

# Irish Wind Energy Research Network 22<sup>nd</sup> March 2018

Wind farm externalities and public preferences for community consultation in Ireland

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# Negative externalities

- Evaluating social acceptance of wind farms
- Problems: those who benefit vs those who bear cost: externalities, Coasian bargaining.
- Role of Landscape and biodiversity, Noise pollution, shadow flicker, Declining residential property values
- Attitudes may be changed with increased consultation, engagement, control or through local benefits and local ownership
- Current debate on setback distance: 10 times turbine height
- NYMBYism



# Choice experiment literature

- WTP for varying environmental and physical impacts (Alvarez-Farizo and Hanley, 2002; Heintzelman and Tuttle, 2012; Jensen et al., 2014; Vecchiato, 2014; Fimereli, et al., 2008)
- Social and institutional aspects (Devine-Wright, 2005; Maruyama et al., 2007; Wolsink, 2007; Ek and Persson, 2014)
- Consumers WTP if wind farm owned/ partially owned by local community (Ek and Persson, 2014)
- Experience (Eltham et al, 2008; Kaldellis et al, 2013)
- Respondents can value participation in the planning process more highly than physical attributes (height, no. of turbines) (Dimitropoulos, and Kontoleon, 2009; Ek and Persson, 2014)
- Export concerns (Meyerhoff et al., 2010)



# Research aims

1. To evaluate to what degree local communities are willing to accept (WTA) compensation for wind farm production in their area, and how this varies according to key attributes of developments such as experience of ownership, consultation, compensation and perception of externalities;
2. Develop a framework to investigate tradeoffs between physical and social attributes that influence social acceptance of wind farms
3. Identify efficient policy scenarios that internalize the social costs associated with Irish wind farms by combining social or institutional factors such as community consultation, engagement with alternative physical attribute levels (setback distance, number of turbines)



# Methodology

- Choice experiments: utility individuals derive from a commodity or a programme is based upon various attributes embedded in it (Lancaster, 1966).
- Respondents trade-off the levels of the attributes, enabling the analyst to infer the WTP/WTA for the good in question and the value of the attribute.
- Two stage process to identify attributes: scoping exercise followed by 6 focus groups



# Public focus groups

- Information, consultation and engagement. Feeling of powerlessness about any development and what the potential impacts were
- Benefits important as a means of compensating for perceived externalities. Preferences for either community benefit schemes and electricity reduction costs
- Semi-state bodies and private-public ownership preferred to private ownership. Associated with more lobbying power and that semi-state bodies offered more accountability, offering the community more “control in the future”
- Wary of the export of electricity from wind farms due to the possibility of excessive development arising, purely to meet foreign electricity demand. Preference for Irish electricity needs being met, or where export arose, significant benefits coming back to the community for bearing the burden of turbines
- Suggestions for information dissemination use of an independent state agency, community representation and improved interaction with multiple professionals involved in a development (e.g. engineers, scientists, etc.)



# Attributes

Attributes	Information provided	Levels
Number of turbines	This indicates the maximum amount of turbines in this wind farm for the project lifetime (20 years).	8 20 40
Export level	This indicates where the energy produced from this wind farm will be used. The wind energy could be 100% domestic (used totally in Ireland); 100% Export (used totally outside Ireland); or 50% domestic 50% export. (used both in Ireland and outside Ireland).	Domestic 50%: Export 50% 100% Domestic 100% Export
Setback	This refers to the minimum distance that these new turbines will be required to be spaced from your home.	500m 1000m 1500m
Community engagement & control	This refers to the level of engagement, control and information your local community will have over the planning and development of the wind farm. The levels of could be <b>Low</b> (your community are informed about the development but cannot make changes); <b>Medium</b> (your community are informed and consulted and their opinions may be considered) or <b>High</b> (the developer and your community actively negotiate the planned wind farm together and inform one another throughout the development/at all times).	Low Medium High
Electricity discount	This refers to compensation paid to you for this wind farm development, in the form of a discount in your electricity bills each year over the project lifetime (20 years).	€110 €280 €450 €620

# Onshore survey

- Survey: 4 sections: attitudes towards environmental issues; personal reactions to local wind farm developments; choice experiments; demographic information.

Features	Option A	Option B	Option C
Electricity Discount	€620	€110	No new wind farm
No of wind turbines	20	20	
Export level	50% domestic, 50% export	No export	
Setback	1500m (0.93 miles)	500m (0.31 miles)	
Community engagement	Medium	High	
Choose	1	2	

- 250 (onshore) individuals
- 12 choice cards with 3 alternatives: A and B: different combinations of attributes and levels: Option C: Status quo: *No new wind farm.*



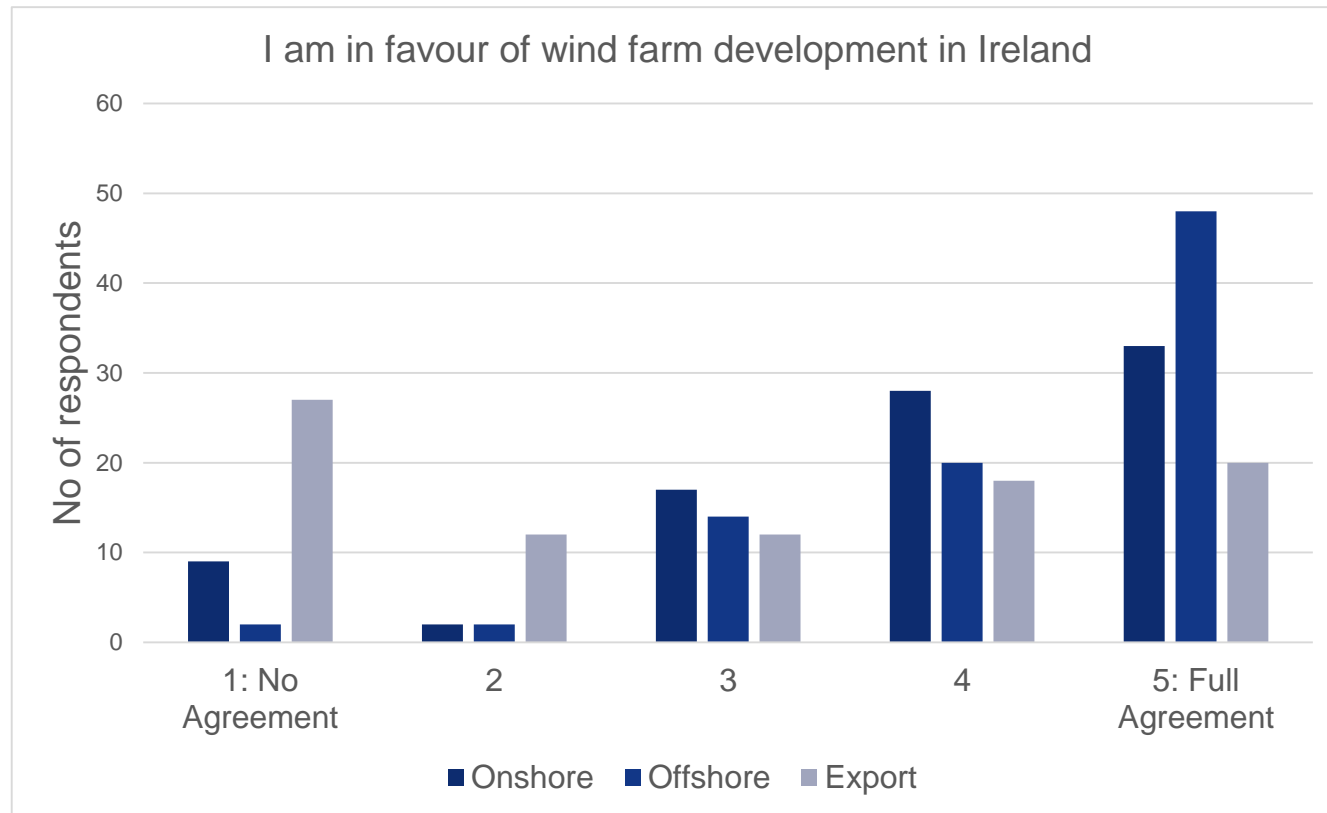
# Attitudes and experience of my local wind farm

- Social acceptance by local residents is high. Most (82%) are willing to make trade-offs regarding WF attributes
- Most respondents are in favour of WF in Ireland with those in favour strongly preferring offshore WT. Respondents prefer WF for domestic use not exports
- Most respondents who are in favour of WF have not changed their opinions compared to 5 years ago
- Respondents were asked if their opinions had changed over time regarding their local wind farm. The general trend is one of no change, although respondents who were very positive about their local wind farm became more positive through time.
- Respondents were asked whether the local wind farm developer cooperates, provides financial benefits or information to local residents. Most respondents are either neutral or appear to strongly agree that developers do engage with local residents with respect to these issues.
- Respondents were also asked whether the experience they have had with a local wind farm developer makes them feel less positive or more positive about future wind farm development in Ireland. The findings below suggest most respondents either had not changed their position or were more positive.
- With respect to ownership respondents held a preference for Irish farmers local to the area and semi state companies. Private (Irish) developers and purely local community ownership and being the least preferred.

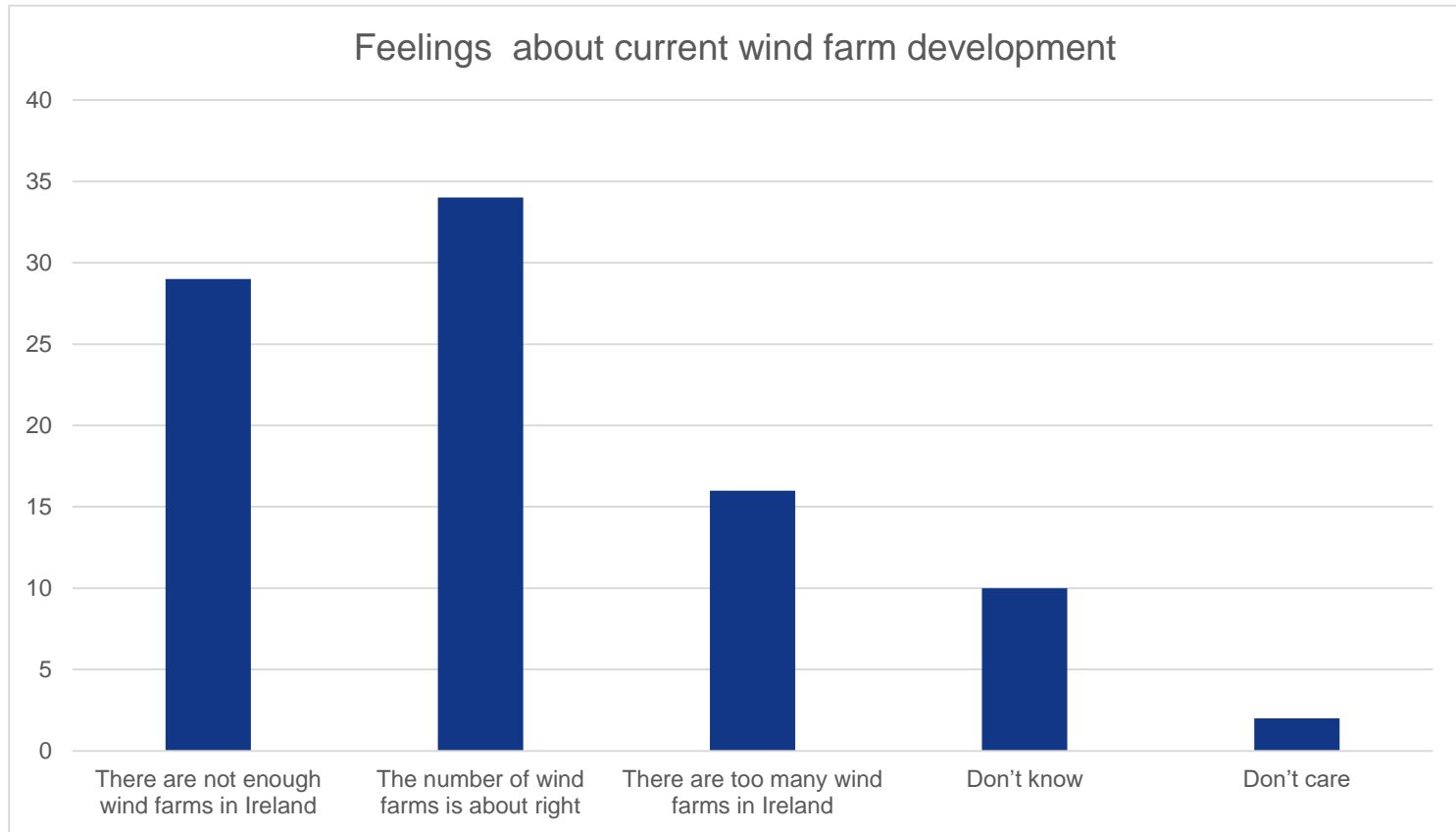


# General attitudes towards wind energy

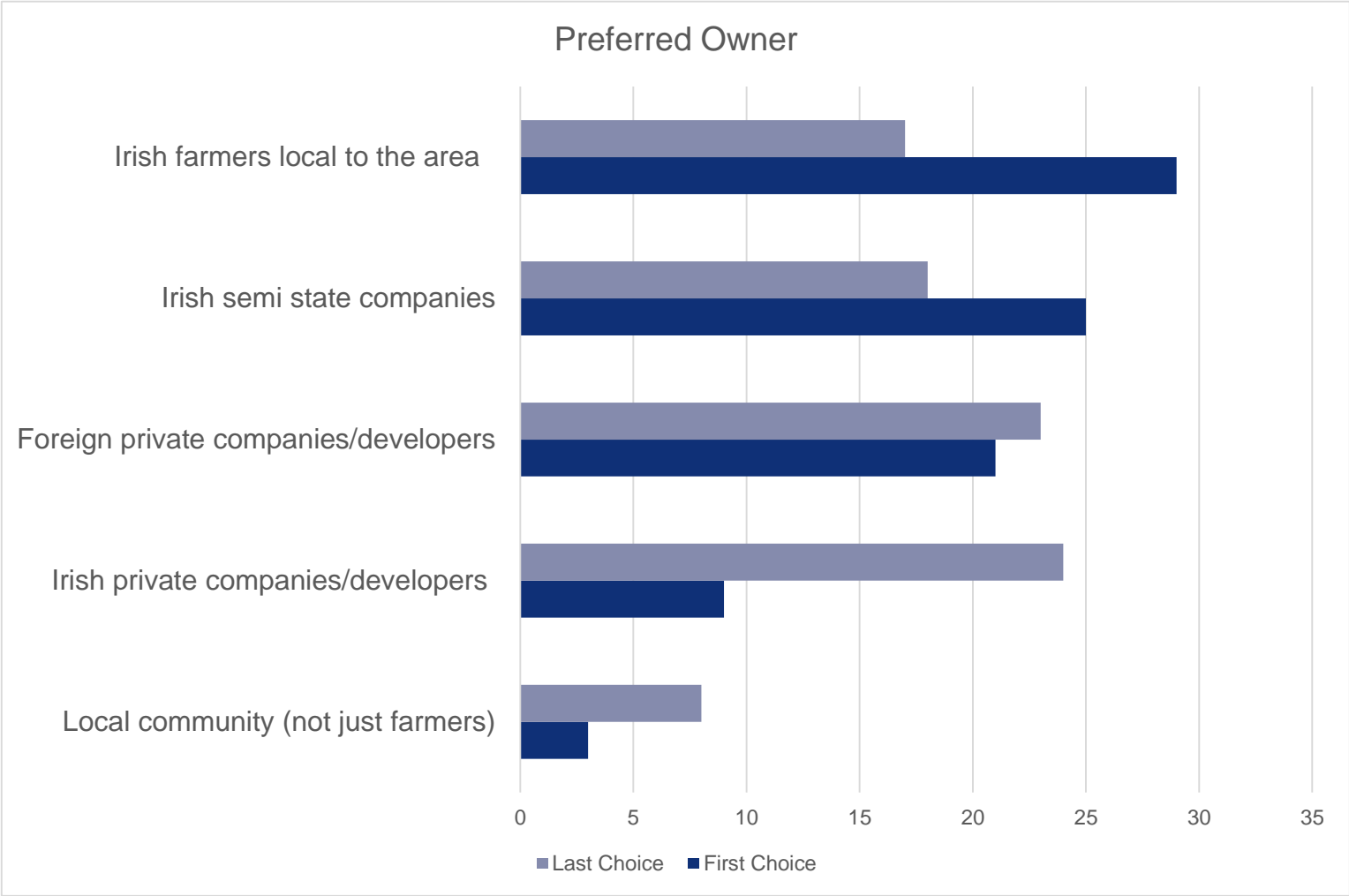
Opinions about the number of wind farms in Ireland with respect to onshore wind farms, offshore wind farms and wind farms dedicated to export.



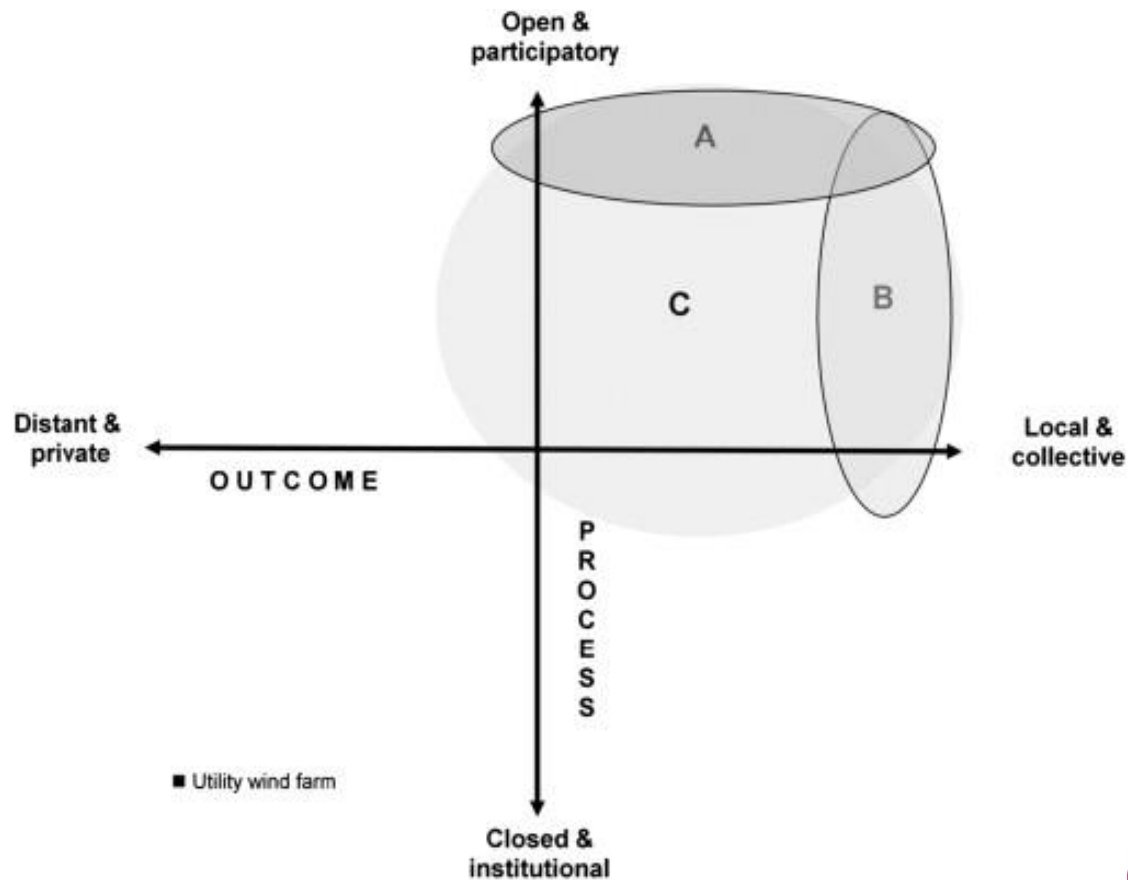
# Opinions about number of wind farms in Ireland



# Preferred ownership



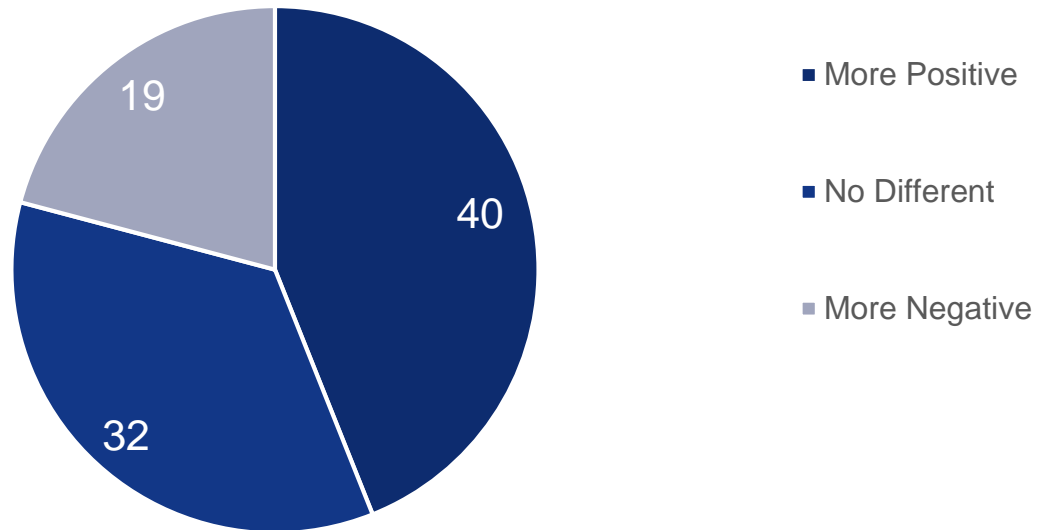
# Measuring “Community” Involvement: Process vs. Outcome



*Source: Walker and Devine-Wright (2008)*

# My views on wind energy in general based on my local experience

Impact of experience with local developer on views on wind energy



# Model Output

Attributes and interactions	MNL Coeff (s.e)	RPL Coeff (s.e)	Std dev
<b>TURBINES</b>	-.00695** (.00317)	-.00892** (.00449)	.02079*** (.00602)
<b>EXPORT MEDIUM</b>	-.06140 (.10294)	-.11707 (.12500)	.21254 (.21230)
<b>EXPORT HIGH</b>	-.14907 (.10201)	-.25129** (.12434)	.21254 (.21254)
<b>SETBACK 1000M</b>	.34191*** (.10201)	.41877*** (.12538)	.05612 (.51065)
<b>SETBACK 1500M</b>	.29575*** (.11312)	.43524** (.16972)	.74535*** (.16699)
<b>CITIZEN MEDIUM</b>	.31457*** (.10217)	.37288*** (.11707)	.13855 (.31611)
<b>CITIZEN HIGH</b>	.15591 (.10673)	.24026* (.13142)	.33818 (.24264)
<b>COMP</b>	.00054** (.00022)	.00069** (.00027)	
<b>ASC</b>	.48512*** (.15813)	-.47516 (.64568)	5.32021*** (.78320)
<b>Log- Likelihood</b>	-1184.184	-818.959	
<b>McFadden Pseudo R<sup>2</sup></b>	0.10	0.32	
<b>A.I.C</b>	2.185	1.529	
<b>No. of respondents</b>	91	91	
<b>No. of observations</b>	1092	1092	
<b>No. of Halton draws</b>		1000	

# Welfare estimates

	MNL € /H.H,P.A	RPL € /H.H,P.A	
<b>TURBINES</b>	12.80** (6.48)	13.01* (6.87)	
<b>EXPORT MEDIUM</b>	113.09 (195.05)	170.56 (192.78)	
<b>EXPORT HIGH</b>	274.56 (216.71)	366.55 (223.35)	
<b>SETBACK 1000M</b>	-629.76** (299.86)	-610.84** (268.90)	
<b>SETBACK 1500M</b>	-544.74** (258.67)	-634.87** (282.25)	
<b>CITIZEN MEDIUM</b>	-579.42* (298.64)	-543.91** (274.87)	
<b>CITIZEN HIGH</b>	-287.17 (226.30)	-350.45 (233.67)	
<b>Log- Likelihood</b>	-1184.184	-818.959	
<b>McFadden Pseudo R<sup>2</sup></b>	0.10	0.32	
<b>No. of respondents</b>	91	91	
<b>No. of observations</b>	1092	1092	
<b>No. of Halton draws</b>		1000	

Notes: Level of significance, \*\*\*=p<1%, \*\*=p<5%, \*=p<10%



# Policy Simulations

Attribute	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
<b>SETBACK</b>	500m	500m	1000m	1000m	1500m	1500m
<b>CITIZEN ENGAGEMENT</b>	No	Yes	No	Yes	No	Yes
<b>WTA</b>	260.28* (137.56)	-283.63 (260.71)	-350.57 (245.19)	-894.48** (448.34)	-374.69 (266.08)	-918.50** (442.80)
<b>CONF INTERVALS</b>	-9.13 529.69	-794.62 227.36	-831.122 129.99	-1773.211 -15.75	-896.12 146.93	-1786.38 -50.63

Policy simulations (standard errors within parenthesis).

Notes: Level of significance, \*\*\*=p<1%, \*\*=p<5%, \*=p<10%

The standard errors (within parenthesis) were calculated using the WALD command in Nlogit and values were obtained using the Krinsky and Robb method with 1000 draws.

- Assume 100 residents: 20 year project, at 20 turbines per farm for domestic use:
  - -€520, 560 (case 1)
  - €567, 260 (case 2)
  - €1,788,960 (case 3)



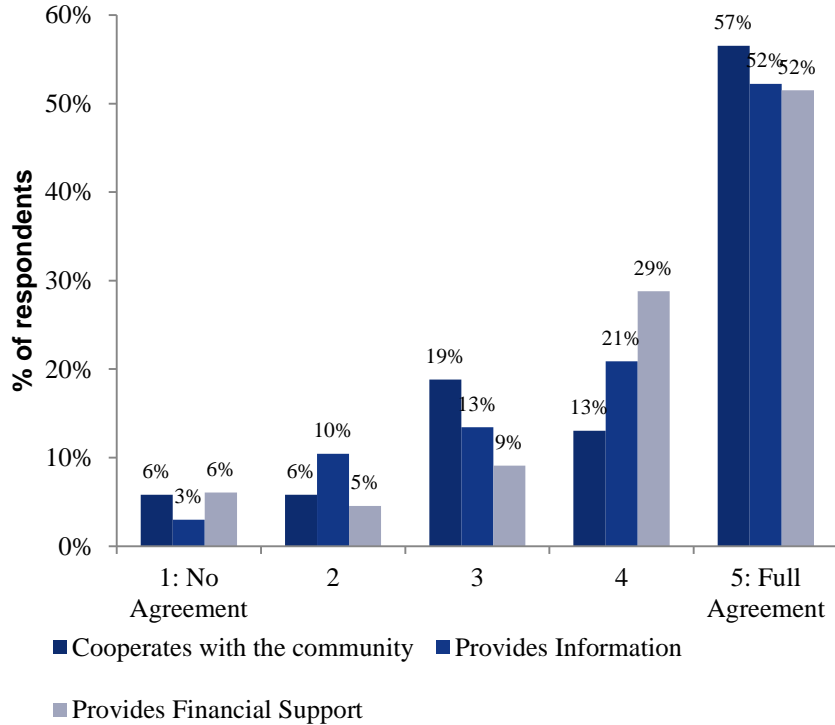
# Status Quo Respondents

- 18% of respondents picked the SQ option
- Most respondents are willing to make trade-offs regarding wind farms and their attributes
- SQ respondents feel there is no need to increase wind energy and would not accept any amount of compensation
- SQ respondents are much more negative regarding local farm developers actions compared to non-SQ counterparts
- Over half of the non-SQ respondents fully agreed that the local WF developer engaged with the local community in terms of information, cooperation and financial support
- The SQ findings are similar on this issue but the percentage of respondents who totally disagree that the local WF developer either cooperated, provides information and financial support is significantly higher for this group

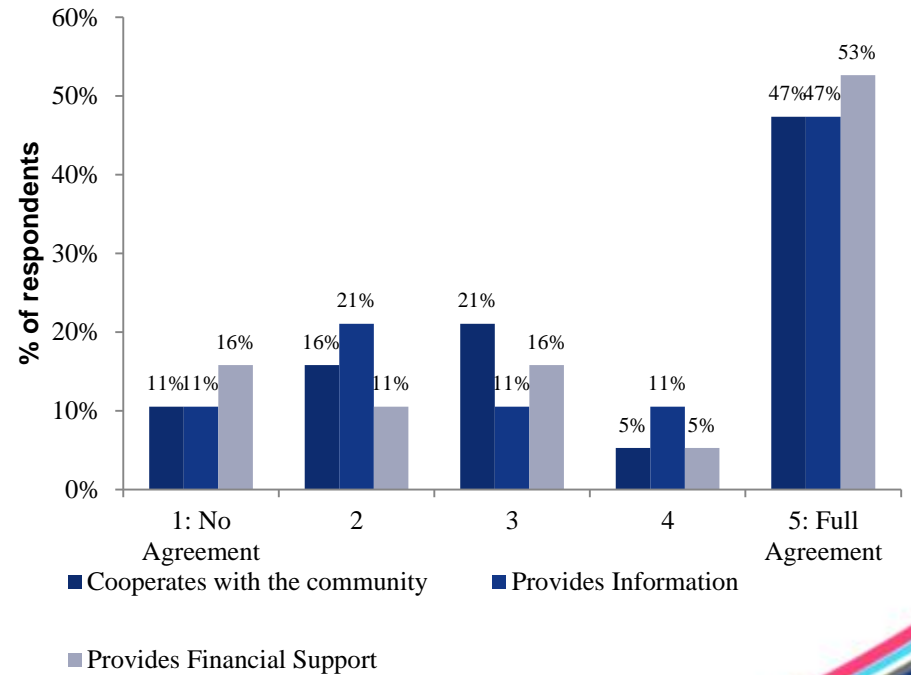


# Local WF developer and SQ vs. Non SQ respondents

(a) Non SQ respondents

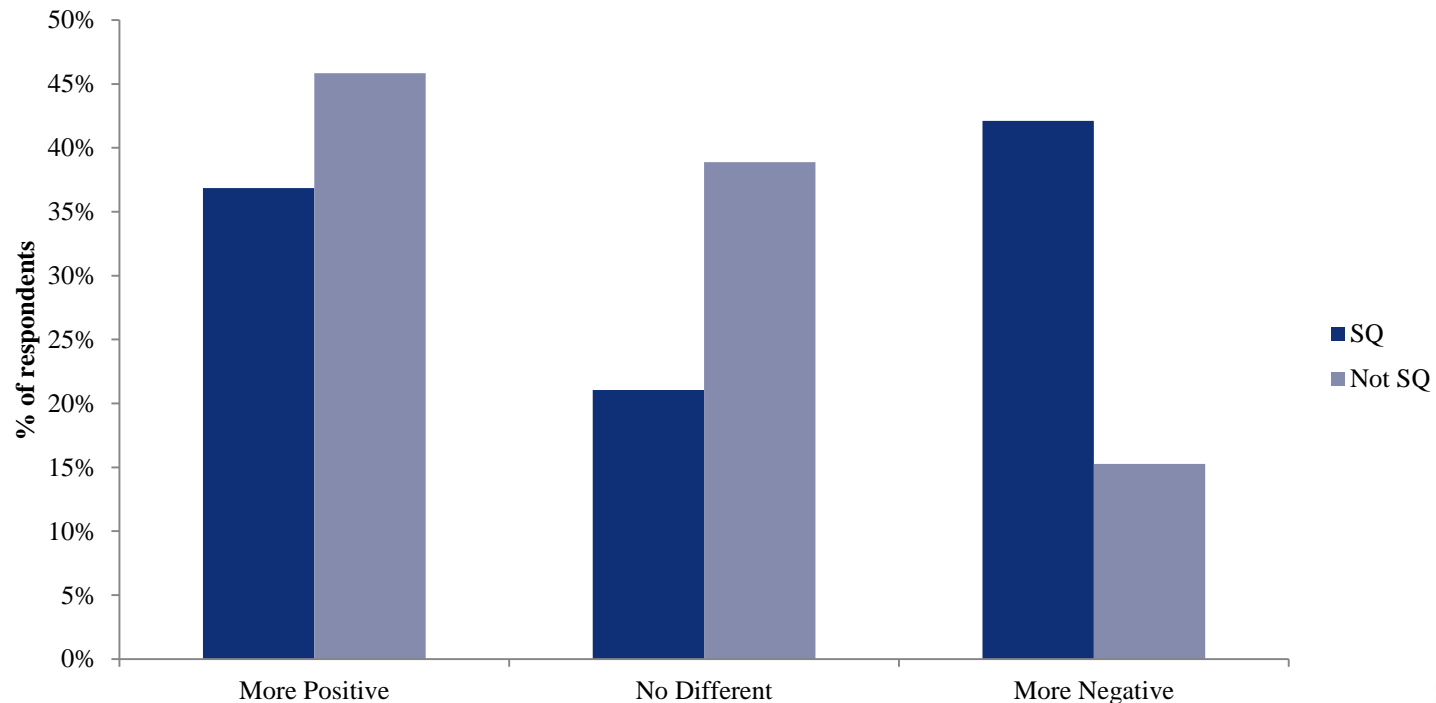


(b) SQ respondents



# Attitudes to WF in general based on my experience

- Percentage of SQ and non-SQ respondents who feel that the behaviour of the local WF developer made them feel more positive, no different or more negative about wind energy in general in Ireland



# Preliminary conclusions and policy implications

- Majority of respondents (82%) are willing to make (monetary) tradeoffs to allow for wind power initiatives and most individuals surveyed are generally supportive of WF
- Negative externalities identified include visual dis-amenities, turbine number, setback distance, electricity export.
- Respondents are willing to make (monetary) tradeoffs to allow for setback distances to be changed.
- Between €543.91 and €579.42 less in annual compensation is required if provision is made for community engagement. Information and engagement between stakeholders and the wind farm developer may be a cost effective approach for many developers.
- Recommended that the guideline minimum setback distance be increased from 500m to 1000m for moderately densely populated communities.
- Recommended that alternatives to the private developer model be considered. Ownership appears to be linked to control, accountability, engagement. Preferences to broaden WF ownership model especially to include semi-state bodies and farming groups, or public private partnerships. Or Co-ownership arrangements. which speak and respond to concerns regarding control, accountability and engagement.
- Heterogeneity with respect to preferences: Group with landscape and environmental interest vs. development interest. Both want engagement but to different ends.
- External costs are broadly in line with community benefits proposed by the RESS.

