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Do people prefer offshore to onshore wind energy? The role of ownership and intended use

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Background:

- Controversies related to land-based wind power development
- Norway has a large potential for offshore wind
- Technological development
- What about ownership?

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Do people prefer offshore to onshore wind energy? The role of ownership and intended use

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ABSTRACT

Global investments in offshore wind energy are expected to escalate over the coming decades, fueled by improvements in technology, declining costs, and increasing political support. The complexity, scale, and location of these developments make international ownership and export of electricity more feasible. We examine how the general public's acceptance of wind energy will be affected by a political shift in focus from onshore to nearshore or offshore locations, from local or national dominance of ownership to international dominance, and from meeting local or national needs to meeting international ones. We use a nationwide choice experiment with 1612 individuals in Norway to reveal the preferences for these attributes and apply a mixed logit regression model to estimate the willingness to pay to avoid certain outcomes. We show that, although respondents prefer offshore and nearshore locations to onshore ones, they are even more concerned with maintaining local or national control both through ownership and intended use of the added electricity. Although the preferences for national ownership are strong for both nearshore and offshore alternatives, the preferences for meeting national needs becomes less important when wind energy developments are located farther off the coast. Three wind energy scenarios are used to further investigate these preferences: 1) international consortium for offshore wind energy, 2) national alliances for nearshore wind energy, and 3) local energy communities for onshore wind energy. We also discuss how a shift to nearshore and offshore wind energy can be enabled by paying greater attention to people's concerns over national control of wind energy resources.

1. Introduction

Through their design of policies, regulations, and energy targets, national governments may affect wind energy developments in the coming decades. That is, it is within their power to direct wind energy developments towards specific technologies and locations, and more indirectly, to influence who owns and controls these installations and for what purpose the generated electricity will be used [e.g., 1]. In this study, we ask the following question: How will the general public's acceptance of wind energy be affected by a political shift in focus from onshore to nearshore or offshore locations, from local or national dominance of ownership to international ownership, and from serving local or national needs to international ones? The answer to this question is relevant for three reasons.

First, investment in offshore wind energy is expected to escalate in the next few decades, fueled by improvements in technology, declining costs, and increasing policy support in Europe, the United States, China, and other key markets in Asia. The offshore wind energy market grew by 30% between 2010 and 2018 [2] and is expected to quadruple between 2020 and 2025 [3], raising its share of new wind energy installations from 6.5% to 21%. In a special report on offshore wind energy, the International Energy Agency (IEA) [2] concludes that the untapped potential for offshore wind energy is vast. This is particularly the case in the EU, where offshore wind energy is expected to have the largest share of electricity generation by 2040 in the IEA's Sustainable Development Scenario. Even when wind energy sites are limited to shallow water locations close to the coast, IEA [2] claims that "the best offshore wind sites could supply more than the total amount of electricity consumed worldwide today". Moving farther from shore and into deeper waters, floating turbines could meet the world's total electricity demand 11

Abbreviations: DCE, discrete choice experiment; (M)WTP, (marginal) willingness to pay; NOK, Norwegian kroner.

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The survey

- Large, technical complex developments offshore will make international ownership and export more relevant
- This could lead to new conflicts..
- How will the publics acceptance of wind energy be affected by a political shift from onshore to nearshore/offshore locations – from local/national ownership to international – and from serving local/national needs to international ones?
- Survey among 1612 Norwegians in December 2020 and January 2021

Our research questions

1. Do our research confirm the contention that offshore/nearshore locations are preferred to onshore, and that local/national ownership are preferred to international ones?
2. Is the general public willing to trade off national/local ownership and use to move wind farms to nearshore or offshore locations?
3. Is the general public less concerned with national/local ownership and use when wind farms are moved to nearshore or offshore locations?

Methods

- Discrete choice experiment
- Respondents are asked about their preferences among alternative wind energy developments
- Attributes are;
  - Choice of location (onshore, nearshore or offshore)
  - Intended use (meeting local, national or international needs)
  - Dominant owner type (local, national or international)
  - Turbine height
  - Changes in the household's monthly electricity bill
- Each respondent was presented with 8 cards with 2 options
- We used a mixed logit model to estimate willingness to pay to avoid certain outcomes

Illustration from Shutterstock, as examples of onshore wind projects

Main findings*

- People are willing to pay more (250 kr) to move wind power offshore and out of sight
- People are willing to pay even more (4-500 kr) to secure national or preferably local ownership
- Use of energy is also very important, willingness to pay almost 200 kr in order for the energy to be used for national/local purposes

*Ranging of options are more important than the number

Conclusion

1. We prefer to move wind power development offshore
2. But it is even more important to secure national ownership and use of the energy
3. Is location important?
   - We accept export of offshore wind, but not onshore and costal wind
   - We are at least as concerned about national ownership of costal and offshore wind as we are of onshore wind.

Illustration from regjeringen.no/no/aktuelt/storstilt-satsing-pa-havvind/id2900436/