Survey of Utility-Scale Wind and Solar Developers Report

Robi Nilson, Ben Hoen and Joe Rand

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Methods and Respondent Information

Emailed web survey in Qualtrics survey program

open from April 18 to June 26, 2023

Survey Details & Response Information

Survey Details:

- Sample included developers of utility-scale (transmission-connected) wind or solar projects
- Focused on community engagement and project development specialists
- Web-based survey (Qualtrics platform)
- Survey invitations sent via email
  - Email addresses collected via:
    - Lists from ACP and SEIA (with NDA)
    - Personal connections
    - LinkedIn searching, etc.
- Open April 18 – June 26, 2023

Total invitations sent	713
Non-contact: bounced email	44
Non-contact: auto-reply, no longer at company	8
Ineligible: screened out	20
Eligible invites	641
Direct refusal: opted-out (27) or failed consent (2)	29
Implicit refusal: never started	461
Unusable partial completion	28
Usable partial completion	25
Full completion	98
Full + Usable Respondents:	**123**
Response rate: sum/eligible	**19.2%**

Company & Technology Representation

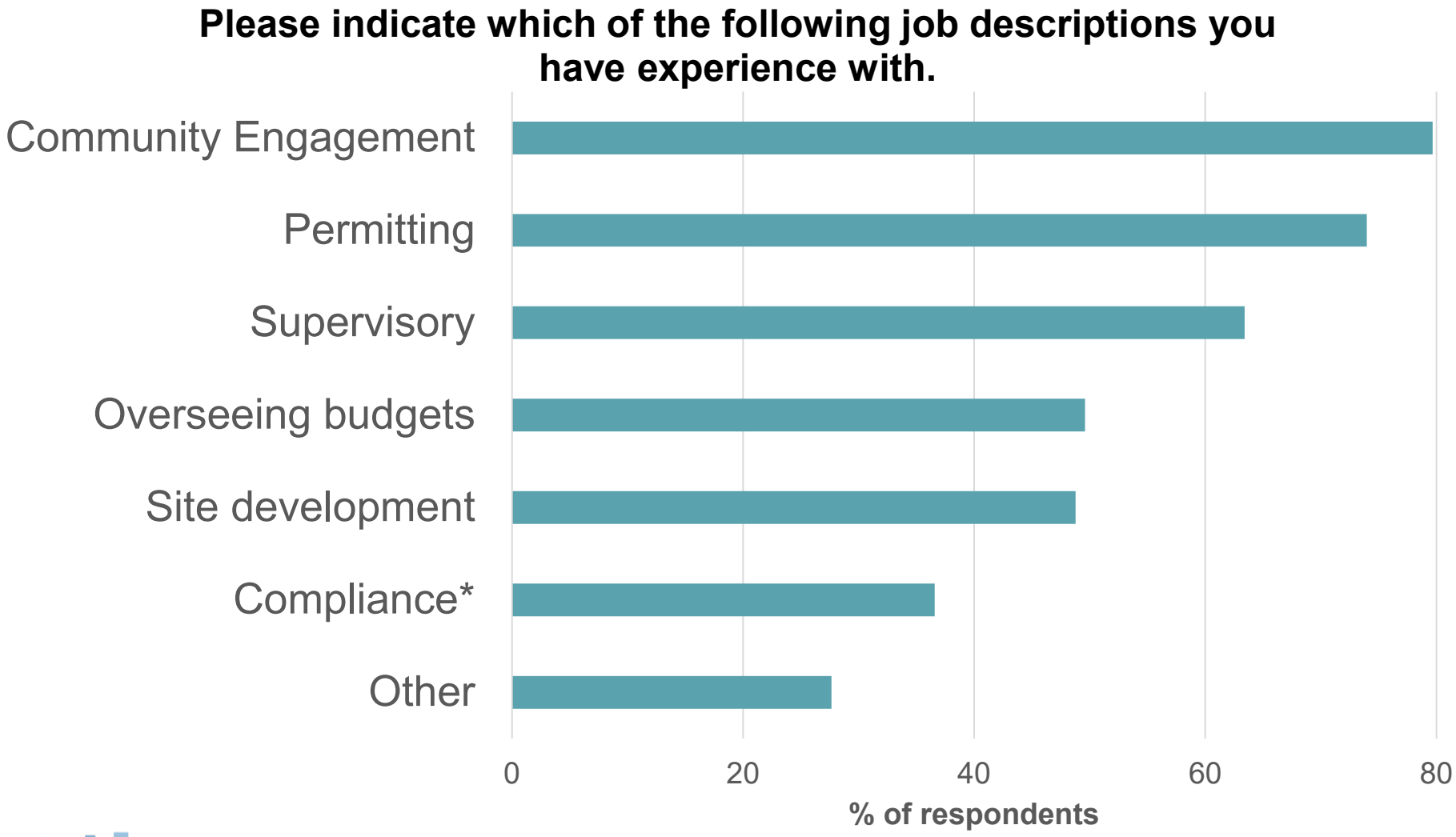
- 123 respondents
- Employed at 62 unique companies, representing the following percentage of the wind and solar markets:

	Capacity	Number of projects
Wind	51%	45%
Solar	45%	26%

*Based on ACP dataset of installed and under construction projects from 2016 to 2023Q1. 21 respondents are employed companies not in the ACP dataset.

Respondent experience	Count	Also completed other section
Only wind	10	n/a
Both, but more recently wind	27	3
Only solar	32	n/a
Both, but more recently solar	54	8
	Total solar	89
	Total wind	45

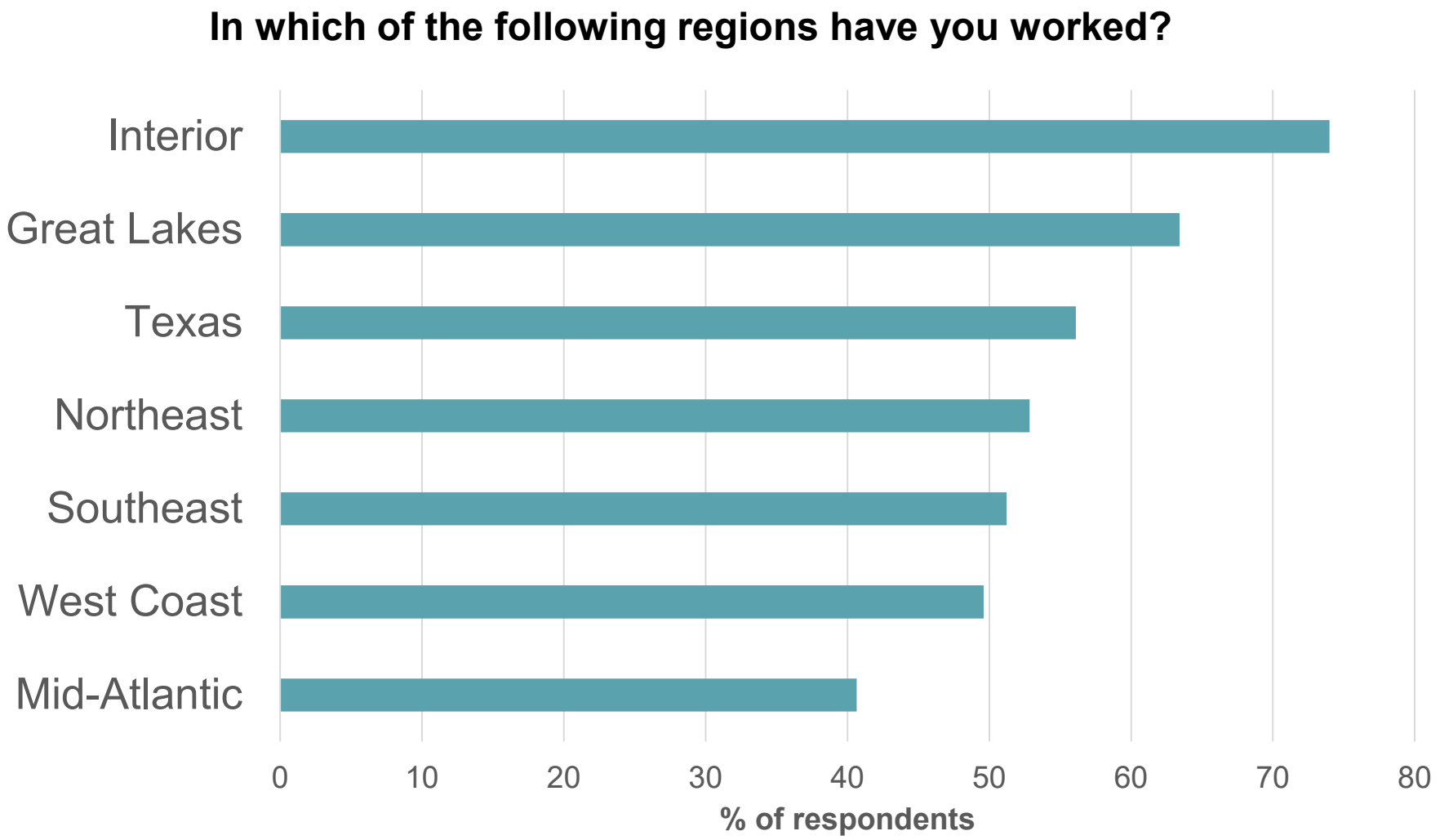
While community engagement is the most common job description selected, the majority selected more than one category



82% selected more than one category.

*Compliance refers to ensuring project design is compliant with applicable laws and permits

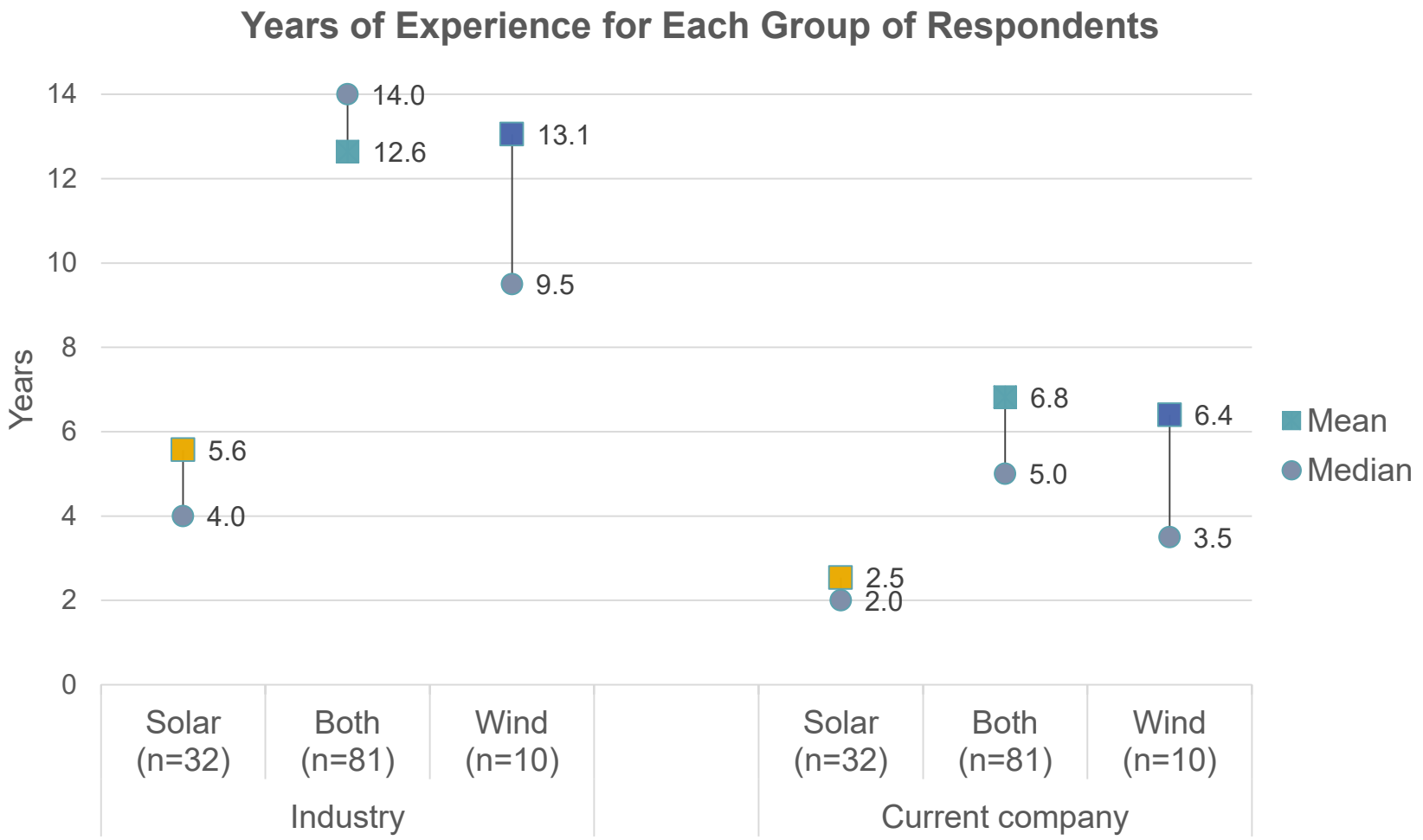
Respondents represent experience from all regions of the U.S., with the majority having worked in multiple regions.



82% have worked in more than one region.

More than half have worked in 4 regions or more.

On average, those with experience with wind have more years of experience than those with only solar experience.

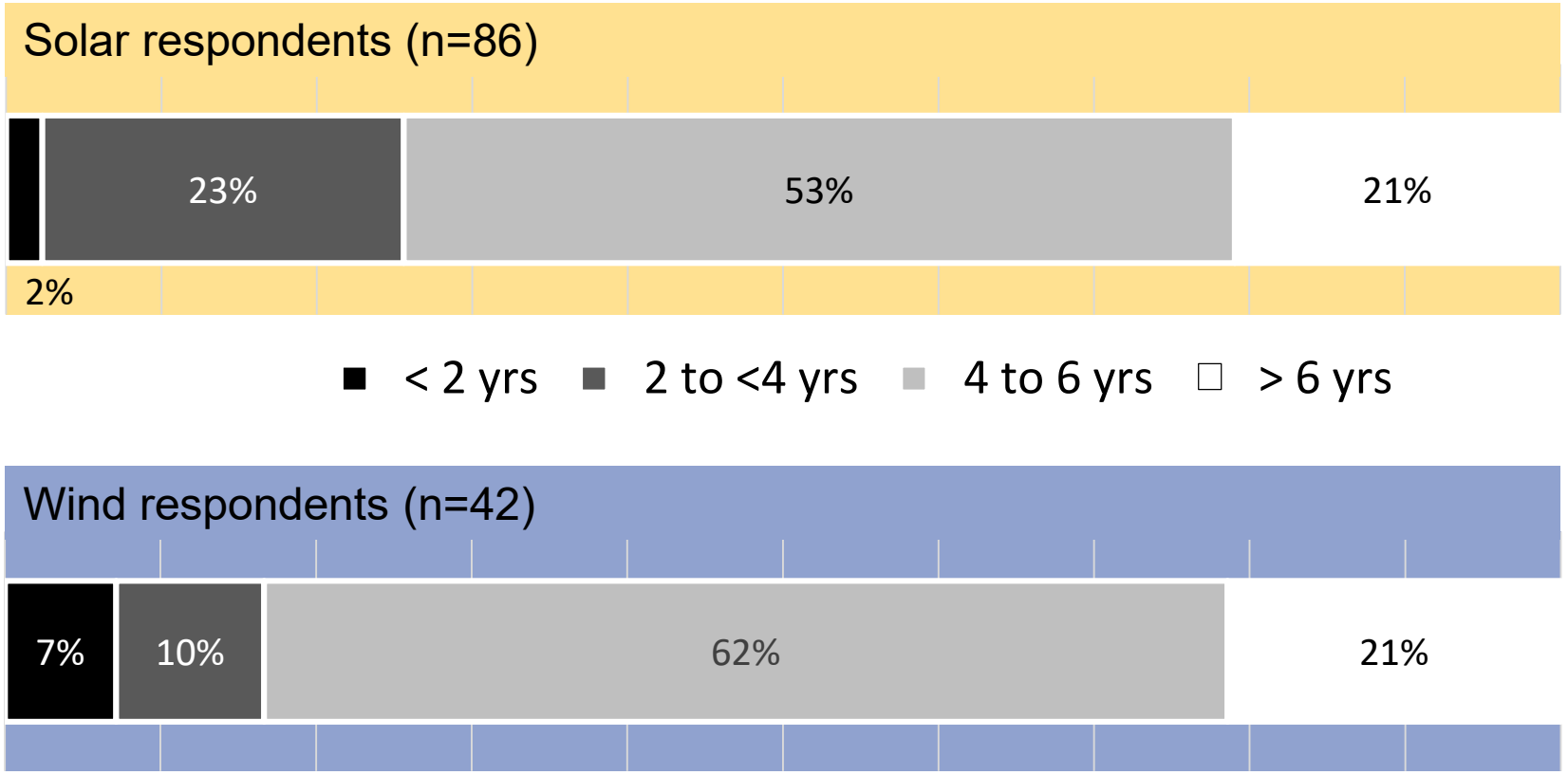


Experience ranged from 1 to 50+ years in the industry and 1 to 23 years in the same company

Project timelines, delays, and cancelations

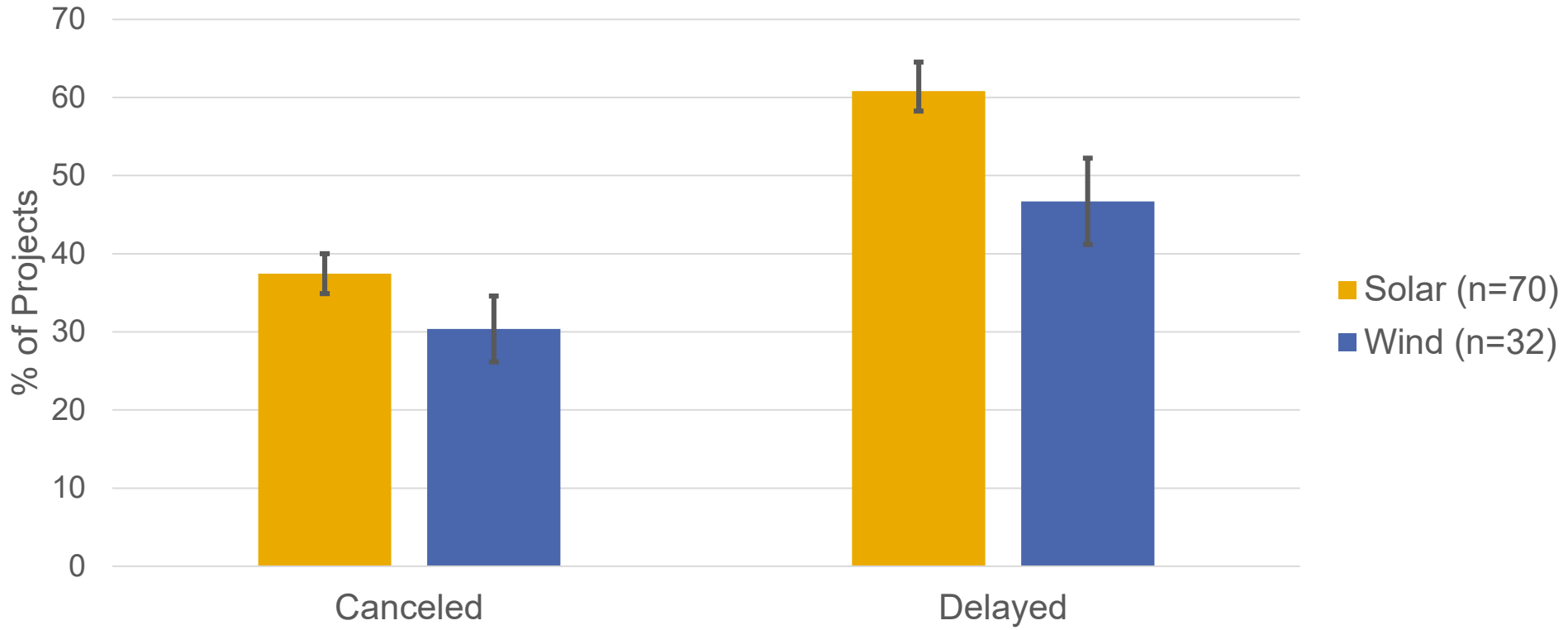
Project development often lasts 4-6 years for both technologies

For utility-scale projects completed in the last 5 years, what has been the typical length of a project timeline from a first local contact to COD?



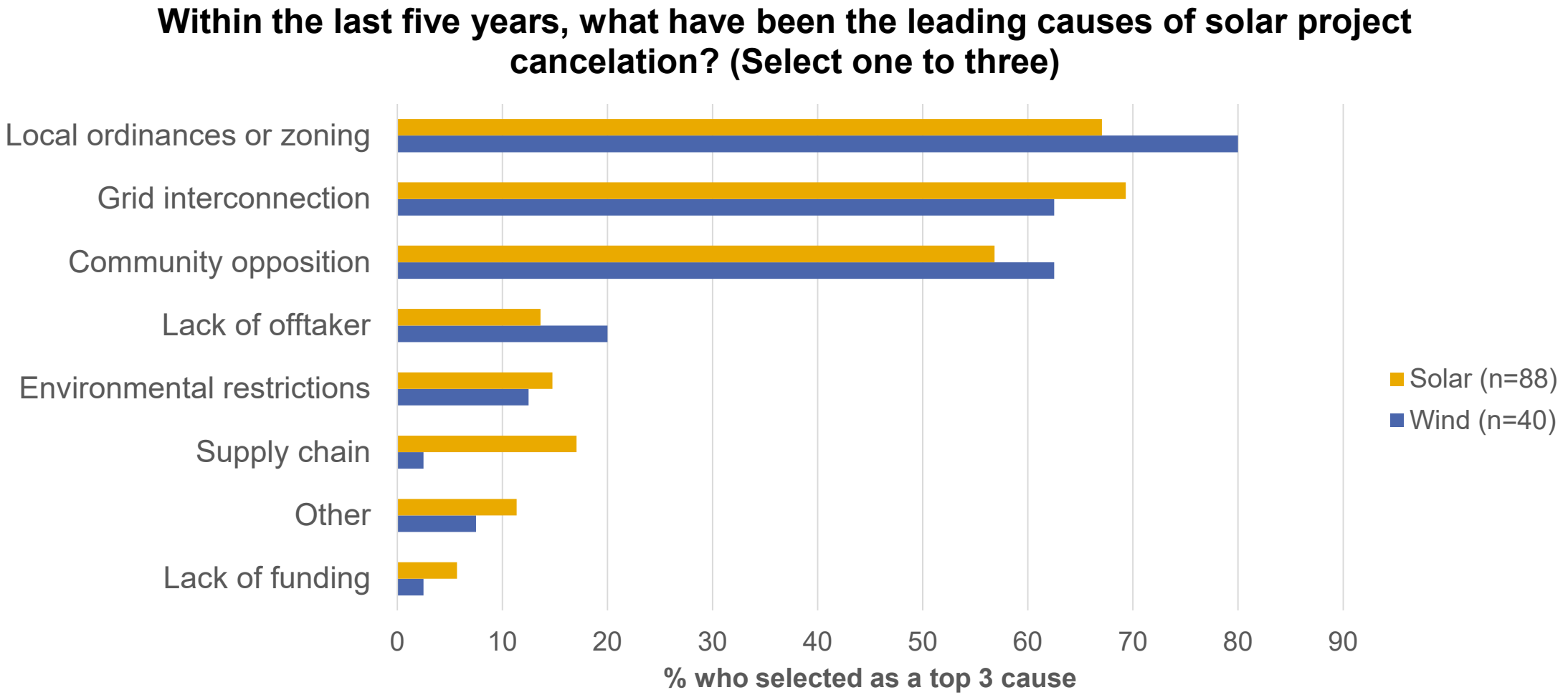
Many projects experience significant delays and at least 30% are canceled

Approximately what percent of siting applications submitted by your company in the last five years were canceled or significantly delayed (≥ 6 months)?

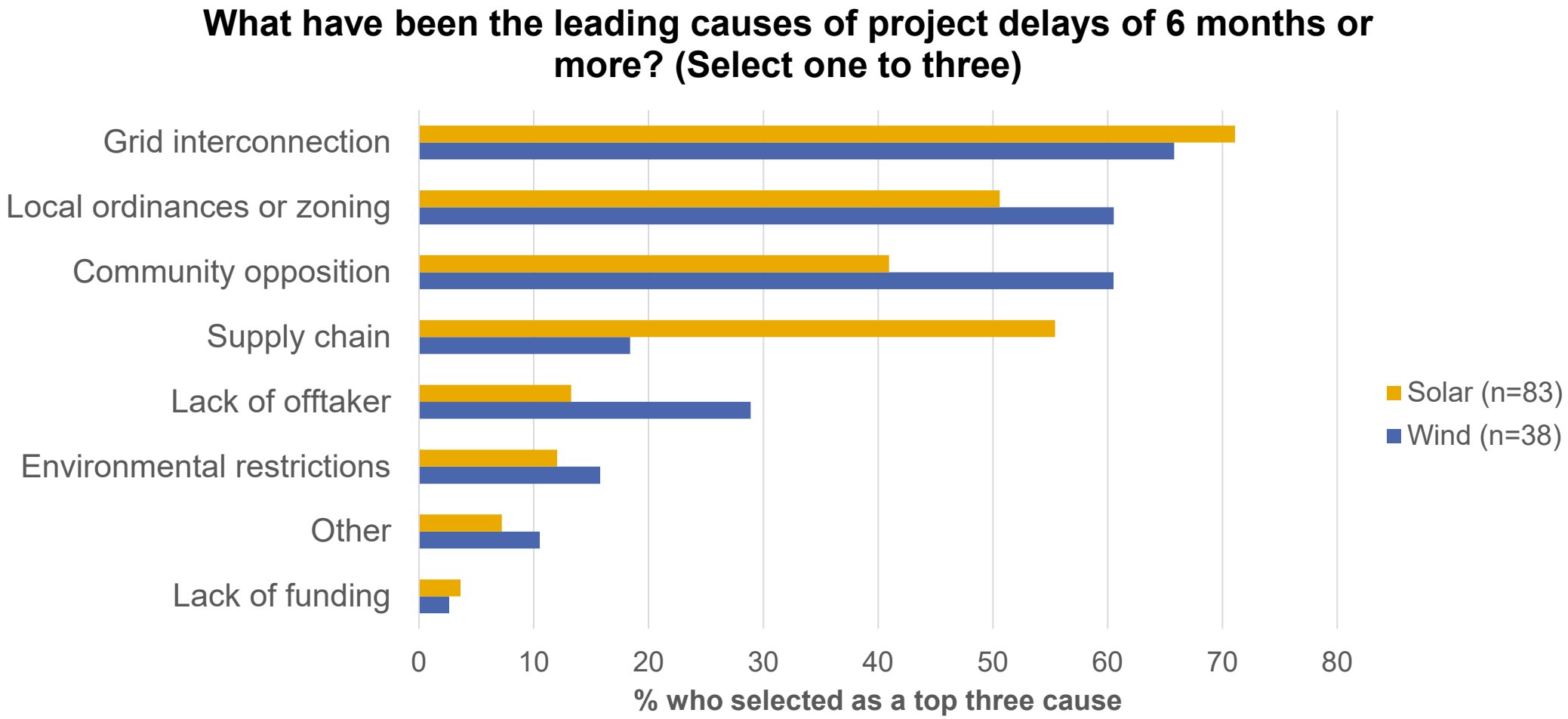


Note: error bars represent standard error throughout the presentation

Local ordinances, interconnection, and opposition are leading causes of cancelation for both wind and solar

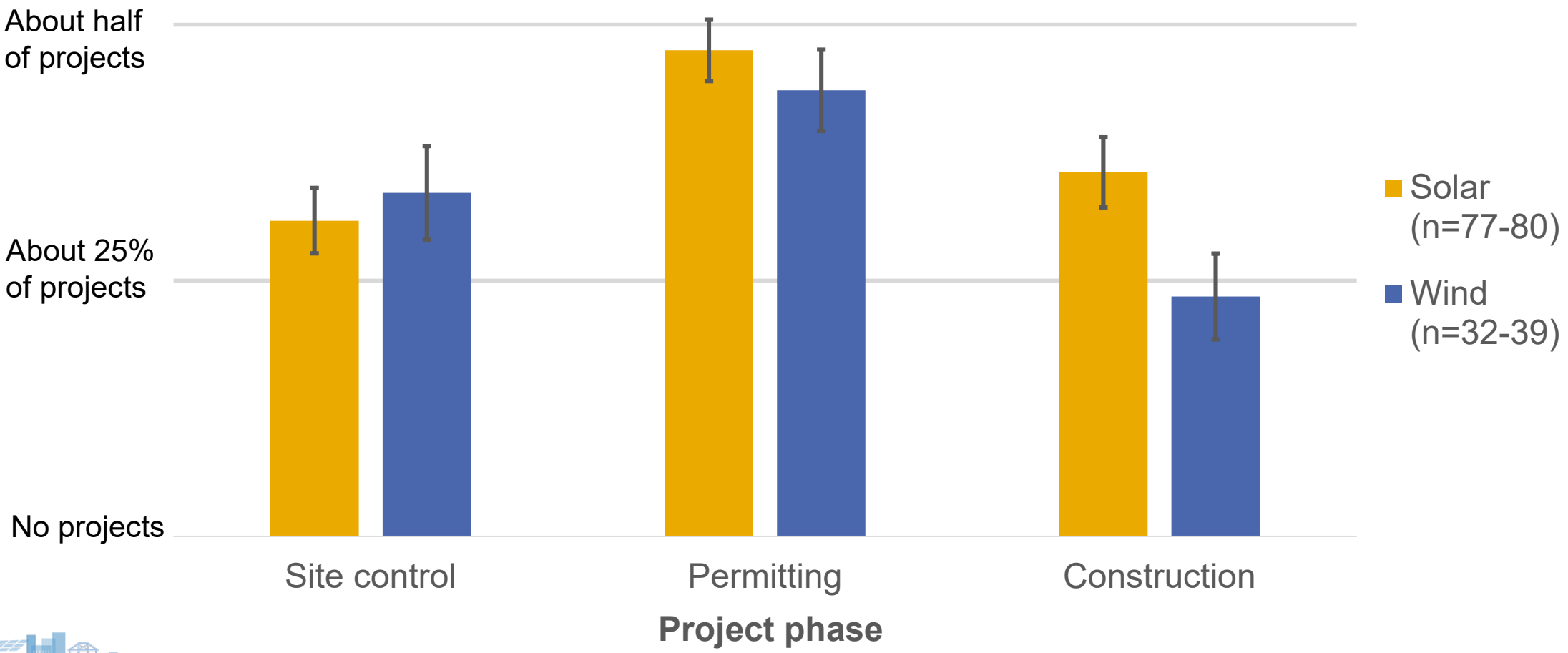


Interconnection, local ordinances, and opposition are also leading causes of delays. Additionally, supply chain has led to many solar delays.



Project delays occur in all phases, but most often occur during permitting

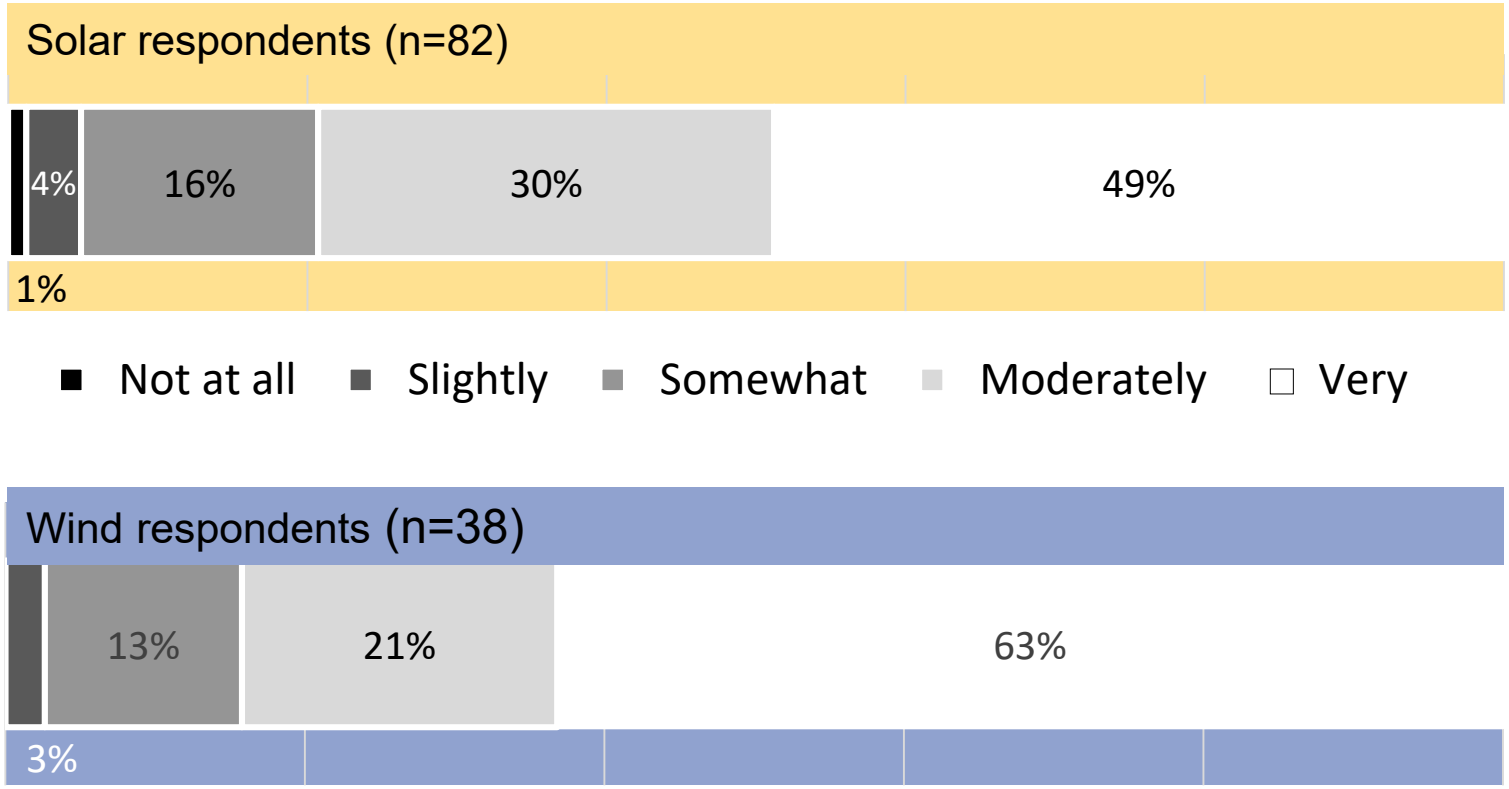
Within the last five years, how many solar projects have been delayed by 6 months or more during each of the following project phases?



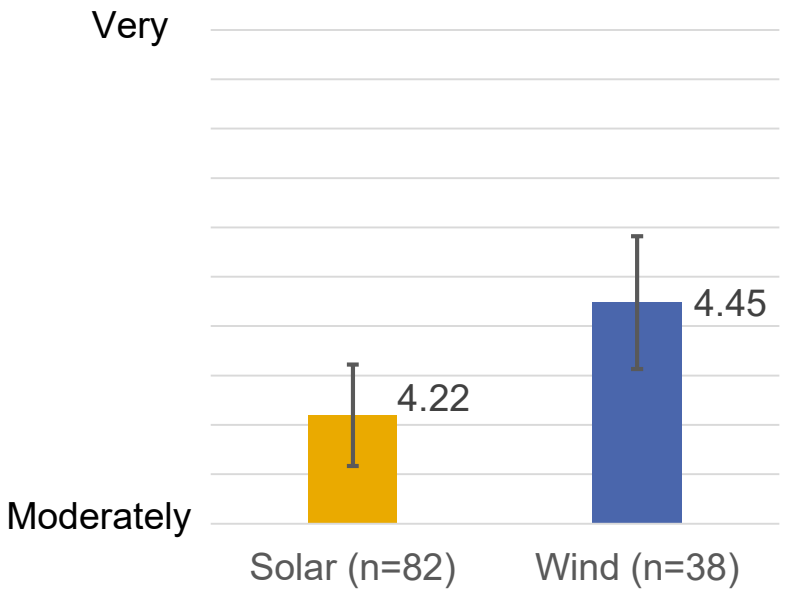
Trends in community opposition

Developers expect community opposition to be detrimental to decarbonization goals, especially for wind

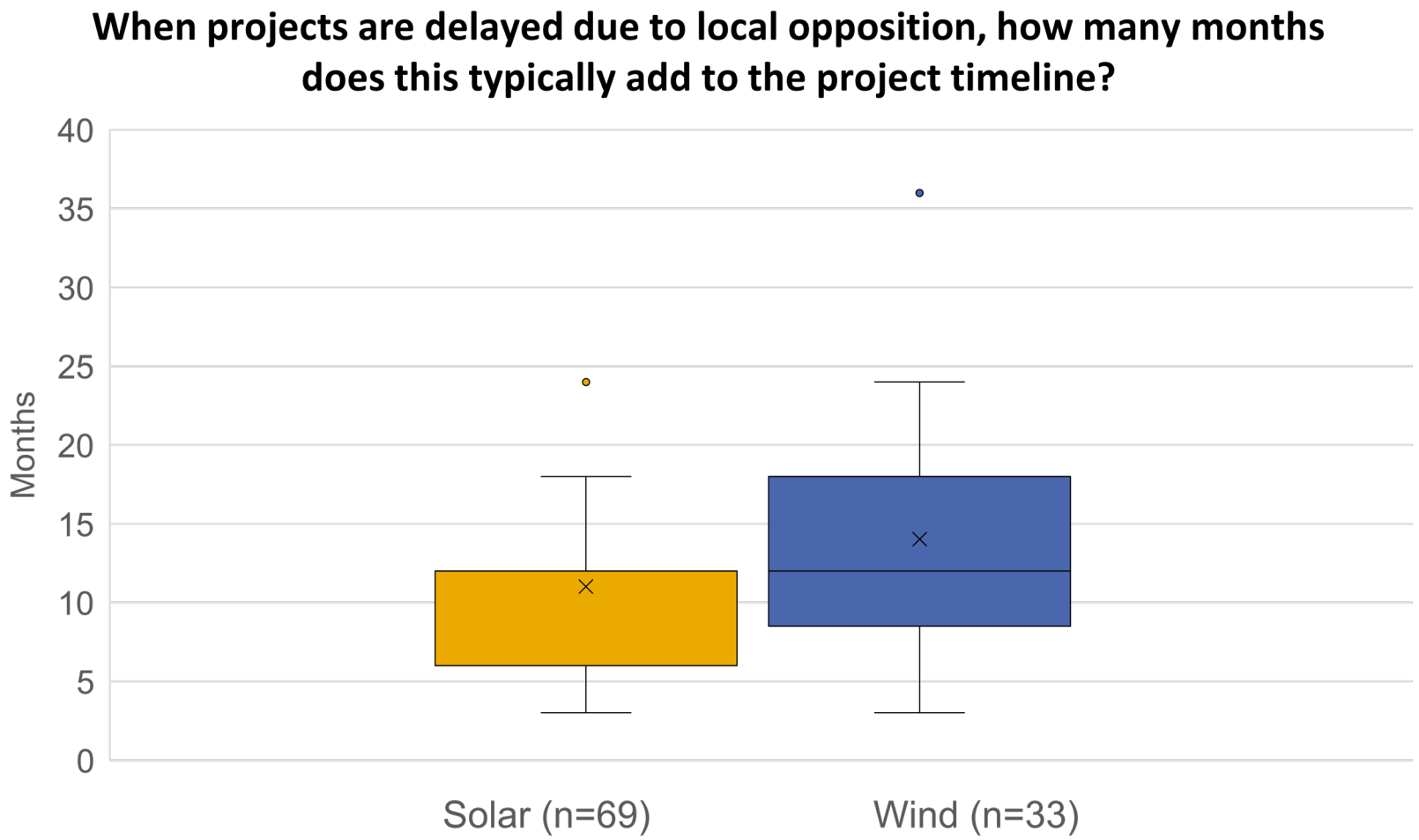
How much do you think community opposition will get in the way of decarbonization goals?



Comparison of means

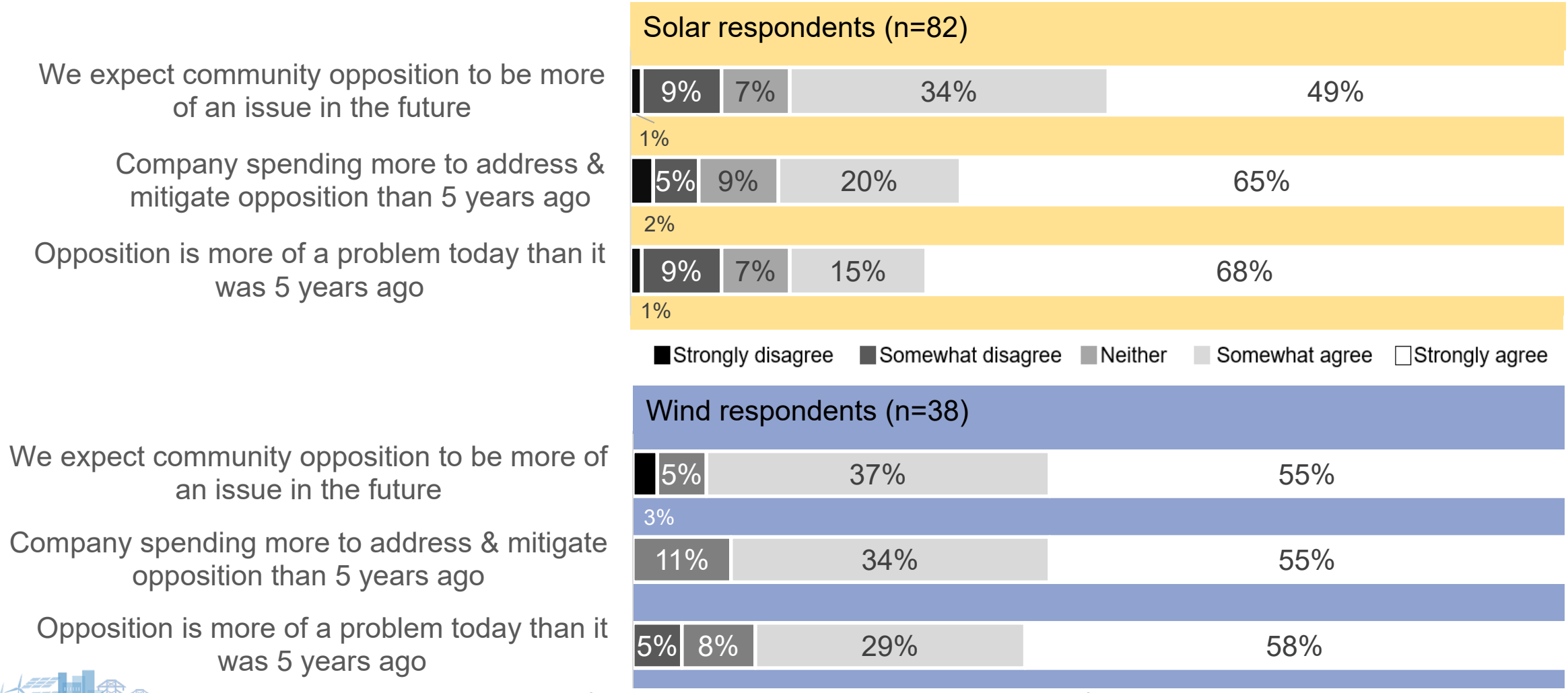


Community opposition can cause considerable project delays, with average delays of about 11 months for solar and 14 months for wind

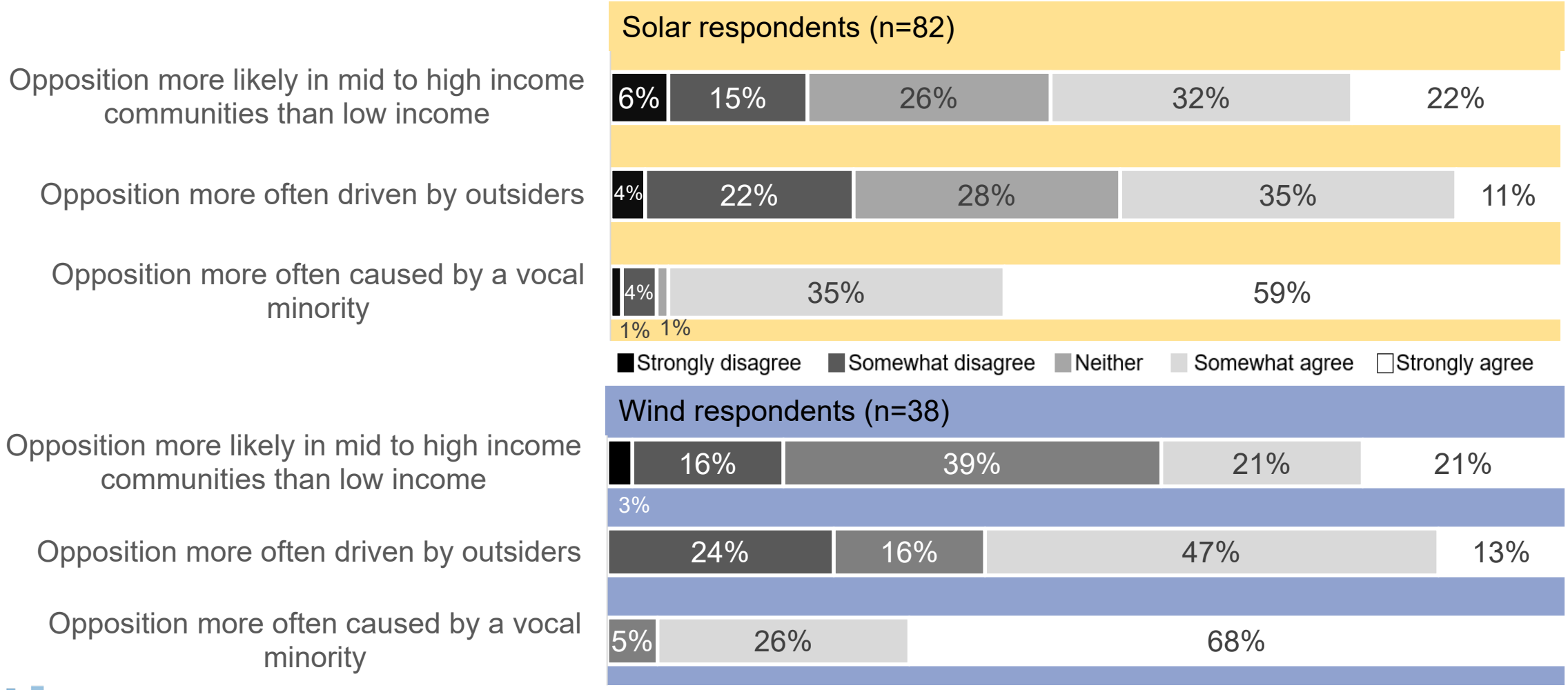


For both wind and solar, community opposition is becoming more frequent and more expensive to address than it was 5 years ago

How strongly do you agree or disagree with the following statements?

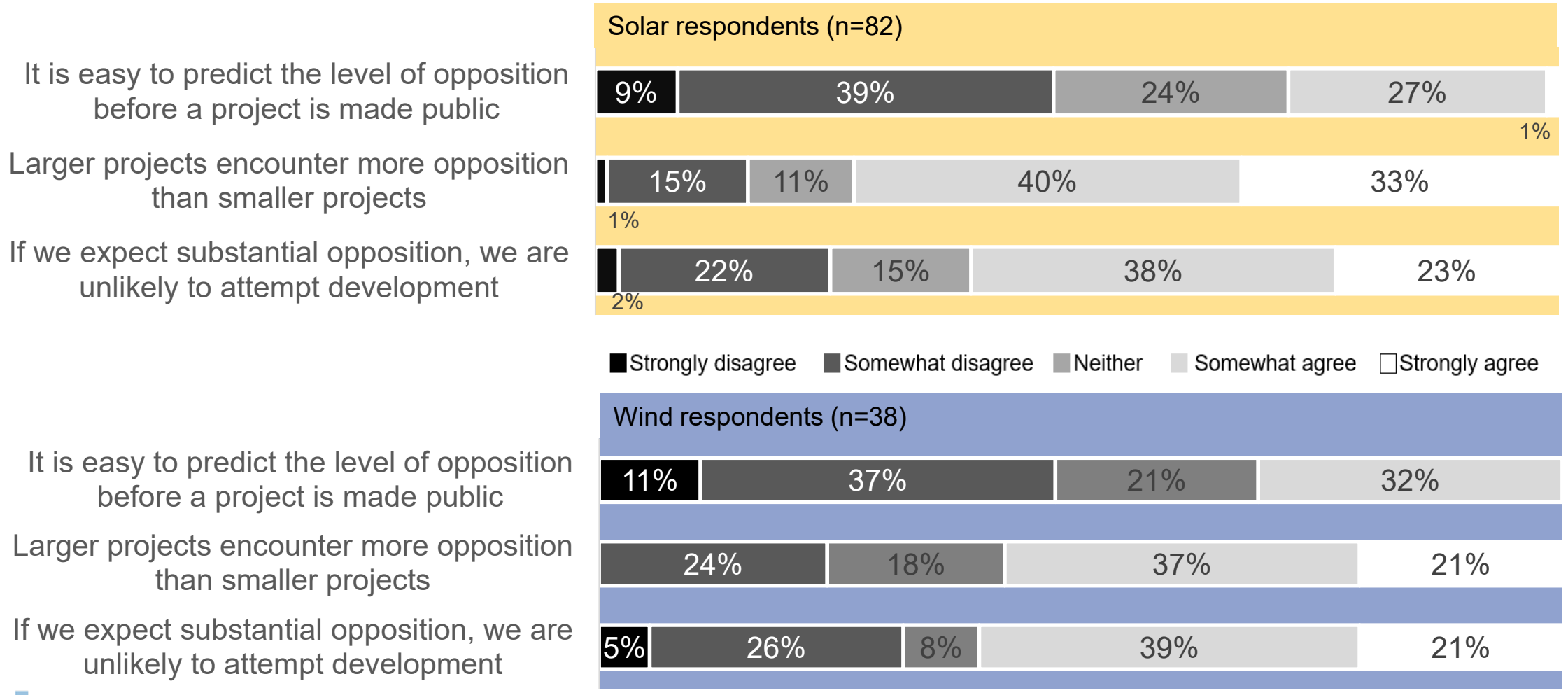


Opposition is often driven by a vocal minority or outsiders, and may be slightly more likely to occur in higher income communities

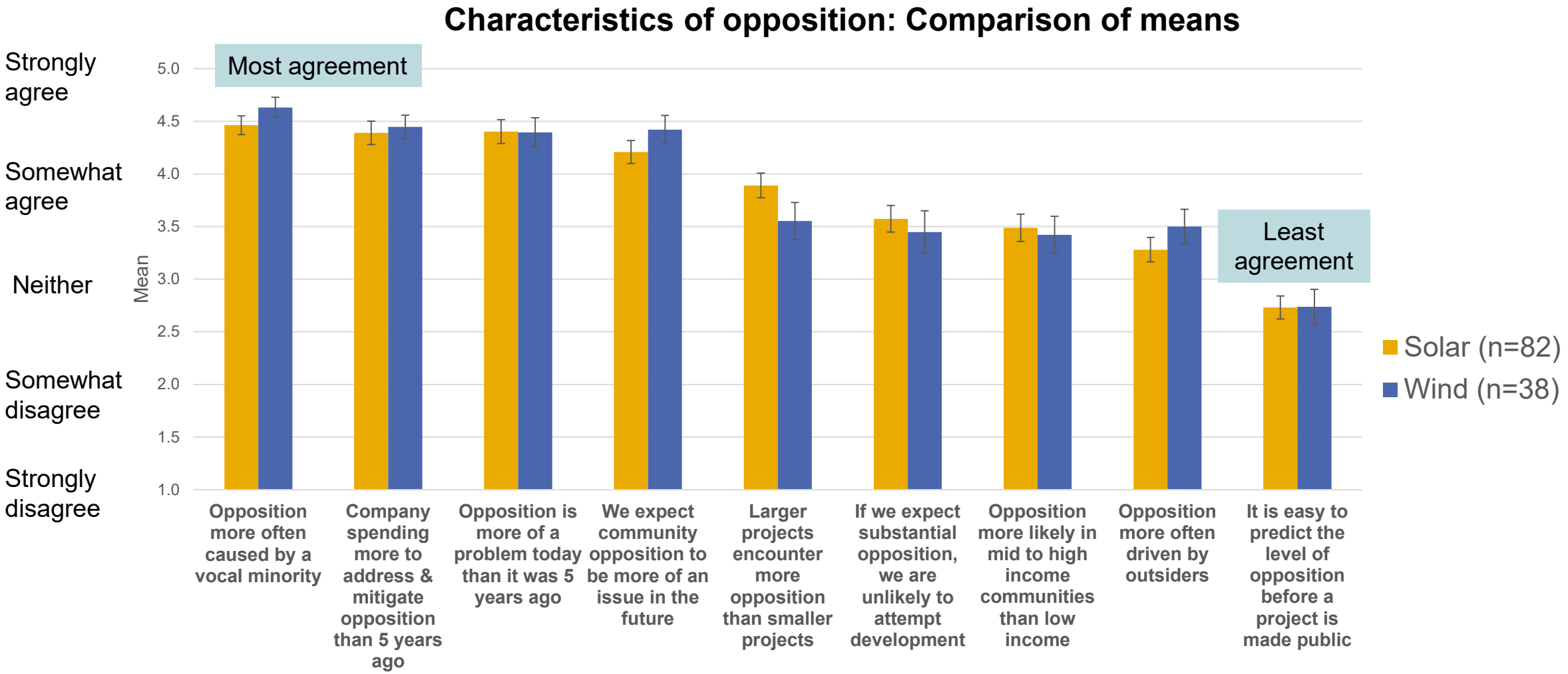


Developers may avoid communities where they expect opposition, but it can be difficult to predict. Large projects often encounter more opposition.

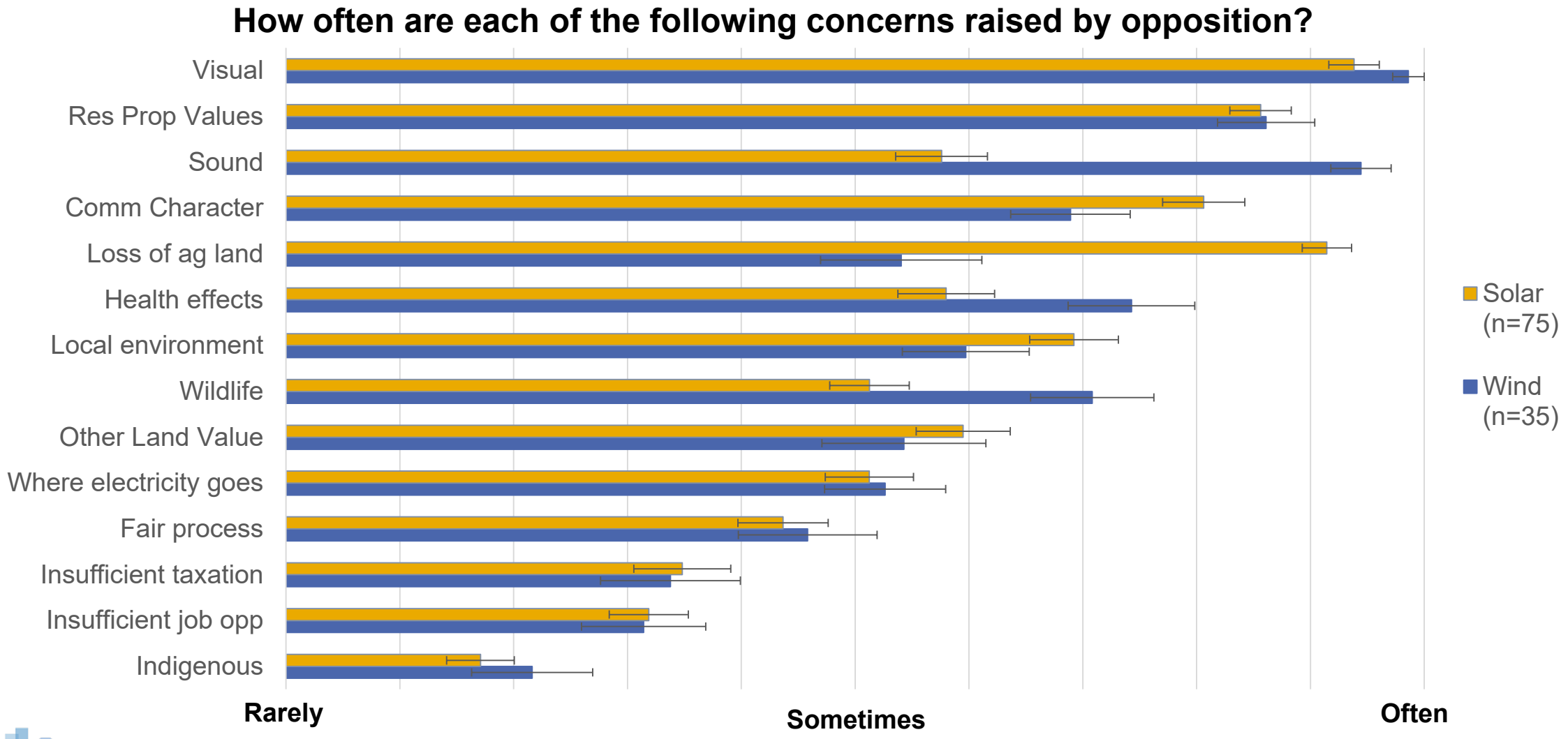
How strongly do you agree or disagree with the following statements?



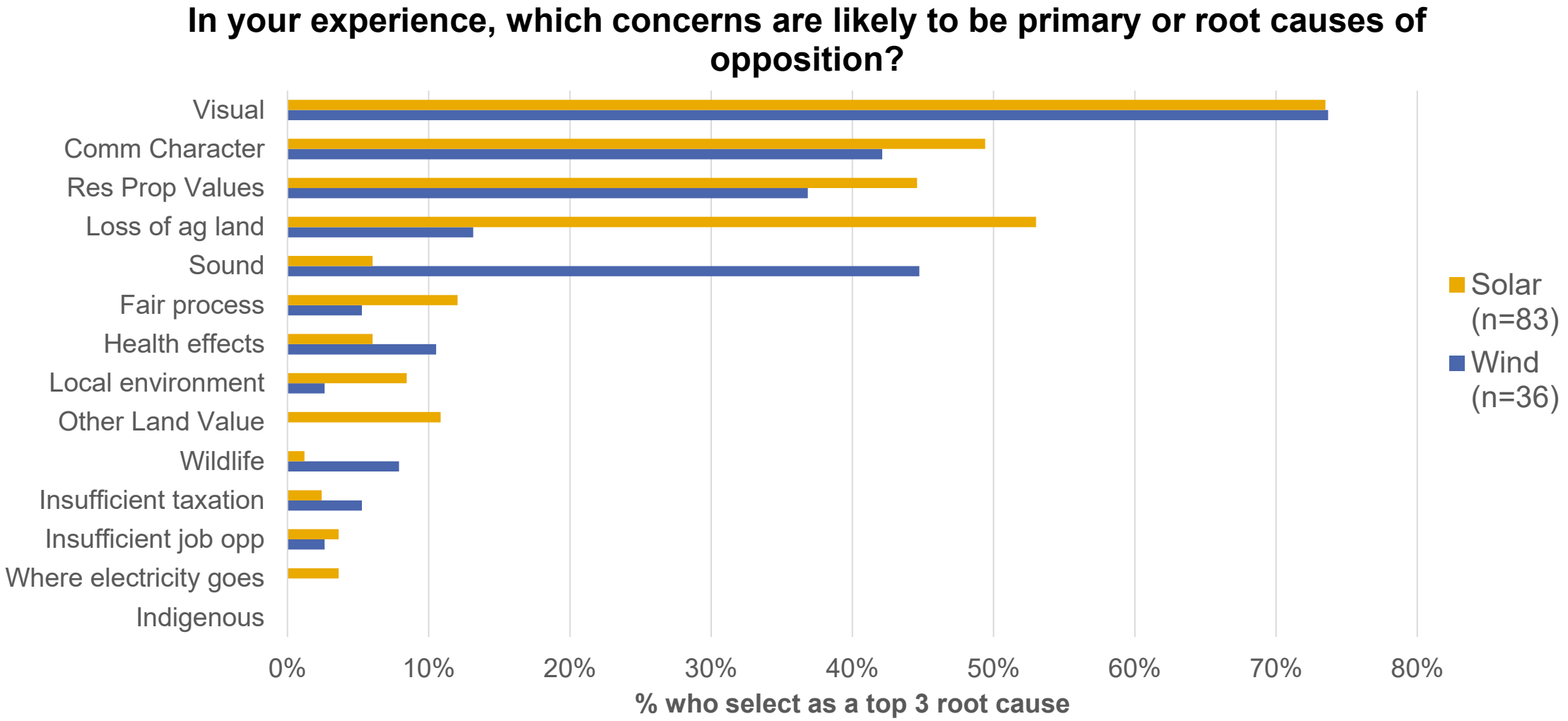
Across these characteristics, developers are least likely to agree that opposition is easy to predict



Developers report visual concerns to be the most common for both wind and solar, followed by sound for wind and loss of farm land for solar

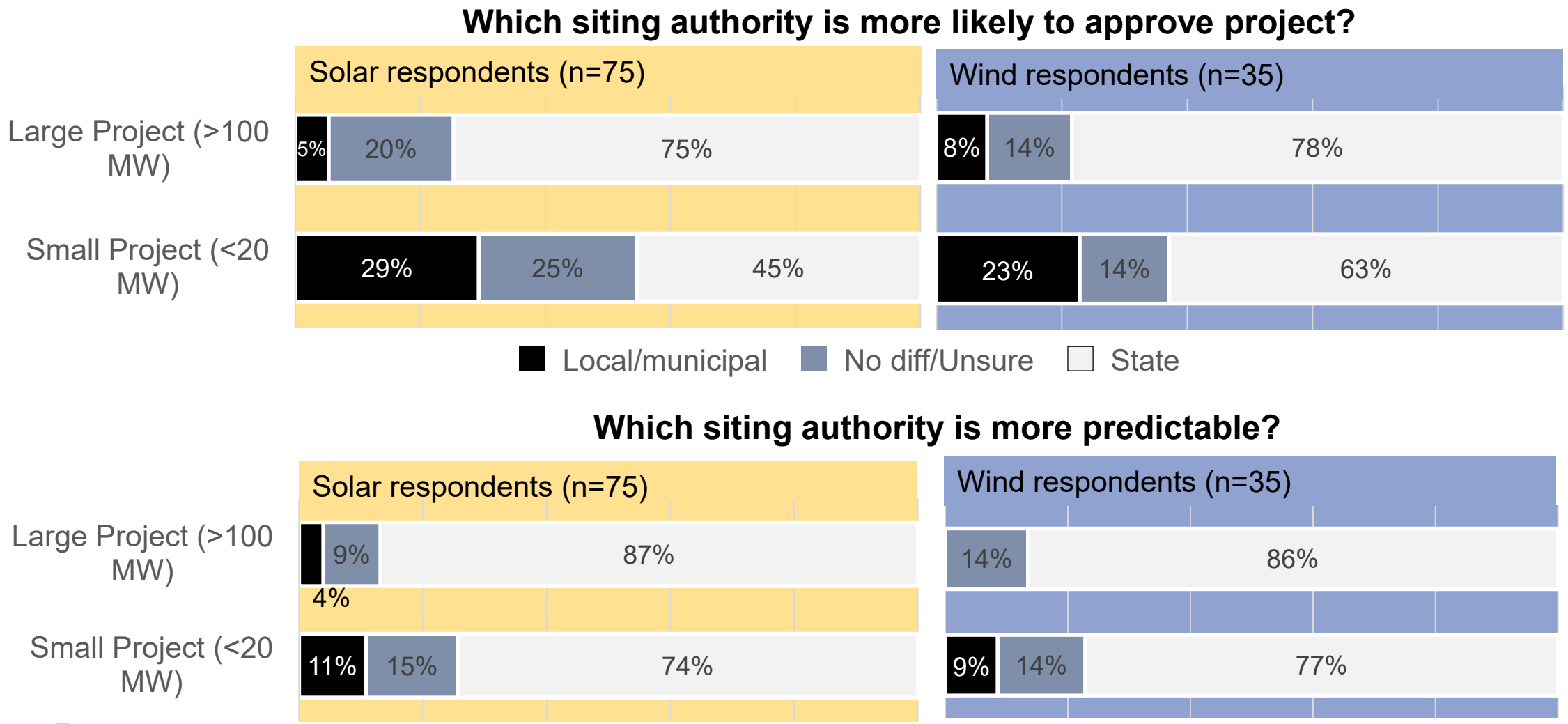


Developers do not expect many of the concerns raised to be root concerns of opposition (e.g. fair process, job opportunities, taxation)



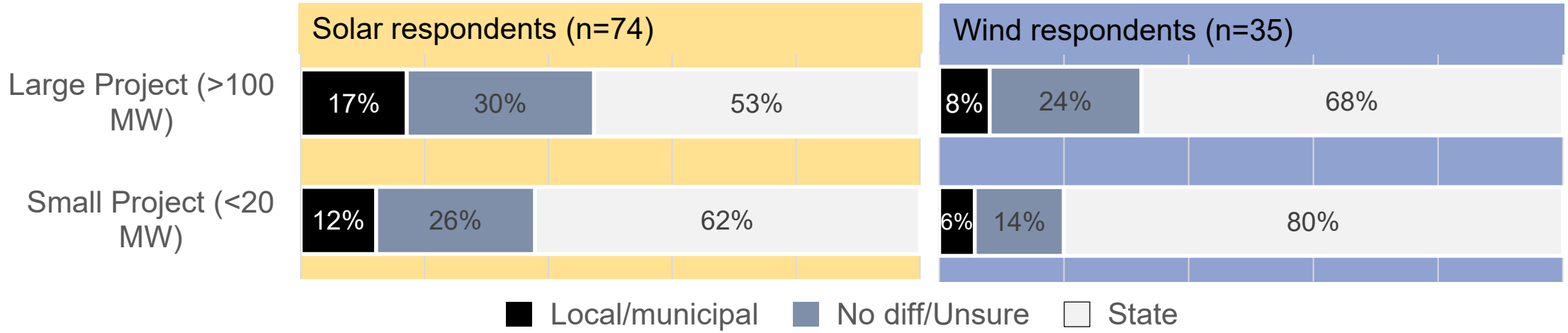
State and Local Permitting

State siting authority is expected to be more likely to approve projects and more predictable for both technologies and project sizes

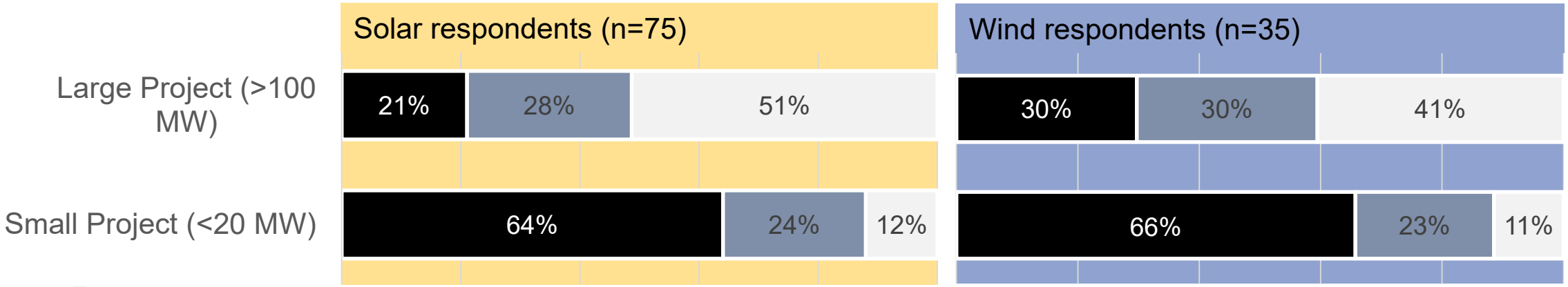


Most respondents agree that state siting authority is more expensive, while efficiency depends on project size – local authority is often more efficient for small projects.

Which siting authority is more expensive?

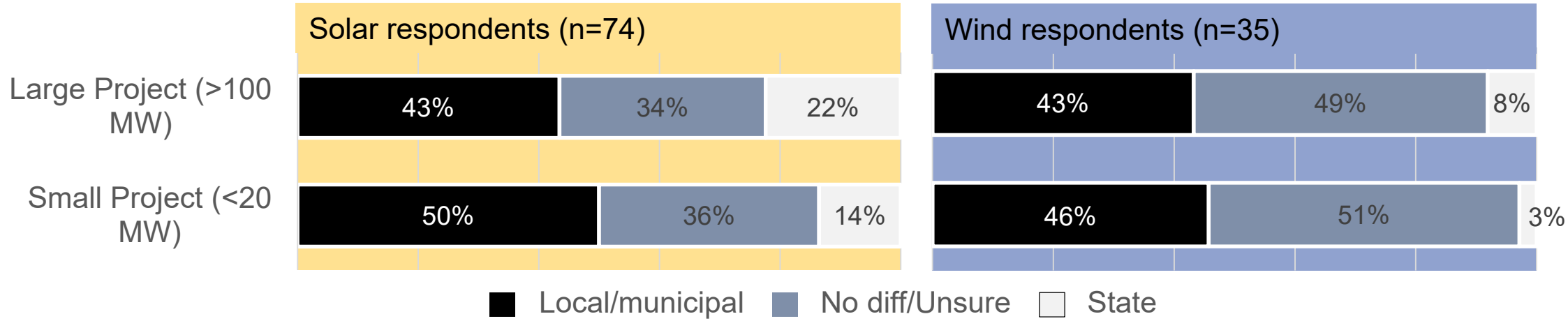


Which siting authority has more efficient timeline?

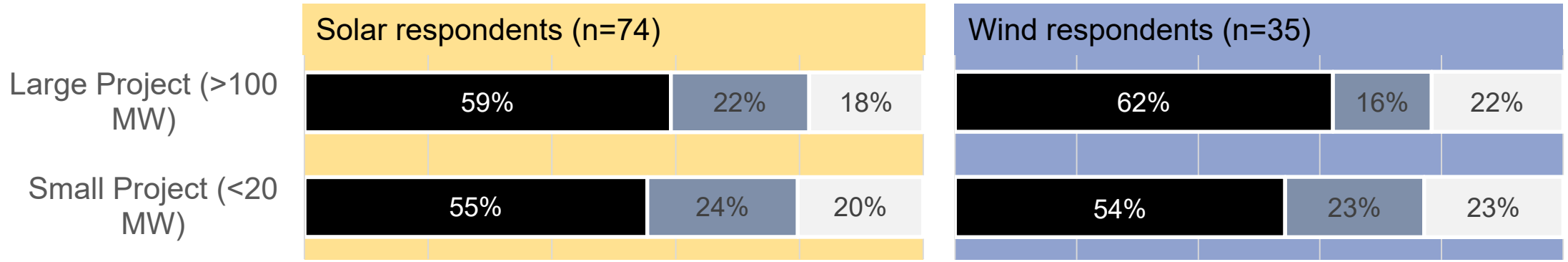


More respondents expect local siting authority to result in greater net benefits to a community and lead to more community opposition

Which siting authority results in more net benefits to the community?



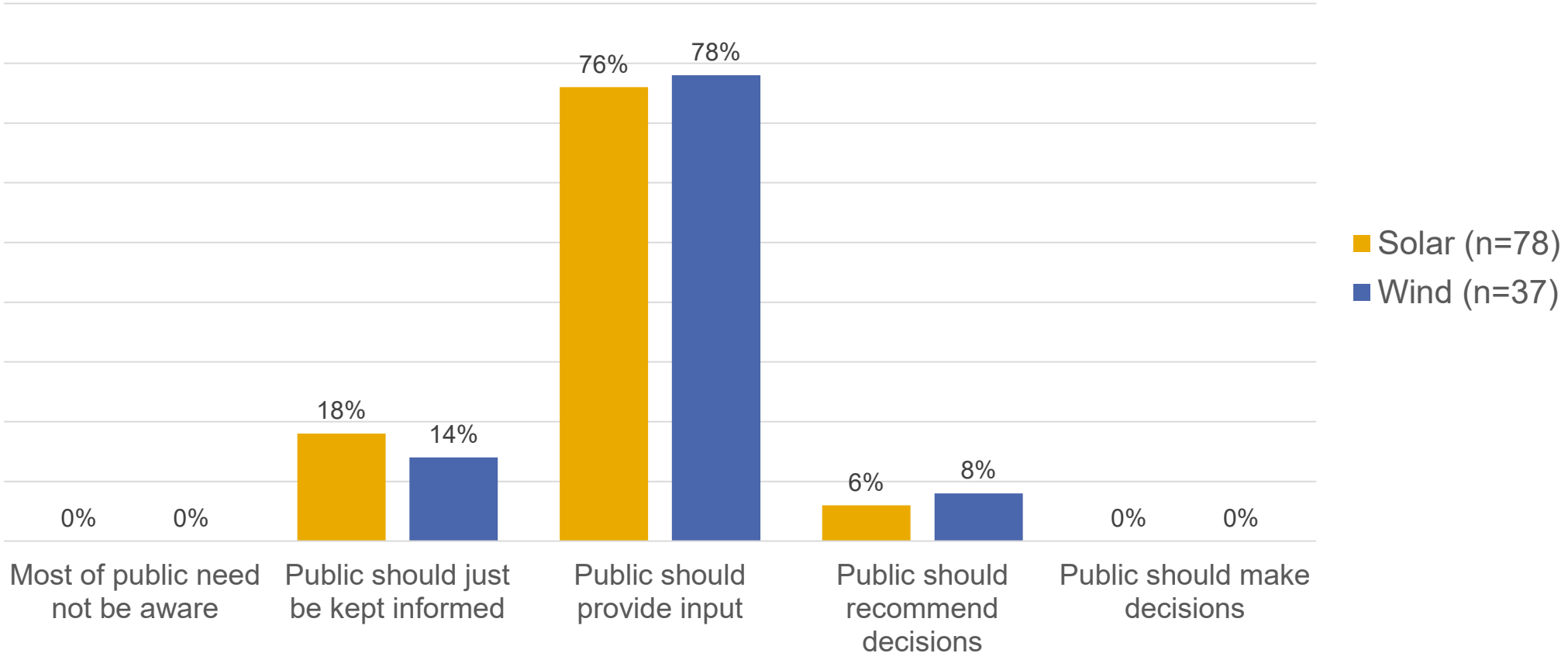
Which siting authority leads to more community opposition?



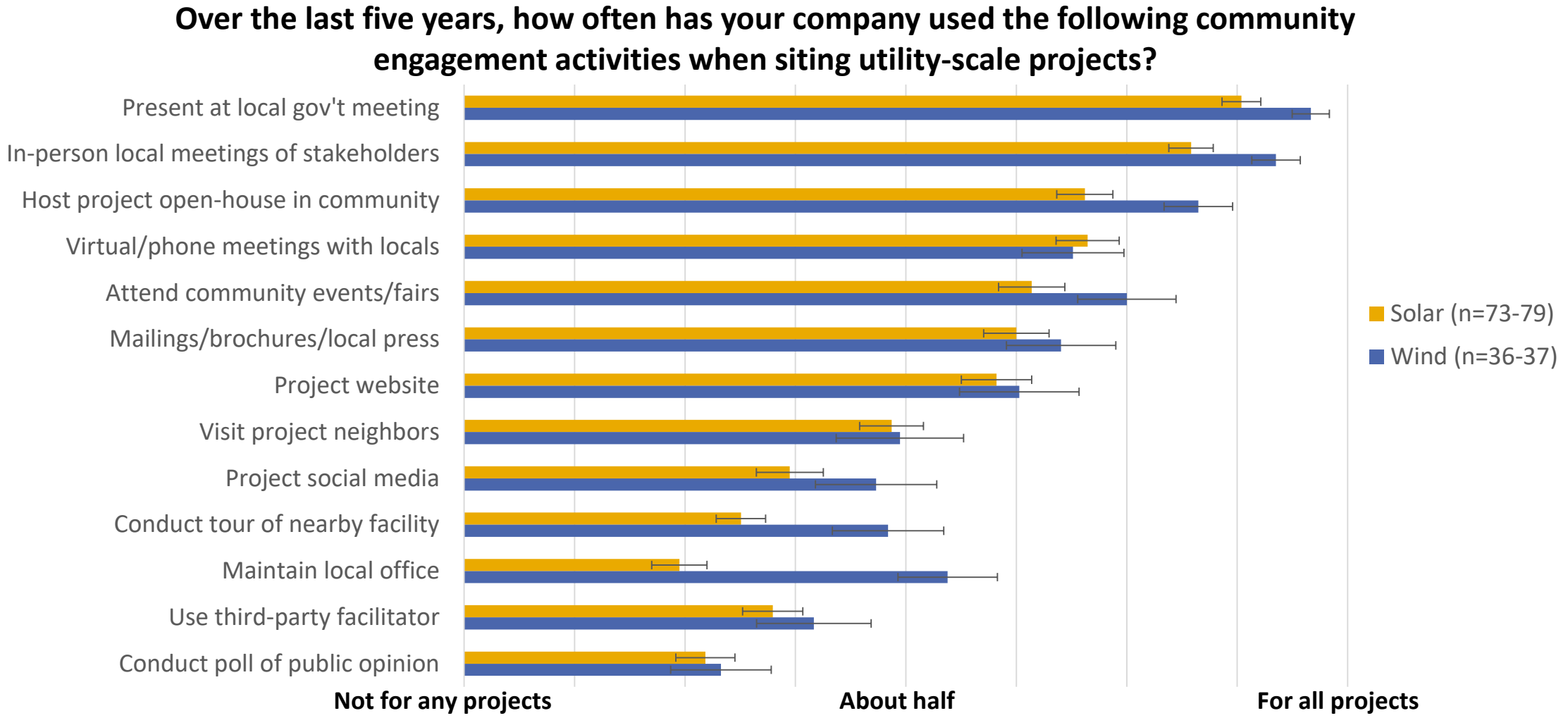
Community engagement

Most developers agree the public should provide input, but not recommend or make decisions about projects

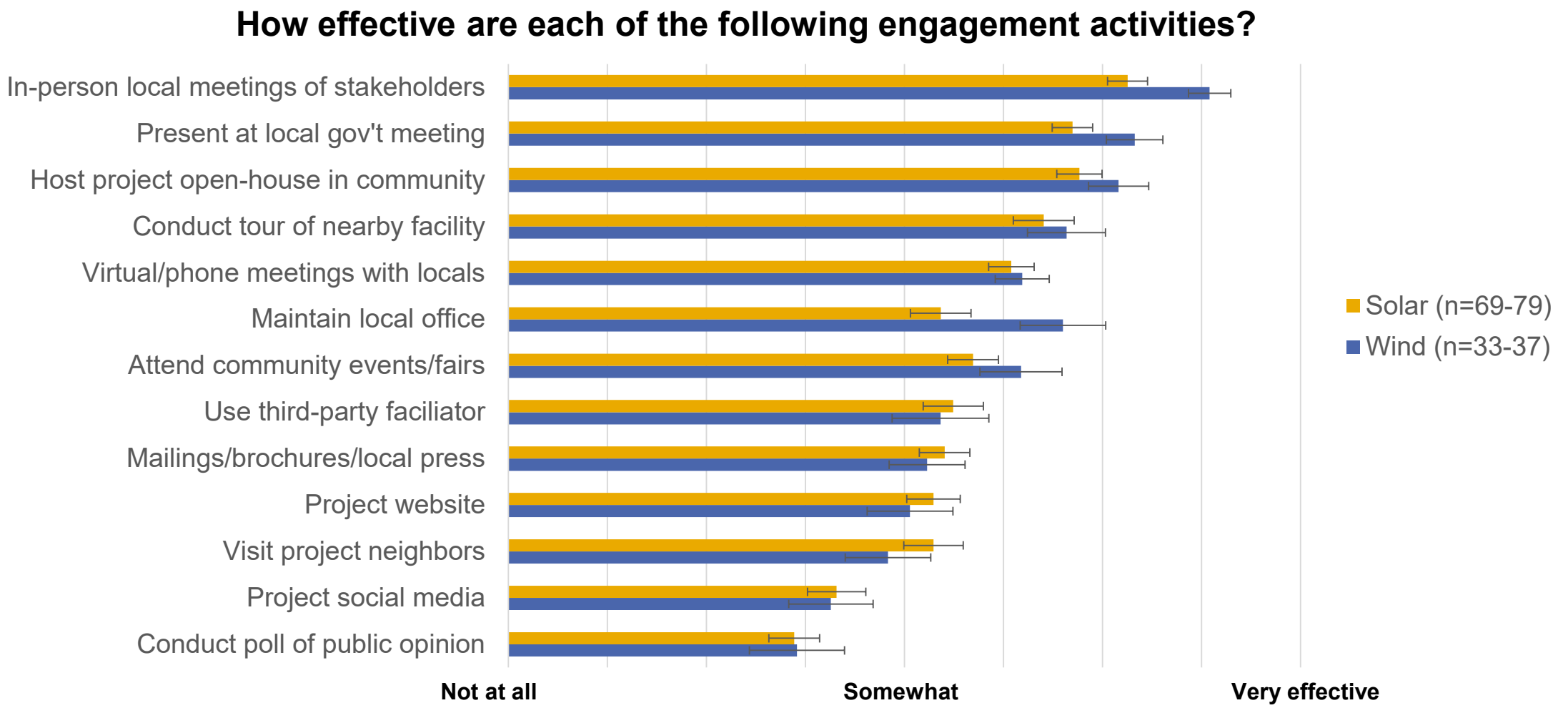
Which is the most appropriate way to engage members of the public in decisions about utility-scale projects proposed in their community?



Developers use many engagement strategies, most often local meetings and presentations



Developers rate conducting a poll of public opinion and using social media as the least effective strategies



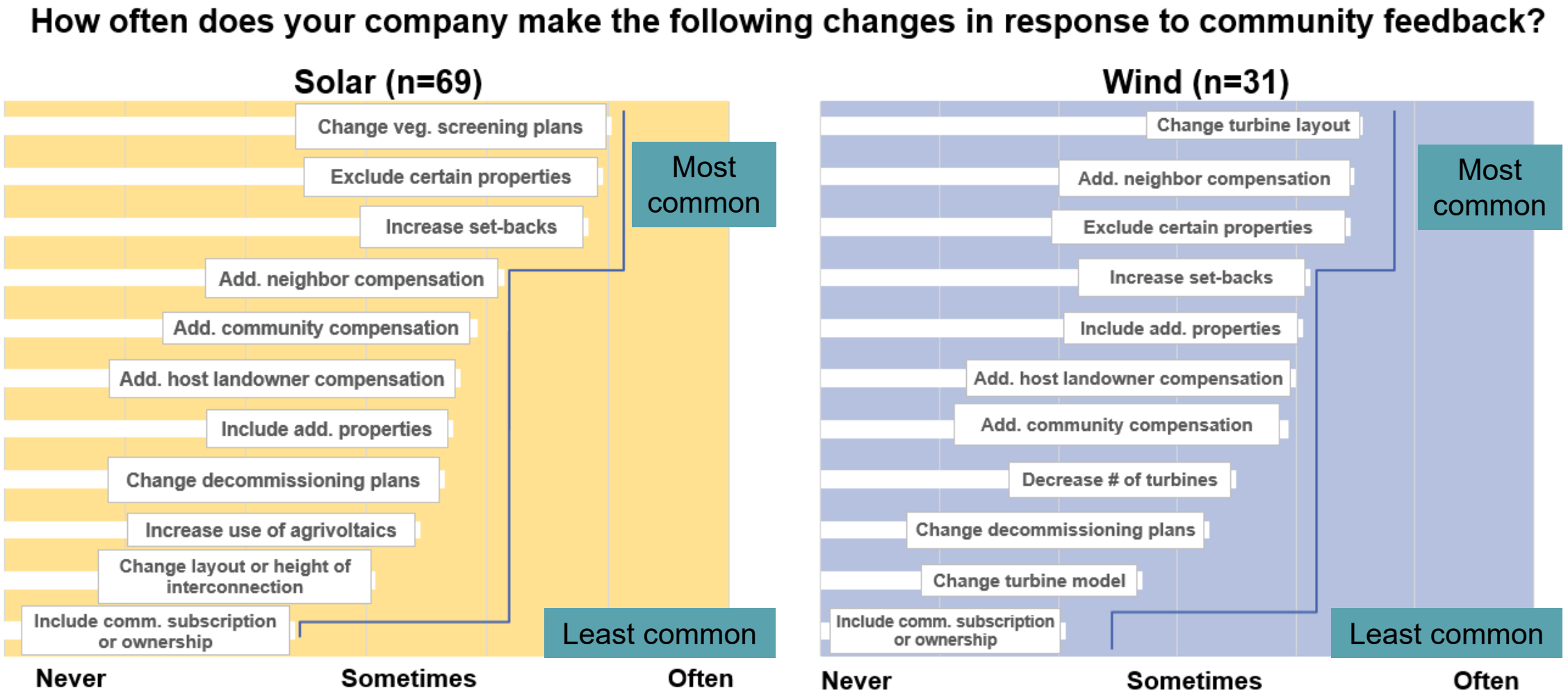
Developers also note employing local staff, community donations and volunteering, and land-owner only events to be particularly effective

Are there any other activities that you have found particularly effective?

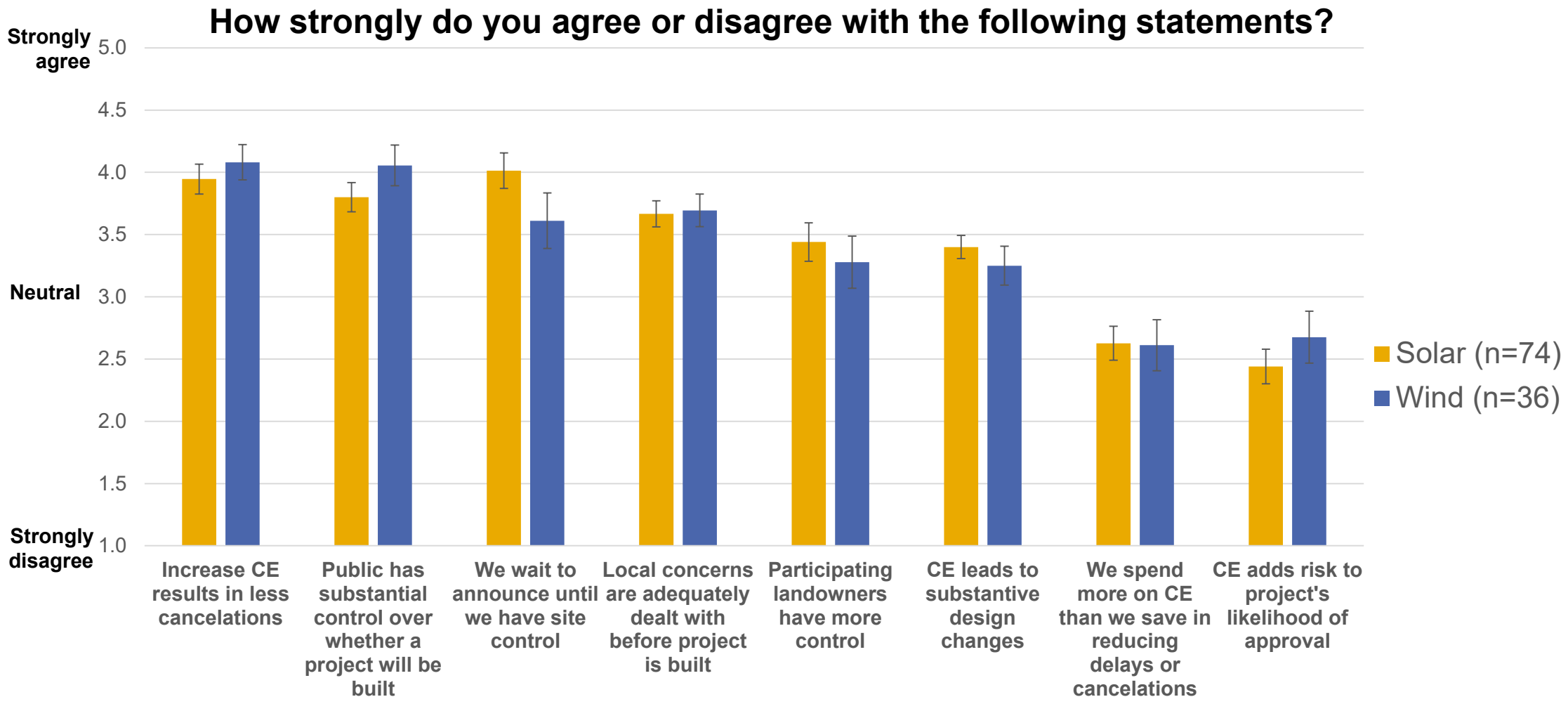
		Solar	Wind
		16	12
community donations and volunteering	4	2	2
employing local staff	4	3	1
good neighbor agreements	2	1	1
landowner-only events	4	2	2
meet local businesses	2	2	
meeting with civic organizations	2	1	1
podcasts and webinars	2	2	
relationships with local advocates	2	1	1
school engagement	2	2	
vendor fairs	2	2	

Table displays additional engagement strategies that at least 2 respondents provided in an open-ended text box.

Community feedback is more likely to impact some project features than others

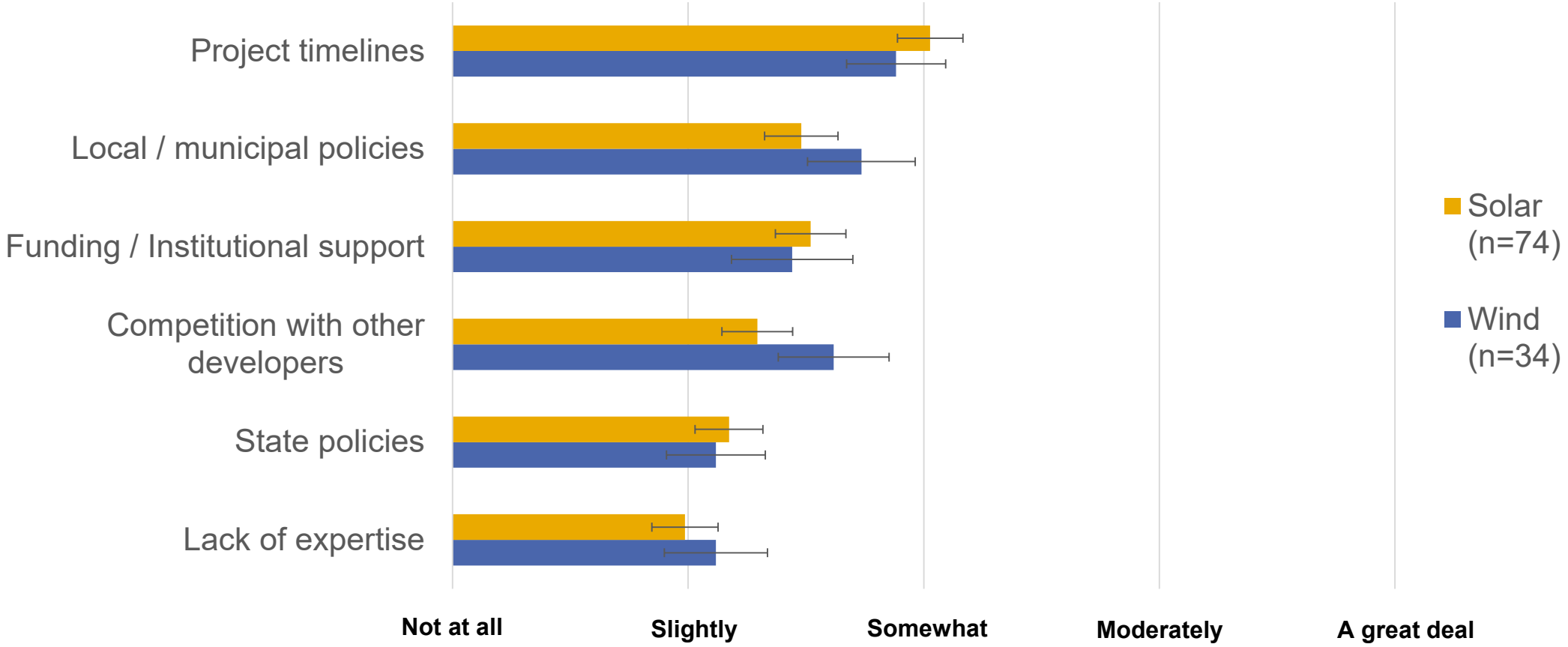


Community engagement is not generally expected to add additional risk to a projects likelihood of approval, and it may help reduce delays and cancelations



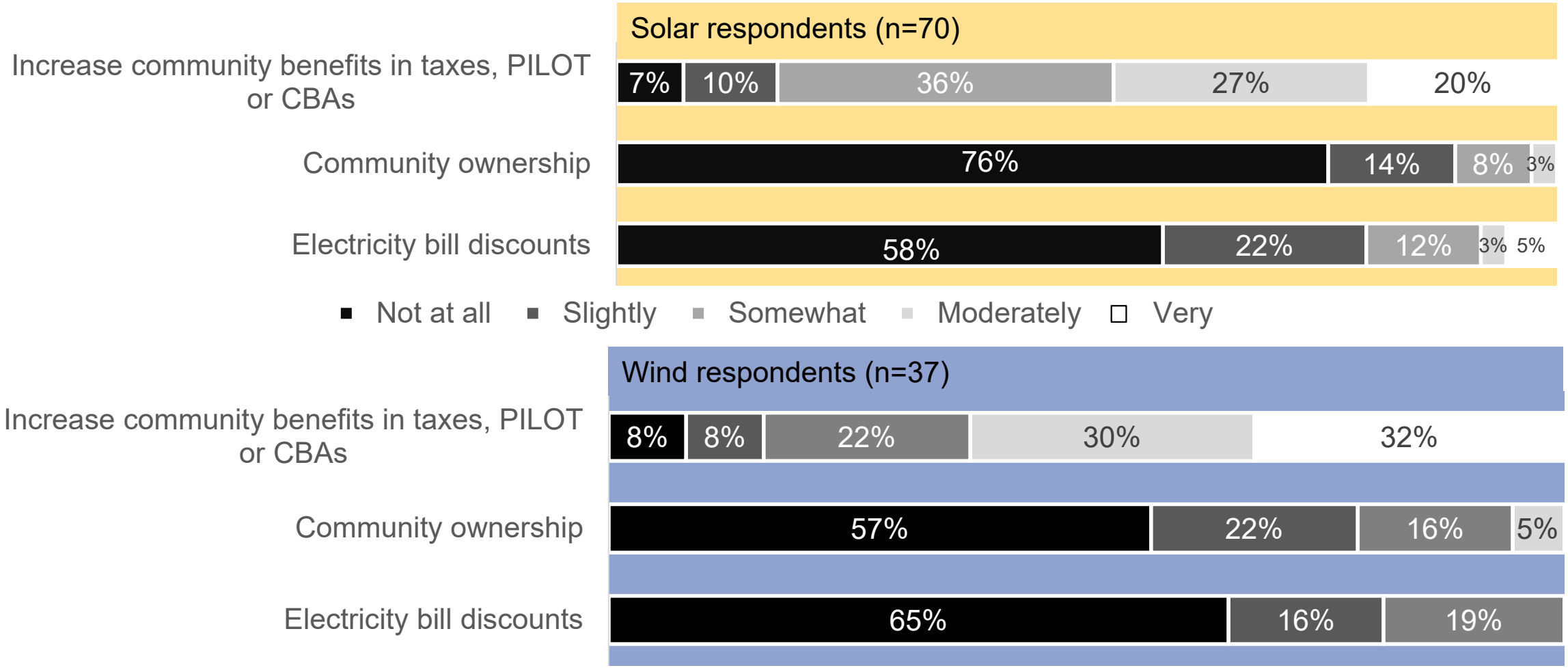
Project timelines ranked as the biggest barrier to improving community engagement, but all options ranked as relatively minimal barriers

Please indicate the extent to which each of the following restricts your ability to improve community engagement.



According to developers, community ownership and electricity bill discounts are not very feasible, while increasing community benefit payments are somewhat feasible

How feasible are these recommendations?



Structural barriers and project finances are dominant reasons that community benefits do not increase

Electricity bill discounts

- About 80% think not at all or only slightly feasible
- Majority reference **regulatory, logistic or policy barriers.**
  - "*We have to do it in New York though. But it's prescriptive and set by law.*"
- 4 respondents questioned why:
  - *"There is a lack of knowledge of the conveyance or mechanism to provide those discounts, and there is not enough internal buy-in to pursue a better understanding of how this would work.* ***Generally, developers feel that this is a ridiculous proposition, even without looking at the cost.***"

Community ownership

- Over 80% think not at all or only slightly feasible
- Most reference **financing**:
  - Communities do not have the capital or credit history to participate
  - Communities cannot monetize the tax credits
- Solar respondents were more likely to also reference thin profit margins, which make additional community compensation infeasible
- Would require policy change:
  - "*But we do it in Canada sometimes.*"

Increase community benefits in taxes, PILOT or CBAs

- About 17% think not at all or only slightly feasible
- Two-thirds of respondents mention **project finances & competition**
  - "*Projects need to be economically competitive. If one county/municipality is going to require higher taxes, their projects will not be competitive with projects in surrounding areas.*"
- 4 respondents mentioned structural barriers – state regulated PILOT or taxation amounts

Structural barriers, company capacity, and opposition can all present challenges to community engagement

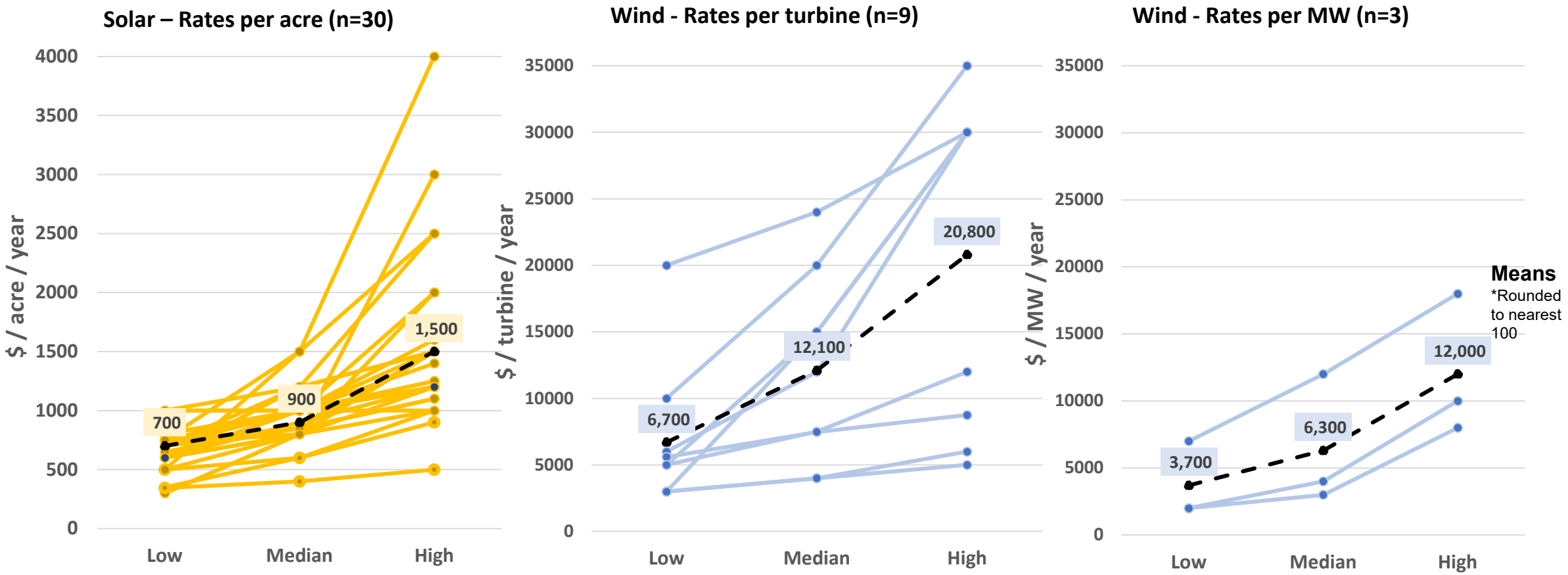
Anything else you would like to tell us about barriers or challenges in community engagement?

- Structural barriers (4 respondents)
  - *"Local or state processes are sometimes so stringent, draconian, or discretionary/risky that it incentives developers to not conduct community engagement"*
  - *"State policies that incentivize fights rather than dialogue and authentic participation are a major barrier"*
- Company capacity (3 respondents)
  - *"Bandwidth -- people or money that we dedicate to one project likely needs to come from another project"*
- Opposition (2 respondents)
  - *"Increasing threats and hostility from local opposition"*

Project budget & costs

Payments to landowners vary considerably between projects developed by the same company for both wind and solar

Please provide an estimate of the lowest, median, and highest rates paid to host project landowners.



Reported landowner payment rates

Dots represents a reported low, median, or high rate. Lines connects the rates of a single respondent.

Many factors can lead to variation in lease rates paid to host project landowners

⑩ Factors which contribute to variation in landowner payments:

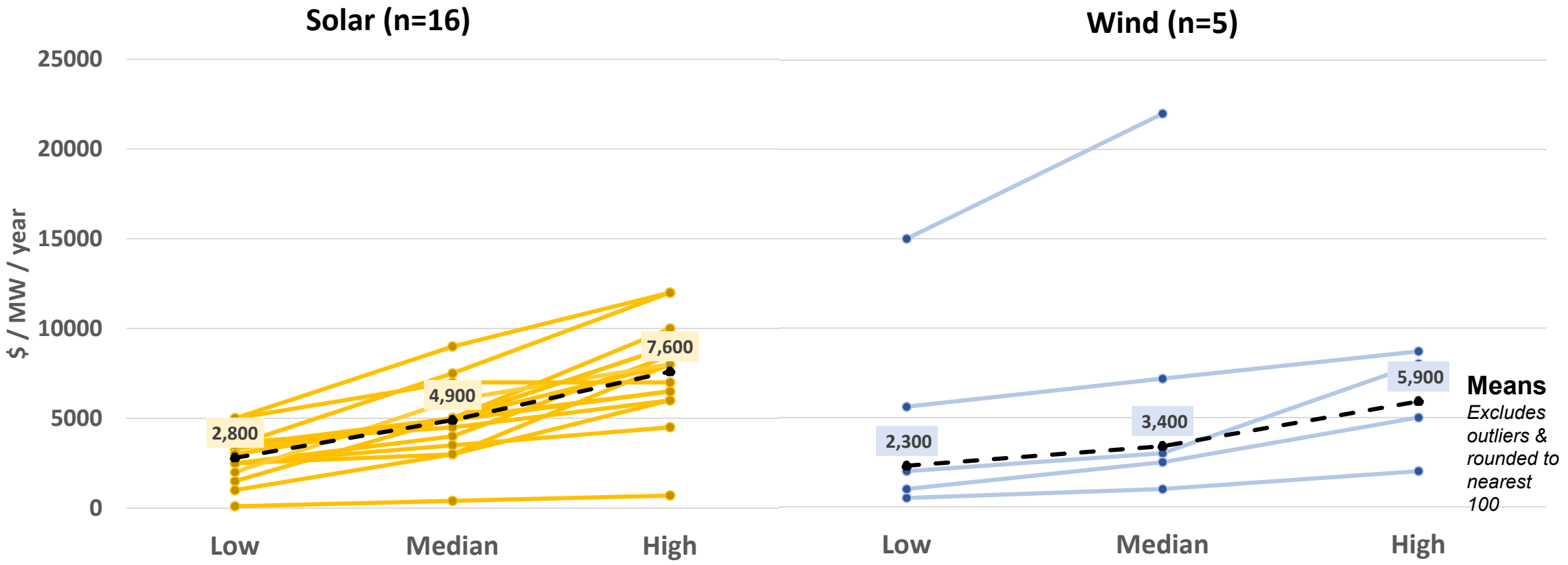
- Land value
- Competition
- Number of landowners per project
- Turbine model or capacity
- Geography & how critical the land is
- Wind/solar resource
- Rates increase over time
- Relative parcel size
- Expected interconnection costs (better payment with good interconnection)
- Expected build costs (flat land allows higher solar rates)
- Demand for renewables & expected value of power
- Savvy or large landowners can negotiate better rate

"My actual answer to "A typical (e.g. median) rate paid" is: "May depend on the region and wind resource, but some per-MW figure based on the nameplate capacity of the turbine used, and acreage payments. Possibly $3,000/MW and something in the $60 range per acre?". To answer this question: Resource, number of participating landowners, project risk/certainty, competition, land use and regional surrounding land values.

"Savvy landowners with significant land holding or land that is critical to a project can often negotiate for more."

Payments to host communities are similar for wind and solar, however vary considerably between different projects of the same company

Please provide an estimate of the lowest, median, and highest rates paid to host community (e.g. in tax or PILOT agreements)



Each dot represents a reported low, median, or high rate. Each line connects the rates of a single respondent.

State regulations and local receptivity to the project are the primary reasons for variation in host community tax or PILOT amounts

- Many states set or regulate the tax or payment amounts
- Additionally, the willingness of a local entity to abate a portion of the tax amount is a leading reason for variation

"Some states (IL, OH) the tax or PILOT is set by state statute. Other states, it is set from precedent from other projects."

"Communities who are opposed typically demand higher amounts as a way to stifle development. Some areas are talking about higher PILOT amounts in areas with better farmland."

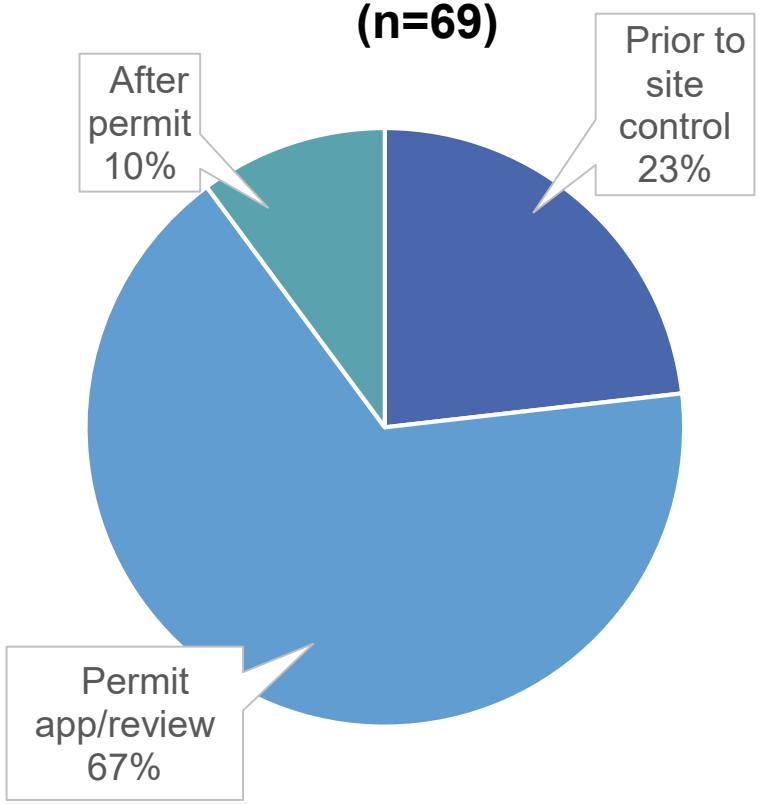
Last canceled project

70 respondents provided data about a recently canceled project. Most were canceled during permitting, and the majority did not sell or transfer development assets.

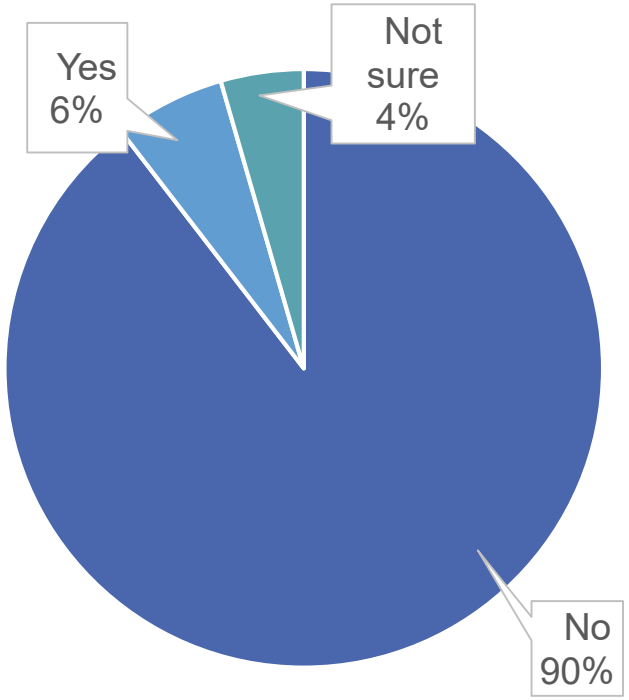
Was this a wind or solar project?

Solar (Including 9 with storage)	42
Wind	21
Wind + Solar	5
Unknown	2
Total canceled projects	**70**

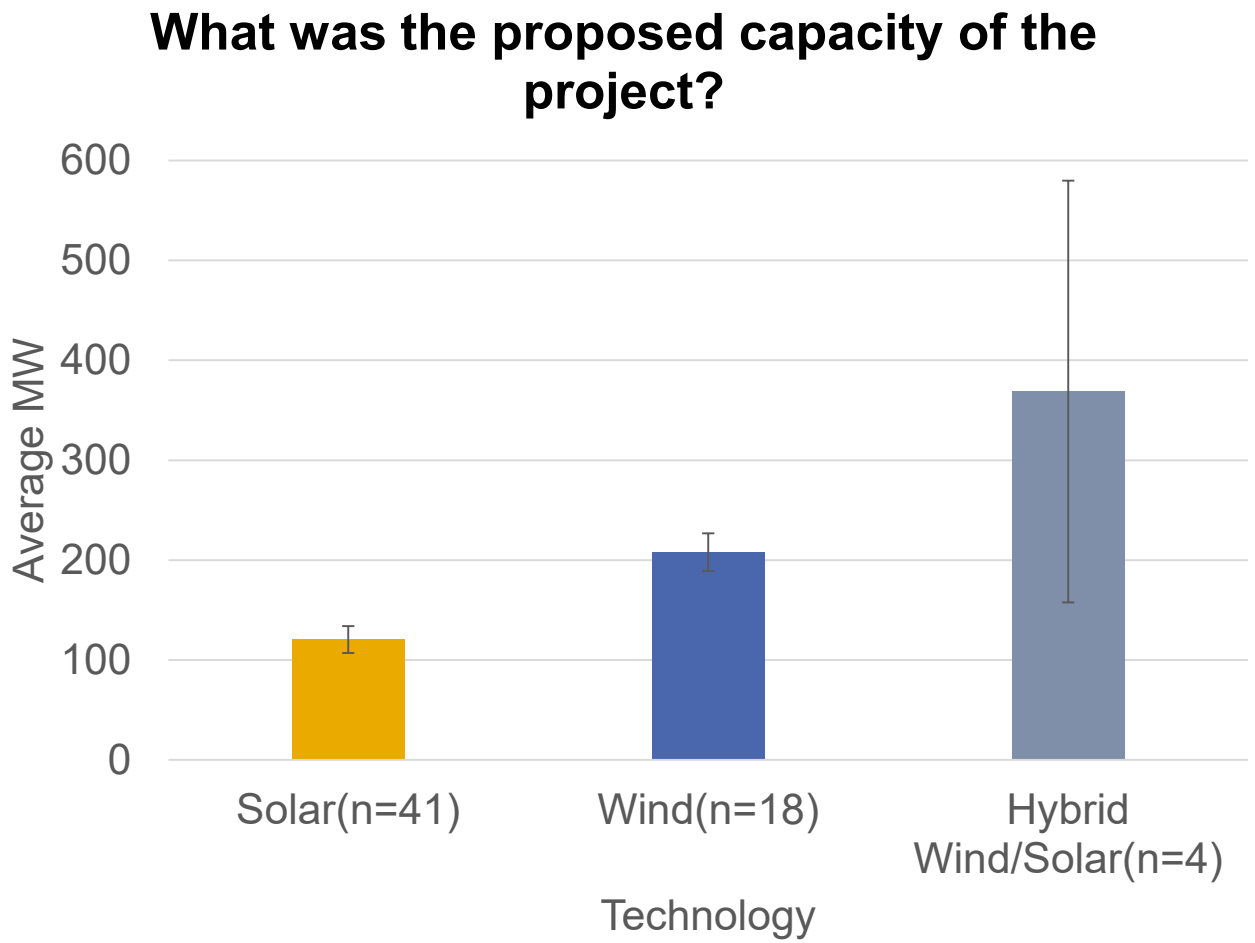
During what stage did your company decide to stop pursuing the project? (n=69)



Did company sell or transfer development assets of this project to another company? (n=67)

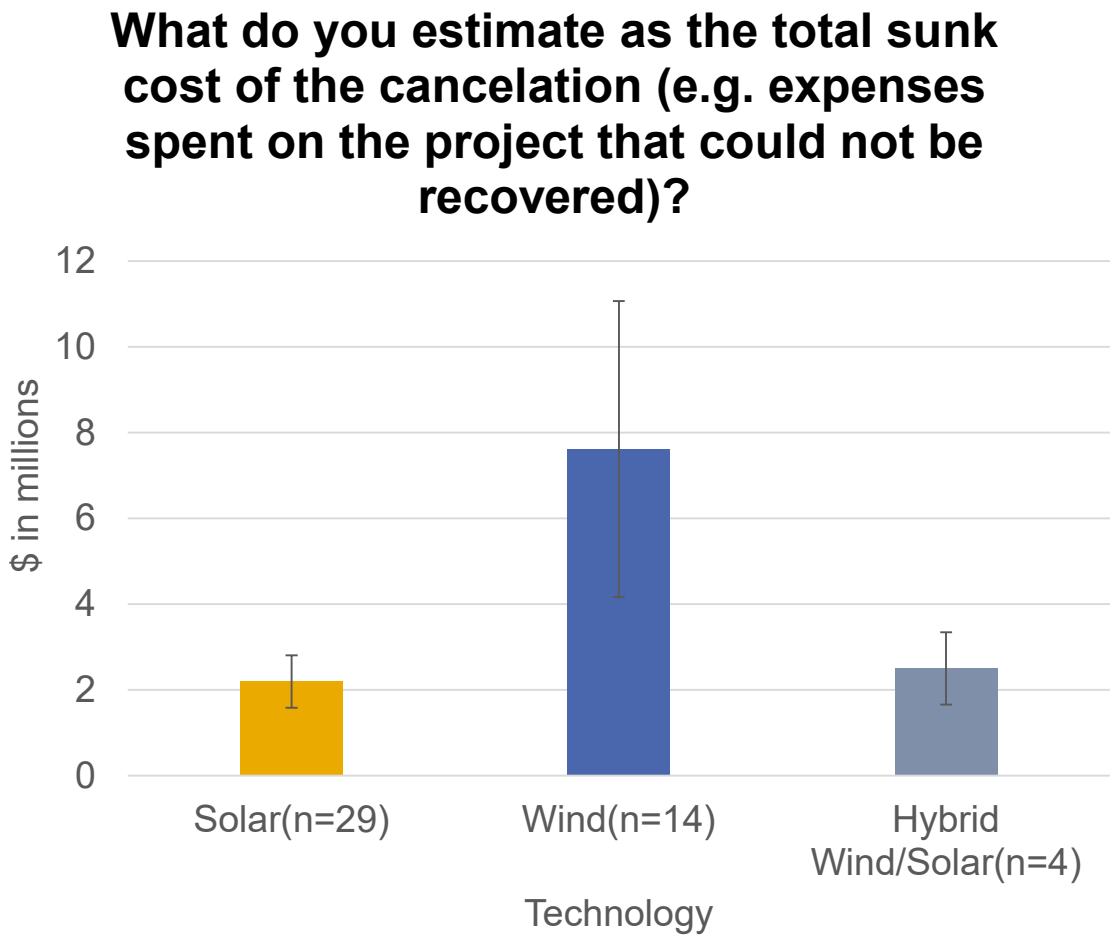


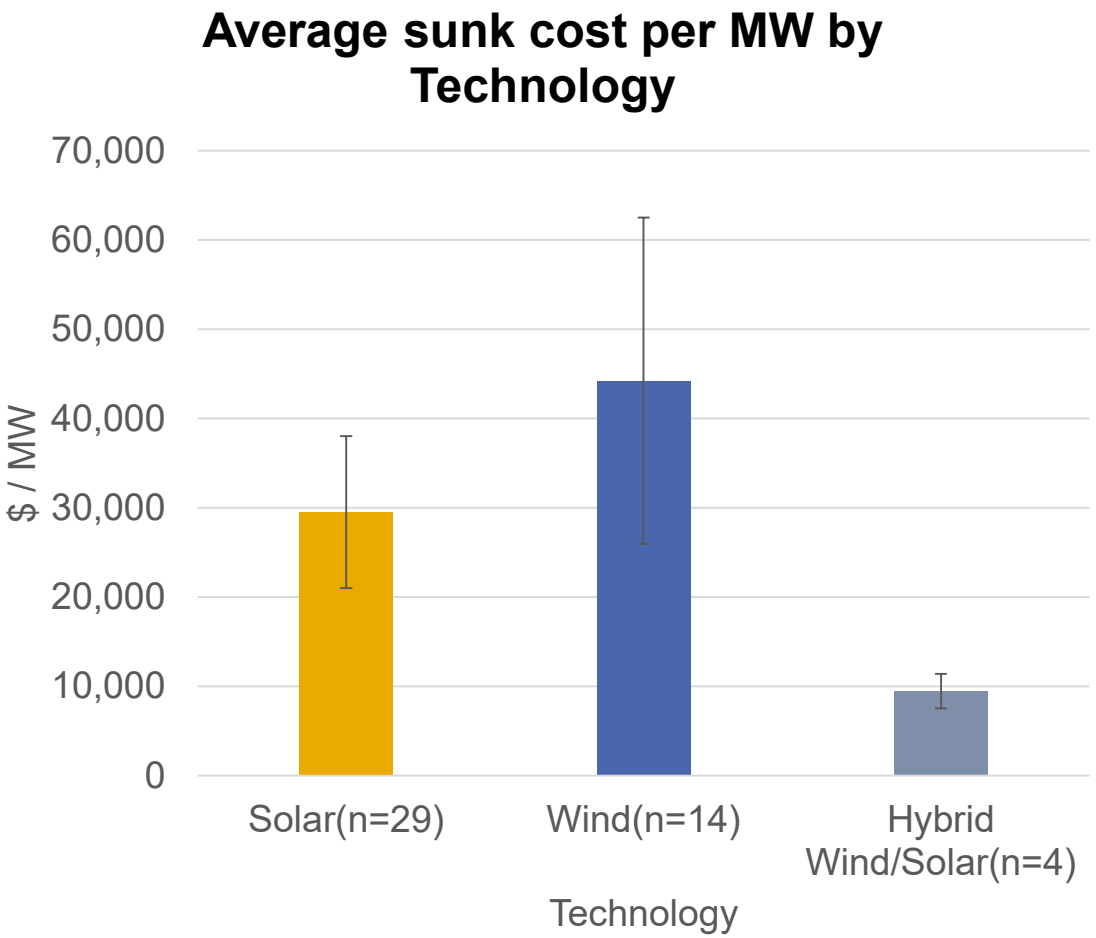
Average capacity of the canceled wind projects if just over 200 MW, and just over 100 MW for solar. Four canceled projects were large wind & solar hybrid facilities.



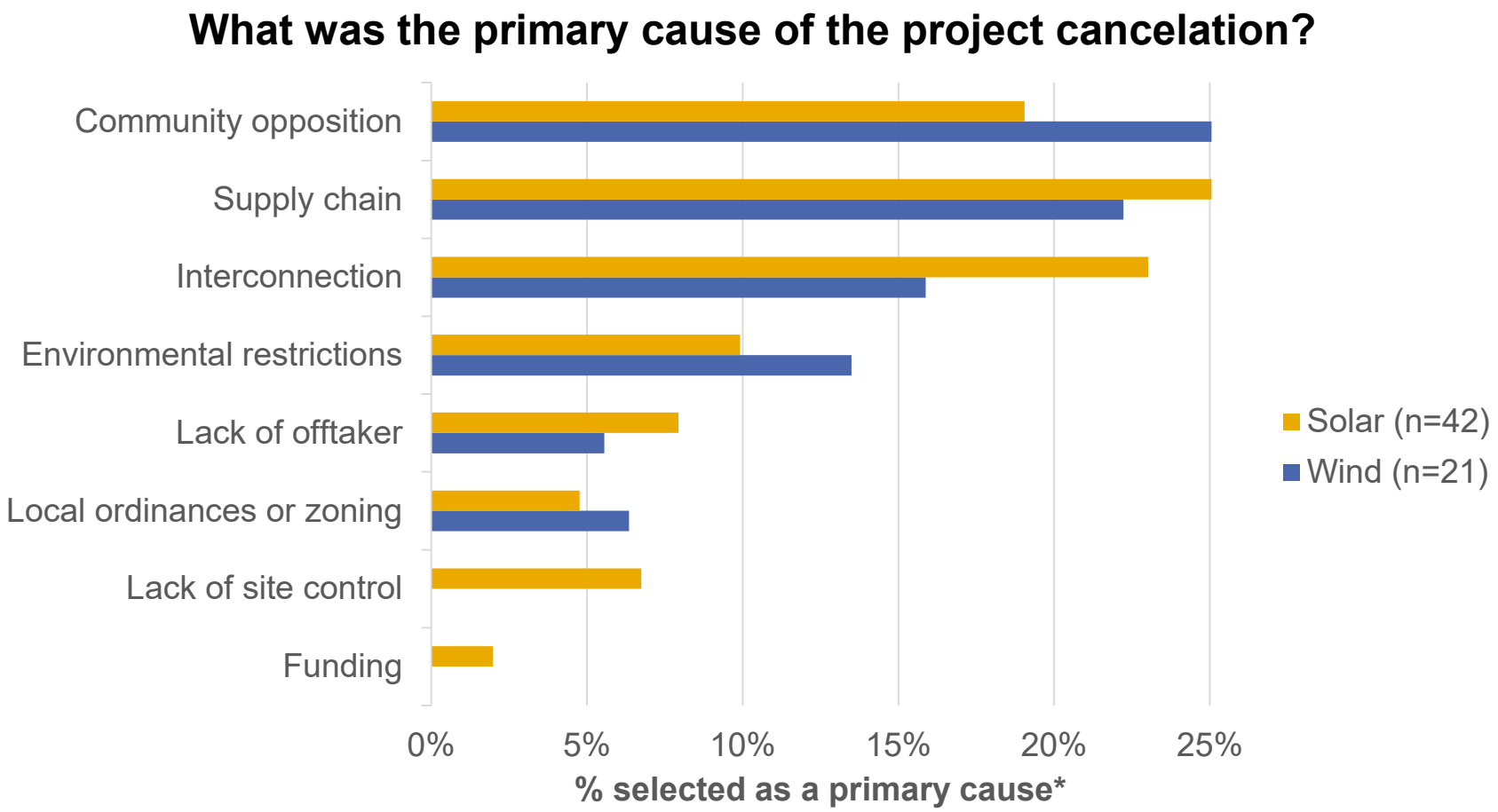
State	Solar		Wind	
	# projects	Avg capacity (MW)	# projects	Avg capacity (MW)
Arizona	1	200		
California	1	150	1	100
Colorado	2	150		
Florida	2	75		
Georgia	1	75		
Hawaii	1	120		
Idaho	1	150		
Illinois			3	197
Indiana	1	350		
Iowa			1	300
Kansas			2	200
Kentucky	2	138		
Louisiana	1	150		
Massachusetts	1	30		
Michigan	2	150	2	250
Montana			2	78
Nebraska	1	310		
New Mexico			2	300
New York	6	54		
North Carolina	1	80		
Ohio	5	87	2	250
Oregon	4	48		
South Dakota	1	190		
Tennessee	1	20		
Texas	2	300	1	300
Virginia	2	115		
Washington			1	150
Wisconsin	1	160	1	150

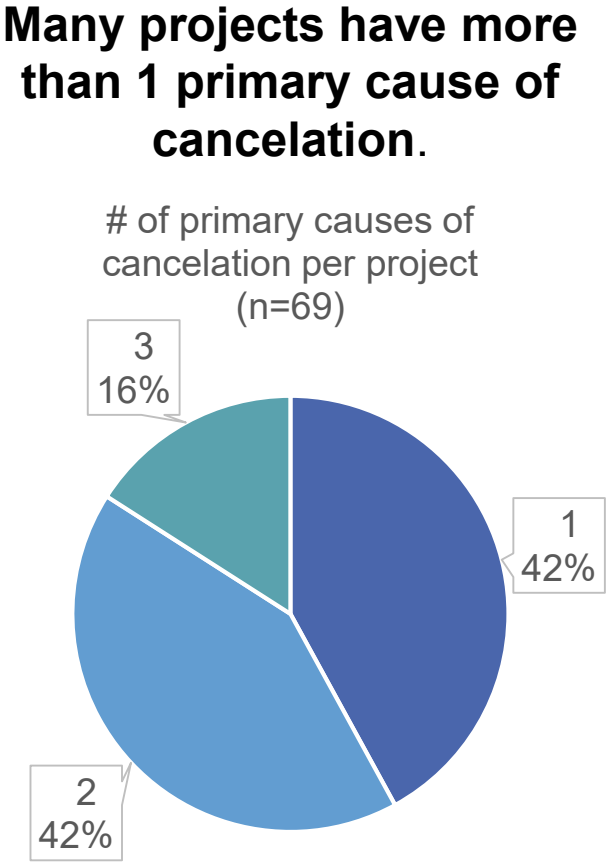
Project cancelations result in average sunk costs of more than $2 million for solar, and more than $7.5 million for wind.





Leading causes of project cancelation are community opposition, supply chain, and interconnection

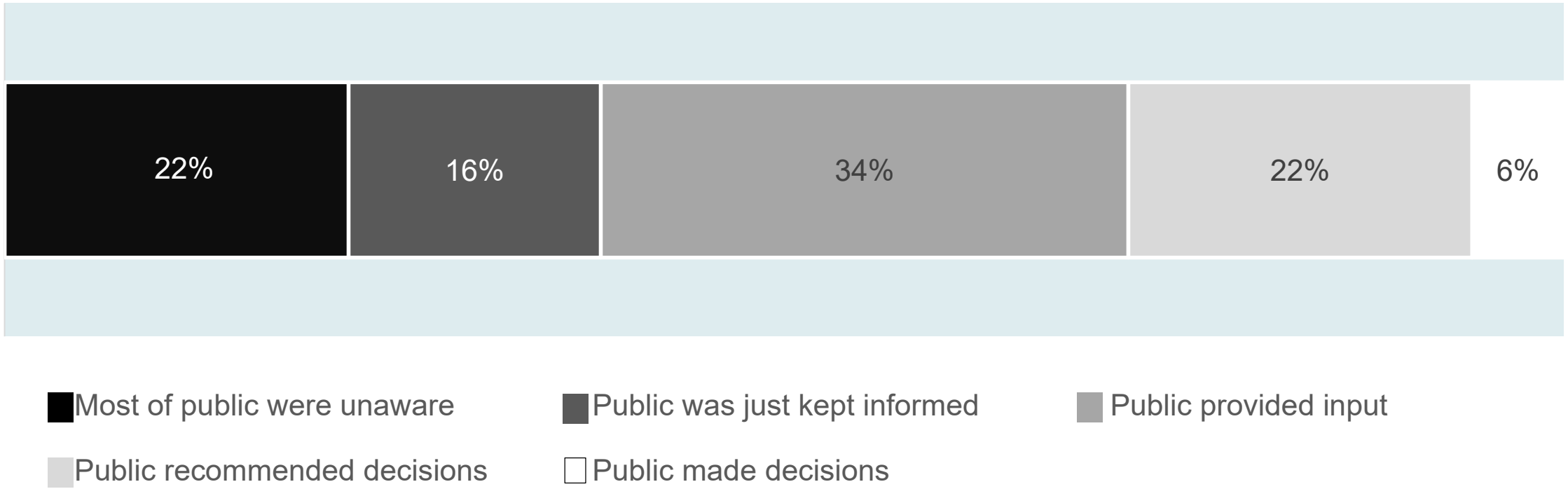




**Respondents could select 1-3 primary causes of cancelation for each project. Here responses are weighted based on the number of causes selected (e.g. if 3 causes were selected, each counted as 1/3).*

Most often, the public had provided input on the canceled project. The public only made decisions for 6% of canceled projects.

Which one of the following best describes the way members of the public were engaged in decisions about the canceled project?



When asked if there was anything they would have done differently on a canceled project, most answers indicated starting engagement earlier.

- Most common response is they would have started **community engagement** earlier
- But, two respondents noted this backfired – they wish they would have started community engagement later

"Wait until site control was further along before starting community engagement… The long window of engagement (about 3 years before permit application) allowed opposition to form."

"Plant trees around all participating fields at a considerable expense so that by the time we got to the permitting stage, viewshed concerns would hold less weight. It's not a viable option for most projects but there's probably nothing anyone can do in the face of well organized, well funded ideological local opposition to a project regardless of how well conceived or designed."

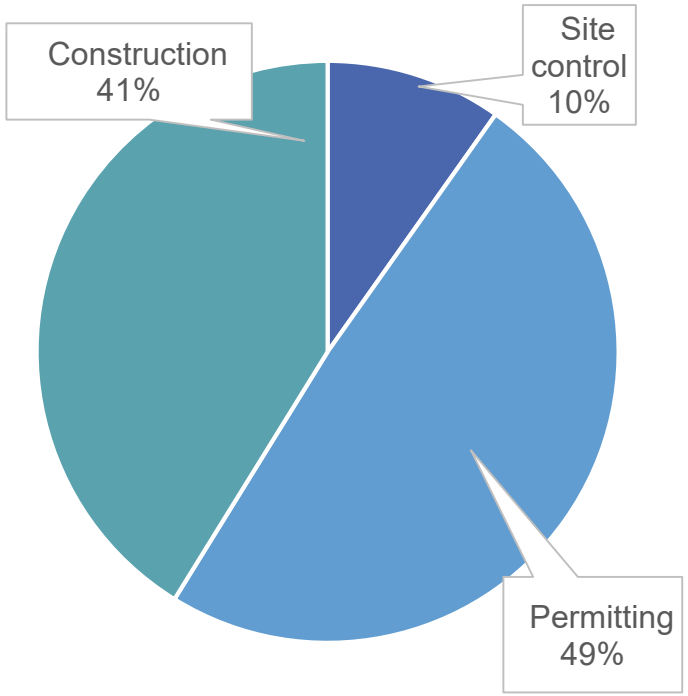
Last delayed project

51 respondents provided data on a recent delayed project. Half of these were delayed during permitting.

Was this a wind or solar project?

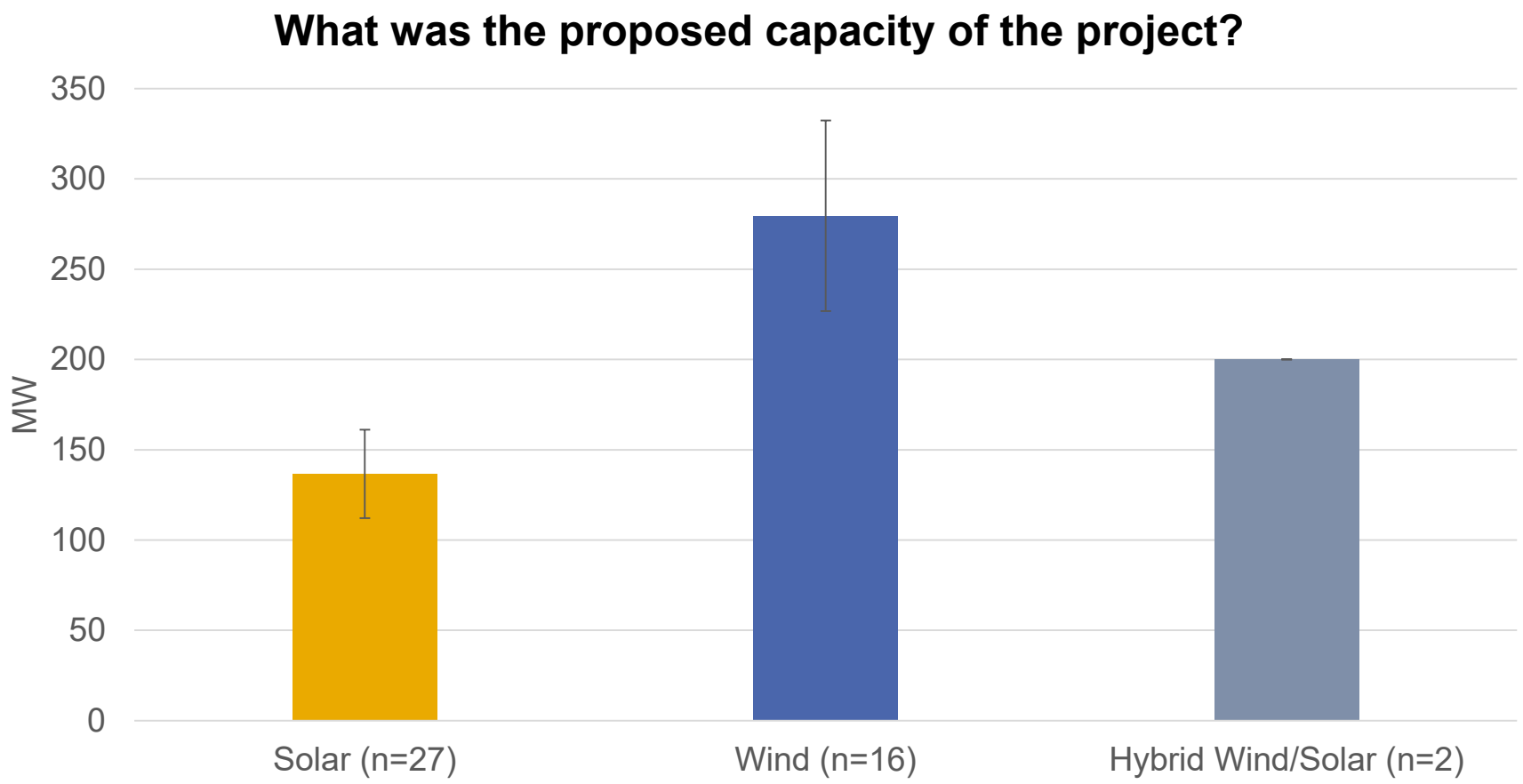
Solar (Including 6 with storage)	27
Wind	17
Wind + Solar (Including 1 with storage)	4
Unknown	3
Total canceled projects	**51**

What stage was the project in when it experienced most significant delays? (n=51)

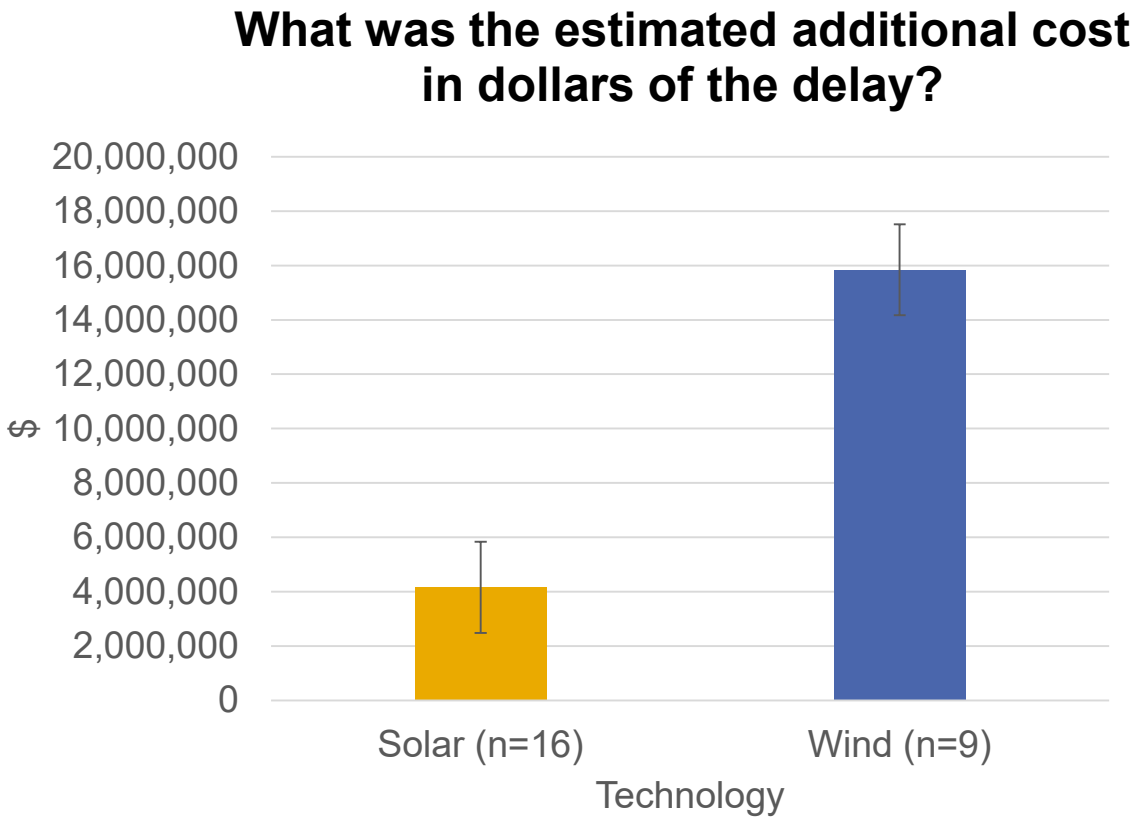


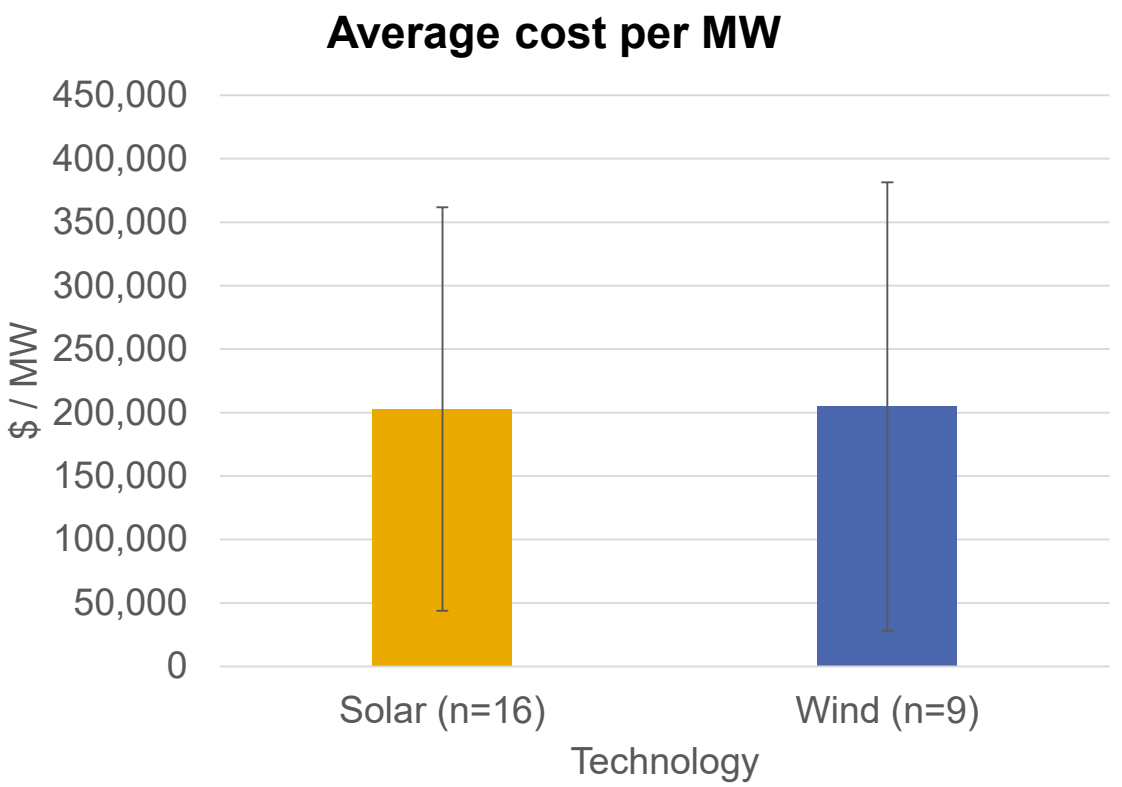
	Solar		Wind	
	# Projects	Avg MW	# Projects	Avg MW
Arizona	2	134		
California	1	650		
Colorado			1	62
Delaware	1	50		
Florida	2	75		
Illinois	2	190	2	250
Indiana	1	18		
Iowa			1	225
Kansas			1	325
Maine	1	120		
Massachusetts	1	7		
Michigan			1	150
New Mexic	1	50	1	1000
New York	5	120	1	126
Oklahoma			1	250
Ohio	3	150		
Oregon	1	200		
South Carolina	1	79		
South Dakota			2	238
Texas	2	200	4	258
Virginia	2	35		
Wyoming	1	200	1	329
Total # projects	27		16	

The average size of delayed wind projects is about double that of delayed solar projects.



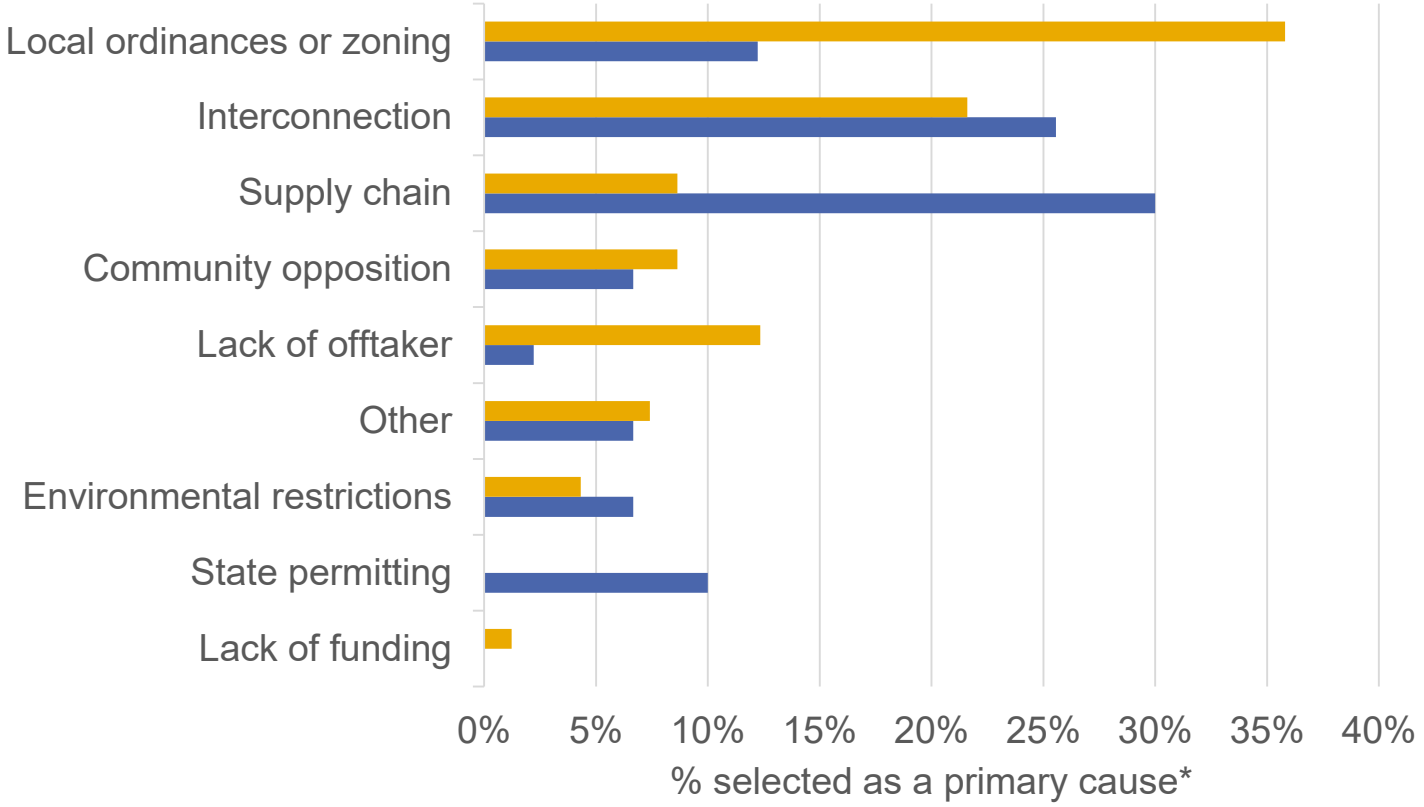
While wind delays cost more on average, the average cost per MW for delays is equivalent for wind and solar



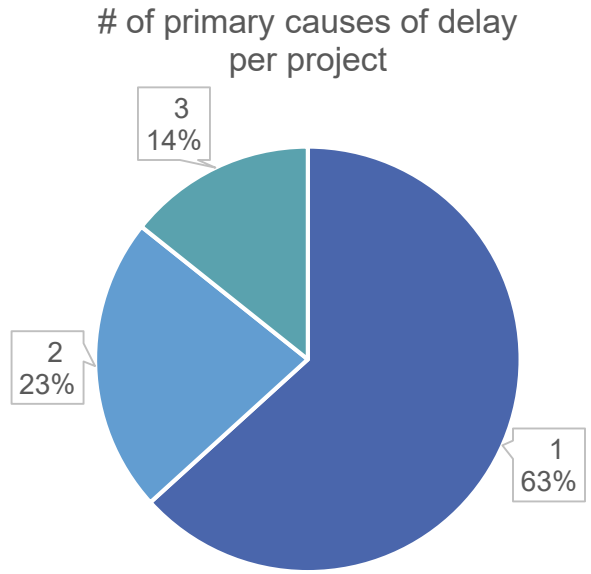


Local ordinances or zoning is responsible for 36% of significant solar project delays.

What was the primary cause of the project delay?



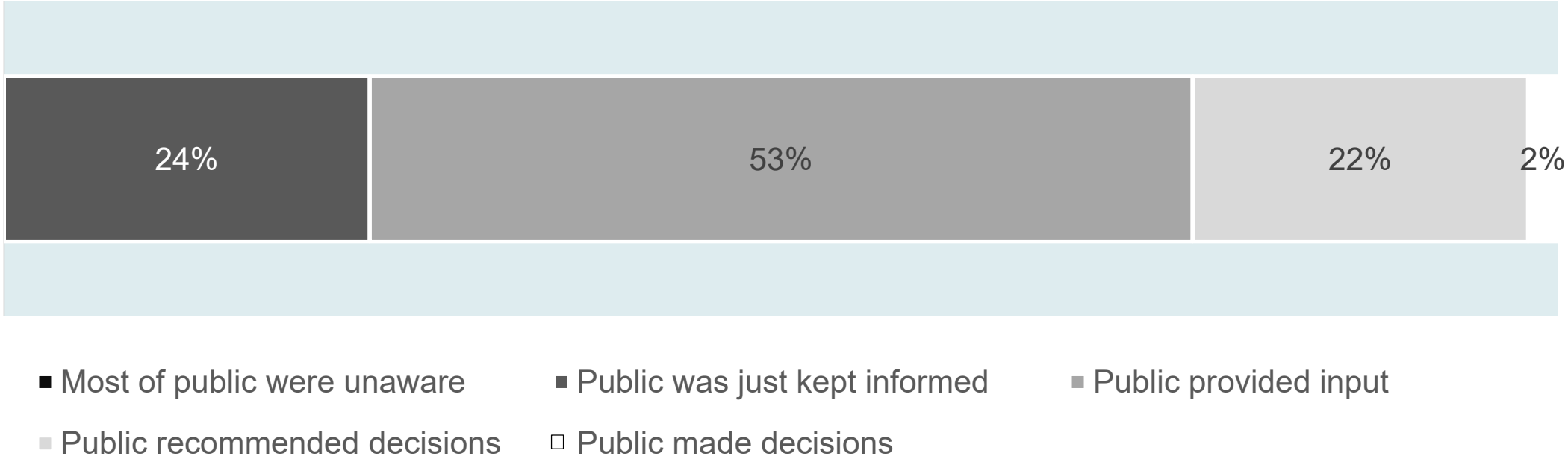
Most delays only have 1 primary cause reported.



**Respondents could select 1-3 primary causes of cancelation for each project. Here responses are weighted based on the number of causes selected (e.g. if 3 causes were selected, each counted as 1/3).*

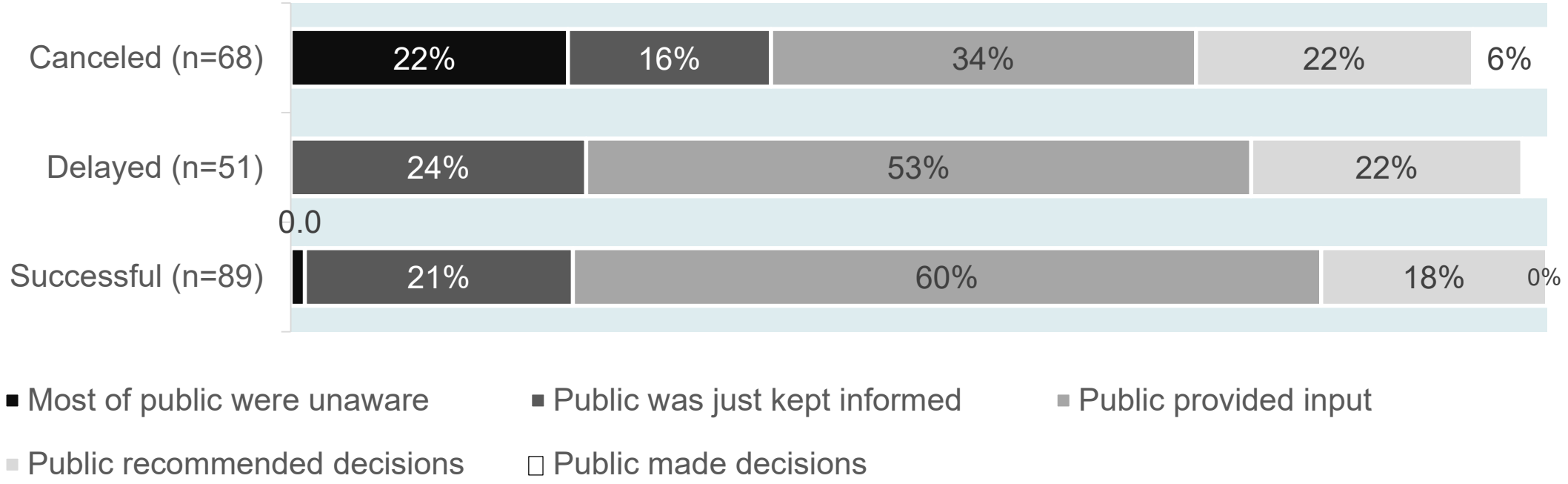
Most often, the public provided input about the delayed project, but rarely did they make project decisions.

Which of the following best describes the way members of the public were engaged in decisions about the project?



The public was least engaged in the canceled projects – some canceled projects were not far enough along to be announced.

Which of the following best describes the way members of the public were engaged in decisions about the project?



Delays may be outside of company control, but community and local government engagement help in some cases

- One-third of those who responded did not utilize any particular innovative strategy to stop the delay
  - Delays were out of their hands, such as interconnection delay or based on market prices
- Three respondents noted that specific project design changes (increased setbacks, modified turbine layout, drain tile mitigation plan, community participation agreement) in response to community feedback eventually stopped the delay
- Two respondents noted renegotiating offtake agreements helped stop the delay, and another noted hiring a new construction contractor
- Unique responses:
  - "*Formed a CRADA to resolve the concern*" (Cooperative Research & Development Agreement)
  - "*Hired lobbyists, hired PR firm, hired attorneys*."

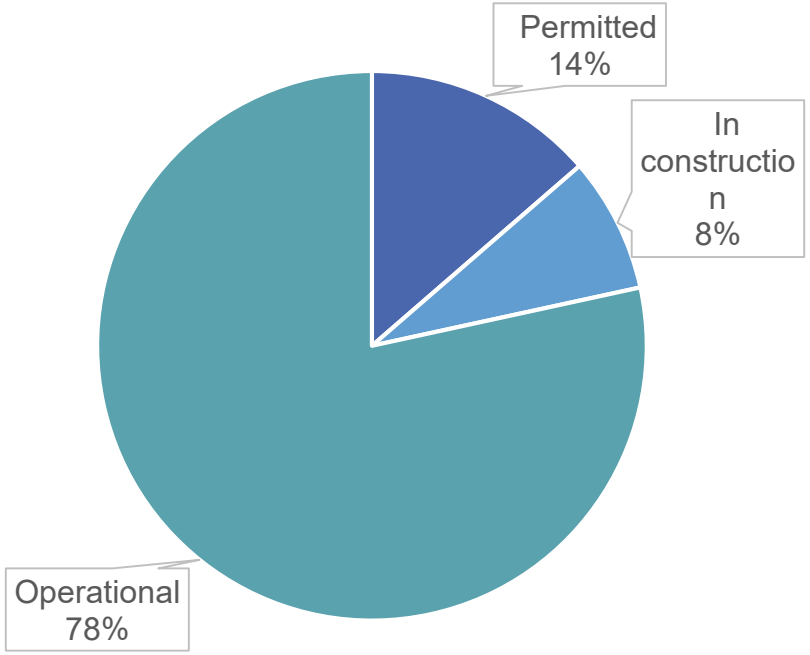
Last successful project

89 respondents provided data about a recent successful project. Most of these projects are operational, and about half experienced significant delays.

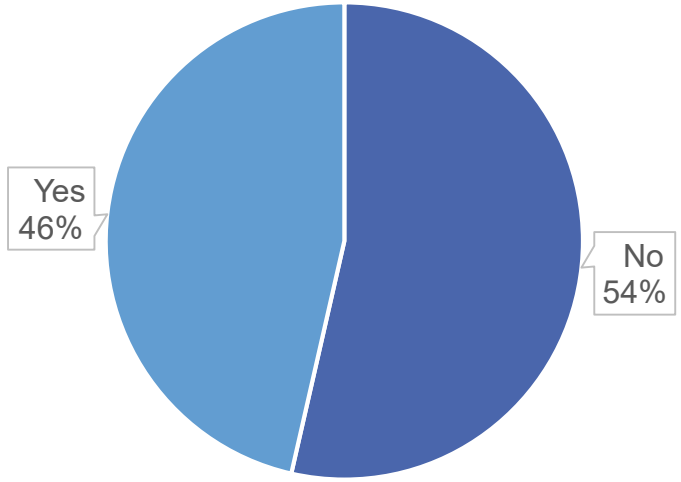
Was this a wind or solar project?

Solar (Including 13 with storage)	43
Wind	35
Wind + Solar (Including 3 with storage)	9
Unknown	2
Total successful projects	**89**

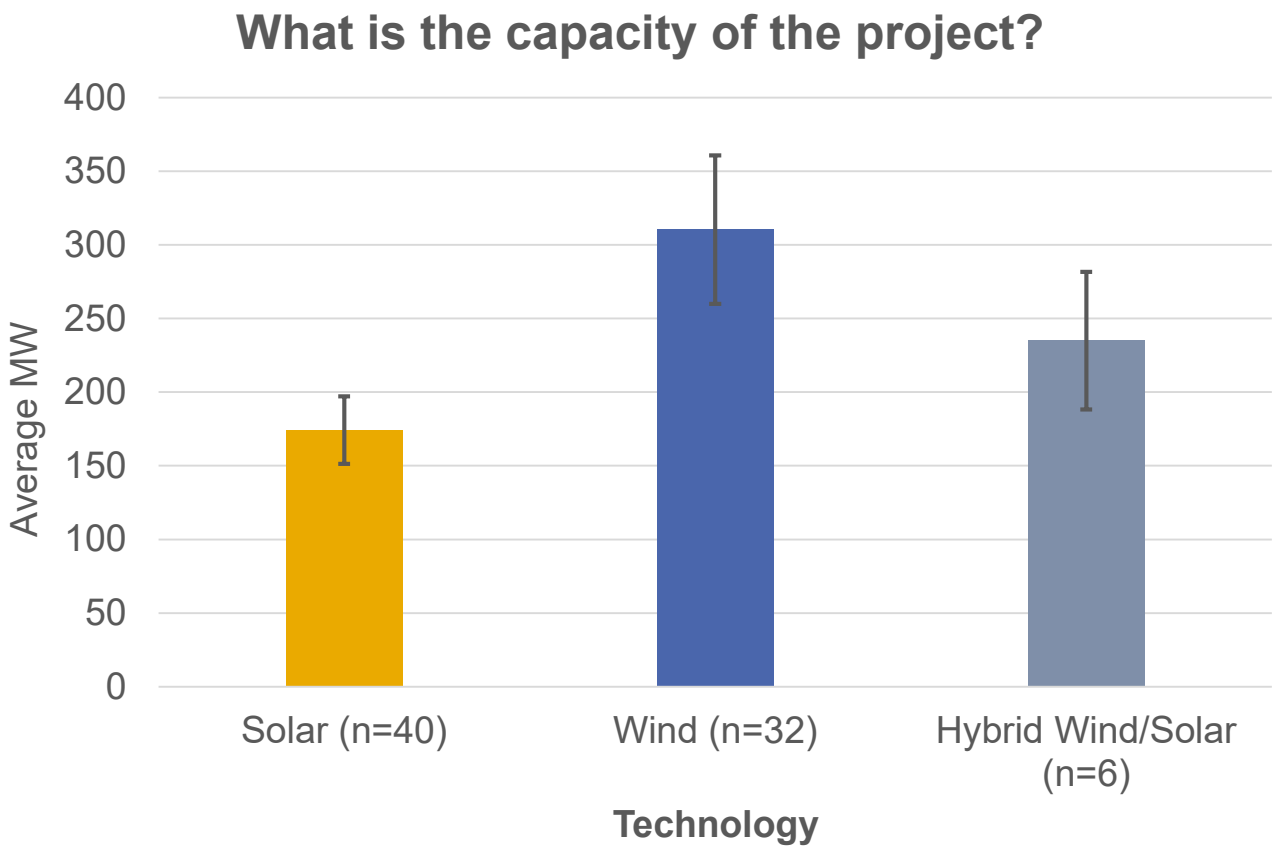
What is the current status of the project? (n=88)



Did this project experience a delay of 6 months or more during development? (n=84)

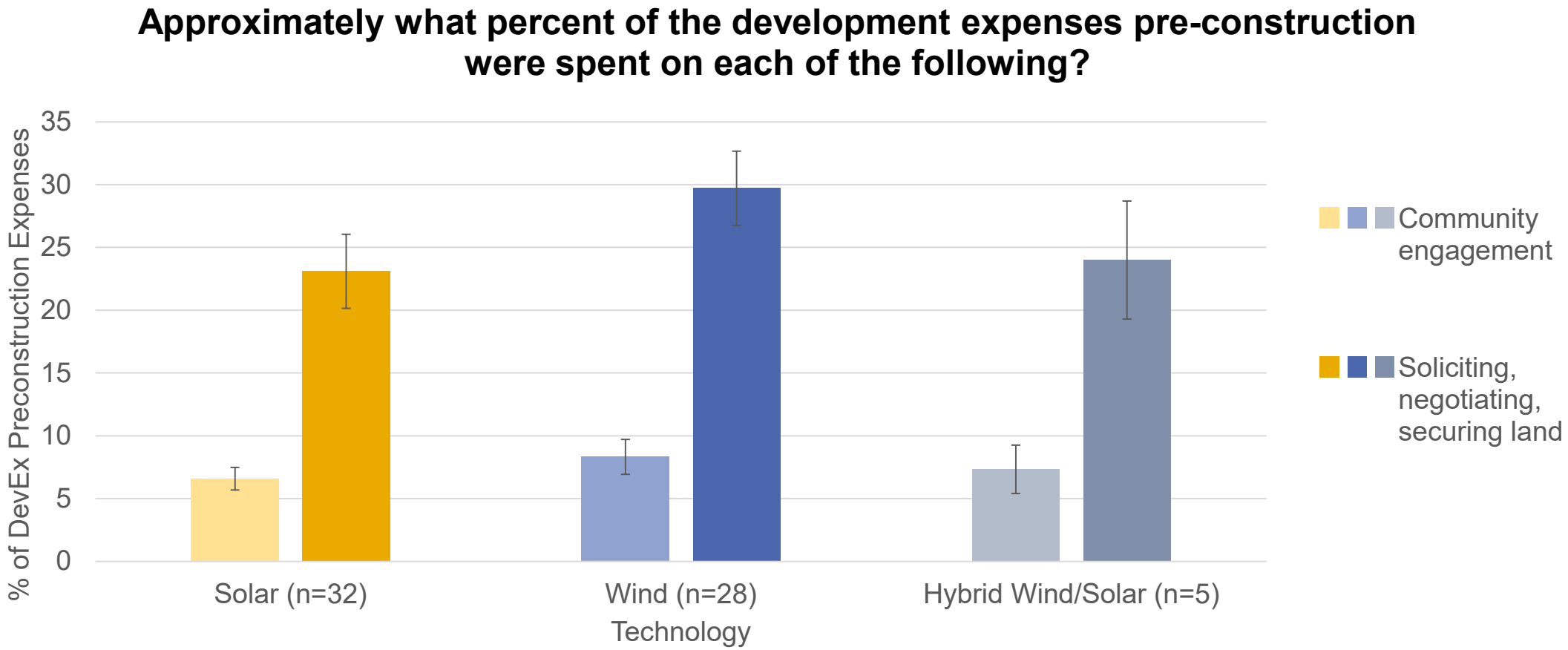


Developers reported on successful projects from 29 states with average capacity of 174 MW for solar and 310 MW for wind

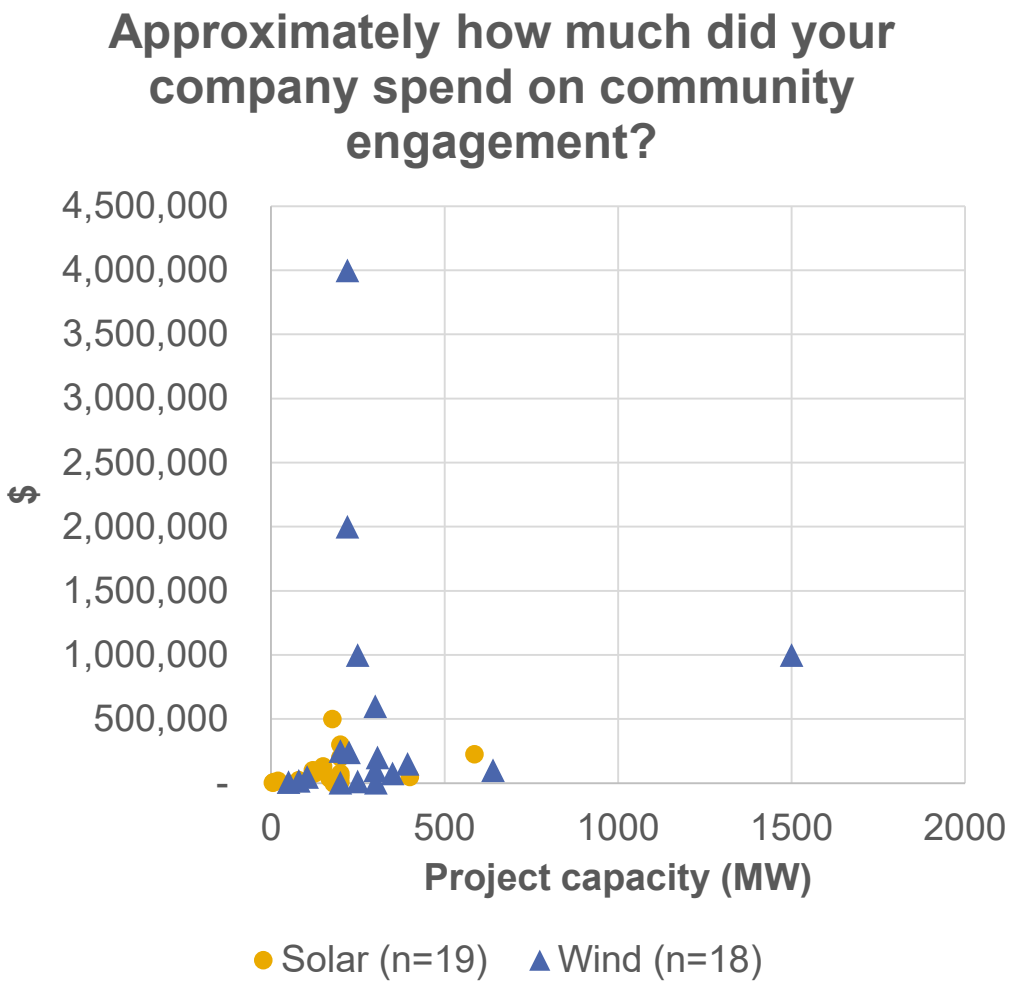


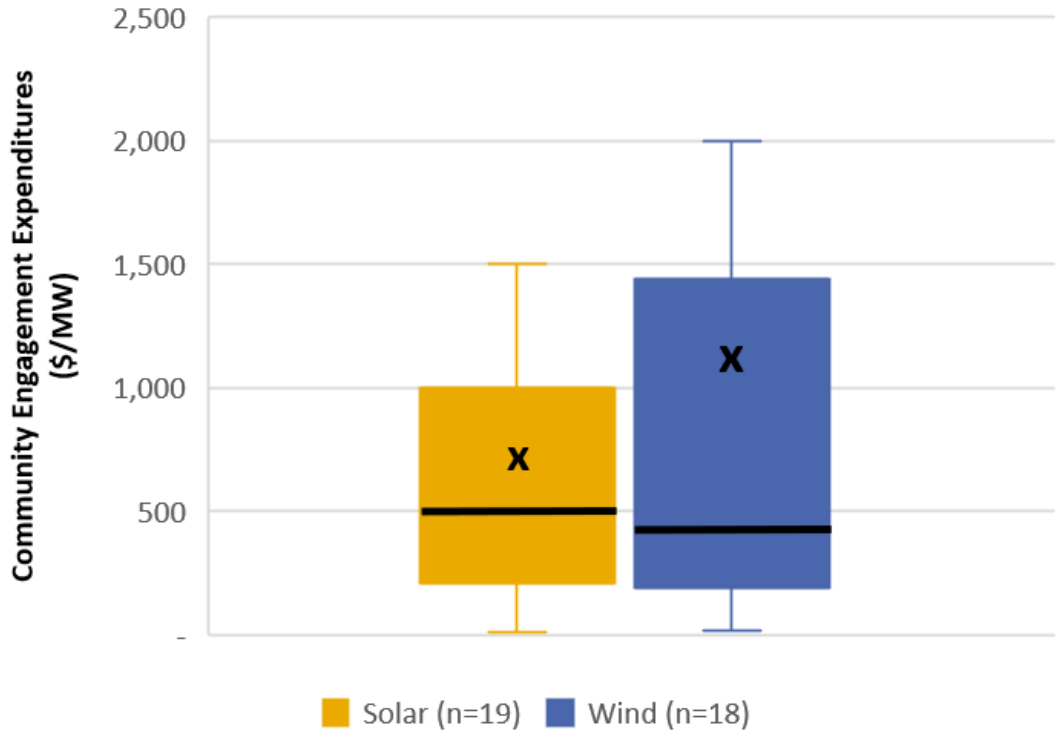
State	Solar		Wind	
	# projects	Avg MW	# projects	Avg MW
Arizona	2	134	1	220
Colorado			1	250
California	3	487		
Delaware	1	10		
Florida	3	117		
Illinois	1	180	4	250
Indiana	1	200		
Iowa			3	217
Kansas			1	325
Louisiana	1	180		
Maine	1	120		
Massachusetts	1	6		
Michigan	2	150	3	197
Minnesota			1	250
Montana			1	80
Nebraska	1	81		
New Mexico			1	1000
New York	7	112	1	126
North Dakota	1	300		
Oklahoma			1	250
Ohio	3	200		
Oregon	1	200	1	104
South Carolina	3	78		
South Dakota			2	238
Texas	3	383	6	497
Virginia	3	65		
Washington			1	640
Wisconsin	1	150		
Wyoming	1	200	3	323
Total	40		31	

Prior to construction, expenses on site control are approximately 3x expenses on community engagement



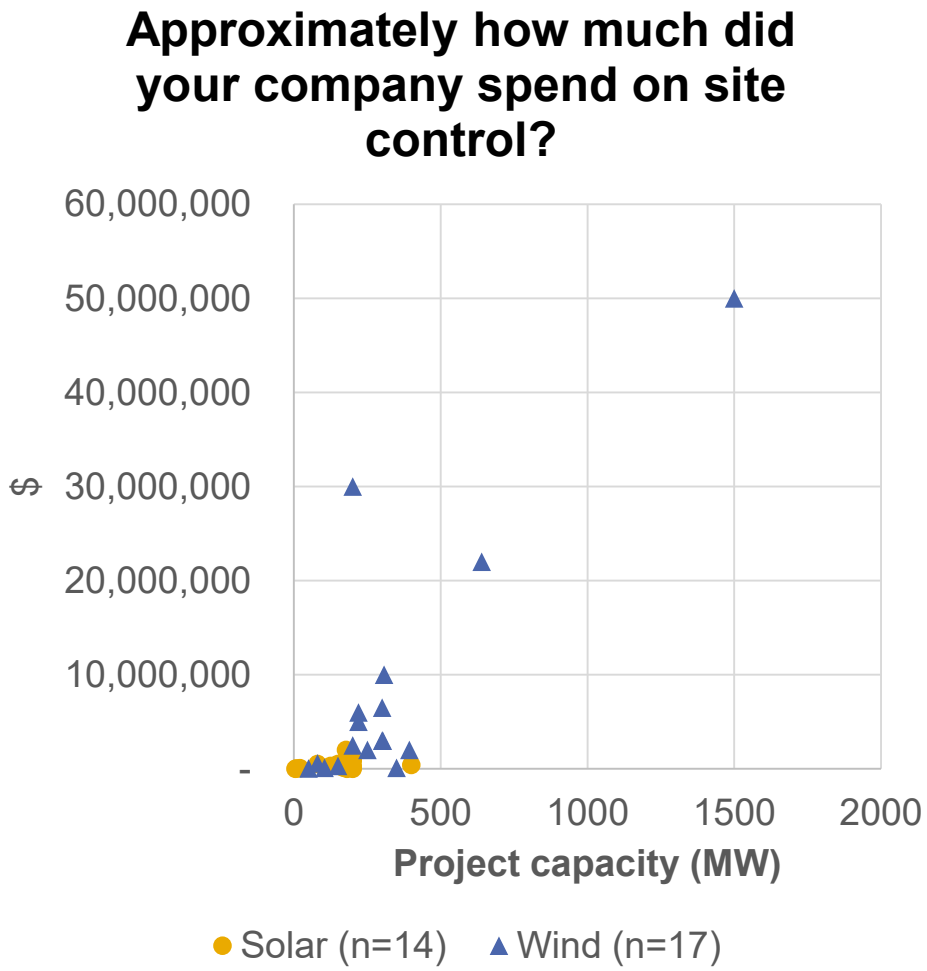
Spending on community engagement was on average $700 per MW for solar and $1,100 per MW for wind.

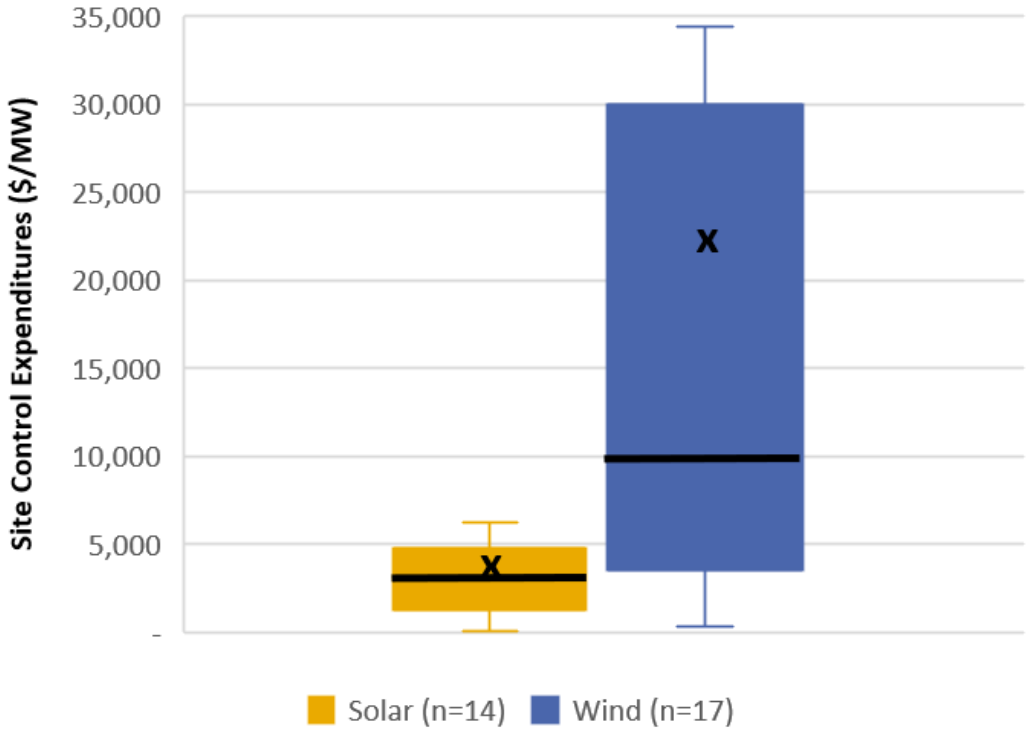




*Medians shown as dark horizontal line, box is 25-75 range; error bars are min and max if within 1.5*IQR. Wind mean does not include one extreme outlier*

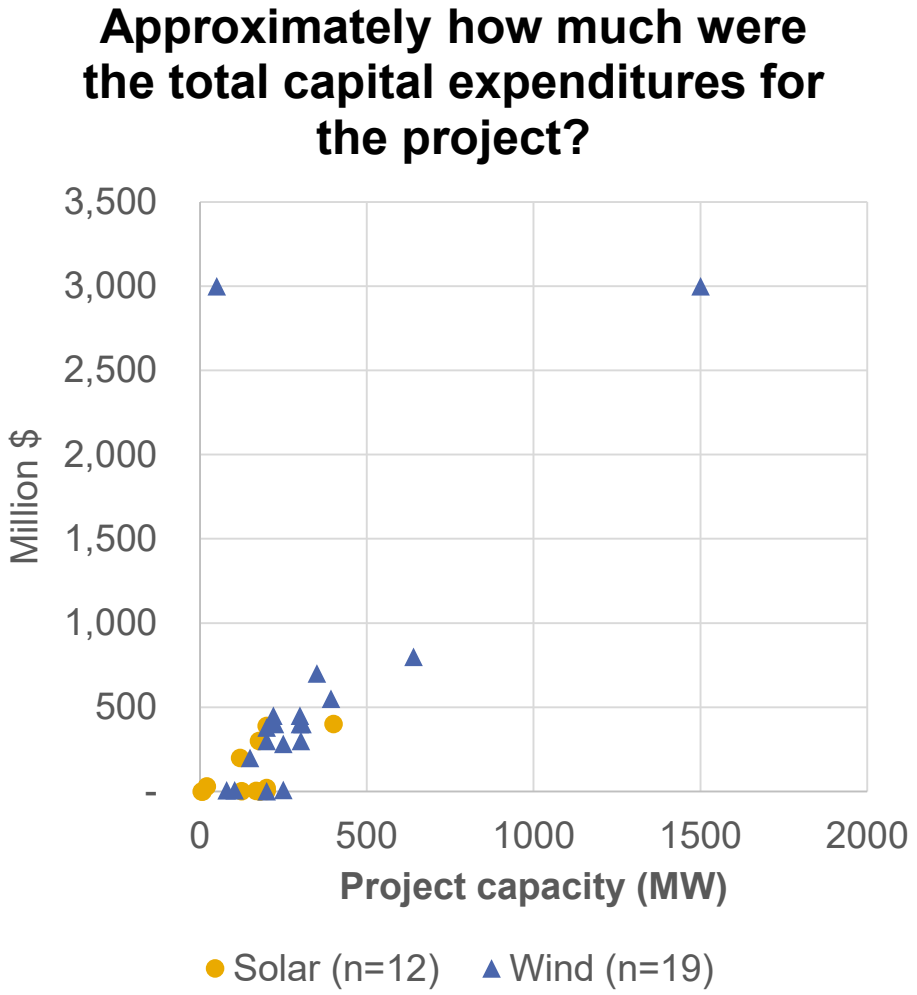
Expenses on soliciting, negotiating, or securing land were considerably higher than expenses on community engagement, averaging about $4000 per MW for solar and $22,000 per MW for wind.

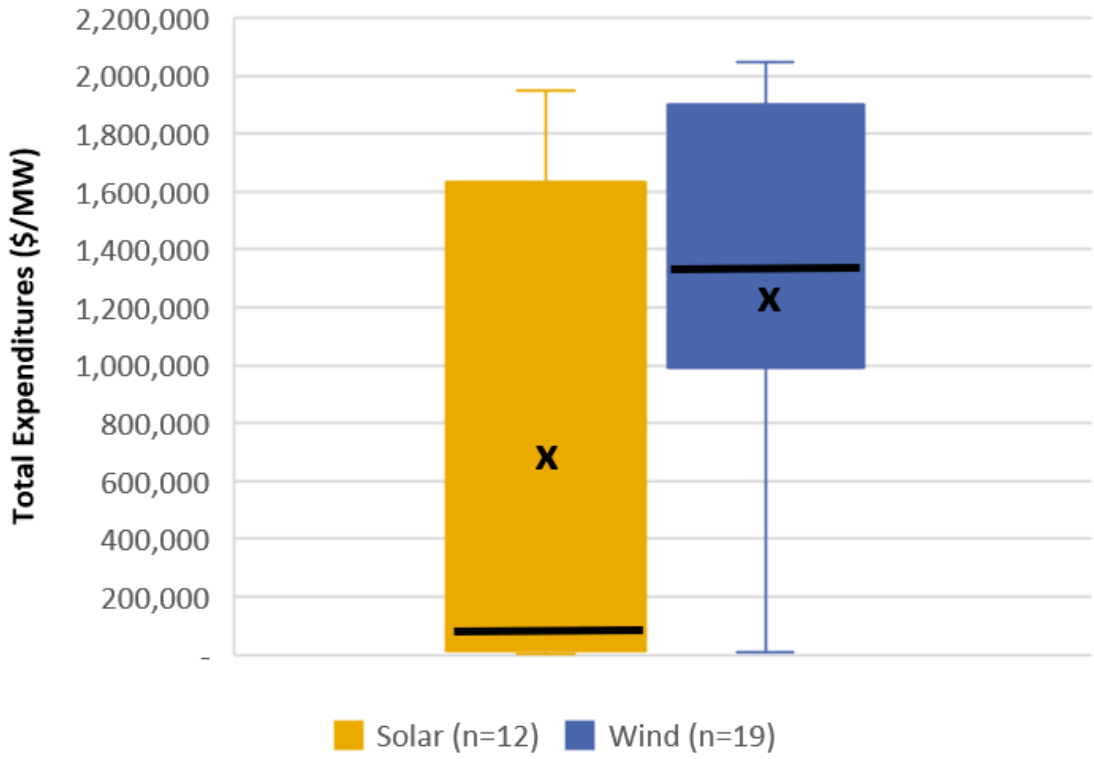




*Medians shown as dark horizontal line, box is 25-75 range; error bars are min and max if within 1.5*IQR.*

Total capital expenditures averaged approximately $700K for solar and $1.2 million for wind.

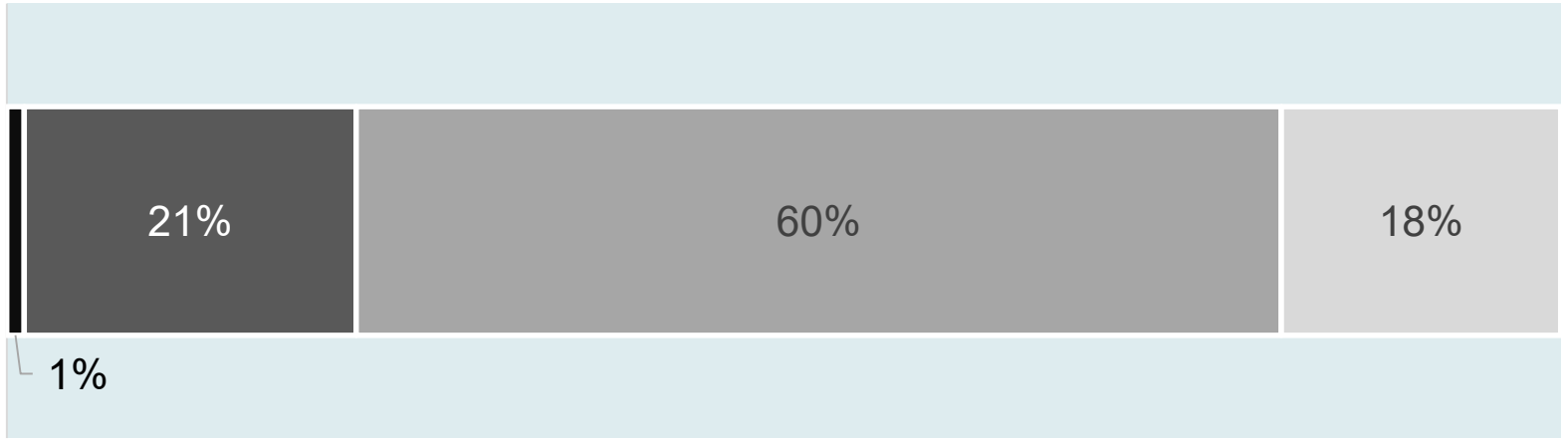




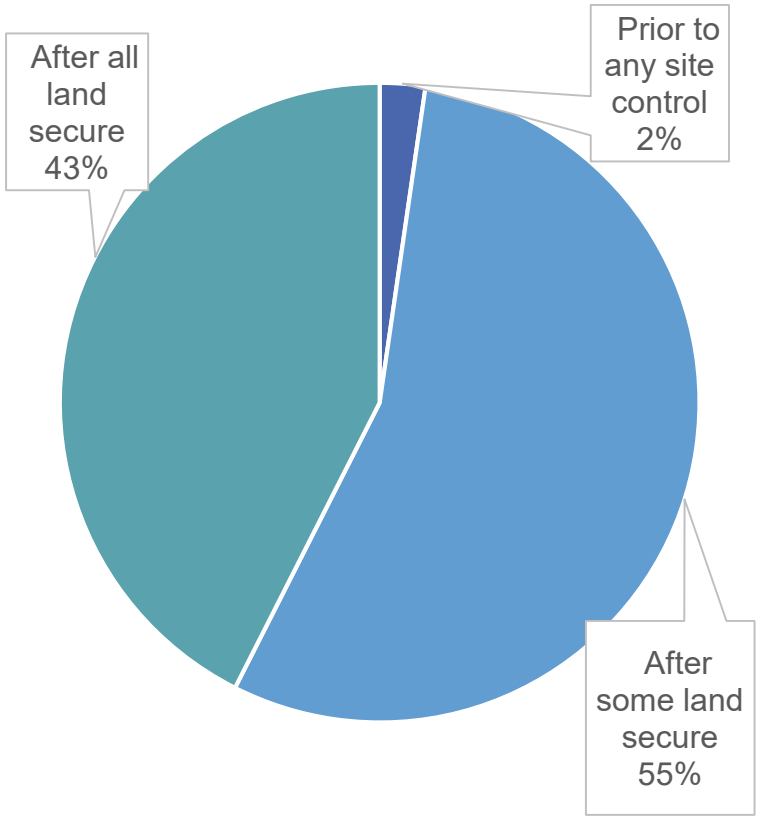
*Medians shown as dark horizontal line, box is 25-75 range; error bars are min and max if within 1.5*IQR. Wind mean does not include one extreme outlier. Low solar capex are for projects that are not yet under construction*

Most often, the public provided input on the project, and engagement began after some of the land for the project was secured

Which of the following best describes the way members of the public were engaged in decisions about the project?



At what stage did you initiate community engagement? (n=87)



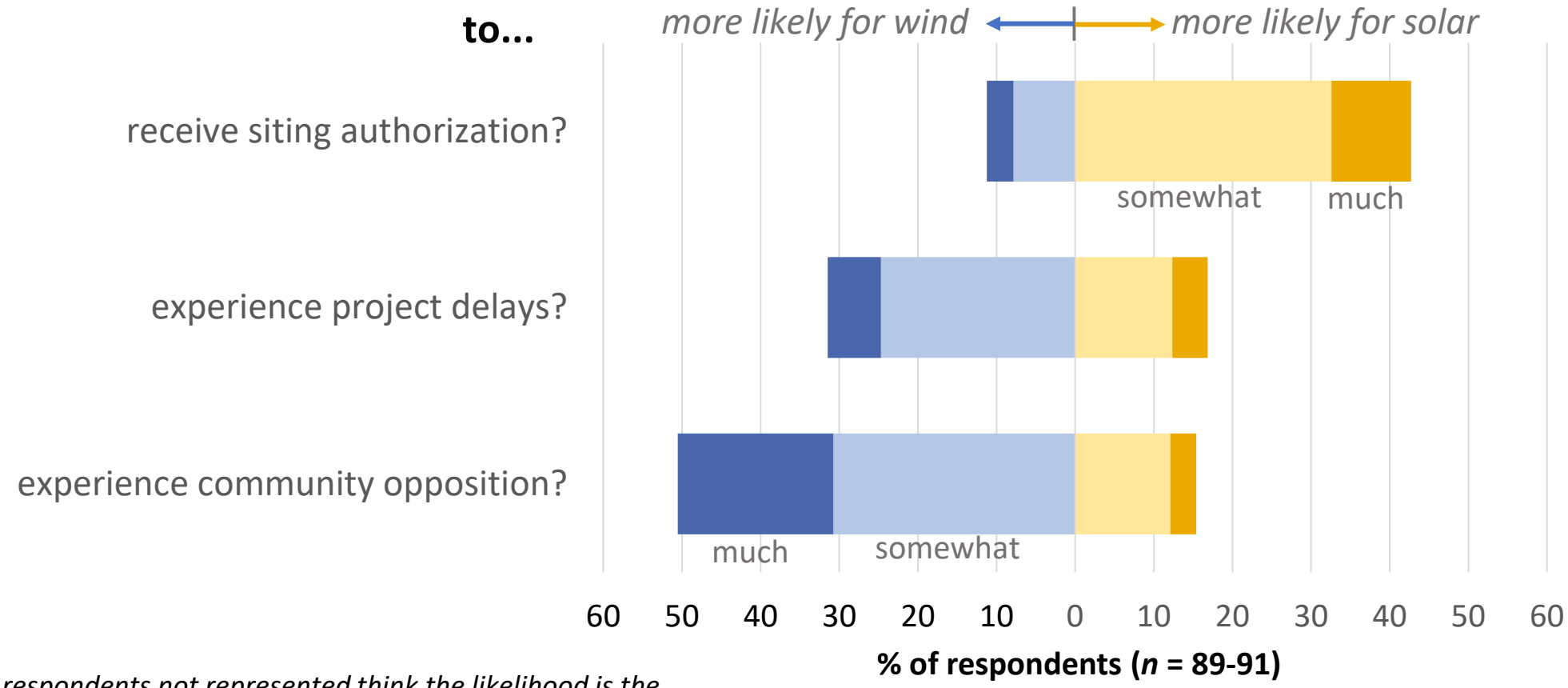
Sometimes success has no explanation, but many note that early, active local engagement is helpful

- One-third of those who answered said they did not use any particularly innovative strategies
  - *"We did not do anything particularly differently/notable here than we have at other projects - even in the same state - that yielded very different results. This underscores how arbitrary the local permitting process is."*
- Many answers refer to early local government engagement, maintaining a local office and making project design changes directly based on community feedback
- Unique responses:
  - *"A community based leasing strategy was used, paying everyone in the project who wished to participate a base /acre annual rent, plus an added payment for hosting a turbine, plus an annual payment for each occupiable structure."*
  - *"The solar developer most likely would not have gained conditional use permit approval without us* ***(utility company) stating on the record that if the out of state solar developer defaults on the project, we will step in and save it.*** *This was during decommissioning discussions prior to the CUP being issued. It is our experience that upfront active participation from the local utility is helpful. For all follow up meetings, both a representative from the solar developer AND the utility always attended public meetings (county commissioners) together and presented a united front."*
  - "*Waiting until I had lots of landowners in the project before going before public bodies*."

Comparison of wind & solar

Many developers still expect wind to be somewhat more difficult to site than solar.

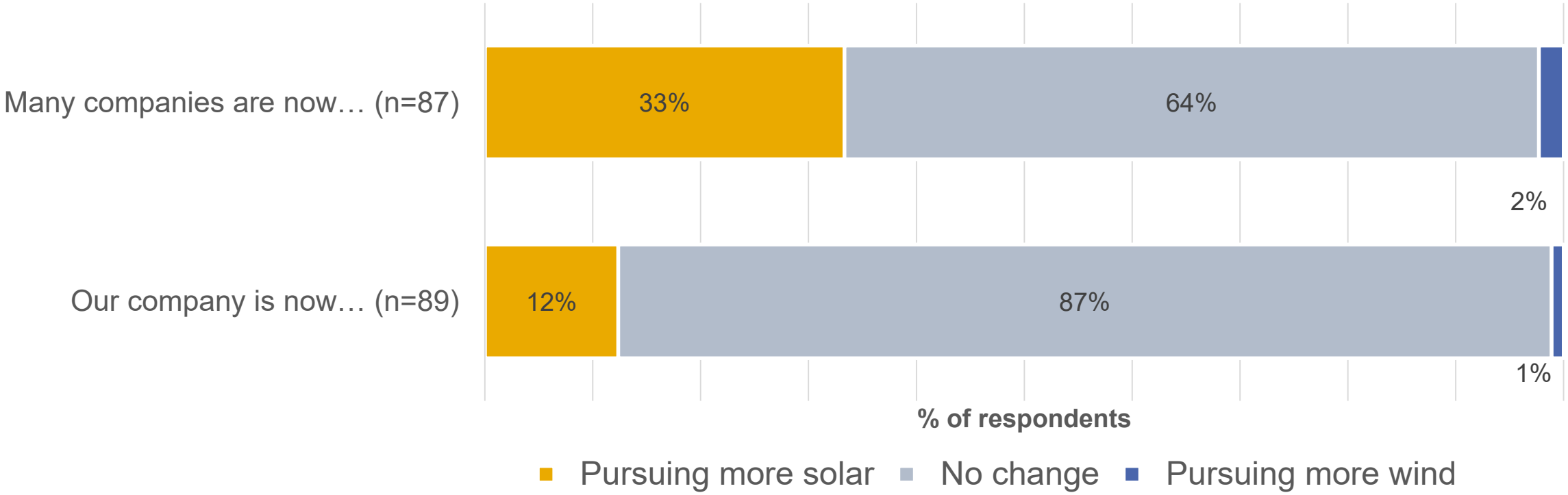
Which technology is more likely to...



Note: respondents not represented think the likelihood is the same for wind or solar

Some companies may be pursuing more solar in response to community opposition, but most have not changed technologies

We would like to understand if community opposition to one technology is leading to more development of the other technology. Select an option for each statement



Do you have any additional thoughts about differences between wind and solar development?

- 10 respondents note wind and solar development concerns are very similar
- Solar's larger land footprint is a dominant difference, wind is more multi-use
  - *"I think many thought/hoped that solar would be easier to permit from a community acceptance standpoint. While that may be the case some places, I don't think that has materialized. We are seeing just as much, if not more, resistance to utility-scale solar than we've seen for wind across the Midwest. This is mostly framed by the opposition around land use, protecting farmland, etc."*
- Wind can require more landowners – which can create stronger support base and greater spread of benefits
- Unique response:
  - *"There is always concern about the community finding out about a potential project before you make an announcement. Our company is engaged much earlier on wind development projects than solar - with wind, we can begin engagement during land acquisition."*

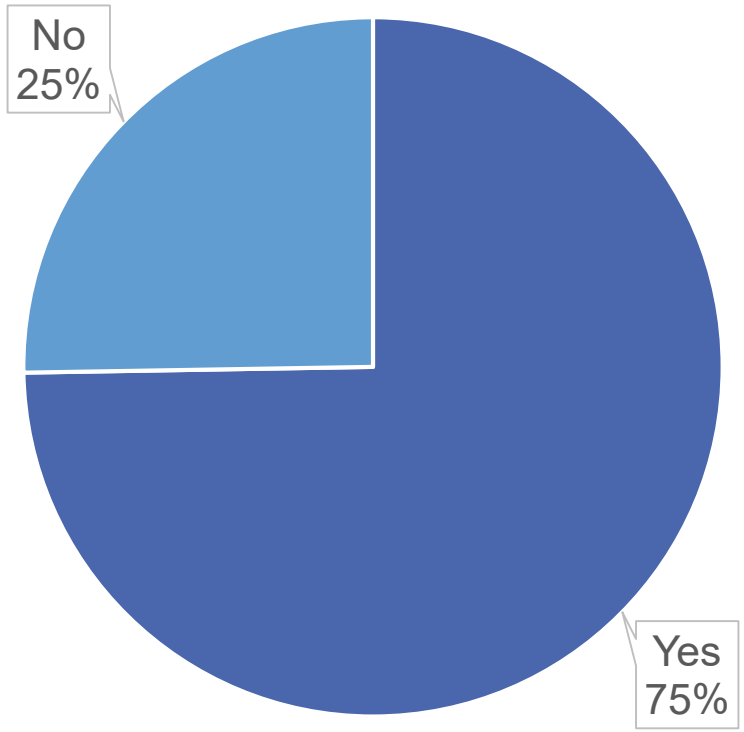
Final thoughts

Many respondents agreed to be contacted again, and overall we received mostly positive comments

- 44 respondents provided the contact information of a colleague to send the survey

- <u>A few points of feedback:</u>
  - One respondent noted difficulty accessing the link
  - One respondent:
    - *"This is asking me to give away the secrets of my job."*

May we contact you again if needed? (n=95)



Is there anything else you would like to share with us?

- Six respondents expressed enthusiasm to see the results
- Unique responses:
  - *"I am hopeful that 5 years from now, when many operating projects have mature landscaping and have contributed for years to local tax bases, the public concern about solar farms will be greatly diminished. For now, it is very easy to scare people with misinformation and attack campaigns, especially when well funded by anti-renewable interest groups, to effectively kill project permits nationwide."*
  - *"These answers are hard to capture because every community is unique and thus the strategy we deploy"*
  - *"Community acceptance and local permitting is one of, if not THE, biggest challenge to widespread decarbonization. We need all the attention we can get across government to support us on the ground."*

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ENERGY MARKETS & POLICY

Contact:
Robi Nilson | rnilson@lbl.gov

Contributors: Ben Hoen, Joe Rand

More Information:

- Sign up for our newsletter: https://emp.lbl.gov/

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