Organic farming policy and government intervention:
Lessons from the wind turbine industry

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Abstract

How should government policies to promote organic farming be designed? Government intervention may here, just like in the case of the wind turbine industry, be justified as an appropriate instrument to achieve the stated environmental target levels. One straight forward way to answer the main question of how to support organic farming would be to look for successful government support schemes in other areas. Renewable energy technologies, for example, have been subject to government intervention for years in many countries. We have decided to select government intervention leading to the successful development of electricity produced by wind turbines in Denmark for analysis. What lessons can we learn from the government intervention in the wind turbine sector and can these experiences possibly be transferred to the organic farming sector? This approach may shed new light on the possibilities and limitations for organic farming polices and has to our knowledge not yet been undertaken.

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1: Introduction

The potential risk of global warming and climate change has led to the introduction of a number of policies to reduce greenhouse gases (GHG). Global increase in atmospheric carbon dioxide is primarily due to burning fossil fuel as various policy measures have been put into effect to reduce the use of fossil fuels. While the debate on GHG has mainly focussed the, energy, industrial and transportation sectors and household behaviour, there has been limited attention paid to great potential to limited the climate effect in the agricultural sector. Methane and nitrous oxide emissions from farming have been shown to cause global warming. Very recent research findings show that organic farming has a strong potential to mitigate global warming (Amador and Castro, 2007). The potential to reduce the global warming effect from farming by applying organic production is significant. GHG emmissions from organic farming systems have been estimated to be 35-37% less per hectare than those originating from conventional farming systems. This difference in emmissions is caused by the non-use of mineral fertilizers and pesticides in organic farming. In particular, the production of chemical fertilisers is very energy intensive and causes increased emmissions when used in the fields (Fliessebach, 2007).

In terms of its proportion of total agricultural production, organic farming is still a minor industry even though that the state has been directly and indirectly engaged in promotion of the industry. From a global warning perspective, it would make sense for states to further promote the organic farming; however before the state engages itself in such an endevour it would make sense to take stock of the effort so far and assess whether lessons from the promotion of other environmentally sustainable industries can be learned. Lessons from the very succesful wind turbine energy sector may provide valuable lessons for state promotion of infant green industries. In this paper we compare Danish state-sponsered promotion of organic sector with that of the wind-turbine energy sector. While the organic farming sector, despite recent rapid growth, is of relatively limited size, the wind-turbine energy sector has grown rapidly and now produces a fifth of the electricity consumed in Denmark. Though findings relate to Danish experiences, they do have broader appeal because they can provide lessons for policy makers in other countries attempting to promote green industries.

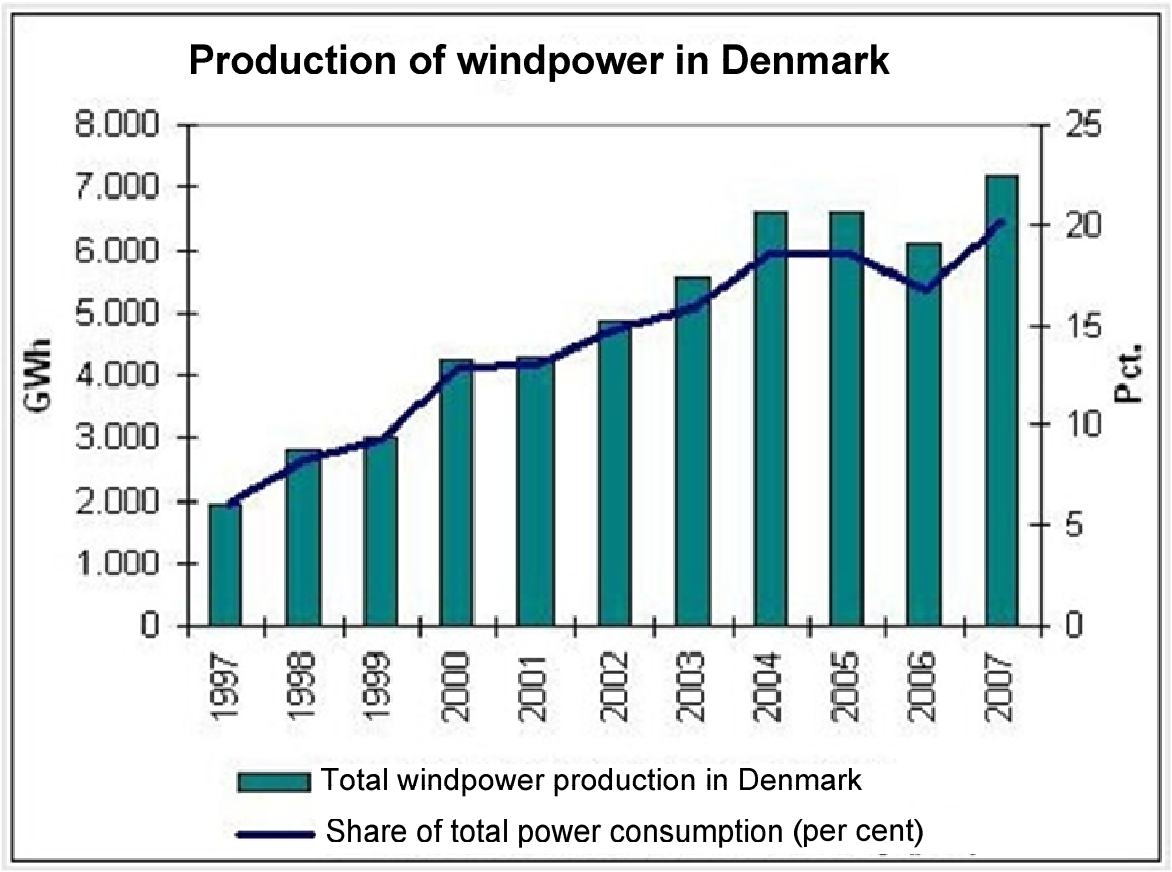
Though wind energy and organic food are not comparable products, the two sectors share some similarities. Firstly, they are both 'green industries' in which the state engages to promote the production of public goods. Secondly, the two industries (re)emerged in the 1970s and thus have the same time period to mature, but have done that to different degrees. The oil price shock in 1973 revived the interest in wind turbines: 'Denmark developed an interest in producing electricity in a way that was independent of oil and that avoided dependence on supplies of raw materials from outside the country' (Tranæs (2001). The establishment of the organic farming movement was associated with the rise of the environmental movement in the late 1960s and early 1970s. The first organic farms were established by urban people who moved into the countryside to experiment with alternative farming and a new way of life 'as a reaction to post-war industrial society and its foundation on material values' (Ingemann 2006, 9).

When looking at market shares, the share of wind-produced electricity in total electricity consumption has grown steadily from about 5% in 1997 to 20% in 2007, see Figure 1 below.

In comparison, the organic sector has performed less successful. The growth rate has been much lower. Relatively speaking the market share is approximately a third of that of the wind power, see Table 1 below.

Since the growth of both sectors has been state-sponsored, it seems very relevant to compare the policy measures introduced in the two sectors and discuss whether the policy experiences of the wind energy sector can be transferred to the organic sector. We do this in the following way. First, Section 2 gives a theory on relevant policy instruments. Section 3 and 4 analyzes government intervention in the wind power sector and in the organic sector, respectively. Section 5 concludes.

Figure 1: Windpower in Denmark (total and share in per cent)



Source: Livijn (2008).

Table 1: Market share of organic products

Year	Market share of organic products %
1990	0,07[1]
1991	0,15
1992	0,3
1993	0,8

[1]Source Økologisk landsforening: The data derives from GfK's household panel. The panel is consisted of 2500 households that register their purchasing. The market share should been seen in relation to the total purchase of food products *where exist both organic and conventional products.*

1994	1,2
1995	2,4
1996	2,75
1997	3,8
1998	5
1999	5,5
2000	5,5
2001	5,5
2002	5,5
2003	5,5(3,6[2])
2004	5,5(3,6)
2005	5,5(3,9)
2006	6,5(4,6)
First quarter 2007	7,5

2. Policy strategies in infant industries

Most often public policies are composed of a mix of several policy instruments; only rarely do policies rely on a single instrument to sustain a preferred situation or bring about change. The more interventionist policies are, the more likely they are to rely on a *mix* of instruments. It is the combination of policy instruments which define policy and therefore it is important to establish how 'various policy instruments … [are] packaged into overall programmes or comprehensive policies' (Vedung 1998, 39).

Since the specific policy instruments designed to promote an infant industry are specific to the industry, a comparison between state engagements in two or more different infant industries needs to be based on a comparison of the instrument *types* used rather than specific instruments. Though some similar types of instruments are applied, it does not make sense to compare their

[2] Source: Danmark Statistik: The share in brackets is the share in relation to the total purchase of food products in *retails.*

specific settings. What we need to focus on is whether different policy instrument types and instrument mixes are applied in the industries to be compared.

Governments have a number of instruments at their disposal when they intervene in an infant industry. Table 2 suggests a typology with four different instrument types for infant industry promotion. The typology distinguishes between supply-side and demand-side policy instruments. Supply-side policy instruments are, directly or indirectly, aimed at increasing the supply of the new product through the creation of incentives to produce it. Demand-side instruments are, direct or indirectly, aimed at motivating, or even force, consumers to purchase the new product.

Table 2. Policy instrument typology

Supply-side policy instruments (push)		Demand-side policy instruments (pull)	
Direct	Indirect	Direct	Indirect
Examples: • Producer subsidies	Examples: • Funding of research and development activities	Examples: • Compulsory purchase • Consumer subsidies	Examples: • Market facilitation • Support for marking

In industrial economics, researchers distinguish between the effects of bringing innovations (e.g. new products) to the market (seen as push) and the effect of new demands from consumers (seen as pull) on growth of a particular market. Some scholars are pointing at push and others at pull as the main explanation of innovation (Klein & Rosenberg 1986, Porter 1990). Infant industry policies would reflect the underlying paradigm specifying the relationship between supply, demand and market growth. Where demand effects are seen as the driving force of infant industry growth, policy would aim at creating or motivate new demand. By contrast, where supply of new products are seen as the main driving force, policy motivate to increased supply. In practice, infant industry promotion policies would to some extent apply all four types of policy instruments, but the underlying paradigm of the policies would dictate the balance of instrument types applied. Thus, it makes analytical sense to conceive of an infant industry promotion policy continuum running from pure supply-side policy (push) to pure demand-side policy (pull). In this paper we apply the policy typology to compare state engagement in the promotion of the wind energy sector and organic farming sector with the aim of assessing whether the policy makers in the organic sector can learn from the wind turbine sector.

3. Government intervention in the wind power sector

3.1. Power purchase contracts

To ensure reliable power purchase contracts, the power purchase agreements can be split up into three main phases. As Nielsen (2005, 116) puts it:

'These agreements obliged the utilities to purchase the wind electricity from wind turbine owners at a guaranteed minimum price while also distributing the cost of connecting wind turbines to the power grid (additional installations, grid strengthening, and so on) between the utilities and the wind turbine owners. In the early 1990s the three parties (utilities, manufacturers and owners) failed to reach a third agreement because of disagreements regarding the per kWh price for wind power and the distribution of grid strengthening costs. Consequently, in early 1992 the three parties were summoned at one day's notice to the Ministry of Energy and Commerce where the ministry principals simply informed them that the minister was going to solve their disagreements by law. This law maintained the previous payments for wind power (for which the manufacturers and owners were happy, but the utilities not) and stated that wind turbine owners would have to pay for connecting their wind turbines to the 10kV grid, whereas the utilities had to manage (and pay) for the necessary strengthening of the high-voltage grid including extra substations and service line. The 1992 law, which fixed the wind power tariff at 85 per cent of normal residential prices, was terminated in 2000 as a result of electricity liberalization.'

Thus, in the first phase from 1979 to 1992, the wind electricity market in Denmark was regulated by voluntary agreements between the utilities and the associations of wind turbine manufacturers and owners. In the second phase from 1992 to 2000, the agreement became mandatory by law. In the third phase from 2000 and onwards, the market is liberalized and no formal agreement exists any longer (ibid.).

3.2. Taxation of fossil fuels

There is, in general, a high level of energy taxation in the EU compared to the rest of the world (OECD, 2002). Environmental taxation penalizes fossil fuel and thereby encourages an earlier

switch point in time combined with the subsidy scheme to producers of renewable energy. In essence the energy tax changes the price relationship between fossil fuel based energy production and renewable energy. This, in turn, affects the demand structure in favour of the latter. Denmark started mixing taxation of fossil fuels and subsidization of renewable energy in 1984. Nielsen (2005, 117) finds, based on Ministeriet for skatter og afgifter (1984), that in 1984 the Ministry of Taxation introduced a general per-kWh electricity tax on electricity consumption from which renewable energy was exempted.

In year 2005, the fossil fuel tax in Denmark was about 52 DKK/GJ corresponding to 0.19 DKK/kWh (Energistatistik 2005). At the same time, for purposes of supporting renewable technologies, a per-kWh subsidy for producers of renewable energy was installed.

3.3. Subsidization of wind turbines

The Danish government support scheme is basically a feed-in tariff that guarantees a minimum price for electricity produced by wind turbines. Overall, the existing wind turbines in Denmark can be separated into two categories according to the main support schemes, namely wind turbines built before January 1 2003 and wind turbines built after January 1 2003.

Three main features characterize the main support scheme for wind turbines built ***before*** **January 1 2003**. First, these turbines receive 0.33 DKK/ kWh for the first 22.000 full-load hours and nothing after this limit. Full-load hours are defined as the annual wind turbine production in kWh divided by the installed effect. The installed effect is again defined by type approval of the wind turbine. If, for example, a wind turbine produces 1.200.000 kWh per year with a 600 kWh type approval, then it runs 2.000 full-load hours. A land-based wind turbine typically produces 22.000 full-load hours in about 10 years and has an expected production life of 20 years (Energistyrelsen 2001: 5-6, 10)

The 0.33 DKK/ kWh subsidy consists of the electricity market price and a supplement to reach this number. Say, for example, that the market price on electricity is 0.25 DKK/kWh. Then the turbine will receive an extra 0.08 DKK/kWh, in total 0.33 DKK/kWh. This means, that the subsidy cost decreases when the electricity market price increases.

Second, turbines built before 2003 typically receives 0.17 DKK/kWh in a number of full-load hours depending on the size of the turbine. Third, an extra 0.10 DKK/kWh subsidy is given during the first ten years or a guaranteed number of full-load hours (Moesgaard 2006).

Concerning wind turbines built ***after*** **January 1 2003**, subsidies drop but are no longer dependent on market terms. A 0.10 DKK/kWh feed-in tariff is now introduced. It was, however, first deducted in the market price during 2003-2004 when the electricity market price increases from 0.26DKK to 0.36 DKK/kWh. Therefore, the rules were soon modified so that for turbines after 2004, the 0.10 DKK/kWh feed-in tariff is fixed and no longer dependent on the electricity market price (ibid.). As the saying goes, today each kWh produced by wind turbines has a "dime tied to its tale." (in DKK).

Overall, wind turbines built before 2003 has been guaranteed a minimum subsidy whereas wind turbines built after 2003 produces based on the market price. They receive, however, a fixed 0.10 DKK/kWh feed-in tariff after 2004 independent from the market price.

In February 2008, a new energy policy is discussed in Denmark. The present proposal also concerns new rules for wind turbines. Wind turbines producing electricity after February 21, 2008, are planned to receive more support as the feed-in tariff is planned to increase from the former 0.10 DKK/kWh to 0.25 DKK/kWh for the first 22.000 full-load hours (Folketinget 2008). I.e., the dime tied to the tale of one kWh produced on a wind turbine grows to a quarter (in DKK).

3.4 Costs

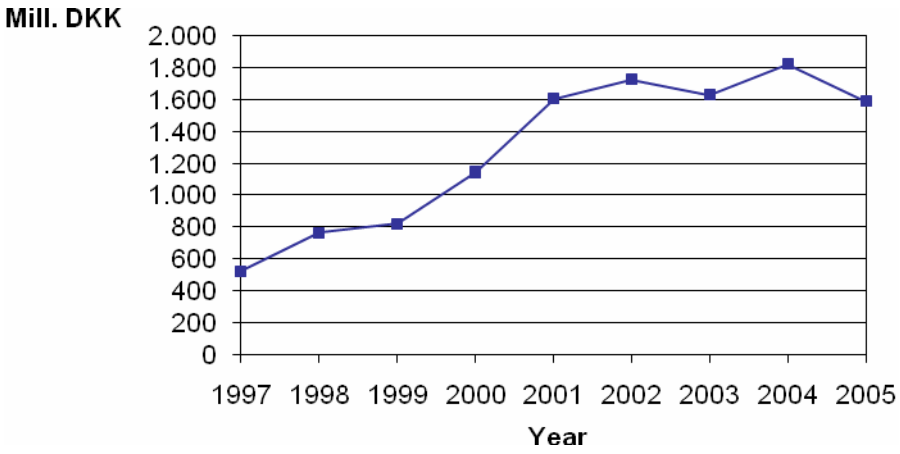
Support to wind turbines in Denmark **is paid by all electricity consumers**. On the electricity bill, a special tariff called the PSO (Public Service Obligations) tariff is in effect. Because electricity price has varied substantially over time, the historical PSO costs in relation to the existing wind turbines

have varied a lot. Up till 2004, the PSO costs have decreased when the electricity price increased and vice versa. During the period from 2001-2006, the variation has spanned between 2.2 and 4.3 bill. DKK/year (Klima og Energiministeriet, 2008).

From year 2006, separate data exists for total subsidy costs including both running costs and construction costs. This total amounted to 1,7 bill. DKK in 2006 and no data exist at the moment for 2007 and 2008 (Energistyrelsen 2008). So far, to our knowledge, no separate and annual data for subsidy costs to wind turbines in Denmark are available for the period before 2005. Therefore, we requested the Danish Energy Authority (Energistyrelsen) to estimate the size of subsidies for our project which they kindly did.

Figure 2 shows the development in running costs to the wind turbine sector from 1997 to 2005. Note, that the estimated data in Figure 2 concerns running subsidies only. Thus, construction subsidies are not included implying that the estimated data from before 2005 are not comparable to the 2006 figure (which included construction costs as well).

Figure 2: Development in running subsidies to wind turbines in Denmark, 1997-2005 (mill. DKK).



Source: Energistyrelsen (2008). Estimated data for this project.

The overall result is that from 1997 to 2005, the annual support increased 67 % (from 522 mill. DKK to 1591 mill. DKK). After year 2000, there is some uncertainty and stagnation in the market due to different political signals concerning government support schemes (as presented above in section 3.2). The annual support, however, is expected to increase substantially after the new 2008 energy policy proposal in Denmark. Calculations have shown that the new 2008 energy policy proposal in Denmark will lead to an extra annual cost of 0.036 DKK/kWh, i.e. an extra annual cost of 150 DKK per household (Klima og Energiministeriet, 2008).

Furthermore, calculations have shown that wind power creates more competition in the market. The total gain for consumers following the effect on the electricity price in 2005 is estimated to 1 bill. DKK (Mosegaard et. al.). Combined with the invested PSO funds, the conclusion is, that wind turbines received 400 bill. DKK more in support than they contributed by lowering the electricity price (Østergaard, 2006: 21). As mentioned in the introduction, one has to add the benefits from collective good provisions such as better environment, health, less acid rain etc to this cost-benefit analysis.

Note overall, that electricity consumers cannot avoid paying PSO allowing stable government support schemes for the wind turbine sector

4. Government intervention in the organic sector

The lion's share of Danish state support is used for direct supply side instruments. Denmark was the first country to enact a distinct law on organic farming (1987). It introduced direct farm subsidies to ease conversion from conventional to organic farming for the first three years of the conversion period. In 1989, additional conversion payments for organic livestock were introduced.

As a consequence of implementation of EC Regulation 2078/93, permanent subsidies for organic farming were introduced in 1994 (see Tables 3 and 4). This scheme provided conversion subsidies,

based on area, for *two* years and permanent organic subsidies. To be eligible, farmers had to farm organically for at least five years.

Table 3. Danish organic area payments, 1994-1997 (DKK per hectare)

Year	1994	1995	1996
Conversion payment	300	275	200
Permanent organic payments	750	600	450
Payment for reduced fertiliser use	650	525	400
Supplement for environmentally sensitive areas	215	215	215

Source : Bekendtgørelse no. 250, 1994.

To increase the supply of organic arable products and pig meat, the subsidy scheme was altered in 1996. Additional support was provided to organic farms without milk quotas and a special subsidy to pig producers was also introduced (Strukturdirektoratet 1999, 136).

Table 4. Danish organic area payments 1997-2003 (DKK per hectare)

Year of five year obligation period	1	2	3	4	5
Permanent organic payments[4,6]	600	600	600	600	600
Conversion payment[5,7]	450	450			
Supplement for environmentally sensitive areas	500	500	500	500	500
Payment for farms without dairy quota	2000	2000	1200[1,3]	500[1,3]	500[1,3]
Payment for pig production[2]			2000	2000	2000
Maximum area payment including EU	5000	5000	4000	3500	3500
Maximum payment for pig farms	5000	5000	5000	5000	5000

Source: Bekendtgørelse 226 1997; 881 1998; 883 2002; 700 2007, Direktoratet for FødevareErhverv 2002, *Økologisk Jordbrugsproduktion: Vejledning om arealtilskud 2003*.

[1] Not paid to pig farmers.

[2] This payment expired on 2 November 2002.

[3] This payment was introduced in December 1998. It was not paid for the five-year period that followed.

[4] 850 DKK until December 1998.

[5] 200 DKK until December 1998.

[6] Before 1 January 1998 this payment was not paid to permanent grass fields.

[7] Not paid to permanent grass fields.

In 2000, it was realised that the organic subsidy scheme had to be simplified and, after several years with considerable overproduction of organic milk and cereals. Therefore support schemes directed at selective commodity groups had to be abolished. In the new organic support scheme which came into effect in 2004, the permanent organic subsidies were abolished. Instead organic farmers were paid an environmental subsidy to which also other types of environmentally friendly farming were eligible, but organic farming was given first priority to the subsidies. The only remaining organic subsidy was the general conversion payment to which only non-dairy farmers were eligible. Up to 2007 there was no wish to increase organic milk production and therefore it was decided that they were not eligible for conversion subsidies. However, in 2006 market forecasts envisaged future under-supply of organic milk production and, therefore, dairy farmers again became eligible for conversion subsidies (interview, Directorate for Food, Fisheries and Agri Business, 13 December 2007). The current subsidy scheme is shown in Table 5.

Table 5: Current organic area payments 2004-present (DKK per hectare).

Year of five year obligation period	1	2	3	4	5
Perm. payment for environmentally friendly farming	750	750	750	750	750
Conversion payment[1]	1050	1050	100	100	100

Source (to be added)

[1] Not paid to dairy farmers 2004-2007.

Danish organic farming policy also applies a number of in *indirect supply-side policy instruments.* From 1984 until 2002, state subsidies have been provided to organic extension services. Recently these subsidies have been reintroduced. More importantly, considerable state funded for research into organic farming has been provided since the mid-1990s. Most of the research has been funded by three organic research programmes under the auspices of the Danish Research Centre for Organic Farming (FØJO) (http://www.foejo.dk/forskning/index.html).

Unlike organic sector policies in other countries, the Danish policy put considerable emphasis on demand-side policies. The Law on Organic Farming enacted in 1987 set up a state certification and labelling system for organic farming (the 'Ø' label). All costs related to certification of organic producers, processers and distributors and inspection activities are covered by the state. The state label is the sole national organic label and can only be applied by enterprises producing, processing, packaging or labelling organic produce *in* Denmark. The state label implies that only state-certified farms would be allowed to sell organically labelled products and receive state support. The inspection activities under the state certification system are undertaken by the Plant Directorate which is an agency under the auspices of the Ministry of Agriculture.

The 1987 Law on Organic Farming also granted financial support for development initiatives related to processing, marketing and distribution of organic food. For instance, support was granted to test marketing of organic dairy, poultry and beef products. Funds allocated for these activities peaked in 2000 with 97 million DKK and declined to 10 in 2005, but were increased again in 2007 to 40 million DKK. Between 1997 and 2000, the state allocated 20 million DKK for training and other conversion activities in state, regional and local government cantines and kitchens (including hospitals) which wanted to use organic produce (Strukturdirektoratet, 1999, 28). After 2000, the programme has been retained, but now as part of the Innovation Act (Bekendtgørelse no. 318, 2001 and Bekendtgørelse no. 865, 2006). The School of Organic Sales received support to provide advice to these institutions. Further, since 1998, the Veterinary and Food Safety Agency has launched a number of information campaigns on organic food directed towards consumers, retailers and processors. The agency is regularly involved in organic exhibitions (ibid., 26, see www.dffe.dk).

As stated above, infant industry promotion policies may often be a mix of different instrument types, but usually the balance tips towards either demand-side or supply-side manipulation. Up until the mid-1990s, the major part of the state funding was applied on demand-side policy instrument, since then the funding was increasingly directed towards supply-side measures as evident in table 6.

Table 6: State financial resources spend on Organic Policy in Denmark[3]

Year	Direct supply-side measures: Farm subsidies Million DKK[4]	Indirect supply measures: Extension (advisory service) Million DKK[5]	Indirect supply-side measures: Research Million DKK	Indirect demand-side measures: Marketing /product development Million DKK
1987	-			0,1
1988	4,1			8,3
1989	5,7			38,6
1990	5,1			18,2
1991	11,2			4,8
1992	3,6			27,5
1993	2,2	2,9		27,6
1994	20,9	2,8		27,1
1995	Na.	2,8	5	Na.
1996	25,7	6,9	20,0	42,0
1997	86,4	3,6	35,3	47,2
1998	372,9	4,2	16,2	44,2
1999	368,0	5,7	14,3	89,1
2000	392,2	7,5	9,0	[6]96,6
2001	143,7	3,2	44,5	51,1
2002	142,2	1,1	40,0	52,1
2003	[7]311,3	Na.	40,0	69
2004	521,5	Na[8].	32,0	28,9
2005	277,5	Na.	40,8	10,0
2006	276,0	Na.	40,9	21,0
2007	272,9	Na.	40,5	40,0

Table 6 shows that in terms of funding allocation the Danish organic farming policy has increasingly been supply-side orientated. In the formative years in the late 1980s and early and mid-1990s tha major part of the funding was spent on indirect demand-side instruments, but since 1997 spending has increasingly been directed towards supply-side instruments. Based on the allocation of state funding, Danish organic farming policy is characterised by a strong orientation towards the supply-side.

[3] Source: 1987-1994: Strukturdirektoratet 1995. 1996. 1995-2007, Annual Budget 1996-2007.
[4] Grant assurance (also colons 3 & 4).
[5] Expenses
[6] Period 2001-2004 also includes expenses on administration of subsidies schemes.
[7] Including permanent organic subsidies which are part of a subsidy scheme for environmentally friendly farming (miljøbetinget tilskud subsidies). Applies also to conventional farms, but organic farmers are given first priority to funding.

In 1995, the Danish government introduced a pesticide tax equal to 37 per cent of the retail price on insecticides and 15 per cent on fungicides, herbicides and crop growth-regulating chemicals. The revenue would be reimbursed by suspending the state's share of the regional land tax. In 1998, the pesticide tax was doubled and the revenue was to be used to fund subsidies for organic farming, monitoring of pesticide pollution and policy measures to limit nitrate pollution. Thus, the spending of the new pesticide tax proceeds, to a great extent, would redistribute money from conventional to organic farming. Though pesticide revenue fund organic farming, its introduction was not motivated by organic farming concerns, but rather by concern for pesticide residues in the ground water which is the major source drinking water (Daugbjerg 1999, 124), it may have direct impact on the organic sector –though very limited. Since it is a tax on production input, it can be characterised as a supply-side policy instrument.

5. Conclusion

Our main research aim was to answer the question of how government support may be designed to promote organic farming in practice. In answering this main question, we looked for successful government support schemes in other areas focusing on the case of the wind turbine industry. The reason for this choice was twofold. First, both organic farming and wind turbines save GHG emissions and help achieving the stated environmental target levels. Second, Danish energy policy has created a situation where 20 per cent of all electricity in 2007 was from wind energy, the highest share in the world, whereas organic consumption has been considerably lower stabilisrin around 5 percent in late 1990s and early 2000s. It was not until 2006, organic consumption showed a renewed upward trend.

What lessons can we learn from government intervention in the wind turbine sector and can these experiences possibly be transferred to the organic farming sector? This 'public policy matters' approach may shed new light on the possibilities and limitations for organic farming polices. Such an analysis has not yet been undertaken.

[8] Subsidy scheme for the advisory service was abolished in 2004.

Our comparison clearly demonstrated that two different policy types have been applied. The Danish wind turbine energy policy has concentrated on direct demand-side policy instrument which have have created demand for wind energy by forcing energy utilities to buy wind energy at a price above fossil fuel energy. To compensate for the extra costs associated with purchase of wind energy, utilities were allowed to introduce a levy paid by all electricity comsumers. The price premium made it ecnomically lucrative to supply wind energy and this was an important driving force behind the sector's growth.

As Madsen et al., (2002, 1) point out 'Without these subsidies, windmills as suppliers of electricity would not have been competitive compared to traditional power plants and hence the producers of windmills would not have got a foothold in the Danish industry'. Taking a broader European perspective Gipe (2006, 50) reaches a similar conclusion: "…how can continental Europeans be so successful? How can Europeans have How can continental Europeans be so successful? How can Europeans have installed so much generating capacity that the Danes produce 20% of their electricity with wind, the Germans 10% with wind, solar, hydro, and biomass, and the Spaniards 6% with wind? The answer is surprisingly simple: they pay for it. They pay for renewables by setting a price per kWh for wind, for solar PV, for hydro, and for biomass. They set a price high enough to ensure that they get the kind of renewables they want" (ibid., 50).

In contrast, since the late mid-1990s, the Danish organic farming policy has, in budgetary terms, relied heavily on supply-side policy instruments, mainly farm subsidies (direct supply-side instruments). In comparison with other European countries, the Danish organic farming policy has devoted more resources to demand-side policy instruments, but these have not been as forceful as those applied in the wind energy sector. Only indirect demand-side instruments such as marketing and product innovation support and market facilitation through the introduction of a state organic certification and labelling institution have been introduced.

Thus a key question is whether the lessons from the wind turbine sector can be applied in the organic farming sector? Would it be possible for governments, or the EU, to guarantee prices for organic produce above the market price for conventional produce? Administratively speaking, yes.

The Common Agricultural Policy (CAP) have operated such system since the mid-1960s and still for a number of commodities, for instance for dairy products. Thus the organisational set-up is available, but would it also be politically feasible? Since 1992 there was been a number of reforms of CAP which has shifted support to farmers from price support to direct payments. In 1992, the main change to the CAP's price support mechanisms came in the cereals sector where intervention prices were reduced by a third, but farmers were compensated for the implied revenue loss by the introduction of a subsidy paid on each hectare of eligible land on which an eligible arable crop was grown (the arable area payments scheme). Claimants above a specified threshold had to set aside 15 percent of their arable land, but still qualified for an arable area payment on that land. In 2003, direct aid payments based on the area farmed and crops grown, and type and number of livestock kept, were further decoupled and transformed into a new Single Payment Scheme (SPS), often referred to as the single farm payment. The motivation behind this gradual and partial transformation of EU agricultural subsidies has been a need to make them less trade distorting to reach agreement on farm trade rules in the WTO (Daugbjerg and Swinbank 2009). Price support artificially drives up production by enabling production which otherwise would be unprofitable, and has caused massive overproduction. Introduction of price support in the organic farm sector would be a move in the opposite direction and current 'health check' of the CAP suggests further decoupling. Thus, it is must unlikely that the wind turbine model would be introduced in the organic sector.

However, this is not to say that no lesson can be learned from the policy model developed for the promotion of the wind turbine industry. The Danish case of wind turbine promotion clearly demonstrates that demand-side policies may be very effective in promoting an infant industry. Though the model cannot be directly translated to the organic sector, our analysis encourages new thinking on organic sector policies. Demand-side policy can still be further developed. If the aim of government is to increase the size of the organic market, more attention should be given to the stimulation of organic demand. The state possesses means to do so such as the introduction of obligation for public sector canteens and kitchens to purchase of organic products where available. Though there may to political opposition to this, the act would be less interventionist than those applied in the energy sector.

Literature (incomplete)

Amador, M. and Jonathan Castro (2007), 'Organic agriculture, emission of greenhouse gases and carbon sequestration' *Climate Change and organic farming*, Work Shop at BioFach, Nürnberg Messe, 17 February 2007.

Brandt, U. S. and G. T. Svendsen, (2002), 'Hot Air in Kyoto, Cold Air in The Hague: The Failure of Global Climate Negotiations', *Energy Policy*, Vol. 30, 13, *1191-1199.*

BTM Consult (2004), International Wind Energy Development, World Market Update 2003, Ringkøbing, Denmark.

Energistyrelsen (2001), "Vejledning i beregning af fuldlasttimer for vindmøller", http://www.ens.dk/graphics/Energiforsyning/Vedvarende_energi/Vind/Afregning/Vejl_fuldlast_vm.pdf (3.04.08)

EWEA (2002a), http://www.ewea.org/doc/EWEA_Press_Release_11.12.01.doc, Offshore Wind Energy: Achieving the Potential (access date: 6 July 2002).

EWEA (2002b), http://www.ewea.org/doc/20-02-02%20European%20Wind%20Energy-%202001-%20stats.pdf Another Record Year for European Wind Power (access date: 6 July 2002).

EWEA (2002c), http://www.ewea.org/doc/EWEA_Press_Release_11.12.01.doc, Offshore Wind Energy: Achieving the Potential (access date: 6 July 2002).

Fliessebach, Andreas (2007), 'The role of organic argiculture in climate change – scientific evidence' *Climate Change and organic farming*, Work Shop at BioFach, Nürnberg Messe, 17 February 2007.

Folketinget (2008), "L129 - Forslag til lov om ændring af lov om elforsyning. (Øget udbredelse af vedvarende energi m.v.)" http://www.folketinget.dk/doc.aspx?/search.asp?q accessed d. 31.03.08.

Gipe, P. (2006): "Renewable Energy Policy Mechanisms". Unpublished working paper, Ver. 04, Tehachapi, CA 93561 USA.

Gusbin D.G., Klaassen and N. Kouvaritakis (1999),'Costs of a Ceiling on Kyoto Flexibility', Energy policy 27 (14), pp. 833-844.

Hanley, N., J. F. Shogren and B. White (1997), Environmental Economics, in Theory and Practice, Maximilian texts in economics, Hampshire, England.

Hansen, J. D., C. Jensen and E. S. Madsen (2003), The Establishment of the Danish Windmill Industry - Was it Worthwhile? *Review of World Economics*, vol. 139, 324-347.

Intergovernmental Panel on Climate Change (2001), IPCC third assessment report, Working Group III: Mitigation, UNEP.

Klima og Energiministeriet (2008), "Energipolitisk aftale 2008 – Fakta ark PSO-omkostninger og VE bidrag", http://www.kemin.dk/NR/rdonlyres/8DC9536F-5DB3-4DA6-8122-89D336875260/0/Faktaark_PSO.pdf, accessed d. 6.04.08

Livijn, K. (2008) *"Stagnation eller Kaos ? – Betydningen af støtteordninger, vindmølleejerskab og lokal accept for udbygningen af dansk vindkraftkapacitet",* Institut for Samfundsudvikling og Planlægning, Aalborg Universitet.

Madsen, E. S., Camilla Jensen and Jørgen Drud Hansen (2003): Scale in Technology and Learning by Doing in the Windmill Industry. Submitted to *Journal of International Business and Entrepreneurship*.

Mosegaard (2006), "Udbetalt støtte til Vindkraft" i *Vindkraftens betydning for elprisen i Danmark.* IBT-Wind, http://www.windpower.org/media(1464,1030)/vind_presser_elprisen.pdf accessed d. 6.04.08.

Nielsen, K.H. (2005): 'Danish Wind Power Policies from 1976 to 2004' in Lauber, Volkmar (ed.). *Switching to Renewable Power: A Framework for the 21st Century.*
Earthscan Publications, UK. pp 99-121.

Porter, M. E. (1990), *The Competitive Advantages of Nations*, New York: The Free Press.

Reinhardt, F. L. (1999), 'Bringing the Environment Down to Earth', Harvard Business Review, 77, 149-157.

Sims, R.E.H, H.-H. Rogner and K. Gregory (2003), 'Carbon Emission and Mitigation Cost Comparisons between Fossil Fuel, Nuclear and Renewable Energy Resources for Electricity Generation', *Energy Policy*, 31, 1315-1326

Smith, P. (2004): 'Soils as carbon sinks: the global context.' *Soil Use and Mangagement* 20, 212-18.

Svendsen, G.T. (2003): *Political Economy of the European Union: Institutions, Policy and Economic Growth.* Edward Elgar, Cheltenham, UK.

Tranæs, F. (2001), Danish Wind Energy Co-operatives, Part 1
http://www.windpower.dk/articles/coop.htm, (access date 28 August 2001).

Østergaard, Poul A., Morthorst, Poul E., Moesgaard, Rune og Enevoldsen, Svend W. (2006), "Vindkraftens betydning for elprisen i Danmark", IBT-Wind,
http://www.windpower.org/media(1464,1030)/vind_presser_elprisen.pdf accessed d. 6.04.08.