Photovoltaic Bubble in the Czech Republic

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Abstract

From the year 2002, the Czech Republic instituted the policy of feed-in tariffs for electricity generated in so called renewable energy sources (RES). From 2006 tariffs for electricity generated by photovoltaic panels (PV) are exceeding production costs substantially which together with guaranteed level of this price and built-in mechanism of its rising for next 20 years started unprecedented increase of PV sources in the Czech Republic. At the end of 2009 there were PV power plants with installed capacity of approx. 410 MW in operation in comparison of approx. 60 MW a year earlier. Several thousand of applications were already submitted and even approved by the Czech distribution and transmission companies. See the price and costs development, and rise of installed capacity in Fig. 1. This kind of a bubble in PV industry generated a heated response from distribution and transmission operators as well as some politicians bringing up several legislative initiatives to stop it.

I estimate total costs for the period from 2010 to 2030 of mere existence of PV sources in the Czech electricity network taking into account current regulatory situation, applicable rules for price development in this highly regulated part of the electricity market. There are four kind of costs that can be estimated and several types that are highly speculative. I do take into account only those costs that can be reliably estimated. Those are: direct costs of feed-in tariff electricity procurement, costs of new ancillary services needed by the fact of existence of unreliable and erratic power generators in electricity network, costs of forced investments and costs of additional regulatory power needed.

From these costs the value of the electricity generated by PV sources. The value of electricity generated by PV is not known to markets but there is a way to estimate the upper bound of such a value from the existence of the Green bonus regulatory arrangement.

I do these estimates of costs induced on others for PV sources and wind energy sources as well since they are common in nature and by treating them together the electricity system operators lower the overall amount of these costs. By using market value estimates for the value of electricity generated by PV and Wind producers I incorporate into this value the value of saved CO_2 allowances due to this production.

After subtracting value from costs I get the estimate of the lower bound of net social costs of PV sources in the Czech Republic for years 2010 through 2030. The total social costs are summarized in the following table:

Costs (all in mil CZK)	Total for 2010 – 2030	Share of the total
Direct costs of PV electricity procurement	556092	74,4%
Direct costs of Wind electricity procurement	44842	6,0%
Costs of additional ancillary services	48466	6,5%
Forced investments costs	18182	2,4%
Regulatory power additional costs	79800	10,7%
Total estimated costs	747382	100%
Value of electricity produced by PV and Wind sources	46964	
Total net social costs	700419	

Costs of this policy are thus substantial and at least partially known to most of the stake holders involved. There are generally four arguments that help to justify high costs of such a policy: international obligations of the Czech Republic, the need to combat the climate change, lowering of fossil fuel import dependence mainly on Russia and meeting general goals of the Energy policy of the Czech Republic. However, not even one of these goals can be achieved by policy of high feed-in tariffs for photovoltaic and wind electricity. The Czech Republic stated goal for 2010 is to generate 8% of gross electricity consumption in RES. Judging by current state of affairs the Czech Republic will come to this goal but only because it already started from approx. 4,5% in 2005. The share of PV is less than 2% in 2010. For a year 2020, the stipulated goal for the Czech Republic is to have 13% of gross electricity consumption generated in RES. Even by optimistic estimates, share of electricity generated by RES will not be substantially higher than 10% after 2025. In 2020 this variable will be lower than 10%. The share of electricity generated by PV and Wind sources will not by higher than 4% of gross electricity consumption in any year up to 2030.

Concerning the climate change mitigation policies, the role for a policy maker is to find the cheapest way to achieve a goal if it has been already given. I computed the costs of lowering the CO_2 emissions for most of programs supported by the Czech government (and all important ones). Results are stated in the Fig 2. PV electricity generation is by far the most expensive way to achieve this goal even given the fact that costs computed here were only direct costs of electricity procurement. Total costs for PVE and Wind generation are higher. Indirect costs are not attributable to other programs however.

Import dependence in case of the Czech Republic actually rises while introducing PV a Wind sources. These sources are crowding out mostly domestic lignite power production and increasing demand for the production from highly variable sources of electricity – mostly from gas powered power plants.

Feed-in tariff policy is also in conflict of the primary goals of the Energy policy of the Czech Republic to lower energy prices and improving reliability of electricity networks. By introducing feed-in tariffs the costs of electricity will increase by approx. 10% for households and up to 15% for non-household consumers.

Conclusions

The policy of highly subsidized feed-in tariffs for electricity produced by RES in general and photovoltaic power plants in particular has shown to be extremely expensive and highly ineffective in achieving expected goals. Some steps to mitigate impact of this policy had been already taken, but the overhaul of the whole principle is in fact needed.

References

[1] M. Zajicek, Photovoltaic and Wind Electiricty Generation in the Czech Republic; (a forthcoming book)

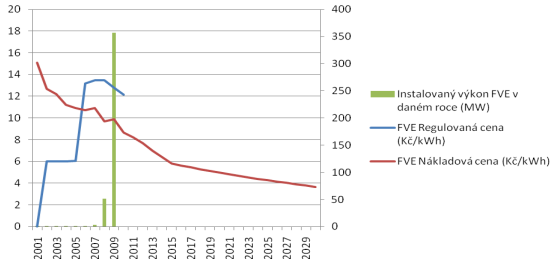

Fig. 1. Regulated price development compared to calculated costs of installation of PV in the Czech Republic. Data up to 2010 are observable, data from 2011 then on are estimates of the author. Left axis shows CZK, right axis shows MWs.

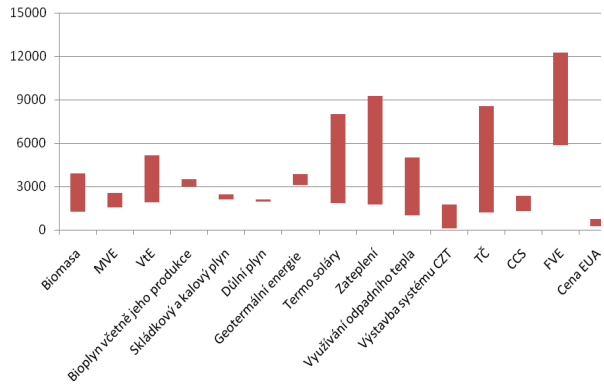

Fig. 2. Overall costs of reducing CO2 emissions by 1 ton in thousands of CZK using several types of publicly supported or introduced programs in the Czech Republic. As is clearly visible, PV electricity generation is by far the most costly procedure to achieve the goal to lower CO2 emissions out of all other policies supported and available. The cheapest and most effective way to achieve that goal has been ETS introduction in which the same goal can be achieved for costs 20 to 30 times lower.