Renewables instead of Nuclear

On the Improvement of the British Renewable Energy Policy

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1. Introduction

The British Energy Policy some success in CO2-reductions, mainly due to the rush from coal to gas and due to the Renewable Obligation which especially favored wind energy. But compared to its ambitious goals (a 60% reduction of CO_2 by 2050) it suffers some severe deficits that have precisely been identified, for example by Woodman and Mitchell (2). The decline of North Sea oil and gas, rising dependence on energy imports and the rise of energy prices make the British Energy system vulnerable.

An issue advocated by PM Tony Blair is the launch of a renaissance of the so called nuclear option, financed eventually by a special tax (3). Such a step would have far reaching impacts, for Britain as well as for other countries (such as Switzerland) who have close relationships with the British Nuclear industry.

The shift towards new nuclear capacities could distract the efforts for energy efficiency and for renewable energy such as wind (onshore and offshore), biomass, geothermal, solar, wave or tidal energy, nationally and internationally.

Additionally the UK could again miss the chance of least cost energy generation by renewable energies. The shift to nuclear would harm the emerging British wind power industry and the prospects for wind energy exports to the European Continent in the long term.

British tax payers paid for the deficits of the nuclear industry for decades, including the ongoing financial support of BNFL, the bail out of British Energy, the coverage of long term costs for radioactive waste and for the restricted liability in case of nuclear accidents. Any new step which accelerates these costs should be prevented.

This paper looks at ways to improve the British energy policy, especially regarding electricity, and it recommends not to subsidize or favor nuclear power before the evident failures of the ROC system are corrected.

Renewable energies can fulfill all energy needs of the UK in a cheap and sufficient manner if an adequate policy is enacted, finally. There is an urgent need for a better framework which puts wind power and other renewable energy on an equal ground with non-renewable electricity generation, without accelerating the cost for consumers. For this to be done, experiences of other nations can be taken into account.

2. Shortfalls of the Quota/ROC system

Beside some fiscal incentives, the British renewable energy policy is based on a quota system (the Renewable Obligation and Renewable Obligations Certificates, ROC).

The ROC system created a tiny boom in renewable energy, notably wind and some biomass. But the system is limitational in its fundamentals and does not provide the necessary income security for investors that can be

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[2] Bridget Woodman and Catherine Mitchell: TOO LITTLE TOO LATE? **http://users.wbs.ac.uk/group/cmur/people/catherine_mitchell**

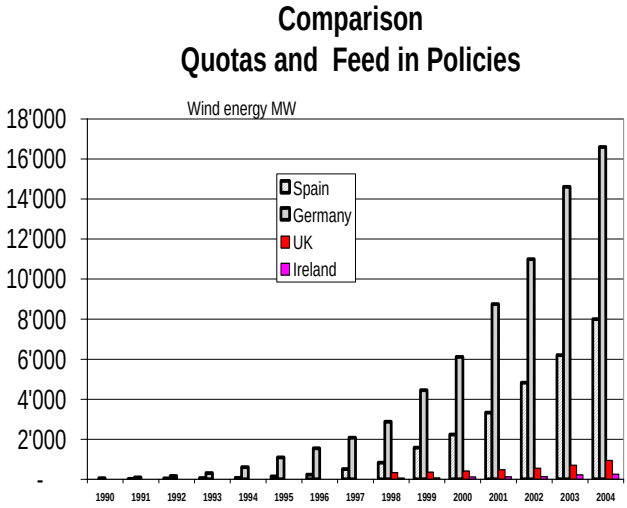
[3] Sunday Times November 27 (see appendix)

found in other nations. Compared to those, the British system still today lags far behind. Instruments who operate with fixed minimum prices such as in Germany, Spain or Portugal, have performed much better than the British quota system, and this at a lesser cost. But financial incentives is not the only condition for successful renewable policy. Despite the UK having the best wind resource in Europe, many more turbines are built in nations like Germany or Portugal, even now. [4]

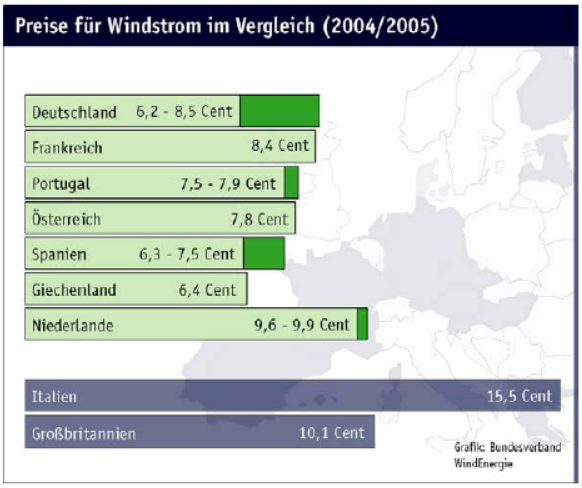
Progress in renewables depends on four key factors:

- a functioning site permitting system,
- reinforcement of the grid,
- a market structure which gives income security for investors and
- a support mechanism who advances less commercial technologies, including offshore wind, to an industrially sufficient extent.

Graph 1 Investments in wind energy compared (MW)



Graph 2 Payments for wind energy compared (Germany, France, Portugal, Austria, Spain, Greece, Netherlands, Italy and UK)



The contribution of wind energy is a minor one in the UK compared to other nations with different incentive systems, such as feed in tariffs in Spain (starting in 1995) or Germany (starting 1990, see graph 1). Most remarkably the British system is more expensive than any other system with feed in tariffs (Graph 2).

For British consumers though the situation must be frustrating: They pay a high price for a renewable obligation, but the contribution of renewables remains a minor one.

The planning process for wind plants in the UK has been improved. But a lot of British projects seem not to find adequate investors. We also observe that a very minor share of investors are non-corporate. In other nations there is a bigger diversity of investors, due to more stable conditions of wind farm income.

The quota system is at the core of most problems:

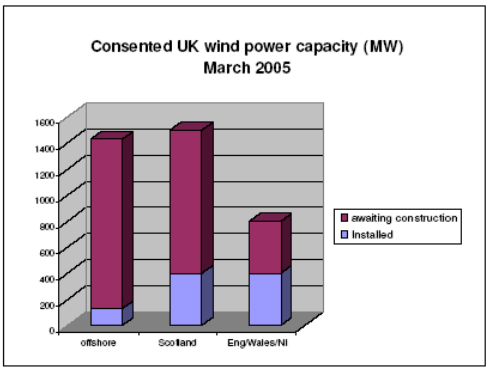
1. Quotas deliver no stable flow of income, depending on the price of ROCs. Investors are confronted with a flip-flop situation:

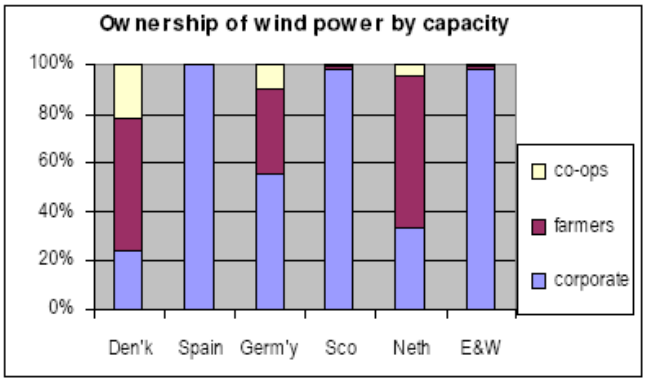
- When the supply of renewables falls below the number of ROCs demanded, the price of electricity consists in the price of energy (some £30/MWh), the certificate (ROC-)price (£40-50), including the redistribution of the buy-out price to the utilities.

[4] Environmental Change Institute: Wind power and the UK wind resource, 2005,

- When the supply of renewable electricity exceeds the demanded number of ROCs, the certificate price falls toward zero, due to an oversupply of ROCs to the market.[5]

Graph 3 and 4: Consented projects and ownership in Britain (Toke 2005) [6]





2. The insecurity of income, combined with the limited time frame of additional ROCs demanded beyond 2015 makes any wind power investment in the UK unduly expensive, compared to any other country in Europe. Investors have to ask for high risk premiums due to a lack of stable income.

3. Additionally the price of wind power in a ROC-system is defined by the marginal unity (the last, most expensive unit) delivered to an unsatisfied market which equals the buy-out-price. This leads to higher cost than in a system with customized payments, dependent on the local wind regime:

- some onshore producers get overpaid; they earn high windfall profits, due to government regulation
- projects with second-best resources or additional costs (offshore) can not get realized for a too high risk. Their cost (risk premium included) exceeds the buy-out price for the ROC-certificates, so they can not find investors unless additional government subsidies turn in.
- and equally, innovative technologies like wave and tidal or photovoltaics lack a stable framework for industrial promotion.

The shortfalls of the Quota systems have been pronounced by a recent study of the European Commission: *"The most effective systems in wind energy are currently in Germany, Spain and Denmark with feed-in tariff systems, although the green certificate systems, where they apply, present currently a significantly higher support level than the feed-in tariffs."*[7]

Widespread impacts of the quota failures

The impacts of quota systems are described by a number of authors.[8] Beside cost aspects they touch a number of sensitive conditions for the construction of new wind farms:

- The reduced ability of investors to find capital
- The "big only" access to market – small investors stay away, mainly due to the instable compensations.
- The difficulty to spend sufficient fringe benefits to the neighboring communities of wind farms.

Hvelplund[9] describes the special characteristics of renewable energy:

"1.Having a cost structure with a very high percentage of investment-/fixed costs and very low running costs, which implies high investor risks on the market, difficulties in establishing a free market as well as the increasing importance of keeping the competition on the equipment market alive.

[5] "The closer the supply of renewable generated electricity comes to meeting the annual obligation, the smaller the value of the recycled premium." Connor/Mitchell 2004

[6] Source: Wind Power Policy: Myths and Realities, Dr. David Toke, Senior Research, University of Birmingham, UK

[7] European Commission, Directorate-General for Energy and Transport: How to support renewable electricity in Europe p. 4, see Appendix **http://www.ewea.org/fileadmin/ewea_documents/documents/press_releases/2005/051207EU_RES_support.pdf**

[8] 8. Catherine Mitchell, Peter Connor: Renewable Energy Policy in the UK 1990-2003

[9] 7. Frede Hvelplund: Political prices or political quotas? Renewable Energy Governance models, Berlin 2005/Aalborg University, Denmark **http://www.unendlich-viel-energie.de/fileadmin/Symposium/Hvelplund.pdf**

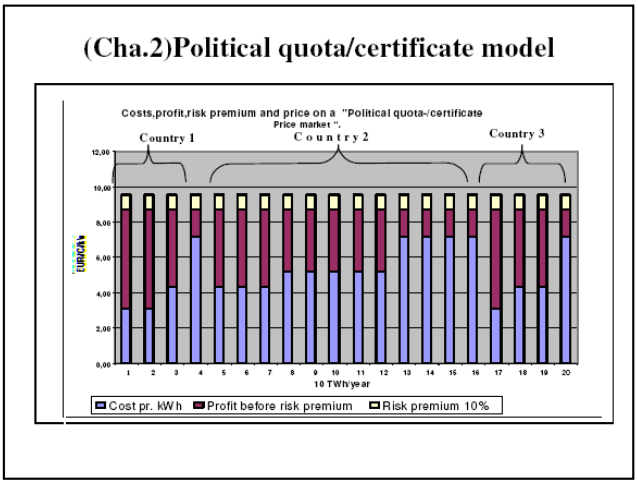
2. Having different natural resource bases from location to location, a factor which makes it necessary to establish a governance system, which furthers an EU-wide "site efficiency" generating process. The certificate price market system operates with a "mono-price" system, which does not take the regional differences in natural resource base into account.

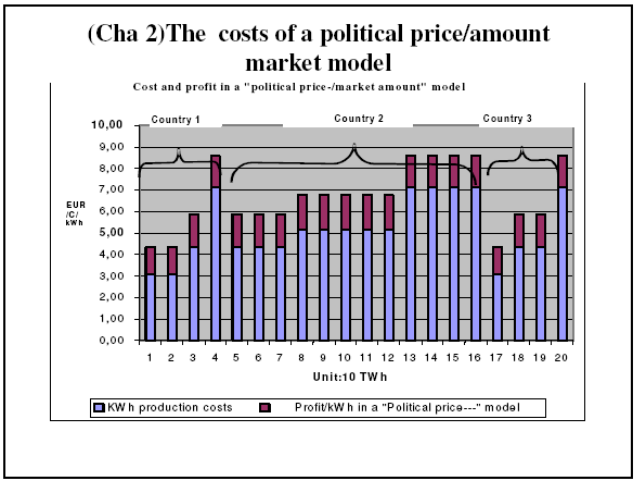
3.Being dispersed around the country, and often in residential areas, which makes it particularly crucial to involve neighbours and people from the region in the design, development and ownership of RE projects.

4. Being newcomer technologies, thus having minor market shares and meeting resistance strategies from established technologies.

5. Fluctuating sources (wind, photovoltaic and wave energy), needing a "compensating" infrastructure. (biomass, hydro, heat pumps, storage systems etc."

Graph 5 and 6: price of power in a quota system and in a customized minimum price system





In a quota system, even sites with cheap power resources get the full compensation at the cost of the marginal site or the buy-out price (as long as there is no oversupply of ROCs). In the fixed price/market model, compensations are customized along full load hours of any site.

No doubt that feed in tariffs can deliver a better benefit system in respect of these mentioned conditions:

- The feed in tariff eliminates undue windfall profits (beyond market price) related to wind regime
- The annual legal reduction of feed in tariffs (2% for wind in Germany) reduces cost differences over time in regard to conventional energies (additionally there is no adjustment for inflation)
- The stability of feed in tariffs for 20 years delivers a "bankable" security for investors.
- This investment security is the bedrock of profit sharing between investors and local communities which lead the way in Germany, Denmark and Spain toward a high acceptance of new wind farms. (This

seems not to be so much the case in the UK. Local opposition, many times reinforced by nuclear lobbyists, seem to prevent the spread of innovative new technology.)

3. Proposal for a dual system

In the next months the British government will make its choices on energy security. There are many possibilities to advance energy efficiency, by fiscal means and standards for example. But there should be a sound strategy in the question where the remaining primary energy should come from, and a market structure which favors least cost energy. This discussion should be based on *costs* and not on *prices* of primary energies, as wind power is by large the cheapest energy in Britain, provided a better compensation regime may take place.

Renewables, mainly wind energy, at a capacity cost of less than 1£/W, is much cheaper than nuclear, even when system costs like grid improvements and intermittency are integrated.

And there is a global trend toward wind power with some annual new investment of more than 100'000 MW projected for 2020 or soon after. [10]

Wind power companies such as Vestas or LM have launched strong investments in the UK. The offshore potential is so huge that an export option of this power to the European Continent will not be so far off. This option could make wind power even more viable than an isolated British strategy, the more as wind power trade over regions can level out intermittency, and some of the necessary grid investment could be financed by exports.[11]

A new way to go

There is no need to entirely abolish the once started ROC system. Instead we propose the introduction of a second tier, a *dual system*. Dual systems for compensations of renewables are common in some nations, such as Spain and Italy.

- In *Spain*, investors in wind can change between two different compensation systems:
  - They can rely on the fixed feed in tariff
  - They can sell to the market and receive an additional fixed "renewable production payment".
- In *Italy* additional to quota system, a feed in tariff was introduced for Photovoltaics.

Generally we think that the UK government should offer the cheaper price-guarantee-system to those investors who do prefer it.

It would be quite adequate to adopt the German compensation scheme for onshore and offshore wind. Because Germany has by far a lower wind resource, British compensations for new installations could be lowered somewhat steeper toward market prices than in Germany, provided enough investments can be observed. But any compensation regime should guarantee a stable price regime over time.

The feed in system is in force in some 16 European nations and it creates customized benefits for any energy technology – beyond wind also for geothermal, biomass or photovoltaics. It does not cap the additional energy feeded in, due to a non-stabilizing regulation.

The ROC-System could be continued for those who want it. But investors would have a choice between the two systems:

- **They could ask for ROCs and sell them on the market or**
- **They could ask for the stable, but lower minimum tariff, similar to the one in Germany, staggered along full load hours like in many other European nation.**
- **The switching of systems should be possible, namely from ROC toward feed in tariffs (maybe not back).**
- **Those who earn a feed in tariff are not supposed to get ROCs. Those ROCs stay in government hands and can (but do not have to) be deducted from the overall ROC-demand.**

The gain of such a system change could immediately increase the interest of investors, even for those who stay in the ROC-system. This is for they can change to the feed in system which gives them ad-

[10] BTM Consult: Ten Year Review of the International Wind Power Industry 1995 to 2004, New forecast for 2015, Long term Scenario for 2025, press release October 19, 2005, **http://www.btm.dk/Documents/Pressrelease-TYR.pdf**

[11] See for example Gregor Czisch: Least-Cost European/Transeuropean Electricity Supply Entirely with Renewable Energies **http://www.europarl.eu.int/workshop/renewable/addocs/czisch.pdf**

ditional income security. This eventually could lead to a lower ROC-price in the medium term that could lead to a convergence of compensations.

4. Some Additional proposals

Intermittency

Many times opponents of renewable energy do pronounce doubts because of intermittency. But intermittency can be managed in an integrated power system with a diversity of sites and technologies. Additionally, a small number of hydro pump storage (overall efficiency 80%) like in Switzerland could bring a cushion of extra power for a couple of days or weeks with no or low wind; additionally you should install some HVDC lines to Norway and/or Switzerland, to use the hydro storage there. These system modification can be implemented step by step and they increasingly prevent you from a fall back on fossil fuels. The expansion of grids also can open doors for wind power exports in the longer term.

Local participation

In Switzerland there is an old tradition of income sharing between locals and investors. A fair share of somewhat less than 1 €C./kWh goes to locals who neighbor the big hydro facilities. This has a strong promotional impact for new investments and can easily outdo nimby-opposition. Another option would be to have direct investments from neighbors of wind farms.

Zoning rules:

In Germany, the law gives priority for wind power: On all land of communities who have not defined (restricted) wind zones, the land owner is allowed to install wind turbines, provided some mimimum distance rules to the next settlement are respected.

Local communities, counties or provinces have a right though to define restricted wind zones. In Schleswig-Holstein some 1% of land declared as “wind zones” are sufficient to deliver 50% of all electricity needs by 2010. In the UK the provinces could deliver a mandatory minimum zone for wind power, so that 50% of electricity needs can be derived from wind power.

- As long as a province has not delivered documented evidence with the conformity of national goals, any land owner should be allowed to erect wind turbines on appropriate land.
- These minimum zones maybe could be tradable between provinces (so Scotland may deliver additional zones on a contractual basis to other provinces which do not want to define zones for population density reasons and such)

Reform of ROCs

Independent of the adoption of minimum price systems, there should be a reflection on the ROC system?

- When energy security is a goal – why are Rocs restricted to just 1 additional percent a year?
- Why should there be a limited number of Rocs at all? It would be better to demand that the entire ROC-demand is a certain percentage higher than supply (1-2 precent). This could abolish dis-incentives for additional capacity in renewable energy.
- Why should an installation which is older than 20 years earn a ROC? Elimination of ROCs for installations older than 20 years could abolish windfall profits and generate incentives for new investments.

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