Klaus Stocker: Financial and economic justification of subsidised Off-shore Wind Projects

Author: Prof. Dr. Klaus Stocker, klaus-Stocker@t-online.de, Tel +49-6172458772 (until July 8th: 060-4361172)
Georg-Simon Ohm Institute of Technology, Bahnhofstr. 84, D-90401 Nürnberg, Germany

OVERVIEW:

Most renewable energy plants can survive only with heavy subsidies by governments or the electricity consumers. Subsidies are being justified by various arguments: expected economies of scale, green house gas savings, a cleaner environment and subsequent improvement of quality of life as well as health improvement and –particularly in Germany- increased safety by the closure of nuclear plants. The main question is, which ones of these expected benefits (and also some social cost) can be identified or even quantified. Among the most risky and costly experiments at the moment, particularly in Europe, appear to be off-shore wind farms. This paper, structured as a case study of an off-shore wind farm in Germany, discusses approaches how to identify and quantify such benefits and compare them with cost and subsidies.

METHODS:

After a glance through to recent literature in particular on the economies of renewable energy a concrete case of an on-going off-shore wind-park is analysed. Because exact and changing cost data are not openly disclosed, some of the cost are estimated based on similar projects. Firstly the project is evaluated from a financial standpoint and –by using the net present values- the subsidies on the levelised unit cost are identified. After this, the non-financial outcomes and impacts are discussed and, by going through known methods of quantification of such outcomes and impacts, a range of potential quantitative benefits is estimated and compared with subsidies. The non-financial benefits or "outcomes and impacts" can be external (e.g. CO_2 reduction) as well as internal benefits (e.g. know how gains and economies of scale).

RESULTS:

The project is financially viable because of considerable subsidies. The internal rate of return of around 7%, however, does not really look impressive if the significant risks are considered, in particular cost increases und insecure tariff development after the phasing out of the subsidies. After this the non-financial outcomes are estimated: for the monetary value of CO_2 reduction a bandwidth between 15 and 54% of the subsidies can be established, a conservative 15% being the more trustworthy value used here. Based on past experiences and some serious estimates of learning-curve cost reductions a value of 25% within 20 years can be reasonably expected and another 20-30% of social benefits may be accounted to the so called merit order effect. So altogether around 65% of the subsidies could be reasonably accounted to external as well as non-financial internal benefits, not yet taking into account heavily disputed increases in safety and unknown benefits on health. This does also not include potential external cost due to negative capacity effects to conventional power plants.

CONCLUSIONS:

The results show that investments in off-shore wind technology must still be considered as very risky and subsidies are only partially justified. Reducing subsidies, however, would mean that the projects would become financially unattractive and no private investor could be found to carry them out. So politicians are facing a dilemma and they must decide without having solid knowledge about economic justification. On the other hand the calculation framework developed here allows us to compare the specific CO_2 avoidance cost of different technologies (like energy efficiency improvements or insulation of buildings) and recommend an economically viable path of developing and, where necessary, subsidising such technologies. It also contributes towards a more rational discussion of potential benefits and avoidance of wishful thinking whenever green technologies are involved.

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