

PUBLIC ACCEPTANCE OF WAVE ENERGY

Hansen, L.K.¹, Hammarlund, K.², Sørensen, H.C.¹ & Christensen, L.¹

¹ SPOK ApS, Blegdamsvej 4, DK-2200 Copenhagen N, Denmark. tel: +45-3536 0219, fax: +45-3537 4537, email: consult@spok.dk

² Hammarlund Consulting, Faarabøke Gård 3584, SE-260 60 Kvidinge, Sweden. tel: +46 435-205 41, email: karin@hammarlundconsulting.com

Abstract:

The paper presents an overview of the main issues regarding ocean renewable energies and public acceptance. The paper is based on experience from the development of existing wave energy pilot plants, offshore wind projects in Danish and Swedish waters, and based on experience gained from the EU Thematic Network on Wave Energy.

It is concluded, that although the biggest challenge currently is to improve public knowledge about wave energy, it is important that public acceptance and mitigation are not ignored. If mistakes are made before large-scale deployment takes place, it may prove very difficult to make wave energy acceptable to a vast majority of the population. The overall recommendation is therefore 'dialogue instead of defence', which demands early public consultation/involvement and open, flexible project planning.

Introduction

Wave and tidal energy are both essentially benign activities. Despite this, as has been shown for wind power, a lack of especially local public acceptance could hinder the development of wave and other renewable energy projects.

From a more pragmatic, economic point of view, it is currently of vital importance for renewables that they are supported by the political system. As long as externalities are not internalised in the price of fossil fuels and nuclear energy [8] the development of wave and tidal energy is dependent of some sort of subsidies. This will be very difficult to justify, if not impossible, if the energy source is not supported by a large majority of the public.

In general opinions polls show that more than 70% are in favour of renewable energies, but developers cannot presume on acceptance for individual projects, among others because the local public (incl. tourists and other users of the sea) often may focus on the impacts, since the benefits (financial and environmental) lay hidden mainly on a national or international level.

At the present early stage of wave energy development it is therefore important that socio-technical aspects¹ such as public acceptance and mitigation are not ignored. If mistakes are made now during the planning and construction phase of specific projects, it may become difficult to make wave energy publicly acceptable in general.

When carrying out specific projects there must therefore be an understanding of the local social context and important issues for the concerned population, and the strategies for gaining especially local public acceptance must be thoroughly

considered: It must be known who to address, when to address and how to address the public.

Public acceptance of renewables

The preconditions for wave energy for achieving a broad acceptance from a large majority of the public certainly exist. Opinion polls from e.g. Denmark show that renewable energies in general (in this case wind and solar energy) are the preferred energy sources, if people could choose themselves [5].

We cannot however presume local acceptance based on national surveys, as examples from for instance UK clearly indicate, see below.

It is in this respect important to note that public opinion can be divided between 1) representative national views, usually considering issues in a more abstract and remote way, and 2) local views based upon the potential or actual experience of particular developments. Practical experience shows that the perceived environmental impacts are of special importance to the public, in particular the local public [4].

This is one explanation why public acceptability is sometimes seen as an increasing constraint on the exploitation of renewable energy. Despite what seems to be a high level of national support for the development of renewable energy, attitudes towards specific projects among authorities and the public can be negative, and often conflicts appear within the process of planning and approval. Experiences from studies made of the public opinion of wind energy show that attitudes can be highly variable, dynamic and sometimes contradictory.

Social acceptance of renewable energy has often been characterized by a NIMBY (not in my backyard) syndrome [9]. The NIMBY-explanation is, however, a too simplistic way of explaining the many variables involved when determining the

¹ Socio-technical aspects concern the introduction and use of new techniques in a social context

general and local public acceptance of a specific project.

Other factors, such as the attitudes towards the developer, local decision makers, and the decision process, for instance, seem to have significant influence on the public attitude towards the project [14].

Socio-technical aspects, i.e. how people make use of a technology and how it is deployed in our societies, are thereby very important.

These socio-technical impacts of renewables development can be broad, including visual, audible, aesthetic and recreational dimensions of concern to people living in the vicinity of a plant, but also other dimensions such as trust, institutional support or lack of support from other actors, knowledge, issues of risk and uncertainty are relevant in the forming of public attitudes to a renewable energy project.

This means that the question of social acceptance really has many components, e.g.—

- the general attitude towards renewable energy in the population as a whole,
- the acceptance within the subpopulation that will experience the local impacts,
- the management strategies for public (and economic) involvement, and
- the legal frameworks for public consultation and involvement.

Legal frameworks

For specific renewable projects the way of using the legal frameworks as a mean to obtain public support becomes a key issue during the pre-planning and planning process.

The legal frameworks for public consultation and participation in larger renewable projects, and thereby in future large-scale wave energy projects, are national directives fulfilling the requirements of the EU Environmental Impact Assessment (EIA) directives [3]: Projects that are likely to have significant effects on the environment must be subject to an EIA before they can be allowed to proceed.

Furthermore, the public will in future be consulted earlier than currently is the practice regarding the effects on the environment of certain plans and programmes, according to the so-called Strategic Environmental Assessment (SEA) Directive, which must be transposed into national laws by July 2004. This is one example of a response to increased demands for deliberative democracy in planning procedures.

The SEA Directive

Where a SEA is required, the authority responsible for the plan will need to, e.g.

- prepare an environmental report on the likely significant effects of the plan

- give the wider public an early and effective opportunity within appropriate time frames to express their opinion on the draft plan and on the accompanying environmental report before the adoption of the plan [2]

- take into account the opinions expressed by the public during the preparation of the plan before it is adopted [6].

The authorities should explicitly show how the consultations with the public and the local authorities have been taken into account.

The SEA directive can be seen as a useful tool in securing that the local public is consulted at an early stage of the planning process. It is however to be expected that this directive will only be relevant for a minority of the coming smaller-scale, wave energy demonstration projects.

Even where projects do apply to this directive, there is no guarantee that the concerned public actually find that they have been heard. In other words this directive should not be considered a pretext for doing nothing by the developers. As described in more details below it is crucial that the local context is well-known and that the local public is informed *and* heard by the specific developer at the earliest possible stage of the planning phase.

Environmental Impact Assessment (EIA)

The main purpose of the EIA is to examine in detail the impacts of the project, and this also includes a requirement for a running public consultation.

The public that is likely to be most concerned about a project must be informed and consulted, but often the public experiences no realistic opportunity to have an effect on the scale and layout of the project. This is due to various different consultation approaches and due to the fact that the process of information and consultation is often carried out by the developer without any involvement from the responsible authority and with no knowledge about the sometimes dramatic consequences of an inadequate dialogue with the public.

An EIA, when it is carried out appropriately, involves a flexible procedure where amendments to the original proposal are constantly weighed against all different aspects of the project, and mitigation is discussed in order to arrive at the most acceptable form of development.

It is impossible to understand, which mitigation measures are relevant, if there is no open dialogue between different concerned parties.

In the EIA, therefore, the true potential of the project lies hidden. Hence, the relevant issues of an EIA will prove to be relevant also to the decisions made during the planning phase of a project. If the scope of an EIA also covers social impacts of a development, this will prove to be an important foundation for a dialogue with the concerned population. Even better, there will be an

understanding of how the population perceive themselves as affected and what their concerns are when it comes to specific wave energy projects.

It should therefore be known whom to address, when to address and how to address, because if there is no understanding of the local social contexts and important issues for the concerned population these concerns cannot be addressed. In addition, there will be no opportunity to follow up on the mitigation measures taken or to document experienced effects as opposed to perceived ones. This is something that may prove essential to coming projects and company good will.

An EIA, in this respect, might prove to be the foundation needed for the appropriate adjustment of the project to the prevailing circumstances. Hence, the EIA process should not merely end up and be seen as a document required by law (Environmental Impact Statement - EIS). An EIA is a dynamic process, a framework and tool which helps us to determine the best technical, economic and social solutions for a development.

Experiences from wind energy

As the experience from wave energy projects is currently very low [15], the ocean energy community must learn from experiences gained from other renewable projects, especially (offshore) wind.

As stated above opinion polls in countries like the Netherlands, Germany and Denmark in general show that more than 70 % of the population are in favour of using more wind energy [4, 11, 13, 16].

In the UK, a summary of opinion surveys carried out between 1990 and 2002 found that 8 out of 10 people support local wind projects [1].

This has however not prevented several wind projects from being delayed or blocked, as it may take only one devoted opponent to start a legal procedure against a planning permit. Furthermore, if there is a lack of documented dialogue with the public there is nothing that can balance wrongful accusations or misleading statements regarding the general public's concerns about the effects of a development.

In order to avoid delays of or protests against wind projects, the following issues, that are obviously all interconnected, have proved to be very important:

- the strategies and timing regarding information and consultation
- the strategies for public involvement
- the transparency and flexibility of the planning phase

Strategies for public acceptance

There are many different forms of public participation in wind projects, but basically the public can be involved in a project in three important ways [see 10, 14, and 16]:

- through information about ongoing development (information),
- through involvement in the decision making process (planning participation),
- through financial involvement in the project (financial participation).

Information strategy

The most common approach is the information strategy, which may be more or less passive.

Often only the minimum requirements regarding consultation are carried out, e.g. in the form of an advertisement in the local newspaper about a public hearing.

The public in such cases is almost never offered a direct influence on the decision and they may receive the information at a time when the project planning has been taken so far that no actual influence seems or is possible.

This choice of strategy may be due to imagined disadvantages and misconceptions, such as [14]:

- public participation may worsen the situation,
- public participation might slow down the project development,
- it is impossible to satisfy all interests so you might as well not try,
- public participation may expand the scope of any conflict.

Often planning strategies are based on the assumption that the local public opposition can be overcome by rational decisions made by experts, and that people will eventually get used to change. As experiences have shown, this is certainly not always the case, as infra-structural development is no longer automatically looked upon as a common good in our post modern society.

The information strategy may however also be carried out in a more satisfactory way, where the public concerned – the local public, tourists and other users of the area – are more directly informed and involved e.g. direct mailing, enquiries and public hearings - this at a time when it seems possible to have an influence on e.g. the layout and the outcome of the project.

Satisfactory information obviously put new demands on the information given; for instance Swedish investigations indicate that visualizations can cause problems with acceptance because pictures do not present the true visual impact of e.g. wind turbines on a landscape, neither do they present their functional contribution [10]. People construe e.g. the depicted wind turbines not as a source of renewable energy but as a new element in the landscape that will diminish its scenic value.

Visualizations undeniably have some value in accelerating social adjustment by providing an idea of what planned developments will look like, however, these pictures never truly depict the real experience.

The benefits of using visualizations are connected to a person's professional training and his or her previous experience of wind turbines. If people can understand the rationale behind certain designs or if they can recognize some benefits in relation to other wind power locations, visualizations can work well to create a positive dialogue. In this context it is important to understand that a 'picture' can both suppress the benefits of wind turbines and camouflage some of the visual effects. Hence, visualizations must always be accompanied by detailed explanations that are understandable to the local public.

Homepages presenting the planned project may also be valuable sources of information and present visualisation with use of "virtual reality" in a way that resembles the final experience more than traditional visualisations.

A professional homepage with regular updates and where people receive quick responses on their questions is generally a good mean for promoting confidence in the project and the developer, but is not sufficient *ad se*.

Planning participation

Another strategy in wind power projects has been to directly involve the local public early in the planning phase, and incorporate the recommendations into the project. The purpose of this strategy is to give the local population a motivation to accept change by, for example, giving them a say in the planning of the project, which will generate an interest and also eliminate misconceived threats.

The 'risk' of this strategy is that the public debate may generate so much awareness that it delays the whole planning procedure. A delay, which on the other hand is unavoidable when permits are appealed against.

However, if the channels for a dialogue are kept open and looked after, potential threats can be mitigated before a more general disruptive protest is formed. If a sense of public control is created through an open and dynamic dialogue, the confidence of the public can be achieved.

This is a very efficient way to navigate towards not only a successful outcome of a project but also future confidence in renewable energy developments.

The advantages of public participation in the planning process may therefore include -

- an essential improvement of planning decisions and balancing of different aspects,
- increased awareness of public concerns,
- an increased understanding of possible cooperation between opposing parties,
- elimination of misinformation and misconception of threats,
- future confidence and acceptance.

A broad-based participation strategy in the implementation and decision process was used in a Swedish offshore project in Kalmarsund conducted by Vattenfall, the largest utility in Sweden. This form of 'conflict management' extended the group of actors involved in the decision-making process, increased transparency and promoted negotiations and discussions.

The strategy of the Karlskrona Offshore project was to directly involve the local public early in the planning phase, and incorporate the recommendations into the project planning and decision-making.

The Karlskrona Offshore project distributed two inquiries along the coast in order to identify in which geographical area the public felt concerned, and what they were concerned about. The replies to these enquiries and subsequent interviews were very useful for guidance concerning what topics were of central importance to emphasise in the EIA and how to mitigate in order to arrive at an acceptable EIS. Also, enquiries and interviews made it possible to prepare and address the issues of central importance to the public at public meetings. This was a very effective way to create confidence in the project and the developer, Vattenfall.

Another example of use of the planning participation strategy is the Danish Middelgrunden project, where dialogues with many kinds of interest groups, in particular neighbours and NGOs, and the Middelgrunden Cooperative, generated a widespread understanding for and social acceptance of the chosen location and layout of the farm.

Some neighbours to the farm, just located 3 km off shore from very popular recreational areas, feared that noise would become a problem, but after a demonstration visit to a modern onshore turbine, they realized that this would not be the case.

An example of dialogue with NGOs is the case with the Danish Society for the Conservation of Nature. At first they decided to reject the proposed location, but through involvement of and information directed at the *local* committees of the society, this decision was later changed. In the end the Middelgrunden project was actually supported by the whole Danish Society for the Conservation of Nature.

Finally, the original layout in 3 rows was changed to the present curved line by the developers, among others as the result of public hearings.

If there had been no proper dialogue and no time for changing the project, protests might have blocked the construction of this 40MW offshore farm, which in 2001, as it was completed, was the world's biggest offshore wind farm and today by far is the one closest to recreational and densely populated areas.

Financial participation

In some offshore wind projects, and many onshore wind projects especially in Denmark and Germany, the public has been involved as owners of (part of) the turbines e.g. when buying shares, thereby sharing potential economic risks and profits from the project.

This is the case for instance at the Middelgrunden and the planned German Butendiek offshore projects.

One obvious advantage from public financial involvement is the fact that the specific project and the specific energy source in each shareholder will have an advocate who can disseminate information to relatives, friends and colleagues, thereby increasing public interest and acceptance.

Furthermore, and this is an important point, financial participation from the local public is a way of enabling direct benefits to the local public (if the project generates profits...). This is a way of overcoming the discrepancy of renewable projects where, generally speaking, the impacts are perceived in the local areas, whereas the benefits are on a national level (environment), and thereby are not sensed by the local public. The financial benefits are usually profited by e.g. remotely located utilities or investors.

It is believed that the strong public participation, including the public financial participation in the Middelgrunden offshore wind project, was an important prerequisite for the success of the project. The public resistance has been surprisingly small despite the obvious visibility of the twenty 2 MW turbines near Copenhagen [12].

Wave energy – introduction

As stated above, it is the experience from (offshore) wind projects that the perceived environmental impacts (including visual aspects and noise) are of special importance to the public, in particular the local public.

It is therefore expected that onshore and near-shore wave energy projects make extra demands on developers in relation to providing information to and gaining the involvement of the local public, in order to secure the highest possible level of acceptance. Information about the expected and the experienced environmental impacts is crucial, also in this respect.

There is however every reason to believe that wave energy may become equally accepted, or even become more popular than wind energy, as a particular advantage of offshore renewables is regarded to be their potential for greater public acceptability, because of lower visual impact [6].

In general, the biggest challenge, currently, is regarded to be the low public knowledge in most EU countries concerning wave energy.

As legitimacy is strongly connected to usefulness, and usefulness is an essential quality for rational technology, techniques have to be known in order to be seen as useful. Techniques with a high degree of utility are seen as rational and a technique must produce the wanted effects in ways that are acceptable to the users. These facts are important to know in order to successfully introduce and promote wave energy technologies.

It is therefore necessary that wave energy becomes known to the public as a huge, important and reliable source of energy, and that the specific principles for harvesting this energy are communicated and understood at not only an international and national level but also understood at a local level.

Experiences with wave energy

The experience with public acceptability in relation to both wave and tidal energy is so far very limited. The test devices that have already been deployed, or will be deployed within the foreseeable future, have generally had the same information strategy: To keep the public well-informed, e.g. through websites and newsletters, but there has been no direct involvement of the public in the projects.

As the demonstration projects do not have to carry out an EIA, it has not been necessary to consult the public or inform the local public directly.

The projects have been discussed in the local press, and in some cases objections especially concerning visual and noise impact have been expressed, but there has been no organised dialogue with the public.

Only in relation to the planning and construction of the Orkney Marine Energy Test Centre public meetings have been held concerning the whole centre, but so far not concerning one specific device/project.

The reason for the general lack of public consultations and involvement during the planning and construction of the first and second generation wave energy projects is obviously the fact that it has not been necessary, from a legal point of view, and that it has not been possible from a financial point of view.

Experience from especially wind energy show us however the importance of information (and public dialogues) and the importance of avoiding technical solutions that are unacceptable to the local public. Many wind projects of today are met by protests because earlier generations of wind turbines were noisy and projects were carried out with no understanding of the local context and concerns.

Developers and authorities should therefore remember to develop environmentally acceptable solutions and promote openness and local involvement also at this early stage of development - if mistakes are made at this point, before large-

scale deployment takes place, it may prove very difficult to make wave energy acceptable to a majority of the population.

Wave energy - recommendations

In order to promote public acceptability of wave energy - based on the existing legal frameworks and experiences from wind and wave energy projects - below some general and project specific recommendations are presented:

In general, it is recommended that

- the public knowledge about wave energy is increased through information campaigns directed at press, public and politicians, for instance when new devices are successfully deployed.
Greater government publicity of its plans for renewable energy developments would help achieve greater acceptance of renewable energy projects. It cannot all be left to the developers, as not everyone will believe their version of the truth [7],
- information is shared world-wide both between developers and authorities. Networks, like the EU Coordinated Action on Ocean Energy should be used in order to avoid mistakes, and especially repetition of identical mistakes,
- developers should consider the benefits of direct public involvement, for instance when the development of specific projects have resulted in a production price that makes public financial participation relevant.

In relation to specific projects it is recommended that

- each project developer aims at the highest positive level of openness and information, already *during the preplanning phase*
 - developers (and authorities) need to be sensitive, thoughtful and diplomatic when developing new proposals. They need to involve local people at the earliest stages, take into account and address their concerns,
 - in order to obtain knowledge about local social contexts and important issues for the concerned population the information strategy must be considered; it should be known whom to address, when to address and how to address,
 - especially concerning onshore and near-shore projects, those responsible for the final layout of the plant/farm, e.g. landscape architects, should become actively involved in the public dialogue

- information should explain in the simplest possible way what is being proposed, what the likely effects and benefits are and the specific technical aspects behind the concept, i.e. how is the energy harvested and which implications does this have in relation to the suggested layout,
- developers should do their utmost to ensure that the whole local community benefits, and is seen to benefit from the proposed project, for instance by engaging local work forces;
- developers keep the high information level both *during and after construction* by regularly providing direct information (mails and emails) and indirect information (webpage, press releases information poster near deployment site), about the progress of work and especially changes of plans.
 - the information should stress the project's effect in relation to job opportunities, use of local suppliers, power produced, emissions avoided, energy payback times etc.,
 - if possible visitors centres should be constructed, and guided visits to the plant(s), should be arranged, on a regular basis, using local employees.

Conclusions

As legitimacy is strongly connected to usefulness, wave energy must become known to the public as a huge, important and reliable source of energy before general public acceptance becomes possible or even relevant.

Developers and authorities must remember that they cannot expect local public acceptance, just because renewables in general are supported by a large majority of the population.

An open public dialogue initiated already in the very beginning of a planning phase is therefore crucial for achieving social acceptance – which is important, also in respect to political decisions. Thus knowledge should be provided about the social context of the local area, incl. the function of the landscape/seascape.

The overall recommendation for wave energy is 'dialogue instead of defence', which demands early public consultation/involvement, all according to the procedures required for an environmental impact assessment (EIA). The EIA process should not merely end up as a document presented to the authorities, but should be a dynamic process, a framework and tool for the whole project development.

If the subject of social acceptance is taken seriously already now, and mistakes as seen within the development of wind energy projects are mitigated, there is every reason to believe that wave energy

may become highly publicly acceptable, both on the national and on the local level.

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