consumer and DSO
- No strong signal to reduce capacity demand

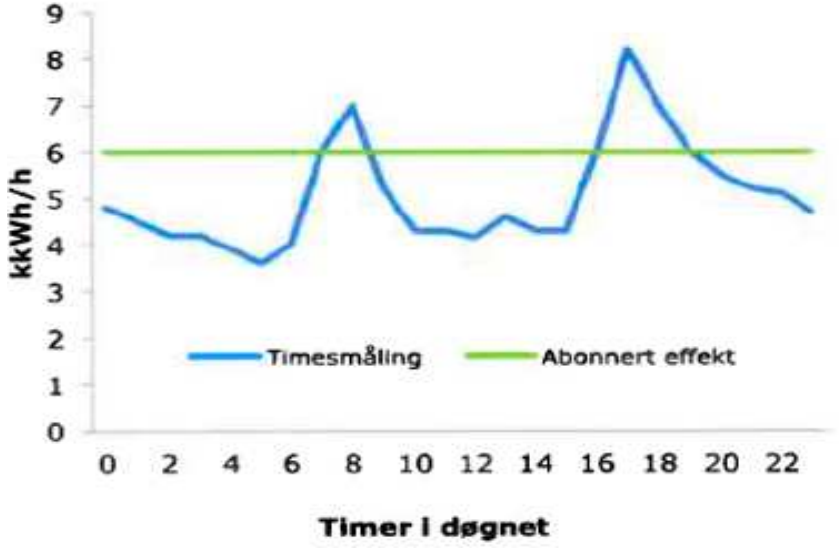
Installed capacity – consumer survey feedback

- Unfamiliar to have to relate to ones own installed capacity
- Lack of and diffuse motivation to adjust behavior
- Disadvantage to change fuse – one must not think that consumers will do that

«People need to dimension for Christmas Eve anyway»

Subscribed capacity – public consultation feedback

- Customers subscribe to a certain amount of grid capacity
- Excess consumption is charged at a higher price
- Strong incentives for behavioural change if subscribed limit is exceeded (regardless of capacity)
- Not preferred in the feedback from the public consultation



Subscribed capacity – consumer survey feedback

- This model is most appealing
- Changing behaviour is motivating
- Easy to see effects of ones own choices

«I want warnings at peak times and when price rises, but also have the freedom to use as much as I want and rather pay for it – when needed!»

Further work

- NVE will prepare for a public consultation on changes to the Regulation Act regarding tariff design in 2017
- Possible changes may be implemented 2020-2021
- English summary of NVE's work on DSO tariffs:

http://publikasjoner.nve.no/rapport/2016/rapport2016_62.pdf