Climate - Policy

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Acceleration of clean technology deployment within the EU: The role of social acceptance

Large-scale GHG emission reductions are feasible to attain, both technically and economically. It is essential to consider the social aspects that influence the acceptance of climate-friendly technologies and measures, however, because a lack of public acceptance may delay or halt the exploitation of these opportunities.

The following five elements are thought to determine the level of public acceptance of clean technologies: awareness of climate change and knowledge of clean technologies; fairness of the decision-making process; the overall evaluation of costs, risks and benefits; the local context; and trust in decision-makers and other relevant stakeholders.

A clear strategy should be used to gain public acceptance of clean technologies and avoid (large-scale) public resistance. This applies both to the level of individual projects, where developers and the government should consider all five elements of acceptance, and to higher policy-making levels, where awareness and fairness, in particular, should be taken into account.

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Acceleration of clean technology deployment within the EU: The role of social acceptance

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Background information and additional references on the elements of public acceptance, as well as more case studies, are available in a POLIMP background paper (www.polimp.eu)

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THE ROLE OF PUBLIC ACCEPTANCE IN TECHNOLOGY DEPLOYMENT

In its Roadmap for Moving to a Competitive Low Carbon Economy in 2050, the European Commission has outlined how the EU can become a competitive low-emission economy by 2050, with possible actions leading to a reduction of greenhouse gas emissions of 80-95% by 2050, compared to 1990 levels (EC, 2011). The roadmap is based on an extensive modelling exercise with several possible scenarios for different sectors, which show where existing and planned policies would lead and what additional efforts are needed. The Roadmap underlines the importance of technology innovation for achieving the targets:

> "R&D, demonstration and early deployment of technologies, such as various forms of low carbon energy sources, carbon capture and storage, smart grids and hybrid and electric vehicle technology, are of paramount importance to ensure their cost-effective and large scale penetration later on."

From the alternative scenarios described in the Roadmap it can be concluded that a GHG emission reduction of 80-95% is technically feasible. It is also indicated that economic benefits could possibly outweigh the costs, especially when new job opportunities in innovative industries and enhanced competitiveness in low emission growth are considered.

In addition to these technical and economic aspects, it is essential to include an analysis of the social aspects that influence the acceptance of clean technologies and measures (Batel, et al., 2013; Musall & Kuik, 2011). Technologies that are technically and economically feasible in a given context may not be successfully implemented due to social resistance, lack of awareness of the technology, etc. Public opposition could then delay or obstruct the implementation of sustainable technologies and measures, such as renewable energy projects. This could hamper the attainment of environmental and societal goals, such as greenhouse gas emission reduction goals.

Against this background, it is vital to improve public acceptance so that technologies can live up to their technical and economic potential. The role of improving public acceptance will not be limited to local regulators and project developers. EU and member states' policymakers should design policies that increase public willingness to pay for the costs of low-carbon technologies, and thereby enhance the predictability of clean technology investments.

Box 1. Definition of 'acceptance'.

Social or public 'acceptance' is defined as a positive attitude towards a technology or measure, which leads to supporting behaviour if needed or requested, and the counteracting of resistance by others. Acceptance that only covers an attitude without supportive behaviour may be described as 'tolerance'.

Note: The definition of acceptance is discussed in literature by e.g. Batel, et al. (2013), Hitzeroth & Megerle (2013) and Huijts, et al. (2012). See the background paper to this policy brief for a detailed consideration of the definition.

ELEMENTS OF SOCIAL ACCEPTANCE

Considering that the success of climate-friendly technologies and measures largely depends on their social acceptance, it is important to have clear insight into the elements that influence public attitudes. These elements may be categorised as follows:

- Awareness of climate change and knowledge of clean technologies;
- Fairness of the decision-making process;
- Overall evaluation of costs, risks and benefits of a technology;
- Local context;
- Trust in decision-makers and other relevant stakeholders.

Awareness

Knowledge, experience, social responsibility and environmental awareness are main factors that affect people's acceptance of clean technologies and measures. In other words, social acceptance is influenced by both the awareness of climate change and its impacts, and the knowledge of the technology or measure in question.

Despite keen awareness of climate change and its impacts, many people do not behave sustainably and may not support the development and implementation of clean technologies and measures. It has been suggested that this mismatch is caused by the 'psychological distance' that people experience with regard to climate change, in terms of time ('when will climate change affect me?') and geography ('will climate change also affect my country?'). An important aspect that indeed keeps the issue of climate change psychologically distant is its uncertainty: in a survey in the United Kingdom, 70% of respondents agreed that there is uncertainty over the effects of climate change, and 40% thought that the effects of climate change are being exaggerated (Spence, et al., 2012).

Notwithstanding this psychological distance, there is an evident positive relation between people's awareness about climate change and its impacts, and their preparedness to act. Increased awareness generally increases the willingness to counteract climate change and the acceptance of climate-friendly technologies (Spence, et al., 2012; Strazzera, et al., 2012; Thøgersen & Noblet, 2012).

Even in relatively climate-sceptic countries, mainly in Central and Eastern Europe (Buchan, 2010), awareness of environmental protection and resource saving can bring forward the acceptance of climate-friendly technologies, although this may be framed in isolation from the climate change debate.

Apart from awareness about climate change, it is important that the public is sufficiently familiar with proposed technologies. For new technologies, timely, complete and balanced knowledge needs to be provided in order to raise awareness on its costs, risks and benefits. Experience shows that potentially useful technologies will not be considered if the public is unfamiliar with them, so that many new and existing technologies are not commonly used (UNDP, 2010). Project developers thus have to consider their outreach towards the general concerned public, i.e. also those citizens who are not organised in interest groups.

Fairness

The perceived fairness of the preparatory and decision-making processes influences how the public will evaluate a technology or measure. Procedures are considered to be fair when they are open and transparent, the public and stakeholders have a voice in decisions, and these inputs are given consideration by the decision makers (Terwel, et al., 2011).

Awareness-raising is important to give all stakeholders the opportunity to be involved in a fair process. Perceived fairness is generally higher if decision-makers are considered to be trustworthy. In turn, a fair and inclusive process leads to trust in decision-makers (Huijts, et al., 2012).

In addition to public participation in the planning and decision-making process, economic participation may also increase the social acceptance of technologies. Several studies have found that joint ownership or community co-ownership of projects leads to higher social acceptance (Musall & Kuik, 2011; Strazzera, et al., 2012).

Evaluation of costs, risks and benefits

Social acceptance of a clean technology or measure will depend on the assessment of its costs, benefits and potential risks. This assessment is inherently subjective, as the public does not usually have complete knowledge or

Box 2. Low acceptance of wind farms in the Netherlands.

Several wind farms are planned in the *Veenkoloniën* area of Groningen and Drenthe provinces, the Netherlands. As part of the national government's ambition to have a capacity of 6000 MW of on-shore wind power by the year 2020, wind farms with a total capacity of around 700 MW will be installed. The planning and preparation of the project is carried out in a top-down manner by the Ministry of Economic Affairs. Direct agreements are made with local land owners, mostly farmers, on the placement of the wind turbines.

The local population is informed on the spatial designs of the wind farms, but citizens' needs, local initiatives, stakeholder interests and other local economic functions were overlooked in the planning. As a result, the local population has no direct revenues or benefits from the wind farms and are merely faced with negative effects related to "visibility, noise and the intermittent shade of the wind turbines" (De Boer & Zuidema, 2013). Because initially only land owners were involved in the planning process, resistance to the plans evolved from the wider local community during public hearings.

The survey by De Boer and Zuidema shows that the local population does not resist wind energy per se, but "they found it unfair that such an unequal share of the (…) wind power capacity was designated for installation in their region." In other words, a low level of distributive fairness is perceived by the public. This is reinforced by long-standing feelings of local residents that their region is being disadvantaged. The trust level in the national government was therefore already low.

adequate information. The assessment made is therefore either a result of their level of awareness, or based on an assessment made by someone else, such as the project developer, the government, or an interest group.

The costs, benefits and risks of a project may be public or private, and in addition to the overall cost-benefit analysis the equal distribution of outcomes for each of the stakeholders also influences the evaluation. If a stakeholder or group of people is significantly worse off, compensation can take place in order to rebalance the sum of costs, risks and benefits (Kamas & Preston, 2012). However, this has to be carefully approached, and a local characterisation has to be made before thinking about compensation. An offer of compensation may be considered a bribe by some, because they are not looking for money but just want their opinion to be taken seriously.

While this overall evaluation of costs, risks and benefits assumes full rationality, in reality people are not expected to evaluate on a purely rational basis. The evaluation of a technology, measure or project also depends on emotions, ethical questions and social needs. The overall evaluation of costs, risks and benefits should therefore be regarded in relation to specific fears or emotions (for example the local context), trust levels and other more subjective aspects.

Local context

While the public has a positive attitude towards clean technologies and measures in general, individual projects or policies regularly face resistance from the local community.

By labelling opposition as NIMBY ('Not In My Back Yard'), genuine local concerns and criticism have often been slated as irrelevant, ignorant or selfish. Even though local resistance may come out of ignorance or selfishness, it is vital that local critical attitudes are not ignored, considering that local acceptance is of great importance for the success of a project (Musall & Kuik, 2011; Kaldellis, et al., 2013).

According to Sijmons and Van Dorst (2012), people tend to resist change in their environment, out of a personal fear for a loss of quality of life, more than the fear of the proposed change itself – the new technology in this case:

"People have a healthy scepticism and want to be sure the new ideas are sound."

As indicated by one of the experts at the workshop:

"With regard to old technologies such as coal mines, the risks are known. But people will be scared by new technologies such as wind turbines. Education is the only way out."

In other words, also in order to create acceptance in specific local contexts, awareness raising is of pivotal importance.

Instead of disregarding local views on new technologies and measures as NIMBY behaviour, both rational and emotional parts of the local debate should be taken seriously. Both rational objections to projects and specific fears and emotions should be identified, discussed and dealt with (Sijmons & Van Dorst, 2012; De Boer & Zuidema, 2013).

Trust

Public trust influences the acceptance of technologies and measures. Hereby the public acceptance depends on the trust in the properties of the technology, as well as the trust in the related stakeholders (Terwel, et al., 2011; Einsiedel, et al., 2013; Huijts, et al., 2012). The element of trust can be considered as a crosscutting issue, as it influences the other four elements discussed above, and is in turn also influenced by them.

Public trust in stakeholders depends on the perception of their organisational competence and integrity. Environmental NGOs generally experience higher public trust than for-profit companies, because the public expects the latter group to act mainly out of self-interest (Terwel, et al., 2011).

Box 3. Low confidence in decision-makers for a tidal stream generator in Northern Ireland.

Devine-Wright (2011a; 2011b) has studied the implementation of the 'SeaGen' tidal energy converter in Northern Ireland, which is the first large-scale commercial tidal stream generator in the world. The study has used empirical methods to analyse the public acceptance of the tidal energy, with a special focus on the concept of 'place attachment', i.e. the "behavioural, affective and cognitive ties between individuals and/or groups and their sociophysical environment."

The SeaGen tidal energy converter is placed in a narrow strait between two villages. Devine-Wright suggests that the tidal energy project has enhanced the place attachment of the local residents, who see it as "exciting novelty that posed a minimal threat to the natural environment." This reaffirms the notion that the NIMBY concept is too narrow, as local residents will make a wider assessment of pros and cons of a new technology project.

Transcripts of focus group discussions in the two villages reveal that residents do an overall evaluation of the perceived benefits, costs and risks of the project. Discussions touched on issues such as environmental risks ("baby seals might be found without their heads on the beaches") and employment ("will there be local people employed at the generator?"). These discussions reveal knowledge gaps about the possible impacts of the generator for the local community, which shows the importance of awareness-raising.

Devine-Wright found discontent with planning and consultation procedures, as these were subject to a perceived lack of fairness. Even though local consultation events were organised, many residents did not bother attending since they felt their views would not be taken into account. Part of the problem was that the community had been used to low levels of involvement during earlier projects. The residents therefore had no confidence that the participation process of this project would be more inclusive.

POLICY RECOMMENDATIONS

The importance of taking the social side of climate-friendly technologies and measures into account is widely recognised. Considering that the success of climate-friendly technologies and measures depends to a large extent on their social acceptance, it is important to have clear insight into what would be the social implications of deploying and diffusing these technologies or measures. The elements defining social acceptance, as elaborated above, therefore need to be considered before technologies are prioritised or measures are selected.

As the case studies show, the implementation of projects for clean technologies could be delayed and frustrated by negative public attitudes, which leads to higher costs or even cancellation. This failing of the current approach should be addressed at two levels:

(1) Project planning and development: public acceptance needs to be taken into account by the developers of the clean technology project, as well as related local and regional government policy makers;
(2) Higher policy-making level: for example at the EU and member states, policymakers have to consider public acceptance as one of the determining factors in the predictability of clean technology investments.

Improve public acceptance of projects

For the development of climate-friendly technology projects, a clear strategy should be used for the attainment of public acceptance and the avoidance of (large-scale) public resistance.

In order to reach a positive public attitude, each of the five elements of acceptance should be assessed positively by the public. Hence, planners, project developers and policy-makers should take all these elements into account when planning a strategy:

- Awareness of climate change and knowledge of clean technologies;
- Fairness of the decision-making process;
- Overall evaluation of costs, risks and benefits of a technology;
- Local context;
- Trust in decision-makers and other relevant stakeholders.

Project developers have a particularly significant influence on the first two elements: awareness and fairness. In order to increase the acceptance of individual clean technologies and measures, their implementation should be embedded in bottom-up processes rather than top-down solutions (see Box 2 for an example in the Netherlands). Practically, this entails that a better engagement and participation of society should be encouraged. Hitzeroth and Megerle (2013) call this a strategy of transparency: in order to be successful, public information and participation in the problem situation is needed, "possibly with the objective to look for a consensus-oriented solution." Large or innovative projects will only be possible if the local community is informed extensively and from the early beginnings of the project. All reports and analyses made should therefore be public, and communication should be free from propaganda and ambiguity. When local citizens are not seriously involved in projects, a 'feeling of not being taken seriously' may arise, which will intensify resistance and take away public support.

The overall evaluation of costs, risks and benefits of a project, as well as issues related to the project's local context, are more difficult to be influenced by the project developer. The characteristics and costs of a technology are often predefined, leaving little room for changes without leading to difficulties with regard to the technical and economic feasibility of the project. As a result, the 'strategy of transparency' is also vital for these issues: by informing and involving stakeholders, objections can be identified at an early stage, providing the possibility to modify the project as far as possible. In case of widespread and unsurmountable resistance, a project can be cancelled or redesigned before high investments of time and money have taken place.

The final element, trust in related stakeholders, may have a major impact on the public acceptance of a technology or measure. Building trust requires long-term commitment, transparency (raising awareness) and a fair process. As the case in Northern Ireland (Box 3) shows, the trust level does not only depend on how government and project developers act in a process, but also on how they, and other project developers, have handled earlier projects.

Policy design for public acceptance

In addition to fostering social acceptance of the planning and implementation of individual projects, policymakers should take public acceptance of clean technologies into account at higher policy-making levels.

According to Schurig (2013), and based on the case studies, social acceptance of renewable energy and other clean technologies does not have to be artificially created. The majority of the public, in general, supports such technologies, as long as the requirements of the five elements of acceptance introduced above are met.

Considering that the local context is specific to the individual project, higher-level policy should focus on the other four elements: awareness-raising, ensuring procedural fairness, the overall evaluation of costs, risks and benefits, and trust-building.

The local context will remain important, however, as a central government can never solve local acceptance problems. Local citizens can be made aware of technologies if the government supports and encourages small-scale local pilot projects. Local awareness with the new technology may ease the creation of a support base for large-scale projects, for example in the case of wind energy projects.

At the higher level the government should, both in relation to individual cases and in general, spread comprehensive information, including costs, risks and benefits, on climate-friendly technologies and underlying reasons. It is suggested by Petrick (2013) that the government should proactively respond to negative media coverage, as misconceptions and negative opinions about renewable energy and other climate-friendly technologies could damage the acceptance of the technologies and the implementation of individual projects. Possible (public) gains from the green technology sector, such as new employment opportunities, should be fairly assessed and publicly presented. These gains should be evaluated in relation to the costs of the transformation to a low-emission economy, and disseminated effectively to the relevant stakeholders. Often, tailor-made presentations of the outcomes of *ex ante* evaluation studies can trigger the interest of stakeholders and initiate a constructive dialogue for accepting them. Such awareness-raising can be especially taken forward by ‘political champions’ and ‘technology champions’, who can put the necessity of a technology on top of both the political and the public agenda.

Secondly, standard rules and procedures should be made and enforced to ensure procedural fairness. As indicated before, fairness can be created through a combination of transparency and engagement of the public. Therefore, in addition to awareness campaigns (provision of information), there should be mechanisms for feedback (public participation). Sander (2011) clarifies this by stating that a move is needed from ‘decide, announce, defend’ to ‘announce, discuss, decide’. “If well done, public participation should save time over the long run” as the interaction with the public increases acceptance and legitimacy.

The final element, trust in stakeholders, can be fostered by ensuring that the other requirements are met: if the government provides timely, reliable and balanced in formation to the public; offers the opportunity for public participation;

and makes sure that private project developers do the same, higher levels of trust will be created. This trust may also ease future processes of clean technology implementation, and it can be facilitated with measures that provide clear market and cost signals (such as pricing or market-based mechanisms). Considering that in many cases there is a general distrust of politicians and policymakers, technologies and projects could be taken away from the core political arena, and instead brought forward by the aforementioned 'champions' or 'technology ambassadors'.

REFERENCES

Batel, S., Devine-Wright, P., & Tangeland, T. (2013). Social acceptance of low carbon energy and associated infrastructures: A critical discussion. *Energy Policy*(58), 1-5.

Buchan, D. (2010). *Eastern Europe's energy challenge: meeting its EU climate commitments.* Oxford: Oxford Institute for Energy Studies.

De Boer, J., & Zuidema, C. (2013). Towards an integrated energy landscape. Dublin: AESOP-ACSP Joint Congress.

Devine-Wright, P. (2011a). Place attachment and public acceptance of renewable energy: A tidal energy case study. *Journal of Environmental Psychology*(31), 336-343.

Devine-Wright, P. (2011b). Enhancing local distinctiveness fosters public acceptance of tidal energy: A UK case study. *Energy Policy*(39), 83-93.

EC. (2011). *A Roadmap for moving to a competitive low carbon economy in 2050.* Brussels: European Commission.

Einsiedel, E., Boyd, A., Medlock, J., & Ashworth, P. (2013). Assessing socio-technical mindsets: Public deliberations on carbon capture and storage in the context of energy sources and climate change. *Energy Policy*(53), 149-158.

Hitzeroth, M., & Megerle, A. (2013). Renewable Energy Projects: Acceptance Risks and Their Management. *Renewable and Sustainable Energy Reviews*(27), 576-584.

Huijts, N., Molin, E., & Steg, L. (2012). Psychological factors influencing sustainable energy technology acceptance: A review-based comprehensive framework. *Renewable and Sustainable Energy Reviews*(16), 525-531.

Kaldellis, J., Kapsali, M., Kaldelli, E., & Katsanou, E. (2013). Comparing recent views of public attitude on wind energy, photovoltaic and small hydro applications. *Renewable Energy*(52), 197-208.

Kamas, L., & Preston, A. (2012). Distributive and reciprocal fairness: What can we learn from the heterogeneity of social preferences? *Journal of Economic Psychology, 33*, 538-553.

Musall, F., & Kuik, O. (2011). Local acceptance of renewable energy - A case study from southeast Germany. *Energy Policy*(39), 3252-3260.

Petrick, K. (2013, October 7-9). Workshop on Social Acceptance of Renewable Energy - Presentation at the IRENA Workshop on Social Acceptance of Renewable Energy. Abu Dhabi, UAE.

Sander, A. (2011). *From 'Decide, Announce, Defend' to 'Announce, Discuss, Decide'?* Lund: IIIEE, Lund University.

Schurig, S. (2013, October 7-9). Participation and social acceptance - Presentation at the IRENA Workshop on Social Acceptance of Renewable Energy. Abu Dhabi, UAE.

Sijmons, D., & Van Dorst, M. (2012). Strong Feelings: Emotional Landscape of Wind Turbines. In S. Stremke, & A. Van den Dobbelsteen (Red.), *Sustainable Energy Landscapes: Designing, Planning, and Development* (pp. 45-67). Hoboken: Taylor and Francis.

Spence, A., Poortinga, W., & Pidgeon, N. (2012). The Psychological Distance of Climate Change. *Risk Analysis, 32*(6), 957-972.

Strazzera, E., Mura, M., & Contu, D. (2012). Combining choice experiments with psychometric scales to assess the social acceptability of wind energy projects: A latent class approach. *Energy Policy*(48), 334-347.

Terwel, B., Harinck, F., Ellemers, N., & Daamen, D. (2011). Going beyond the properties of CO2 capture and storage (CCS) technology: How trust in stakeholders affects public acceptance of CCS. *International Journal of Greenhouse Gas Control*(5), 181-188.

Thøgersen, J., & Noblet, C. (2012). Does green consumerism increase the acceptance of wind power? *Energy Policy, 51*, 854-862.

UNDP. (2010). *Handbook for Conducting Technlogy Needs Assessment for Climate Change.* New York: United Nations Development Programme.

POLIMP STAKEHOLDER WORKSHOP

Background information and additional references on the elements of public acceptance, as well as more case studies, are available in a POLIMP background paper (www.polimp.eu).

The draft of this policy brief was presented at the first stakeholder workshop of the POLIMP project: 'Exploring technology options for the EU transition to a low-carbon economy: The role of public acceptance to enhance predictability of low-carbon technology investments'. The workshop, organised in Brussels on 25 April 2014, was attended by the following experts:

- Eleonora Arcese, Research Associate at Climate Strategies
- Krzysztof Bolesta, Advisor to the Polish Minister of Environment
- Chandreyee Bagchi, Research Assistant at University of Zurich
- Andrzej Blachowicz, Managing Director at Climate Strategies
- Jill Duggan, Director of Policy at Doosan Power Systems
- Daniel Fraile, Senior Policy Officer EU Energy and Climate at CAN Europe
- Claudia Fruhmann, University of Graz
- Noriko Fujiwara, Associate Research Fellow at Centre for European Policy Studies
- Joachim Globisch, Scientific Researcher at Fraunhofer ISI
- Sam Hamels, Intern at CAN Europe
- Erwin Hofman, Researcher / Policy Adviser at JIN Climate and Sustainability
- Tomas Hos, Trainee at European Commission, DG Energy
- Chara Karakosta, Research Associate at University of Piraeus Research Centre
- Helma Kip, Policy Adviser at Ennatuurlijk
- Karsten Krause, Policy Officer at European Commission, DG Climate Action
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