The Effects of an Ambitious Danish Energy Policy

By

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Abstract[2]

As for other EU-countries, Denmark is required to achieve a country-specific target on renewables. The target is a share of 30% renewables out of total energy generation by 2020. However, the Danish Parliament has set out to follow a more ambitious policy of expanding the renewables capacity. This will result in an over-fulfillment of the EU requirement. Most likely the share will attain 35% by 2020.

In this paper we evaluate the effects of over-fulfilling the renewable target, both in terms of price and quantity effects in the Nordic electricity market and in terms of welfare foregone. Also, possible benefits of such a policy are briefly investigated. Since Denmark is not alone in planning for a more ambitious renewables' policy, the results should be of some general interest.

Key words: Energy Policy, Energy Economics, Renewables, Energy and Climate, Costs of Policy

Introduction

The Danish energy and climate policy is to a large extent determined by the general EU policy in these areas. Hence, Denmark has committed to support the policy of establishing an internal market for energy in Europe and to adhere to the so called 202020 by 2020 policy of EU. More precisely Denmark has to participate in the EU ETS, and to otherwise reduce its national emission of CO2 within the sectors not covered by the EU ETS. Furthermore, as for other EU countries, Denmark has to attain a given percentage of renewable energy by 2020 and to adopt the EU policy of increasing energy efficiency in 2020. However, apart from these targets Denmark has chosen to pursue an energy policy that is more ambitious than is required by international obligations. In particular, this relates to the generation of renewable energy. The aim of this paper is to investigate the costs of this ambitious energy policy. Also, possible benefits of this policy are briefly assessed.

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[2] This paper is to a large extent based on "Økonomi and Miljø (2014)" published by the Chairmanship of the Danish Economic Councils´ consisting of Hans Jørgen Whitta–Jacobsen, Eirik S. Amundsen and Claus Thustrup Kreiner, University of Copenhagen, and Michael Svarer, University of Århus. Thanks are due to members of the Secretariat and to Lars Otto, in particular for computational and technical support. The usual disclaimer applies.

Denmark has an obligation towards the EU to reduce emissions of greenhouse gases in the sectors of the economy not covered by the EU ETS by 20 per cent by 2020 and to increase the share of renewable energy in final energy consumption to 30 per cent and in the transport sector to 10 per cent in 2020. In addition, Denmark has a national determined target to reduce total greenhouse gas emissions in Denmark by 40 per cent in 2020, and to ensure that wind power cover 50 per cent or more of the electricity consumption in 2020. Furthermore, there is a national target that coal is phased out from the electricity and heat sectors by 2030 and that these sectors are based on 100 per cent renewable energy by 2035. The background for the analysis in this paper is that the current Danish renewable energy policy heads towards a 35 percent share of energy, while, as mentioned above, the EU target for Denmark is only 30 percent.

Generation of electricity based on renewable energy sources, such as wind and biomass, is generally more expensive than electricity generation based on fossil fuels, even when taking CO_2 taxes and quota requirements for CO_2 emissions into account. To expand the use of renewable energy Denmark, therefore, has to subsidize this sector heavily.

The generation of renewable energy in Denmark is subsidized by several support mechanisms directed towards the various kinds of energy generation i.e. offshore wind, land wind, solar, biomass and biogas. New offshore wind power plants typically are established after a governmental tender and the producers receive a guaranteed fixed price per kWh generated. This is composed of the going wholesale price of electricity with an additional subsidy that is residually determined. Hence, as the guaranteed price is fixed, the subsidy element decreases as the wholesale price is increasing, and vice versa. The guaranteed price is given for the first 50.000 hours of full load capacity, which means that the offshore plant will receive a subsidy for about half the expected lifetime of the plant (25 years). The guaranteed price is fixed nominally which means that the real term price will be diminishing over time. The most recent offshore wind power project, Anholt, receives a guaranteed price equal to 105 øre[3] per kWh. On average, the spot price for Denmark in 2013 amounted to 29 øre per kWh, which implies that the Anholt plant received a subsidy of 76 øre on average per kWh generated.

Onshore wind power plants receive a nominal subsidy of 25 øre per kWh, which is reduced øre by øre, as the electricity wholesale price increases above 33 øre per kWh. The subsidy is completely eliminated as the wholesale price rises above 58 øre per kWh. The support is

[3] 100 øre=DKK 1=EUR 0,13=GBP 0,11= USD 0,18

restricted to the first 22.000 hours of full load, which amounts to approximately one quarter of the expected lifetime of 25 years.

Hence, for both onshore and offshore wind power projects the subsidy depends on the development of the wholesale price. It is expected that the wholesale price will increase over the coming years, and that the subsidy therefore will be reduced over time. At the time of the broad Energy Agreement of the Danish Parliament (Folketinget) in 2012, the spot price was expected to increase from the average of 27.5 øre per kWh in 2012 to 49 øre in 2020 and to 72 øre in 2030. Therefore, as can be seen from Table 1, the subsidy for the wind power plants will be falling over time and completely disappear for onshore wind power at the end of the 2020íes.

Table 1: Subsidies for wind depends on year of installation

	Onshore wind		Offshore wind	
Instal. year	Subsidy first year	Average subsidy in lifespan	Subsidy first year	Average subsidy in lifespan
	----------------------- Øre/kWh -----------------------			
2017	21	7	53	30
2020	16	4	48	26
2023	8	2	40	23
2028	0	0	•	•

Note: The columns “Average subsidy in lifespan” are the present values of all subsidies in the years of subsidies converted to an annuity for the lifespan of the mill. For offshore wind the guarantied price is 90 øre per kWh.
100 øre=DKK 1=EUR 0,13=GBP 0,11= USD 0,18

Solar energy in Denmark receives a guaranteed price of 60 øre per kWh in the first 10 years of operation and 40 øre the following 10 years. The expected lifetime of the solar installations is in the range of 20 to 40 years. For households there is an additional subsidy as they are exempt from paying tariffs and taxes on their own consumption of the electricity they generate.

The support to biogas and biomass is partly in the form of a direct fixed subsidy per kWh electricity generated, and partly indirectly in the form of lower taxes as compared with what fossil fuels such as coal and natural gas pay. The support for biomass is 15 øre per kWh, while the support for biogas is 43 øre per kWh if both biogas and natural gas is used and 79 øre per kWh if only biogas is used.

Finance of Danish renewable energy projects

The Danish support of renewable energy is financed by the so-called PSO-tariff (Public Service Obligation) that is collected from both households and firms via the electricity bill. Hence, the end user electricity price that households and firms pay is composed of the electricity market price, the PSO and a multitude of other elements (see Table 2). The electricity market price for large firms follows to a large extent the electricity spot price, whereas the market price for households and smaller firms often is somewhat higher. In addition to the market price the consumers also have to pay for expenses related to transmission and distribution as well as for expenses to operate the electricity network in general. These expenses are covered by fixed tariffs that are composed of a fixed subscription fee and one part that depends on the actual consumption of electricity. Furthermore, various forms of excise taxes and value added taxes are also included in the electricity bill. Households have to pay much higher taxes than firms, wherefore households pay an end user price of electricity far above what the firms do. Typically the electricity price for smaller firms is also higher than for larger firms. This is partly due to the fact that large firms may obtain rebates on the market price and partly that the subscription fee has a relatively smaller significance at high delivered quantities.

Table 2: Make-up of price for electricity

	Households	Small firms	Large firms
	--------------	Øre/kWh	--------------
Electric energy[a)]	38,6	38,6	28,9
Subscription	2,7	0,1	0,1
Local transmission (distribution)	16,0	14,0	3,6
of which energy savings[b)]	2,0	2,0	2,0
Subscription (net)	15,8	3,7	0,5
Regional transmission	1,0	1,0	0,5
Net- and system tariffs	7,6	7,6	7,6
Elprices before PSO and taxes	*81,6*	*64,9*	*41,2*
PSO tariff	15,5	15,5	15,5
Elprices before taxes	*97,1*	*80,5*	*56,2*
Tax	69,6	3,0	3,0
Distribution tax	4,0	1,0	0,0
Electricity savings contribution	0,6	•	•
CO_2 tax	6,4	6,3	5,1
VAT	44,4	•	•
End user price	**222,2**	**90,8**	**64,8**

a) ”Electric energy” for households and small firms is the price payed through a public controlled intermediary. Large firms buy directly on the spot market and therefore their price is close to the spot price.
b) This component is the total expenditures for energy savings financed by the distribution companies divided by the usage of electricity.
c) 100 øre=DKK 1=EUR 0,13=GBP 0,11= USD 0,18

The spot price of electricity is determined on the Nordic electricity market that encompasses the Scandinavian countries, Finland and the Baltic countries (see www.nordpoolspot.com). Support to renewable energy implies a downward pressure on the spot price as the renewable energy to some extent comes in addition to existing capacity of electricity generation. However, as households and firms have to pay the PSO, they will not experience any reduction of the end user price, rather the opposite. The relationship between the spot price and the PSO is illustrated in Figure 1.

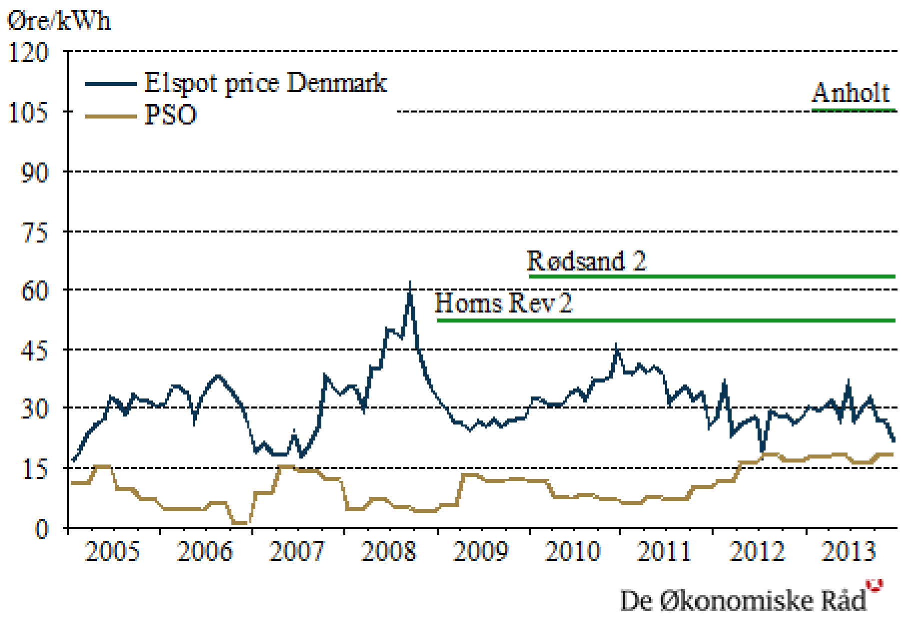

Figure 1. Elspot price and PSO collected per kWh for some Danish offshore projects

(100 øre=DKK 1=EUR 0,13=GBP 0,11= USD 0,18)

The PSO accounts for about 25 percent of the end user price for the larger firms, and 7 per cent for households whereas excise taxes and value added taxes stand for about half of the end user price for the latter group. In total the PSO amounted to about 5 billion DKK in 2012. As mentioned it covers the support to wind power plants and other forms of renewable energy. To some extent it also covers support for R&D. (see Table 3).

Table 3: Subsidies for renewable energy (PSO) and energy savings

	2011	2012
	----- m DKK -----	
PSO collected	2.601	5.121
Of which subsidy to offshore wind	591	1.007
subsidy to onshore wind	867	1.288
subsidy to biomass and biogas	483	458
R & D et al.	240	219
subsidy to local CHP	482	1.228
the remainder	-62	921
Contribution, energy savings	711	783
Total	**3.312**	**5.904**

(100 øre=DKK 1=EUR 0,13=GBP 0,11= USD 0,18)

Costs of renewable energy policy

Using a narrow tax base such as the PSO for financing renewable energy gives rise to sizable economic costs for Denmark. The higher electricity price, resulting from the PSO-tariff, reduces the purchasing power of the households and increases the costs of the firms. Electricity is an important input for firms and the PSO-tariff implies that the choice of production factors is distorted. This reduces the productivity and leads to a reduced competitiveness in the short run. The reduced competitiveness implies that the demand for Danish goods is reduced and consequently that the employment falls. In the long run the reduction of employment will disappear, but the long term consequence is that both wages and welfare fall. In the following some of these costs are assessed.

Price, quantity and subsidy effects

In order to assess the consequence for the share of renewable energy, the electricity price and the subsidies, we assume that all future direct support to renewable energy within the electricity sector ceases, but that the support to projects already in operation continues as agreed. This scenario is termed *No-Subsidy Policy* and is compared with the scenario *Current Policy*, based on the energy policy as laid down in the Danish Energy Agreement 2012 (Energiavtale 2012). For this purpose two models are applied: a technical energy supply model, called Balmorel and an energy demand model, called DEMS. As for the effects on productivity, employment etc., a macroeconomic model called SMEC is applied[4].

[4] The BALMOREL energy model is a partial equilibrium model, which supports modelling and analysis of the energy sector with emphasis on the electricity and the combined heat and power sectors. The model is formulated in the GAMS modelling language. SMEC is a macro economic model consisting of some 600 equations and 1000 variables. It is used for projections and calculations of effects of changes of economic policy. DEMS is linked to SMEC and is a model for energy demand for

A central feature of the *Current Policy* scenario is the construction of two offshore power plants, Horns Rev 3 and Kriegers Flak, with a total capacity of 1.000 MW to be installed and put into operation by 2017–20. It is assumed that these projects get a guaranteed price of 90 øre per kWh lasting for approximately 12 years. In our calculations the EU ETS quota price is assumed to follow the path projected in the IEA´s World Energy Outlook, 2013.

In the *No-Subsidy Policy* scenario all future support for renewable energy based on wind, solar, biogas and biomass disappear completely in electricity generation while the support to district heating remains. The calculations show that no new windmills will be constructed and that the use of biomass is smaller than for the *Current Policy* scenario. The results of the calculations are shown I Table 4.

Table 4 Effects of a *No-Subsidy Policy*

Scenario	Base	Current Policy	No-Subsidy Policy
Year	2011	2020	2020
Elspot price, 2013-øre/kWh	37,6	42,5	45,4
PSO tariff 2013-øre/kWh	7,9	22,3	7,9
PSO million 2013-DKK	2.696	7.594	2.721
Onshore wind power, MW	2.858	2.899	2.616
Offshore wind power, MW	868	2.763	1.268
El. generated from wind, pct.	28	47	29
El. generated from other renewables, pct.	13	20	14
El. generated from fossil fuels., pct.	59	33	57
Renewable energy in Denmark, pct.	**24,9**	**35,1**	**29,0**

(100 øre=DKK 1=EUR 0,13=GBP 0,11= USD 0,18)

For the *Current Policy* scenario the share of renewable energy is estimated to be approximately 35 percent in 2020, whereas the share is estimated to be 29 percent in the *No-Subsidy Policy* scenario. Thus, calculations show that it would be possible to attain the EU requirement of a share of 30 percent in 2020 by a much smaller support to renewable energy in Denmark.

For the *Current Policy* scenario the support of renewable energy in electricity generation in 2020 is calculated to be more than DKK 7.5 billion (2013-prices). The size of the corresponding PSO-tariff is 22,3 øre per kWh in 2020. Hence, a sizable increase of the PSO is expected for offshore

transportation, electricity and heating in households, and energy demand in industry (divided into whether the firm is covered by EU ETS or not). The inputs to the model are data on energy prices, subsidies and energy efficiencies.

windmill projects both due to the recently constructed Anholt power plant and for Horns Rev 3 and Kriegers Flak. This figure also covers support to wind power plants established on land or close to the shore. After 2020 the estimated PSO payment for offshore wind power plants is falling because the support period for the existing plants is stopped. In the other direction it is estimated that the PSO support for solar power will increase. The level of the PSO support for the *Current Policy* scenario further into the period 2020-30 is expected to be around DKK 6 – 7.5 billion (2013-prices). (see Figure 2).

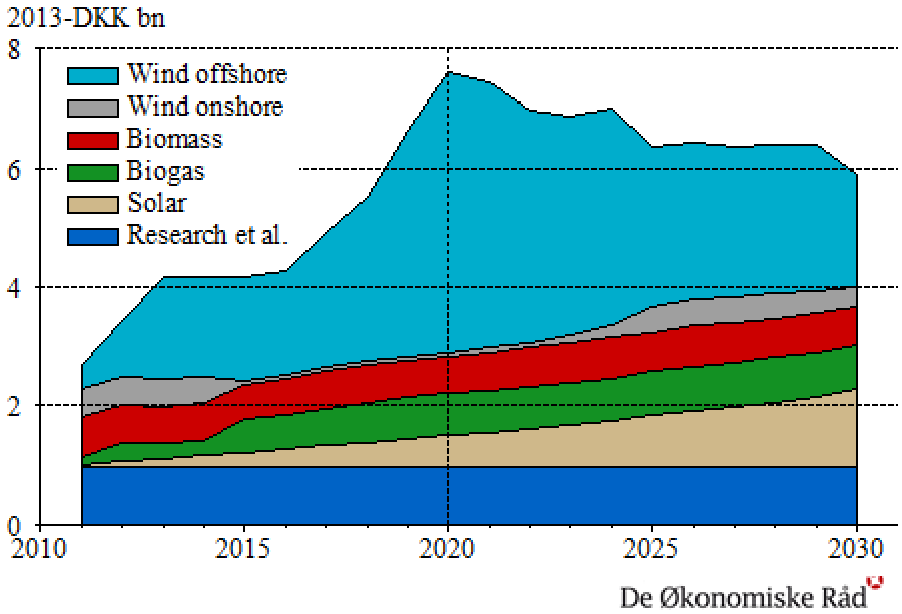

Figure 2. Projections of PSO support for renewables under the Current Policy scenario

(100 øre=DKK 1=EUR 0,13=GBP 0,11= USD 0,18)

Contrary to the *Current Policy* scenario the *No-Subsidy Policy* scenario shows a reduction of the PSO payments towards 2020. (see Figure 4). This reflects the abolishment of the direct support to new generation capacity for offshore wind power, solar power and power generated by biogas and biomass. From 2025 on there is no more support to the Anholt offshore power plant, and the PSO is then only collected in order to finance research and development within the energy sector.

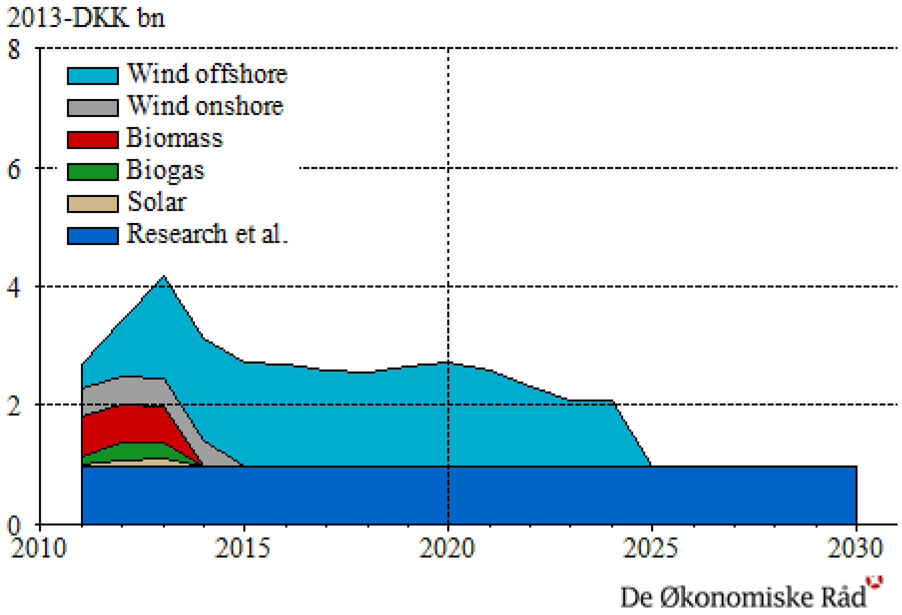

Figure 3. Projections of PSO support for renewables under the No-Subsidy Policy scenario

(100 øre=DKK 1=EUR 0,13=GBP 0,11= USD 0,18)

Under the *Current Policy* scenario the electricity price will be lower than under the *No-Subsidy Policy* scenario due to the fact that more electricity will be generated in the Nordic market if Denmark expands electricity generation by the two large offshore power projects as planned. This will benefit the other countries connected to the Nordic electricity market, but Danish consumers will experience higher end user prices due to the PSO- system. Calculations show that the *Current Policy* scenario involving an over-fulfillment of the share of renewable energy as required by the EU, will result in a reduction of the electricity spot price of 3 øre/kWh as compared with the case of no over-fulfillment and that the PSO-tariff will be around 14 øre per kWh higher in the alternative scenario. Hence, the end user price of electricity will increase by some 10-11 øre per kWh in 2020, corresponding to around 15 percent of what it otherwise would have been without the ambitious policy. In the years following 2020 the end user price will remain around this higher level. (see Figure 3). The extra expense of following this ambitious renewable policy for households and firms are calculated to be in the vicinity of DKK 3.5 billion per year. About half of this expense is due to the two planned wind power projects, Horns Rev 3 and Kriegers Flak, and the new wind power capacity on land. The two wind power projects account for about 2 percentage points of the renewable share of the *Current Policy* scenario.

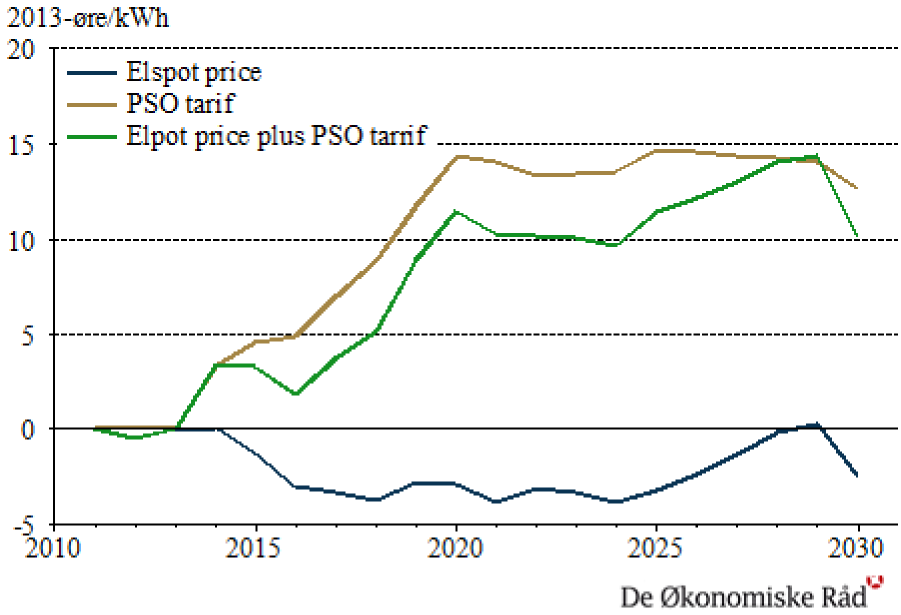

Figure 4. Elspot price and PSO tariff under the Current Policy scenario relative to the No-Subsidy scenario (100 øre=DKK 1=EUR 0,13=GBP 0,11= USD 0,18)

Employment and welfare effects

In order to assess the costs in terms of reduced employment and productivity, we apply the macroeconomic model, SMEC. Calculations show that there is a significant welfare cost of forcing through technologies that are not cost efficient. The assessment is based on the estimates calculated above showing that the end user electricity price will increase by about 15 percent due to the ambitious renewable policy. The effect on the average energy price of all industries taken together (including transportation) is an increase of 3 percent, while the increase is about 2 percent for the households.

The model applied is designed to show the macroeconomic consequences in the short and long run of a lasting increase of the energy prices of the size mentioned above. This can be used to illustrate a situation where increasing energy prices are a result of a more ambitious renewable energy policy than necessary in order to meet the Danish EU obligations towards the EU. It may of course be discussed whether Denmark permanently will keep a more ambitious policy than required by international agreements. Therefore, the results should be understood as an illustration of what will happen in a 10 to 20 years perspective.

The increased energy prices imply that the costs of production increase. However, the energy costs account for only 2.5 percent of the total production costs of the industries (agriculture not included), wherefore the production costs only increase by 0.1 percent. Still this cost increase results in reduced competitiveness which leads to a reduction of the production of Danish goods and services. Calculations show that this entails a reduction of the employment by some 5.000 persons in the short run. In the longer run, the increased unemployment will lead to a lower level of wages that contributes to lowering the production costs so that the competitiveness becomes reestablished. (see Figure 5). The wages will, however, remain lower than what it otherwise would have been without the ambitious renewable policy. According to the calculations, the wage level will have to be some 0.5 percent lower in order to reestablish the level of employment. The lower wage level is related to the reduction of productivity resulting from the distortions of input prices stemming from the support of renewables by way of PSO-tariffs.

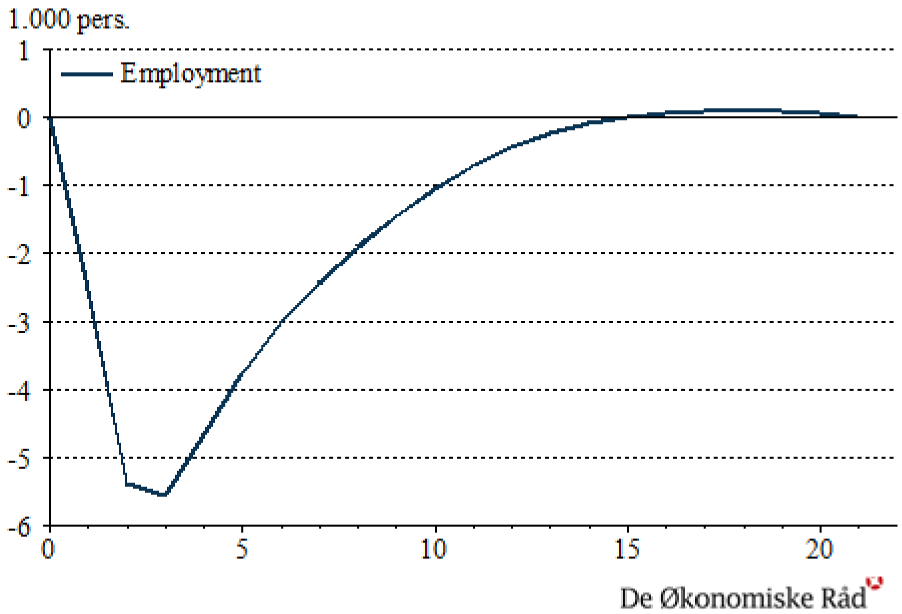

Figure 5. Employment effects of the ambitious Danish policy of renewable energy

The reduced productivity is a consequence of energy prices rising relatively to the cost of capital. This implies that firms orient themselves towards using relatively more energy efficient capital equipment that again implies that the cost of capital equipment increases relative to the wage rate wherefore firms reduce their capital intensity. The lower capital intensity implies a reduction in the real hourly productivity of about 0.25 percent, and the real wages fall accordingly. (see Figure 6). Furthermore, the fall of the nominal wages implies a reduction of the real wages of the consumers, so that the private consumption is reduced by about DKK 5 million each year. The reduction of private consumption is higher than the direct net costs of about DKK

3.5 billion annually. These extra costs to society can be seen as a result of the distortions of the firms´ choice of production factors and the resulting reduction of productivity.

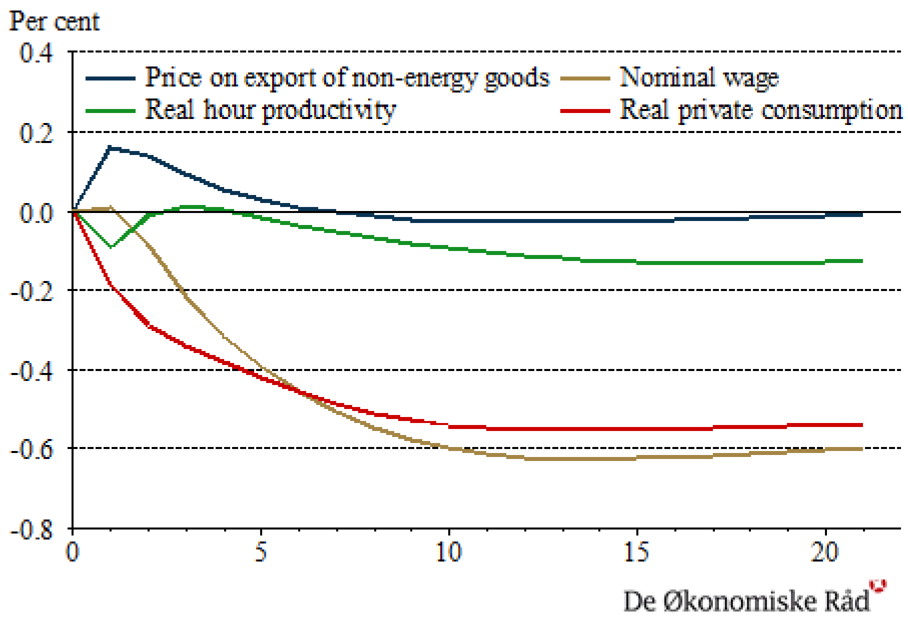

Figure 6. Price, wage, productivity and consumption effects of the ambitious Danish policy of renewable energy

Clearly, the calculations build on a series of assumptions and many of the more important factors may develop differently from what is assumed here. In particular, there is a lot of uncertainty with respect to the development of the CO_2 quota price, prices of fuels and the development of energy technology. Also, the costs of the current energy policy will be smaller if the electricity spot price increases more than expected, wherefore also the gains of cancelling the direct support to renewables in electricity generation will become smaller.

As mentioned, the calculations are only illustrative, but give a picture of how the employment and the productivity develop if Denmark continues to keep an ambitious energy policy, implying increasing costs for both firms and households. An example of such a more ambitious policy could be that Denmark relative to other countries chooses to move faster to the main EU target of reducing the emission of greenhouse gases to a minimum or that Denmark chooses to pursue the various energy targets in a cost inefficient way.

Benefits of renewable energy policy

Following this discussion of the costs related to the ambitious Danish energy– and climate policy, a relevant question is whether there are any benefits that could balance or even out weight these costs. Three candidates of benefits are worth mentioning: the benefit of reducing the emission of greenhouse gases to the atmosphere, the benefit of increasing the security of supply of energy and the benefit of positive spillover effects from the subsidies in terms of technological improvements and learning by doing[5].

The first of these candidates: the value of reduced emissions to the atmosphere, would in principle be very difficult to assess, as we know so little about the real cost to the world of climate change. However, as a dominant part of the support to renewables takes place in the EU ETS sector, this problem really does not arise. The emission of greenhouse gas in EU ETS is determined from the supply side by the number of emission quotas (emission permits) issued. An expansion of renewable energy - if it crowds out fossil energy- only leads to a reduction of the demand for permits, and does not remove any permits. Therefore, subsidies for the use of renewable energy in electricity and heat generation do not lead to lower CO_2 emissions at the European level and hence give no global benefit. It is true that Denmark may reduce its emission, but the quotas are still there and will be reshuffled to other firms or sectors regulated by the EU ETS (e.g. German coal power plants) or, by banking, to a later date.

The second possible benefit: the security of supply is potentially relevant. However, it depends on what kind of security of supply that one is dealing with. Security of supply in terms of threats of "black outs and brown outs", i.e. whether the "light will stay on" is clearly not supported by increasing the share of volatile wind or solar power, rather the contrary. On the other hand, security of supply in the sense of stable energy supply at stable prices is clearly very relevant, as one can argue that there is a benefit to society from reducing the negative macro externality in terms of quantity and price shocks stemming from a heavy dependence on energy delivered from politically unstable regions of the world. This problem is mostly relevant for deliveries of oil from specific regions, whereas coal is characterized by a large number of important suppliers so that there is no dependence on any small group of suppliers that can manipulate quantities and prices. As for natural gas, Denmark has its own production and is otherwise linked to other

[5] Creation of jobs and the first mover advantage are other candidates. With respect to the creation of jobs, one should recognize that Denmark has a well-functioning labor market that efficiently allocate labor to its best use. Hence, creation of jobs in terms of subsidies will be distortive and costly on welfare in the long run. As for first mover advantages, there is no guarantee that heavy subsidies in a particular industry will give successful results in terms of industry development and benefits of export. In general, one should warn again "picking the winner" strategies.

producers in Europe, so there is no particular threat there[6]. The security of supply problem in this latter sense of the term, is also rather small as Denmark is connected to a well functioning Nordic electricity market with further extensions to the Baltic countries as well as to Northern Germany. Hence, it is difficult to see that the ambitious Danish energy policy really enhance the security of supply for Denmark.

The third possible benefit of the Danish energy and climate policy - the spillover effects from subsidies to generation of renewable energy - also seems rather small. The basic idea of this possible benefit is that the subsidy should give a benefit additional to that of the firm that receives the subsidy, i.e. in terms of technology development and learning by doing effects. A study of the German support system (the EEG), that is not very different from the Danish, show that such subsidies have practically no spillover effect on technology development. The group of researchers behind this study (EFI, 2013), therefore, concluded that the support system should be abandoned. A part of the problem is that the subsidies go to firms and households applying already established technologies so that the research potential is not very large. But even if one considers subsidies going directly to private research and development, the benefit seems rather restricted. It is true that there is an argument for governmental subsidies most research. However, a study of the spillover effects from private research within the energy sector in Denmark show that the hypothesis that there are higher spillovers from private energy research as compared with other types of private research can be rejected (Bue Bjørner, 2013). Actually, the analysis suggests that external spillover effects from energy research may even be lower than the spillover effects from other types of private research. In that case the large Danish earmarked subsidies to energy research have led to a relatively small overall social return as compared with general research subsidies not restricted to energy research only. As technological innovation really is a global task, Denmark should merge its research money with other countries and engage in joint international research projects involving the best of research institutions within this field.

Conclusions

Calculations indicate that Denmark would be very close to fulfilling its EU target for a renewable energy share of 30per cent by 2020, even if all subsidies for new wind turbines and direct subsidies for solar cells and the use of biogas and biomass in electricity generation were repealed. In such a situation no more wind turbines would be built, and the consumption of biomass and gas in power generation would be significantly reduced. Overall, this would lead to a renewable energy share of just

[6] For the moment Denmark is not dependent on imports of natural gas from Russia. However, if a political crises with Russia results in supply problems for natural gas in Europe Danish prices of natural gas may also influence.

under 30 per cent in 2020. It would also reduce the PSO payment significantly, implying a saving for Danish firms and households of around DKK 3½ billion in 2020 (in 2013-prices). This would be expected to have a positive impact on employment of around 5,000 more jobs over a 2-3 year period.

A brief assessment of the possible benefits of the ambitious Danish energy policy, indicates that they will not in any way balance or out-weight the costs of the policy. Due to the EU ETS, there will be no global reduction the emission of greenhouse gases to the atmosphere, there are small potential benefits of increasing the security of supply, and there are no significant positive spillover effects from the subsidies in terms of technological improvements and learning by doing.

Hence, the ambitious Danish policy on renewable energy is costly, without any significant gains to Denmark and for the climate. Therefore, Denmark should reconsider its policy. One possibility in this respect would be to reconsider the decision to build the two offshore farms, Horns Rev 3 and Kriegers Flak as decided in the Energy Agreement, 2012. As a result of technological development, it is likely that offshore wind turbines will produce electricity at a lower cost in the future. At the same time there is an expectation of a rising spot price of electricity. Both changes would further reduce the need for future support for offshore wind turbines, which justifies postponing the construction of Horns Rev 3 and Kriegers Flak.

Whether one chooses to reduce subsidies to renewable energy or not, the funding should be changed. The burden of the current funding through PSO tariffs on electricity bill falls on a narrow tax base, which weakens the ability of firms to minimize costs, thus reducing their productivity. The welfare economic costs of renewable energy subsidies will be reduced if the subsidies are financed through the general income tax.

The European Commission has just presented a proposal for climate targets for 2030. This includes the goal of reducing greenhouse gas emissions by 40 per cent by 2030 compared to 1990 emissions. In contrast to the EU 2020 targets, the new targets are not set for each country per se, but stress that countries should be able to make reductions as cheaply as possible. It is encouraging that EU has set targets for greenhouse gas reductions for 2030, and it is appropriate that the focus is on reducing greenhouse gas emissions and not on milestones as shares for renewable energy. The Danish energy and climate policy must, of course, comply with international agreements. If Denmark wants to be more ambitious, efforts should be put where they actually reduce the total emissions, namely in the form of domestic reductions in the non-ETS covered emissions of greenhouse gases.

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