



Support for photovoltaics in Denmark

EUROSAI WGEA Spring Session on Auditing Energy Issues, Tallinn, April 2015





The Danish support scheme

- Photovoltaics = Solar cell panels producing electricity
- Primarily small household photovoltaics (max. 6 kW)
- Introduced in 1999 (time limited)
- Made permanent in 2006
- 3 main components of the support scheme:
 - I. net payment of energy consumption
 - II. Feed in tariff for excess energy production
 - III. Income tax reduction due to depreciation of the investment

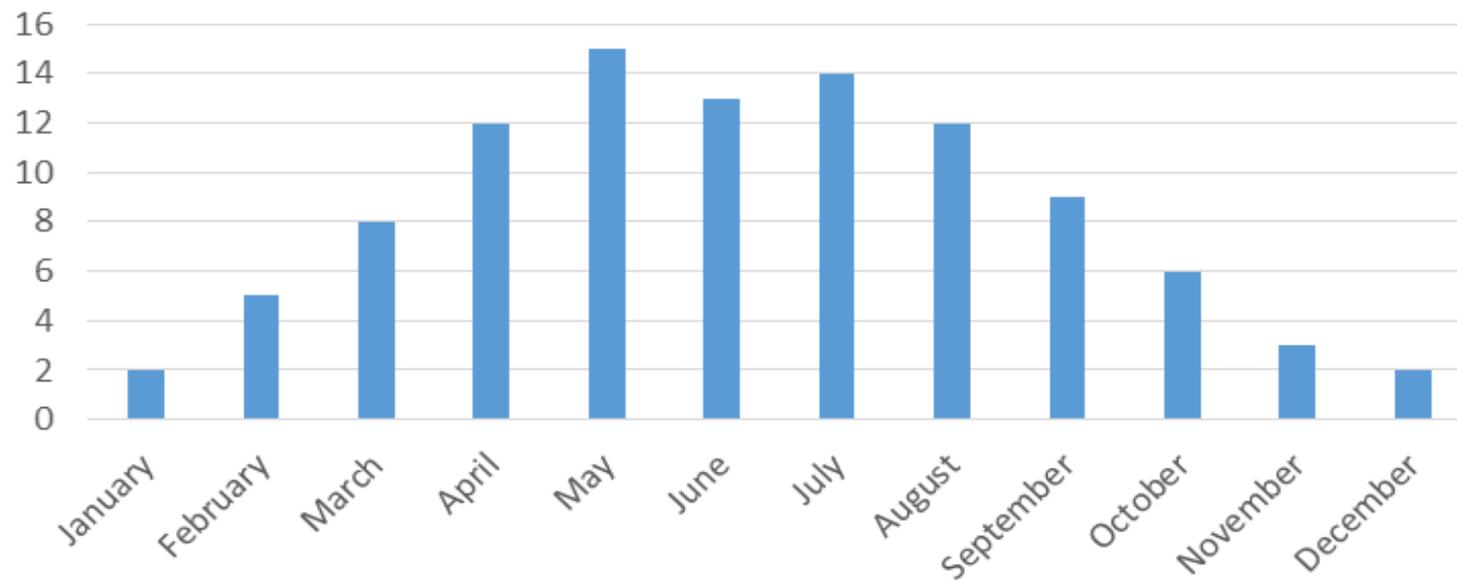


I) Net payment of energy consumption

- The photovoltaics owners should only pay for electricity if the consumption exceeds their production of electricity
- Consumption and production was only balanced once a year
- → "Saving up" electricity produced in the summer for consumption in the winter
- Energy tax-exemption for the consumption of electricity produced by your own photovoltaics

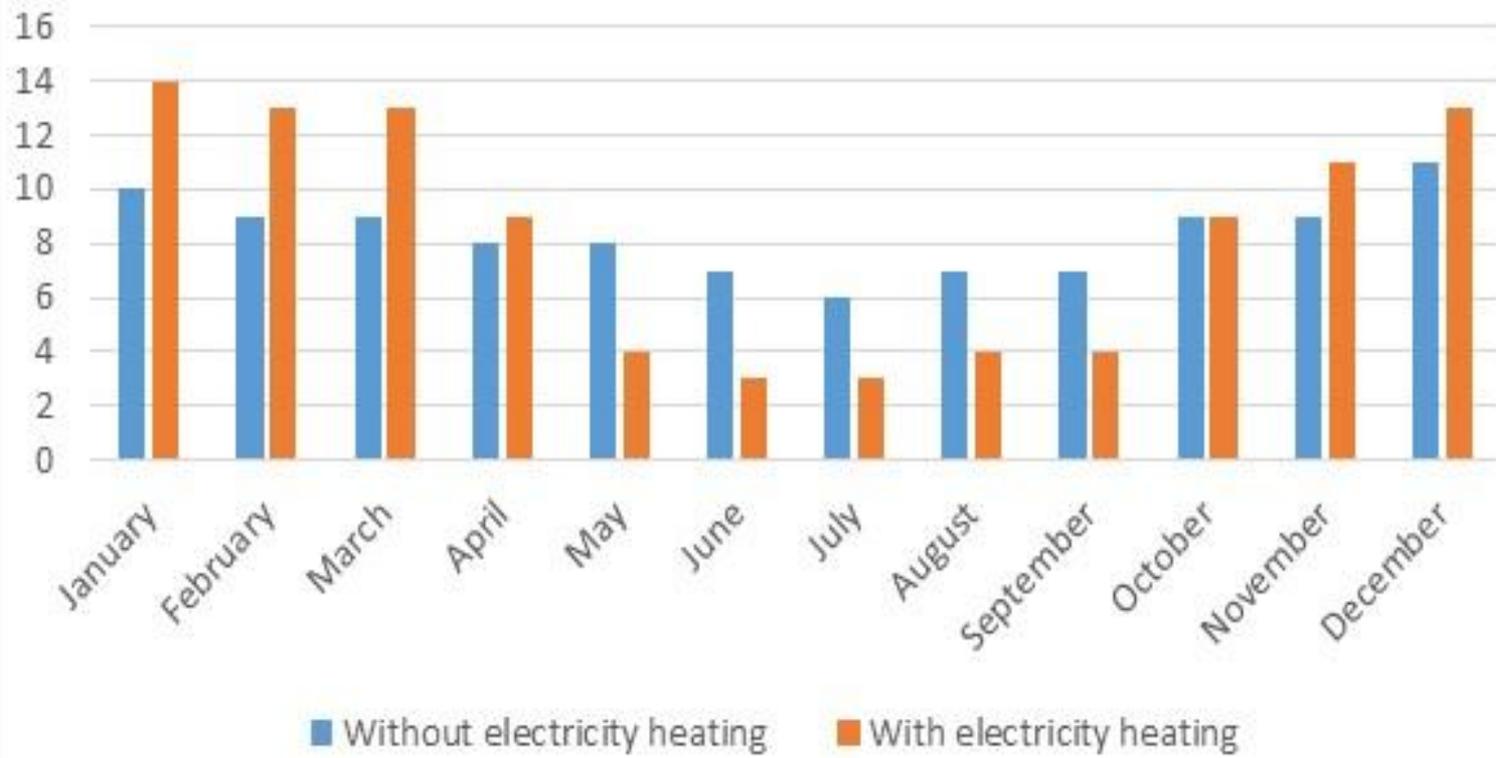


Photovoltaics production in % of the entire year (DK)





Typical electricity consumption in % of the entire year





II) Feed in tariff for excess energy production

- If the production of electricity exceeded the consumption of electricity when balanced once a year the photovoltaics owner were from 2004 offered a feed in tariff (0,08 EURO) which was higher than market price (approx. 0,05 EURO) in 10 year
- Since the production of photovoltaics with a max. capacity of 6 kW (producing typically up to 5.000 – 5.500 kWh) was typically more or less consumed this feed in tariff had only a limited influence on the level of support for photovoltaics



III) Income tax reduction due to depreciation of the investment

- In 2010 private households was given the opportunity to depreciate the investment in photovoltaics according to general legislation for companies
- 25 % depreciation each year
- → e.g. investment 10.000 EURO →
 $10.000 \times 0,25 = 2.500$ EURO depreciation in year 1
 $7.500 \times 0,25 = 1.875$ EURO depreciation in year 2 etc.

Since the private citizen investing in photovoltaics thereby got a high income tax reduction in the first years after the investment the **payback period of investment** was thereby **reduced**



The payback period of investment not yet attractive in 2010

- In 2010 the Ministry estimated the payback period of investment in photovoltaics to 20 – 30 years (not incl. cost for maintenance or reinvestment)
- This was approx. the same as the expected life time of photovoltaics

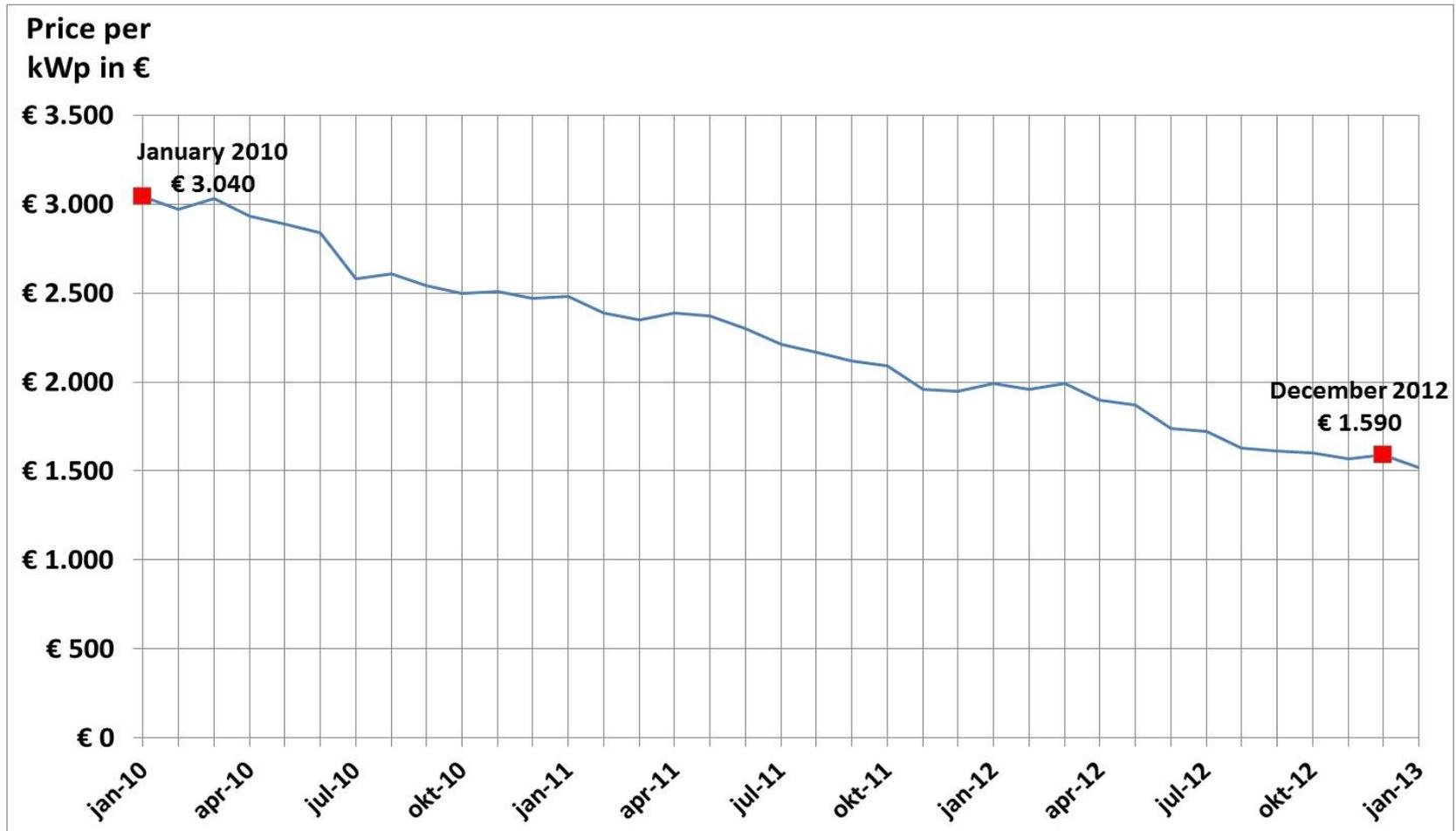


The payback period of investment became attractive in 2012

- High level of public financial support for small household photovoltaics
 - Increasing electricity taxes gave tax exemption on home produced electricity a higher value for photovoltaics owners which increased the support level
 - Legislation in 2012 to promote growth in DK – 115 % depreciation basis → 10.000 EURO investment → $11.500 \times 0,25 = 2.875$ EURO depreciation in year 1 etc.
- Photovoltaics price drop due to:
 - Technological development
 - Economy of scales
 - Competition from China (price dumping)
- → Payback period of investment dropped to 5-7 years

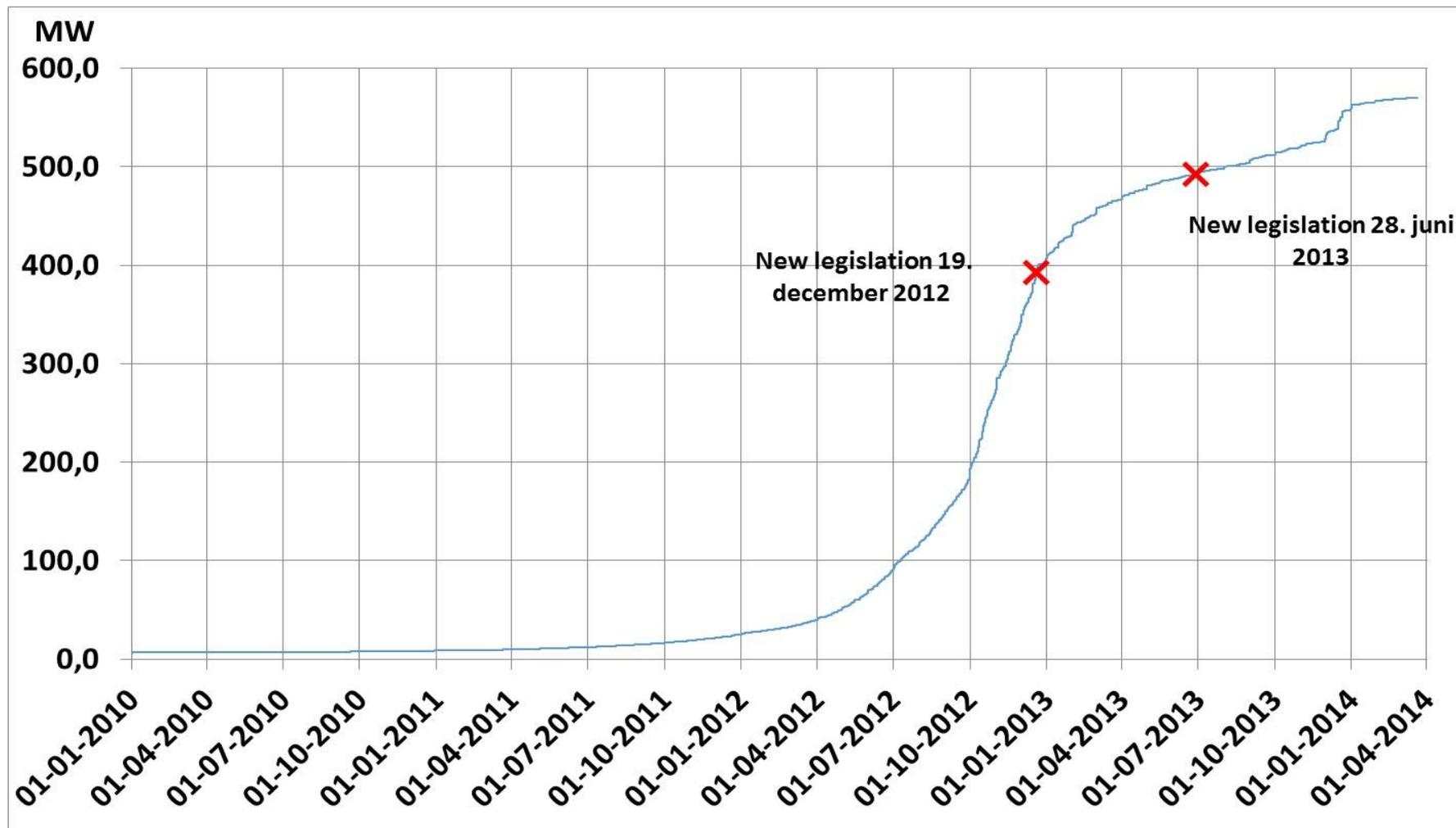


Photovoltaics price drop





Installed photovoltaics capacity in DK







A reduced support level for photovoltaics became necessary in 2012

- The Government decided to amend the legislation concerning support for photovoltaics in mid 2012
- Political agreement and new legislation was adopted at the end of 2012.
- The new legislation reduced the support level
 - Net payment of energy consumption and production on a hourly basis – no longer possible to “save up” electricity for the winter or even for the night
 - The attractive depreciation scheme for private households was abolished
 - To partly compensate the feed in tariff was raised from 0,08 to 0,17 EURO in 10 years for photovoltaics installed in 2013 (0,15 if installed in 2014, 0,14 EURO if installed in 2015 etc.)
 - Target: A Payback period of investment of 10 years



The new legislation opened for larger photovoltaics – for a while

- The new photovoltaics support scheme was targeted at photovoltaics up to 400 kW
- The support scheme was not only available for households but also for companies
- There was a transition scheme according to which existing photovoltaics would continue to be supported at the high support level for 20 years.
- **In practice the max 400 kW could not be enforced.**
 - Risk of large photovoltaics fields leading to large an unexpected governmental spending
- Therefore by mid 2013 a new legislation was adopted
 - Back to max 6 kW and only on roof tops
 - Max 20 MW installed per year



Rigsrevisionen was involved mid 2013

- In the spring of 2013 it was revealed by the press that before the legislation was adopted by the Danish Parliament the Minister/Ministry was aware of the fact that the max 400 kW could not be enforced. However the Parliament was not informed.
- This led to a political remark from the Danish Parliament in May 2013.
- In June 2013 the Danish Public Accounts Committee requested Rigsrevisionen to study the subject.
- Since the Danish parliament had already commented on the 400 kW-problem we did not focus our study on this problem.



The audit questions of our study

- The purpose of the study was to assess:
 - whether the Ministry of Climate, Energy and Building had sufficient focus on the financial implications of the legislation concerning support for photovoltaics,
 - and whether the Minister for Climate, Energy and Building correctly and adequately informed the Danish parliament in this respect.



Our main findings (I)

- The Ministry of Climate, Energy and Building did already in 2011 warn the Government of the risk of an increase in the number of photovoltaics.
- However, at that time the Government would not change the support scheme since the number of photovoltaics had not yet increased rapidly.
- Before the legislation in late 2012 was proposed by the Government and adopted by the Danish Parliament the Ministry did not sufficiently analyse the financial implications of the amendment.
- This goes particularly for the 20-year transition scheme for existing photovoltaics where the Ministry largely underestimated the extent of photovoltaics under this scheme.



Our main findings (II)

- Even when the Ministry had certain knowledge of the fact that their estimate was too low they did not increase it.
- Moreover the Danish Parliament was not adequately informed of the financial implications of the amendment.
 - Neither the fact that the Ministry underestimated the extent of photovoltaics on the transition scheme,
 - nor the total financial implications of the estimated photovoltaics on the transition scheme in the period 2012-2032.



Lessons learned

- We must show particular attention when support schemes for e.g. renewable energy have no limitation in extent or time – this is also called **open-ended spending**.
- Such support schemes must be monitored very carefully since for example technological development or economy of scales can rapidly make an existing support scheme very attractive and lead to large and unexpected governmental spending.
- The Danish case is not the only one. We find the similar in Italy, Spain, Germany and the Czech Republic. Here the payback period of investment became attractive earlier than in Denmark which led to a reduced level of support. However the Danish Government did not timely react in order to prevent the large and unexpected spending.