National Renewable Energy Laboratory
Innovation for Our Energy Future

NREL's Renewable Energy Finance Tracking Initiative (REFTI)

Q2 2010 Summary

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November 10, 2010

NREL is a national laboratory of the U.S. Department of Energy Office of Energy Efficiency and Renewable Energy operated by the Alliance for Sustainable Energy, LLC

Housekeeping

- Webinar: Got audio?
  - Call-in number: **888-469-1051**
  - participant access code: **6794941**

- Presentation, webinar recording, and original aggregated spreadsheet data will be made available at NREL's new RE Finance website:

http://financere.nrel.gov/

- **Gain early access to future REFTI results!**
  - Complete REFTI questionnaire
  - Provide email address when prompted (for internal-use only)

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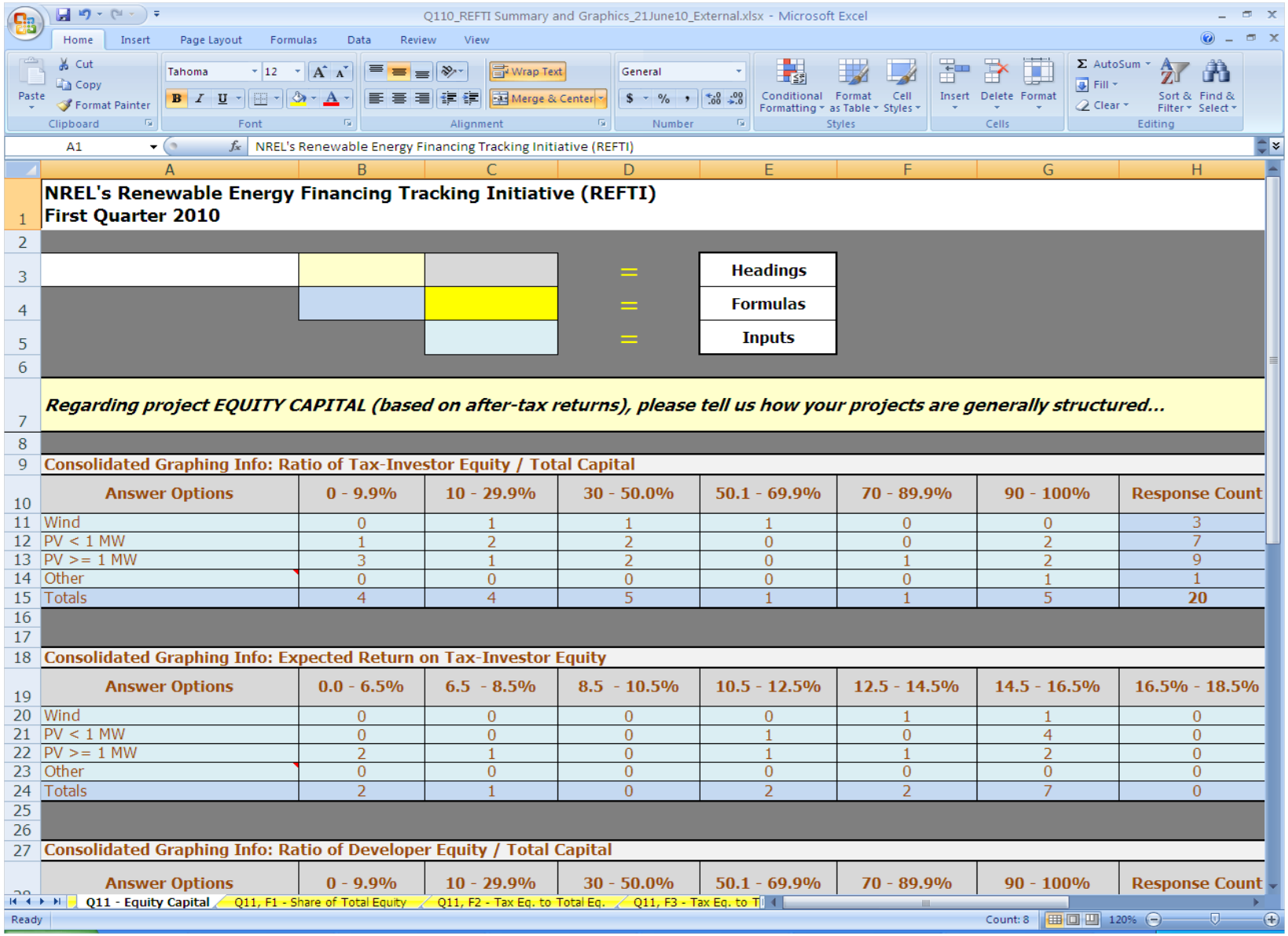
Aggregated REFTI Data Now Available!



Q110_REFTI Summary and Graphics_21June10_External.xlsx - Microsoft Excel

NREL's Renewable Energy Financing Tracking Initiative (REFTI)
First Quarter 2010

	=	Headings
	=	Formulas
	=	Inputs

Regarding project EQUITY CAPITAL (based on after-tax returns), please tell us how your projects are generally structured...

Consolidated Graphing Info: Ratio of Tax-Investor Equity / Total Capital

Answer Options	0 - 9.9%	10 - 29.9%	30 - 50.0%	50.1 - 69.9%	70 - 89.9%	90 - 100%	Response Count
Wind	0	1	1	1	0	0	3
PV < 1 MW	1	2	2	0	0	2	7
PV >= 1 MW	3	1	2	0	1	2	9
Other	0	0	0	0	0	1	1
Totals	4	4	5	1	1	5	**20**

Consolidated Graphing Info: Expected Return on Tax-Investor Equity

Answer Options	0.0 - 6.5%	6.5 - 8.5%	8.5 - 10.5%	10.5 - 12.5%	12.5 - 14.5%	14.5 - 16.5%	16.5% - 18.5%
Wind	0	0	0	0	1	1	0
PV < 1 MW	0	0	0	1	0	4	0
PV >= 1 MW	2	1	0	1	1	2	0
Other	0	0	0	0	0	0	0
Totals	2	1	0	2	2	7	0

Consolidated Graphing Info: Ratio of Developer Equity / Total Capital

Answer Options	0 - 9.9%	10 - 29.9%	30 - 50.0%	50.1 - 69.9%	70 - 89.9%	90 - 100%	Response Count

Webinar Agenda

- Intro to REFTI Program
  - Background/Vision
- Q2 2010 Questionnaire Results
  - Will generally follow REFTI questionnaire progression
  - Trend across multiple quarters
  - Technology Breakout
- Interactive Polling
- Question & Answer
  - Submit via internet conference and we will respond at the end

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REFTI Background/Vision

- Designed to obtain quality data from RE participants
- Provides valuable insight into RE financing terms and the application of government incentives
- Four Quarters of information are now available
- With continued participation, it will be possible to observe market trends and policy implications

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Caveats

- This is a summary of data as reported by REFTI participants
- In general, data provided was not validated by NREL
- Potential concerns:
  - Duplicate data
  - Definition of “financial closure”
  - Small sample size

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Table of Contents

- REFTI participants & their project portfolios & investments
- Behind the meter projects – end-user & economic return
- Financial structure and form of incentive and depreciation taken
- REC and PPA contract terms
- Tax and Developer Equity ratios and exp. returns
- Term debt
- Installed and levelized costs

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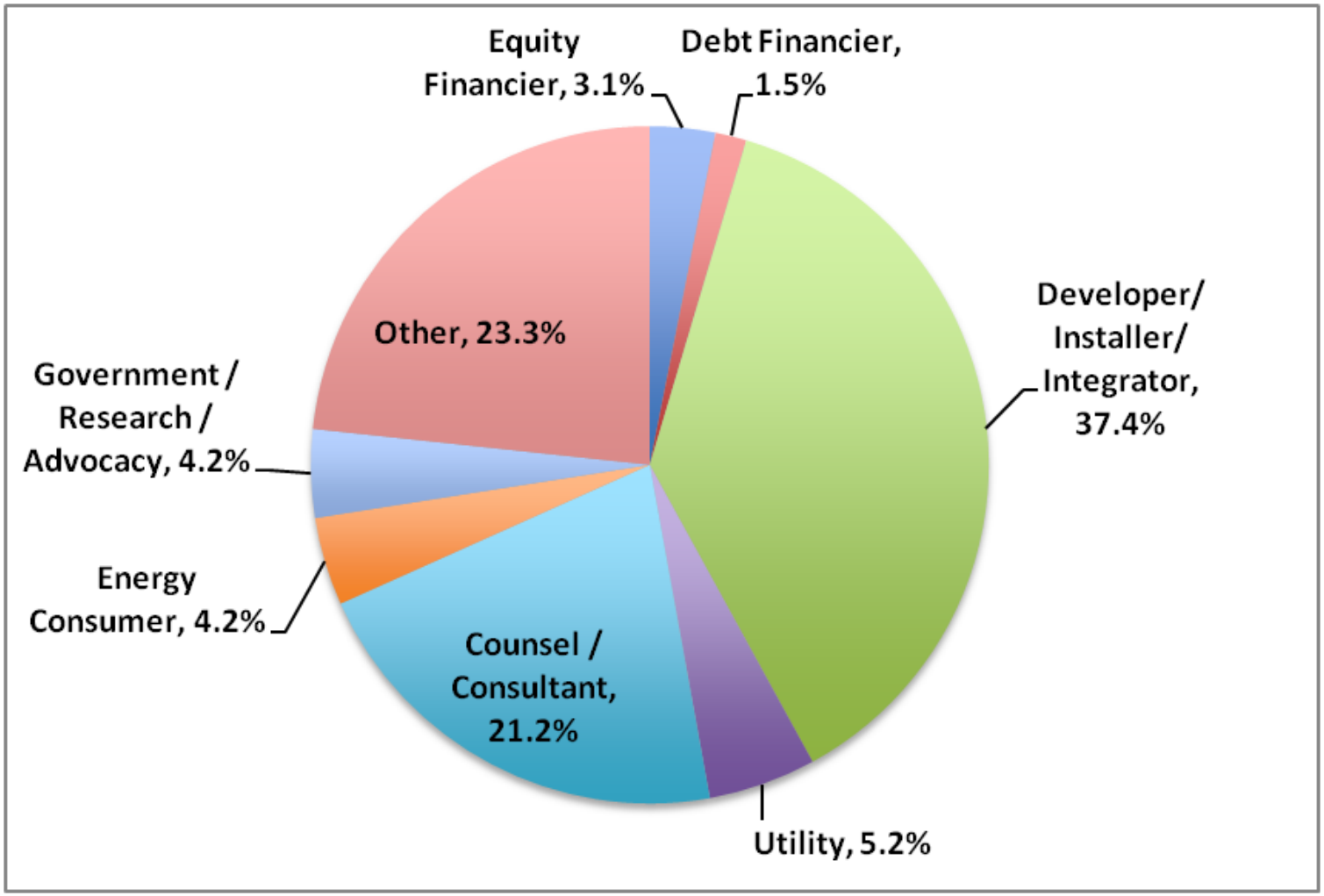
Participation: Q2'10 Firm Composition



188 people entered the questionnaire; 154 left contact info.
Developers represented largest segment with 38%

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REFTI Questionnaire: Page 2, Q1 (Q3)

1. Please tell us about your projects IN DEVELOPMENT and those that CLOSED FINANCING in Q2 2010...

	No. of Projects in Development	Aggregate Capacity in Development (gross MW)	No. of Projects Financially Closed (Q1 10)	Aggregate Capacity Financially Closed (gross MW)	Form of Financial Closure
Wind					
Solar - PV (< 1 MW)					
Solar - PV (>= 1 MW)					
Solar - CSP					
Solar Thermal (non-elec)					
Geothermal					
Biomass - Elec					
Biomass - Non-elec					
Hydro					
Other Technologies					

Comments

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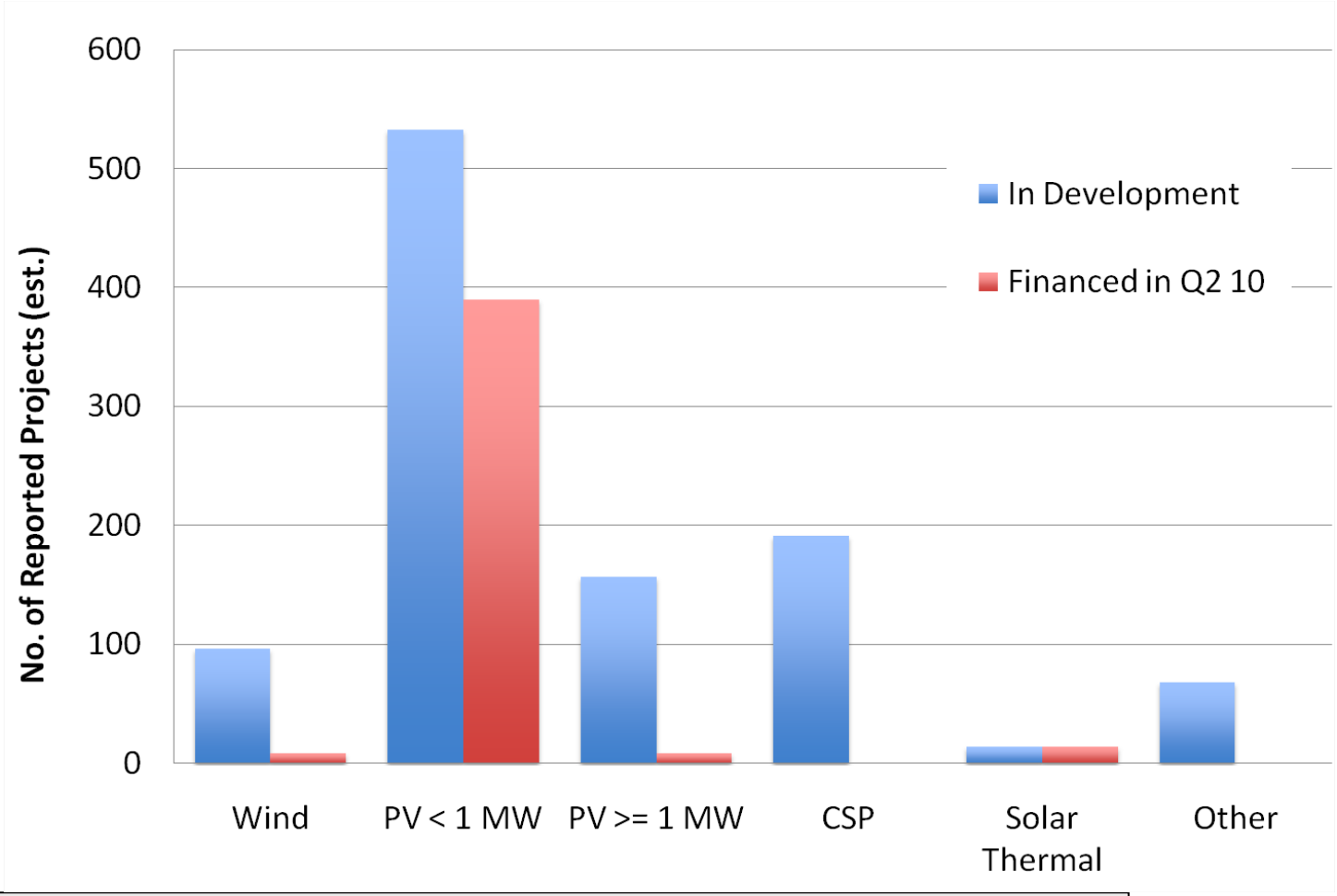
Number of RE Projects Reported



116 respondents reported approximately 1060 projects in development, with 420 projects having reached financial closure of some kind (up from 58 respondents and 912 in development)

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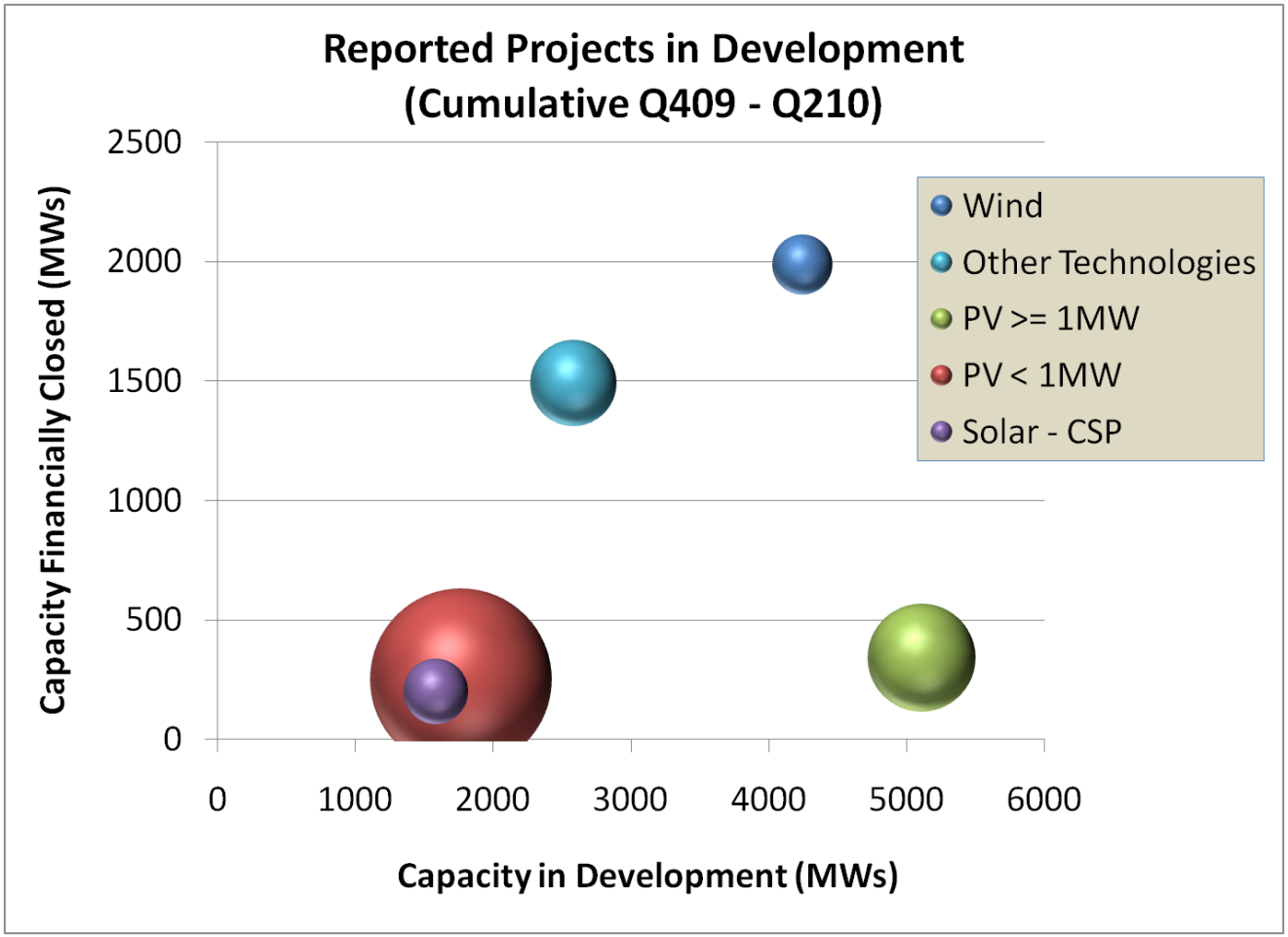
Number of RE Projects Reported



Over past three quarters, REFTI participants have reported thousands of MW in development and financially closed for each technology. Bubble size = # of projects reported

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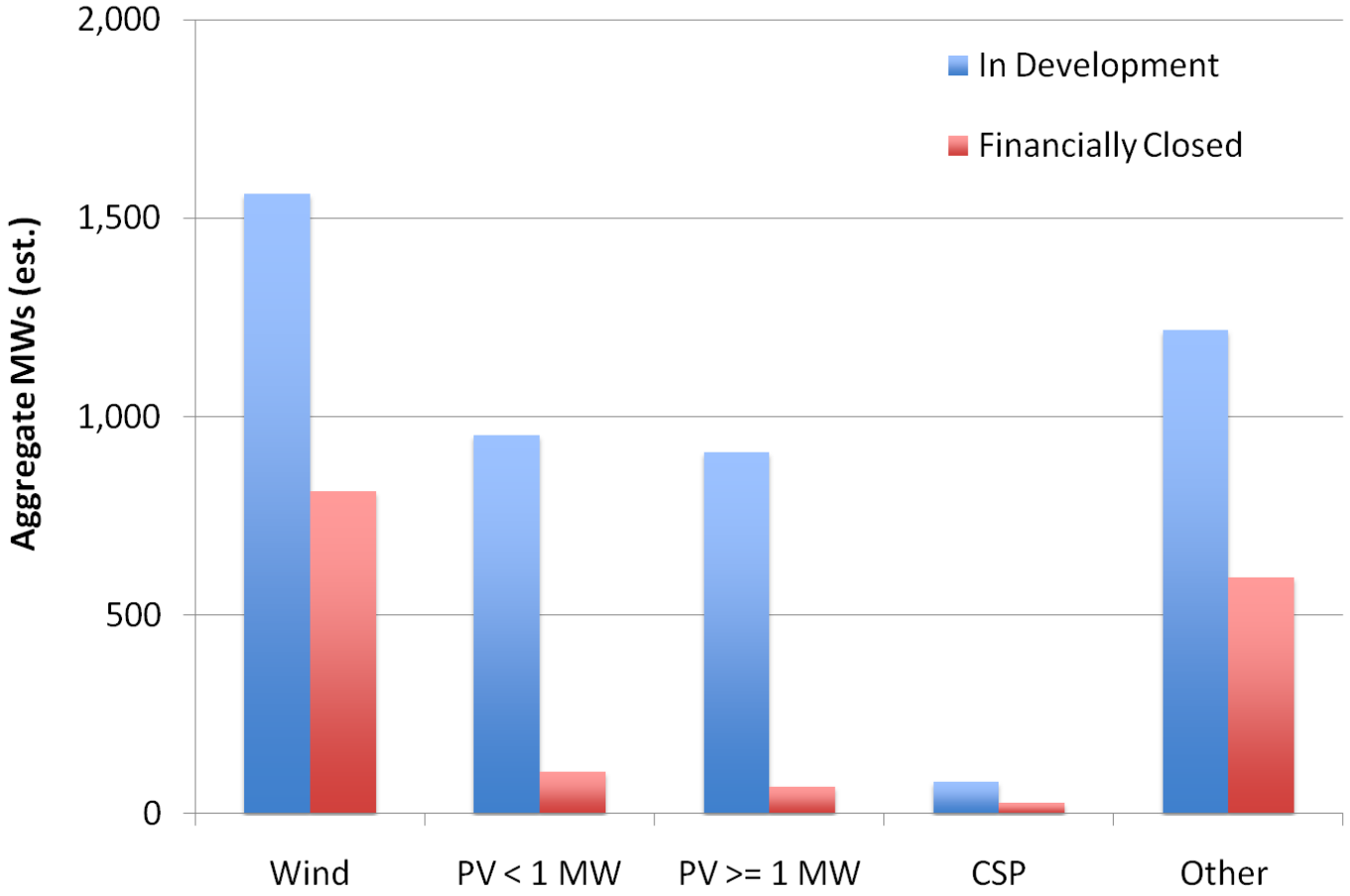
Capacity of Projects Reported (MWs)



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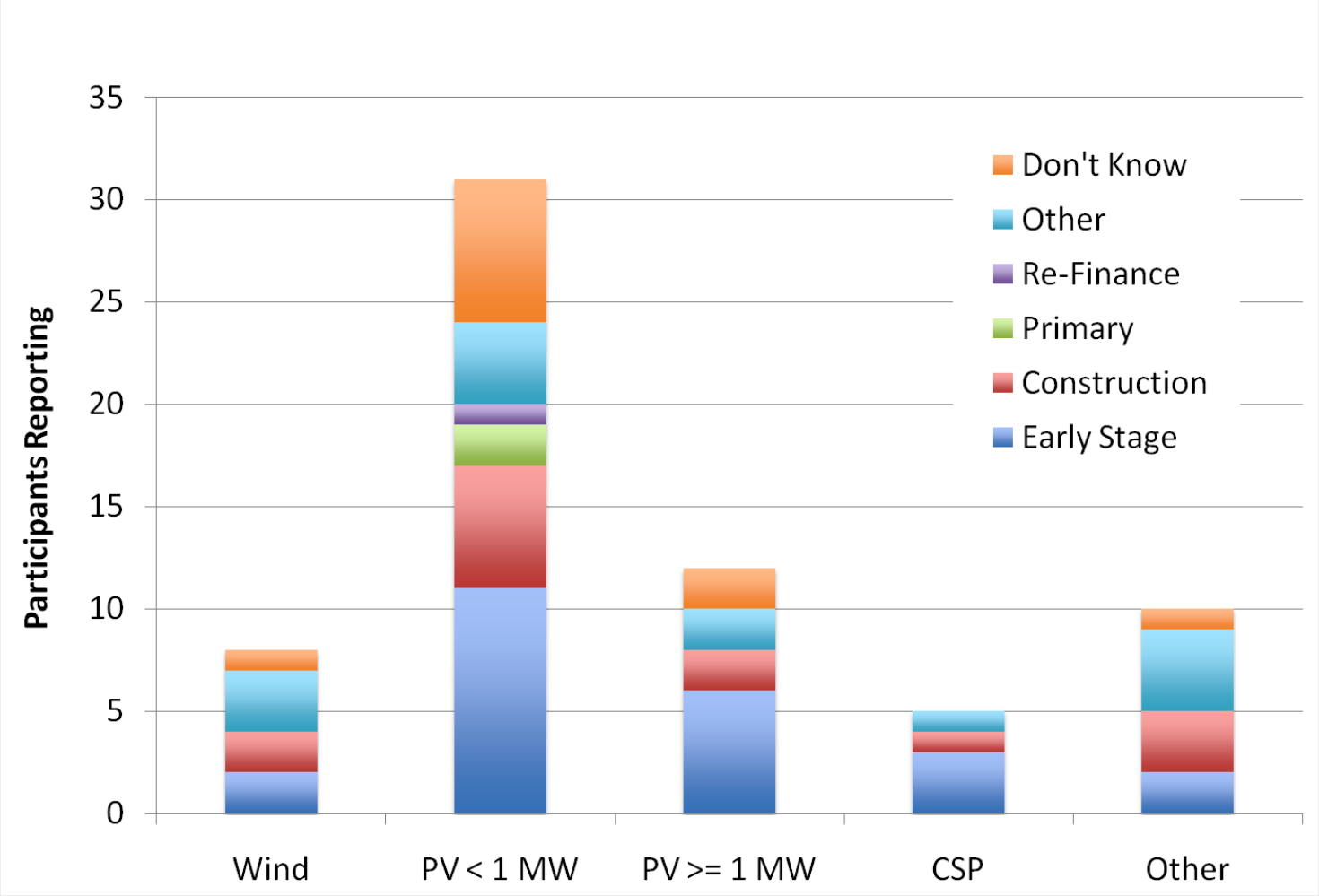
Roughly 4,720 MW in development by REFTI participants with 1,600 MW reaching financial closure of some kind.
** Values estimated based on mid-point of questionnaire bins

Form of Financial Closure



66 respondents indicated form of financial closure. A high number of early stage and construction financings reported.

REFTI Questionnaire: Page 2, Q2 (Q4)

2. For projects that closed in Q2 2010, please tell us the PRIMARY LOCATION, POWER PURCHASER, and the TOTAL and DIRECT INVESTMENT...

	Primary Region	Primary Power Purchaser (i.e., Power Sold To)	Total Cost of Combined Projects ($ millions)	Your Total Direct Investment ($ millions)
Wind				
Solar - PV (< 1 MW)				
Solar - PV (>= 1 MW)				
Solar - CSP				
Solar Thermal (non-elec)				
Geothermal				
Biomass - Elec				
Biomass - Non-elec				
Hydro				
Other Technologies				

Comments

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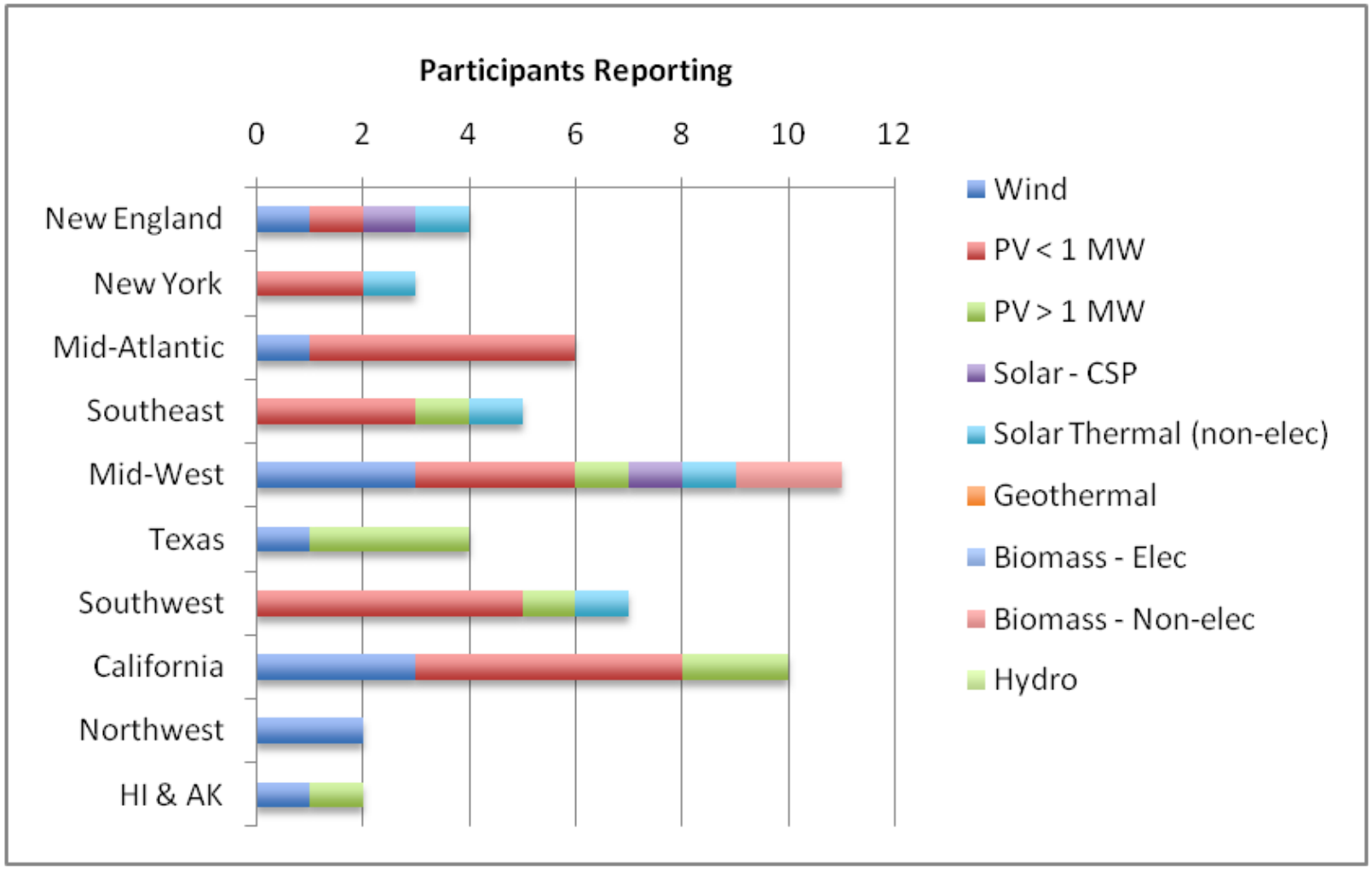
Financial Closures by Region



High number of REFTI participants reporting on projects in Mid-West and CA. All regions represented (59 total participants).

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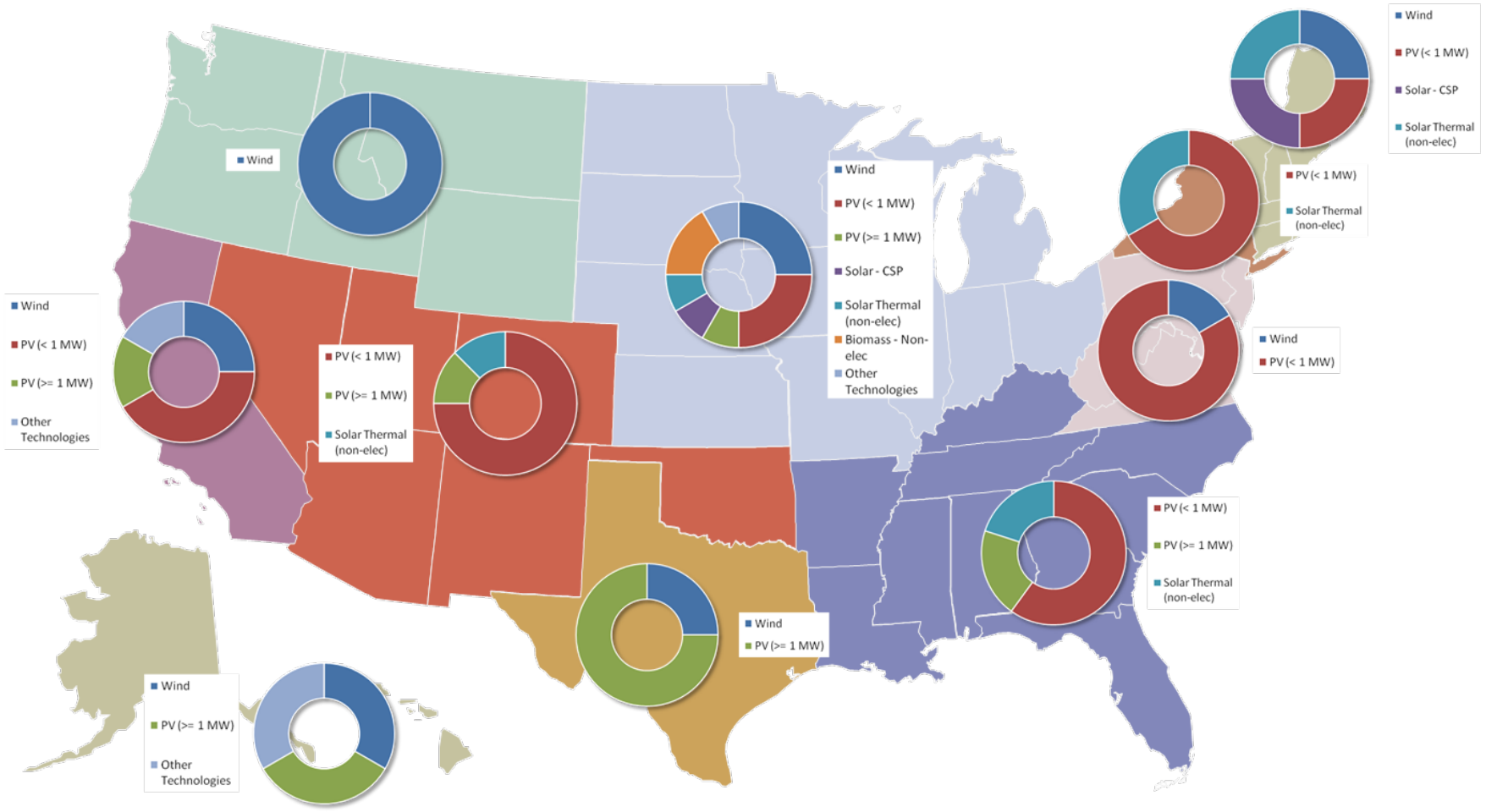
Financial Closures by Region



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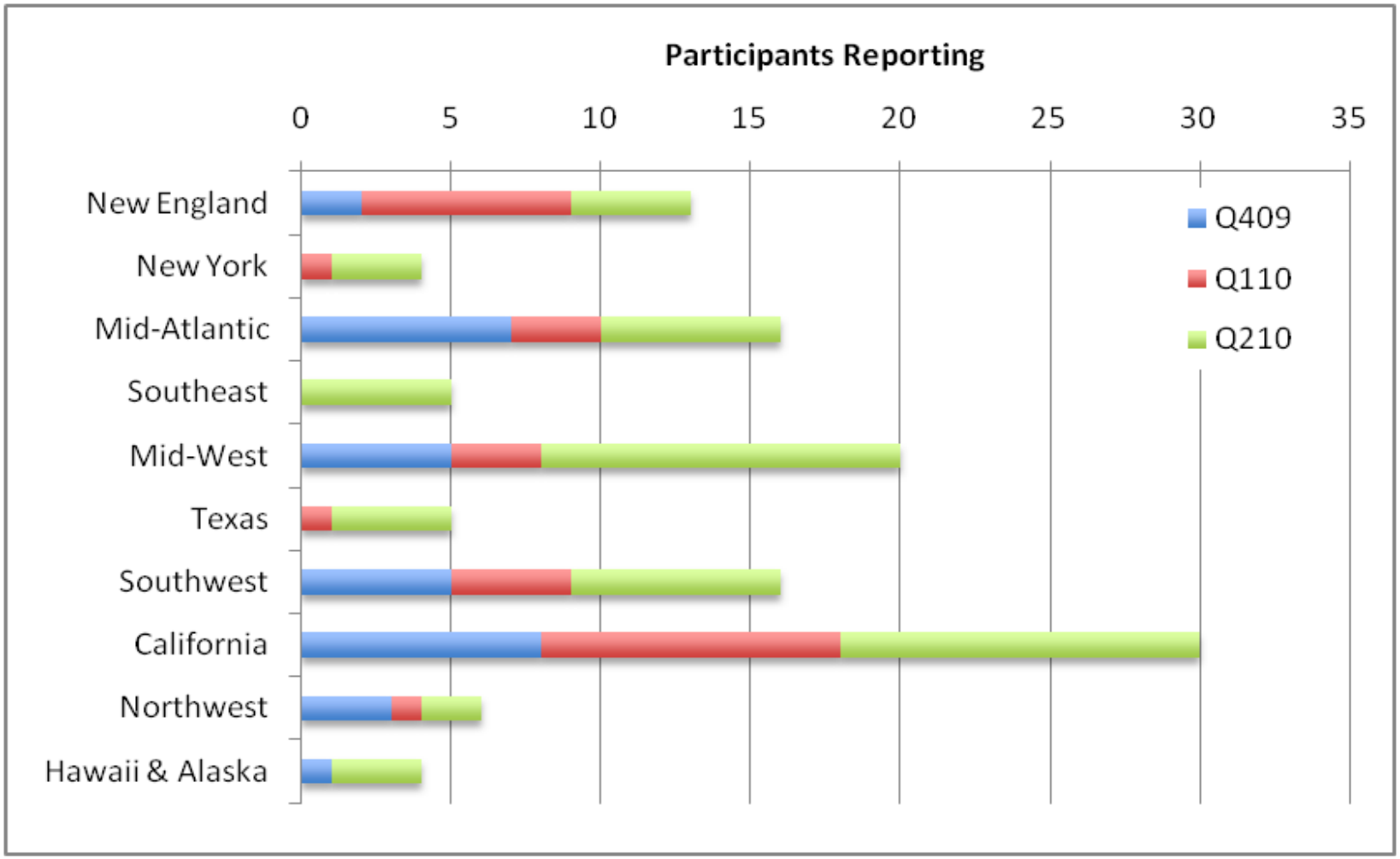
Financial Closures by Region – Trend



CA and mid-west & mid-Atlantic well represented

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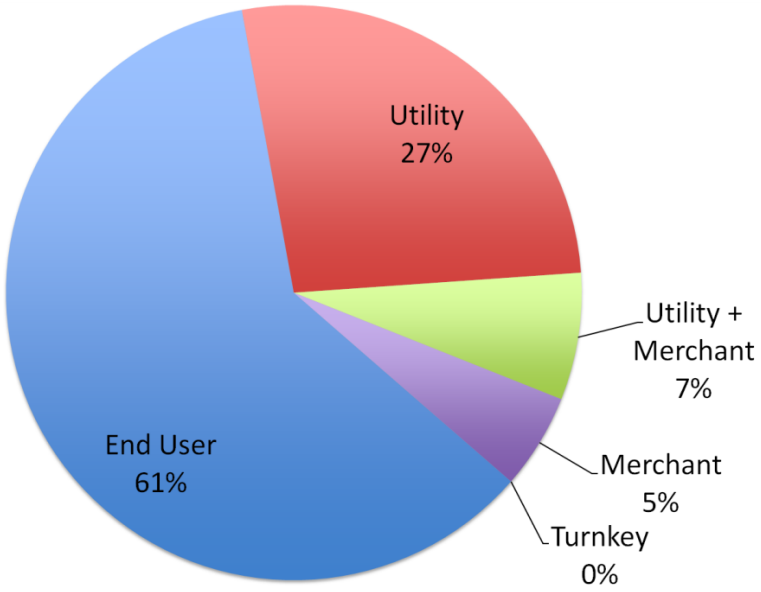
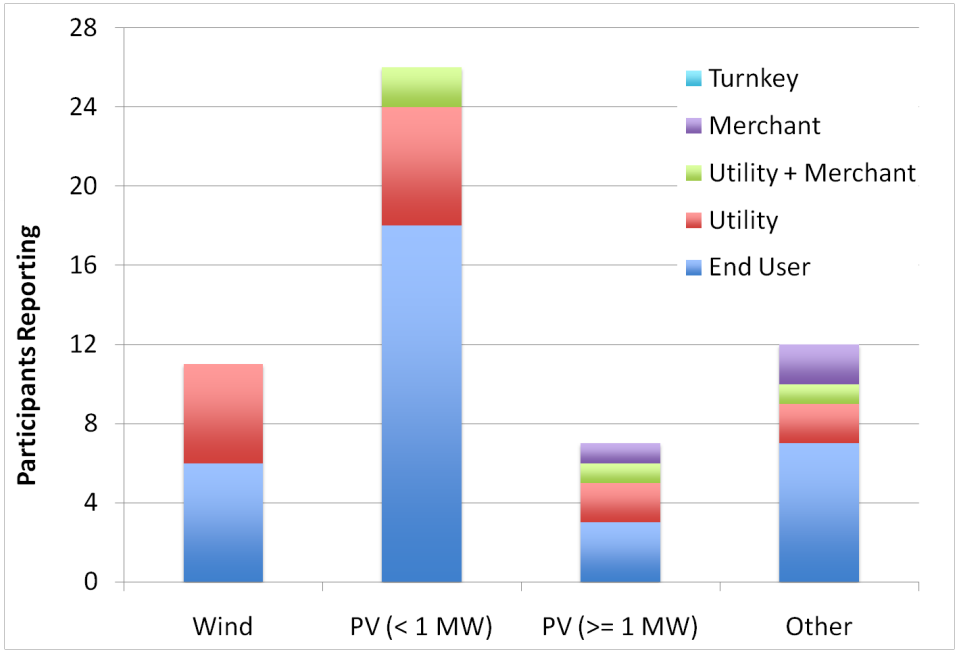
Primary Power Purchaser





Most projects reported signed PPA with customer host. Some merchant sales (inc. remainder after utility sales) reported

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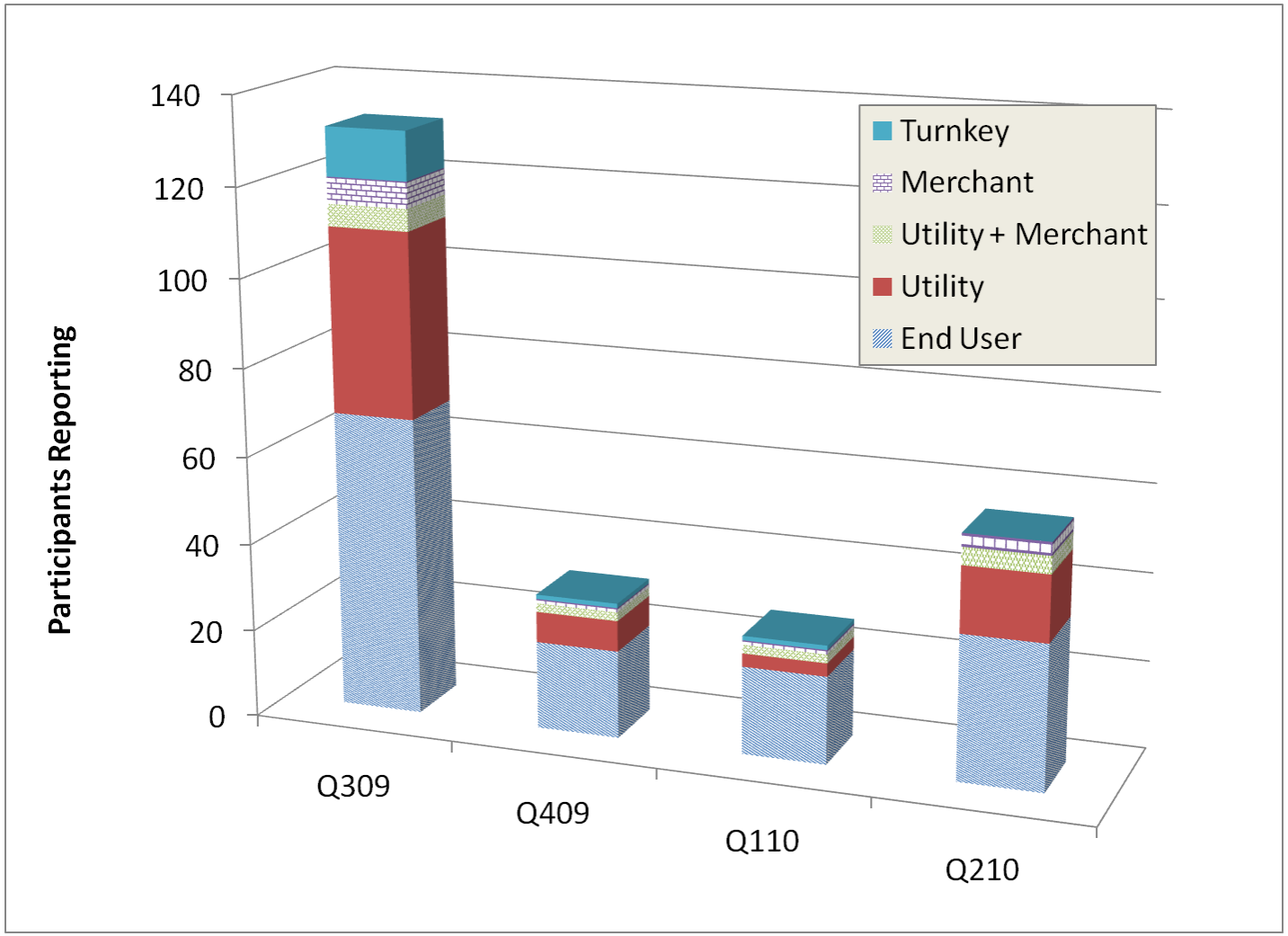
Primary Power Purchaser - Trend



Most projects reported signed PPA with customer host. Some merchant sales (inc. remainder after utility sales) reported

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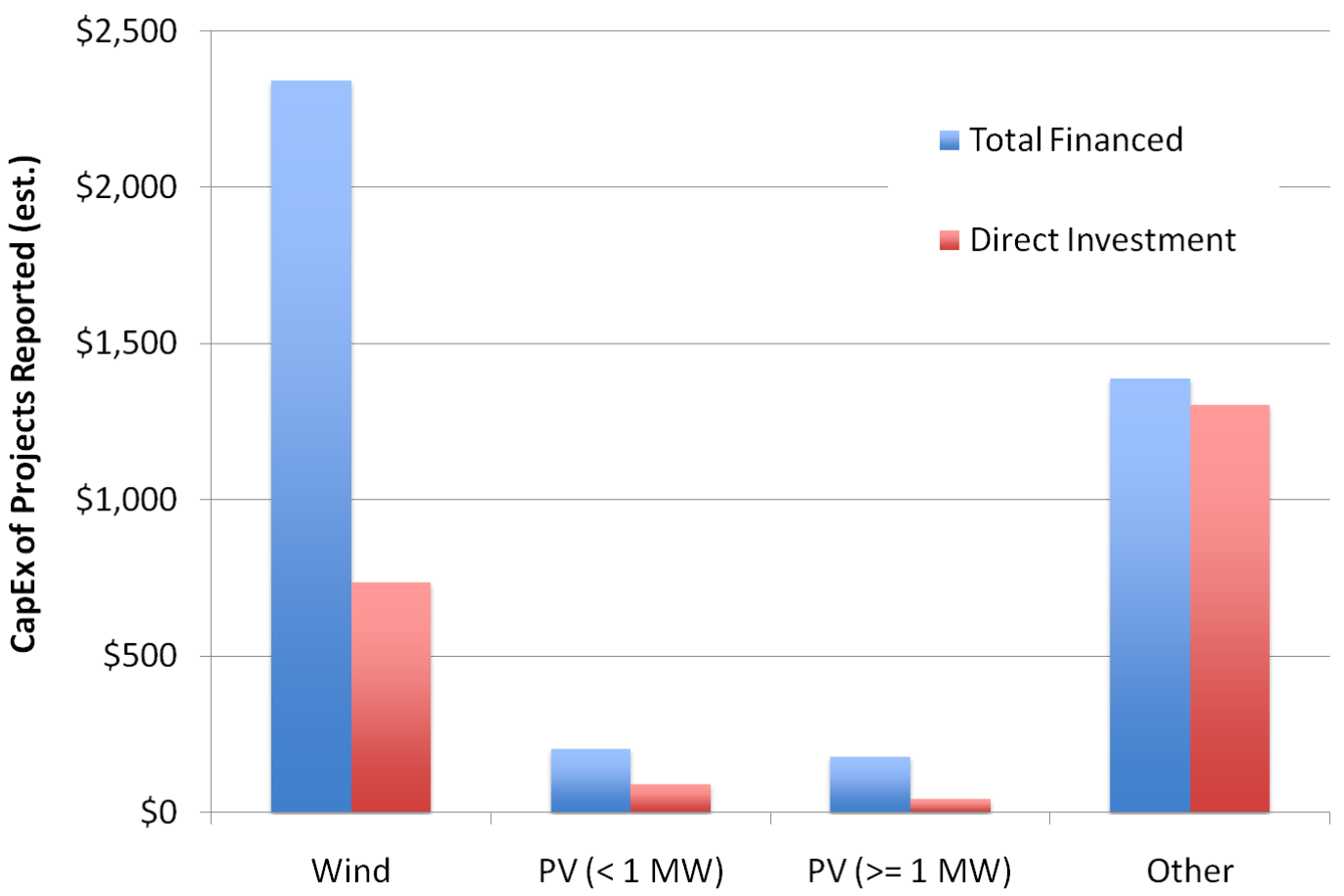
Capital Expenditure Reported ($MM)



REFTI participants reported $4.1B in projects in development, $1.25B of direct finance coming from REFTI participants.
** Values estimated based on mid-point of questionnaire bins

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REFTI Questionnaire: Page 2, Q3 (Q5)

3. For your projects that are ON-SITE and BEHIND-THE-METER, please tell us about the customer host...

	Number of Deals	Nameplate Capacity (aggregate MW)	Typical Customer Financing Structure	Avg. Customer Payback (yrs)	Avg. Customer Discount Rate (%)
Residential					
Commercial & Industrial					
Federal Government					
State & Local Govt.					

Comments

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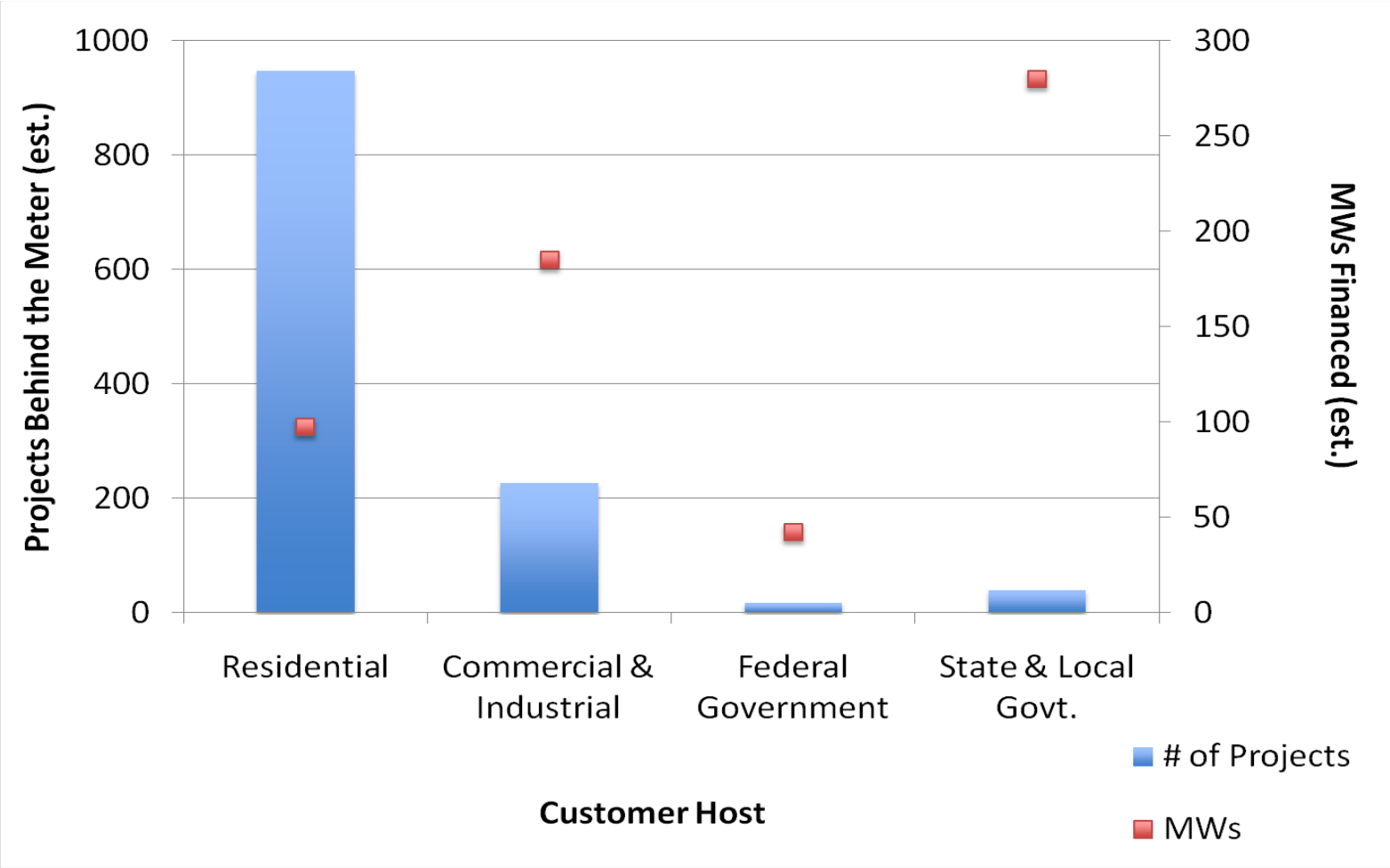
No. & MWs of Projects with Customer Host



Roughly 1200 projects, representing 605 MW, reported with customer host. Very high MW project reported for state & local govt.
** Values estimated based on mid-point of questionnaire

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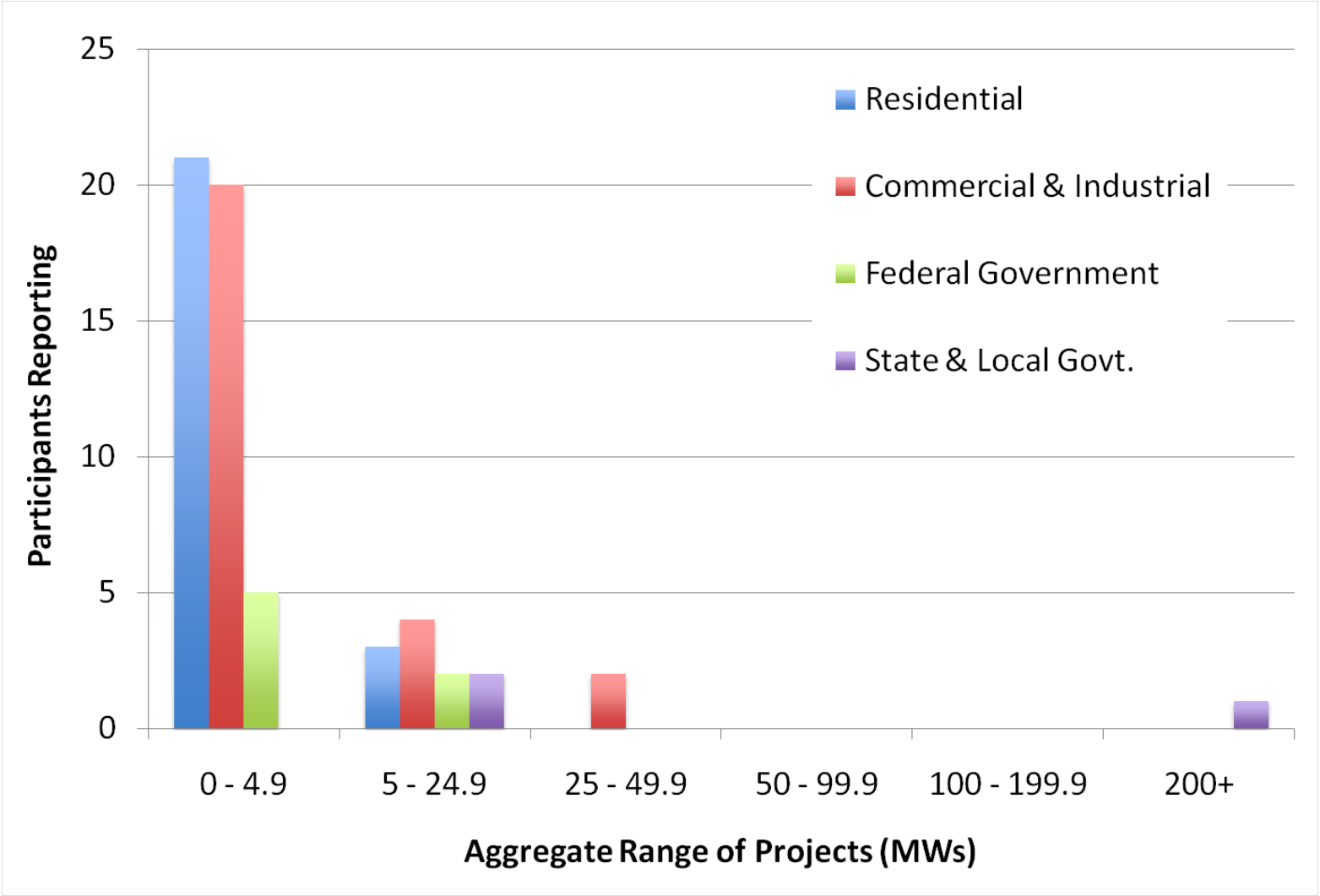
No. & MWs of Projects with Customer Host



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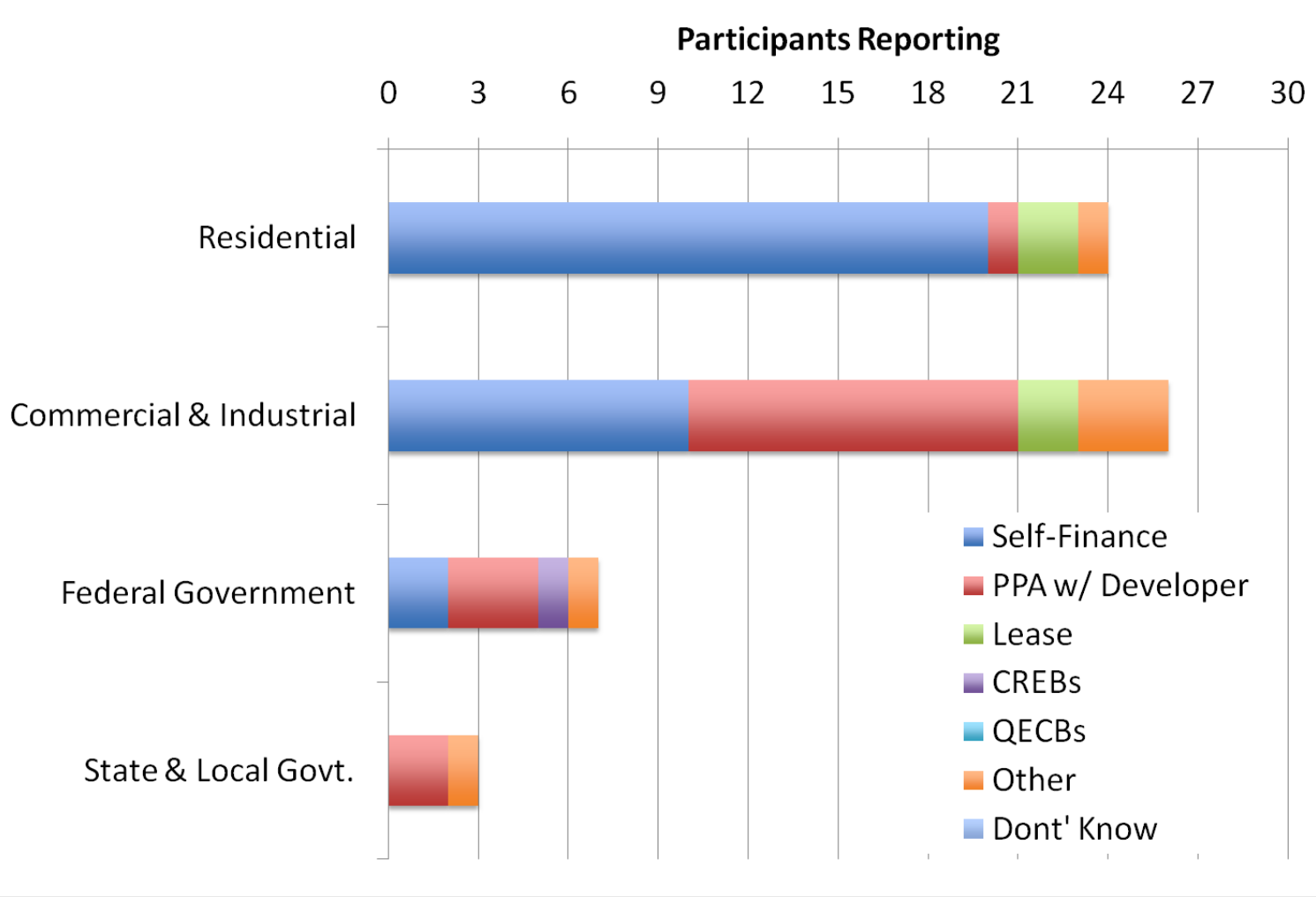
Form of Customer Host Financing



Most residential deals are self-financed. Most C&I deals are financed via PPA with developers

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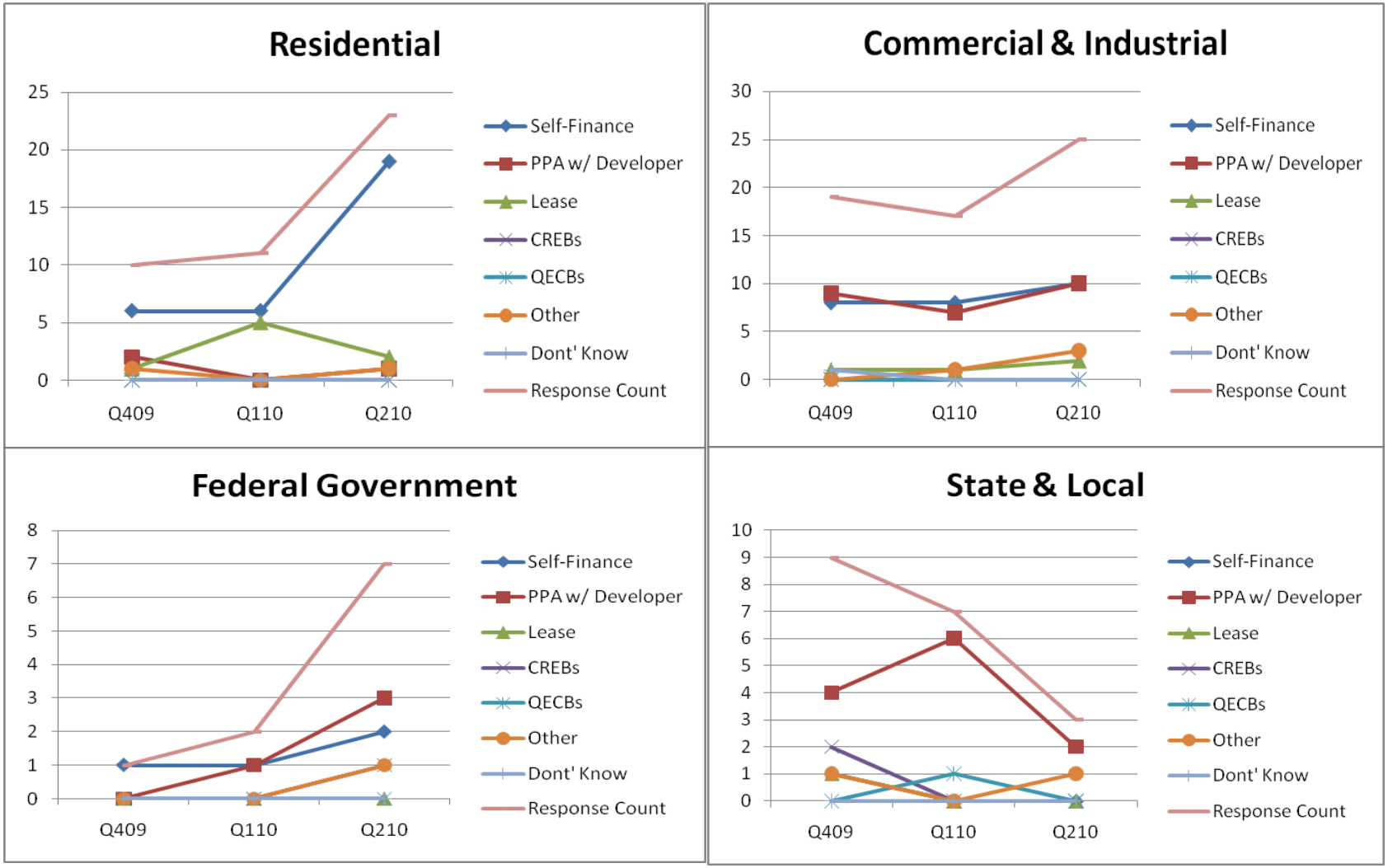
Customer Host Financing – Trend Analysis



Trends by customer sector

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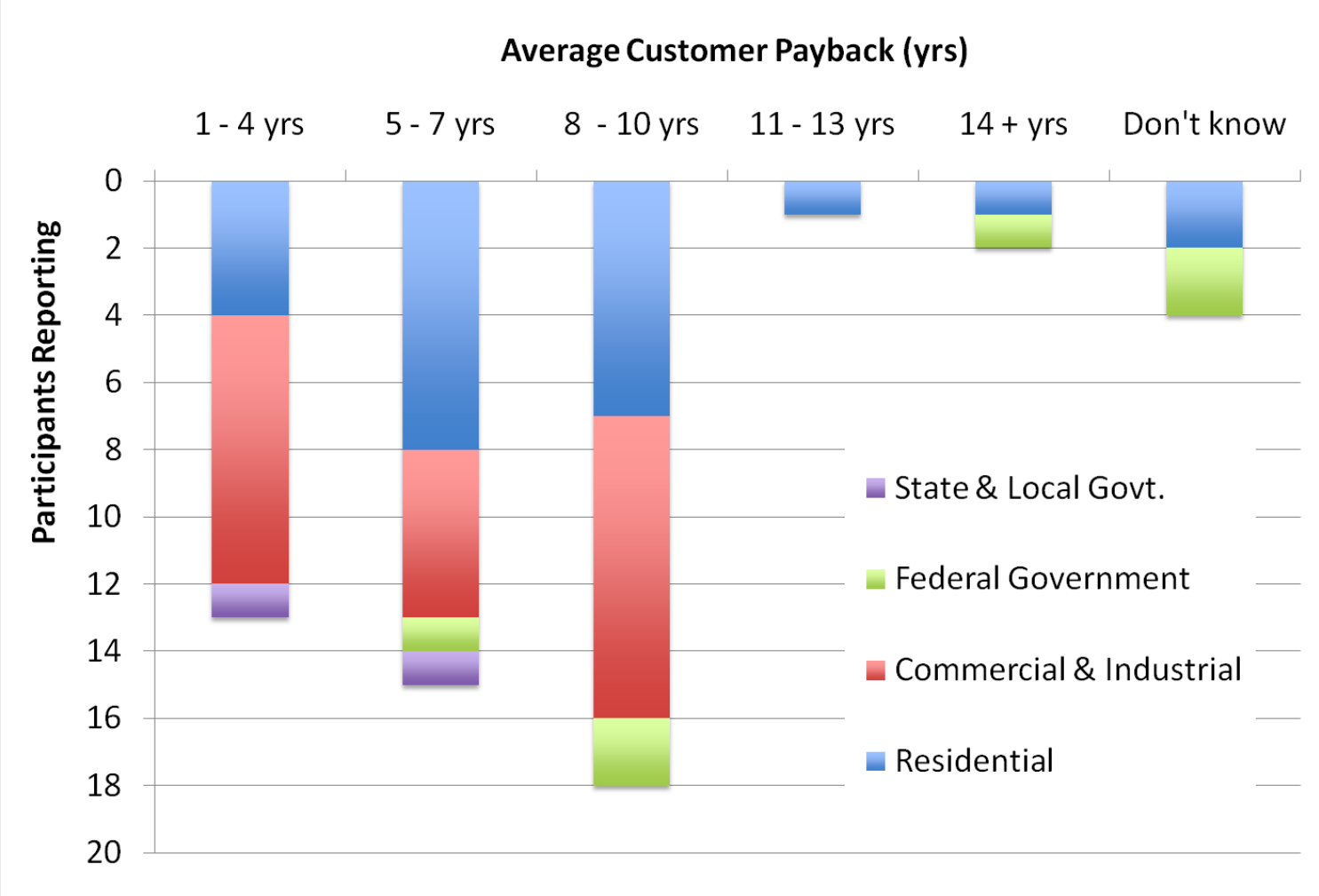
Customer Host Payback (Yrs)



Most projects have 10 year or lower payback. Very wide range on residential deals (likely tied to utility power price and REC purchase)

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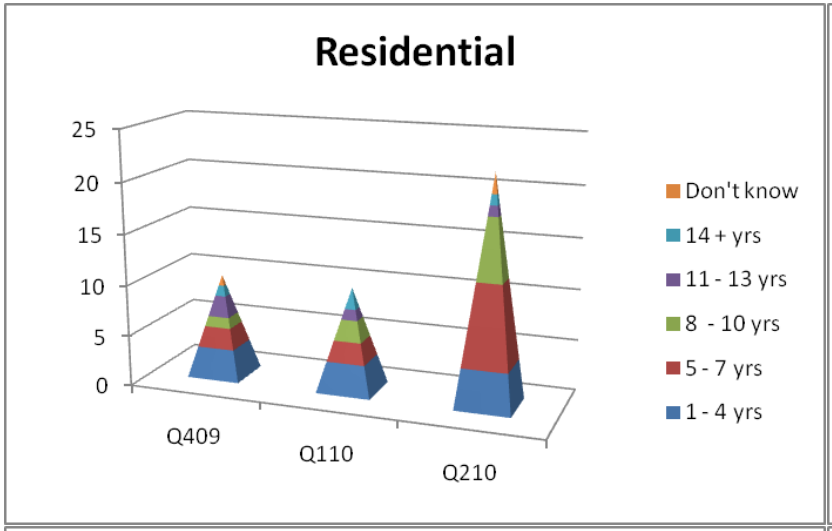
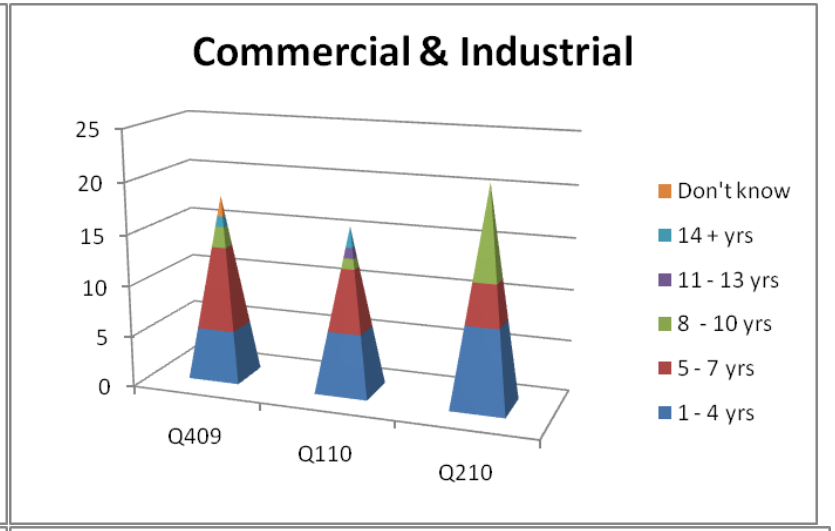
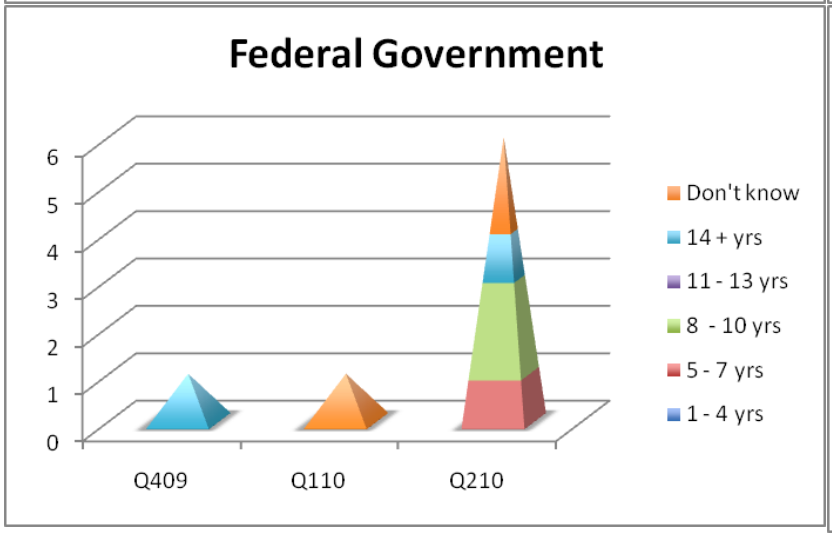
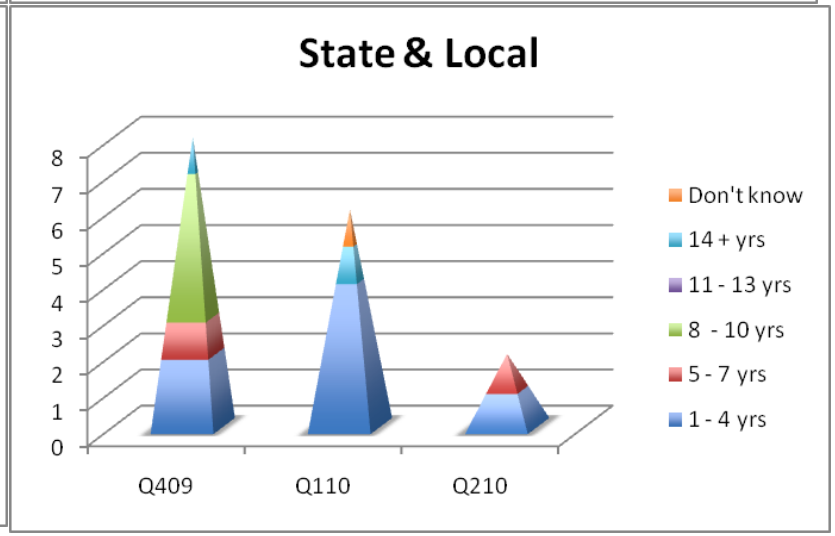
Customer Host Payback – Trend Analysis









Q2 10 first opportunity to look at federal govt. projects - most have payback of 10 years or less.

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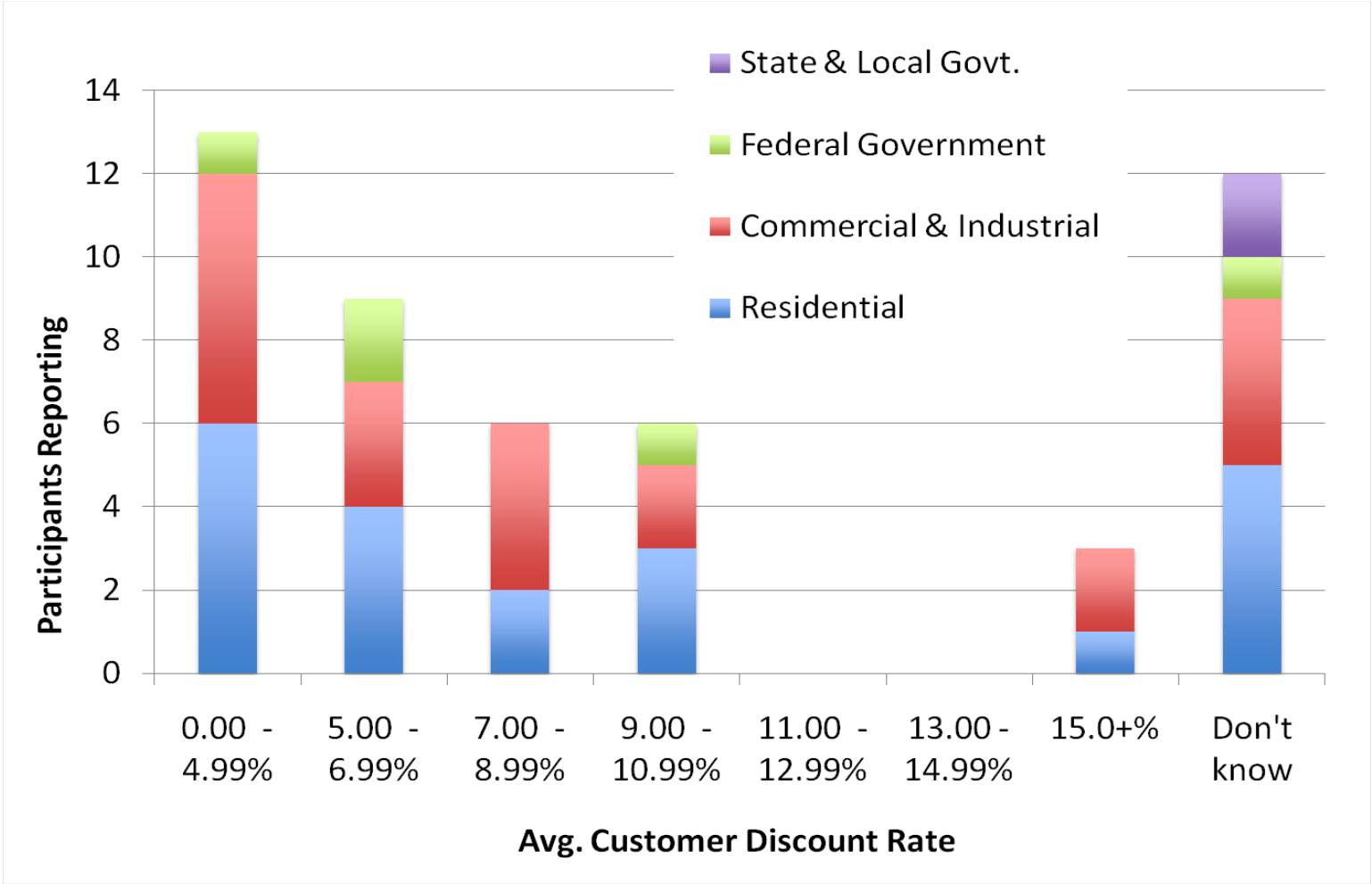
Customer Host Discount Rate



Customer discount rates are estimated to be fairly low (most under 9%). Fairly high "don't knows" as expected

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REFTI Questionnaire: Page 2, Q4 (Q6)

4. What was the LARGEST BARRIER to RE project development and how did it impact your projects

	Barrier	Impact
Wind		
Solar - PV (< 1 MW)		
Solar - PV (>= 1 MW)		
Solar - CSP		
Solar Thermal (non-elec)		
Geothermal		
Biomass - Elec		
Biomass - Non-elec		
Hydro		
Other Technologies		

Comments

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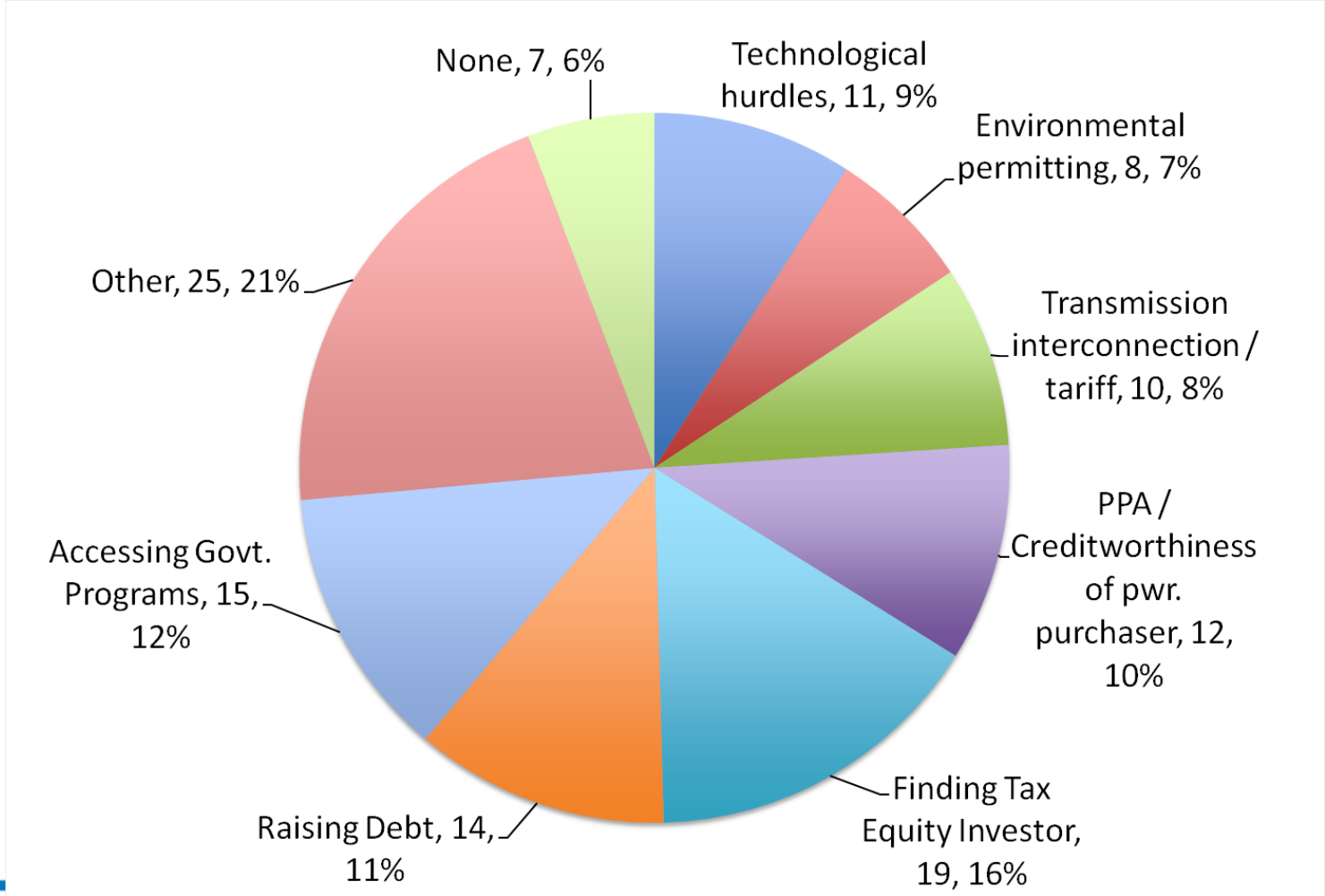
Largest Barriers to RE Development

About 50% of respondents referenced financing-related barrier as most significant; Other still a significant category



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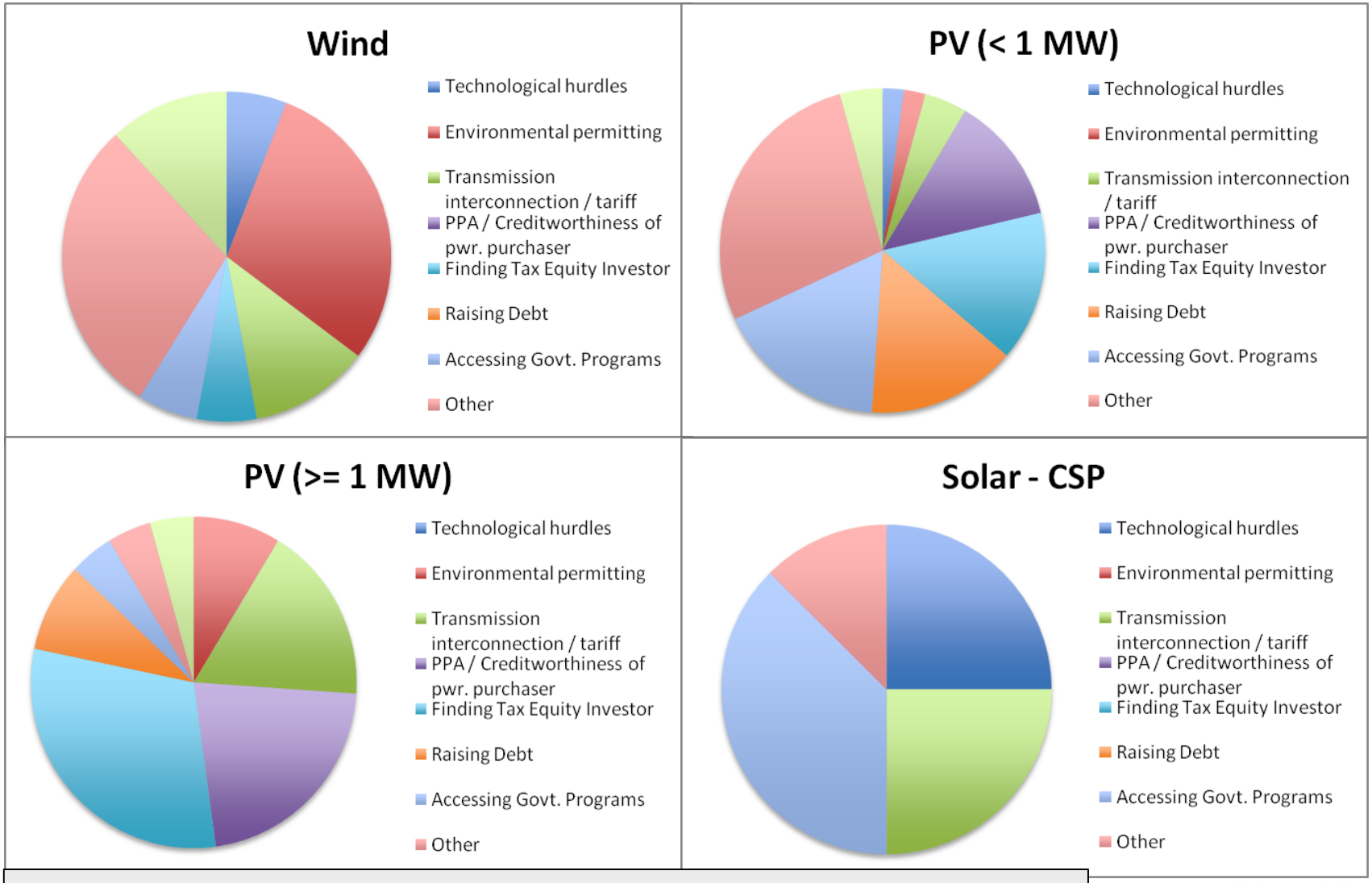
Largest Barrier – Tech Breakout



Tech hurdles not mentioned for large PV, solar CSP dominated by Accessing Govt. Programs

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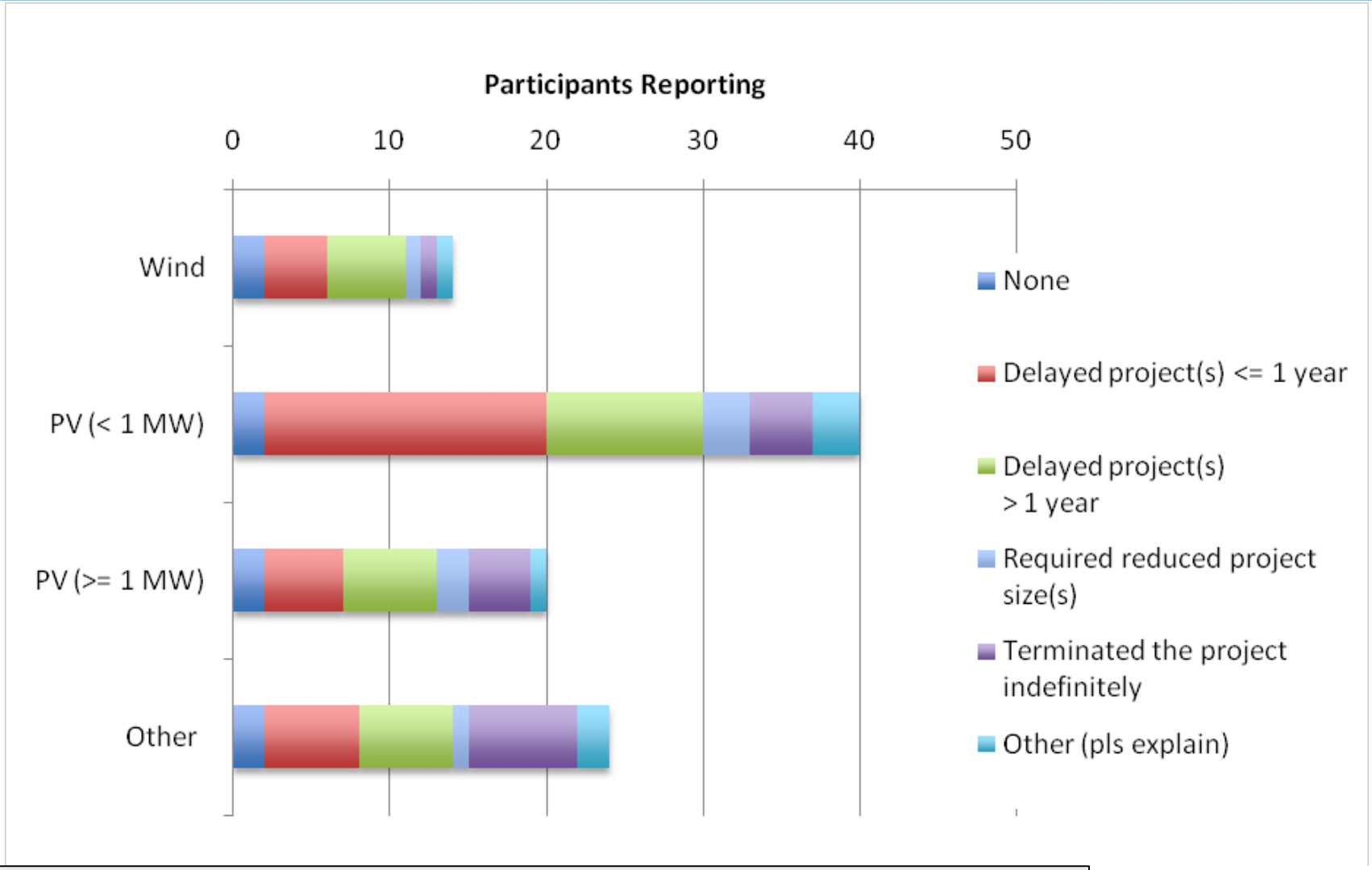
Consequence of Development Barrier(s)



Very few projects indicate no consequence to development barriers. Short-term delays (<1 year) most common consequence.

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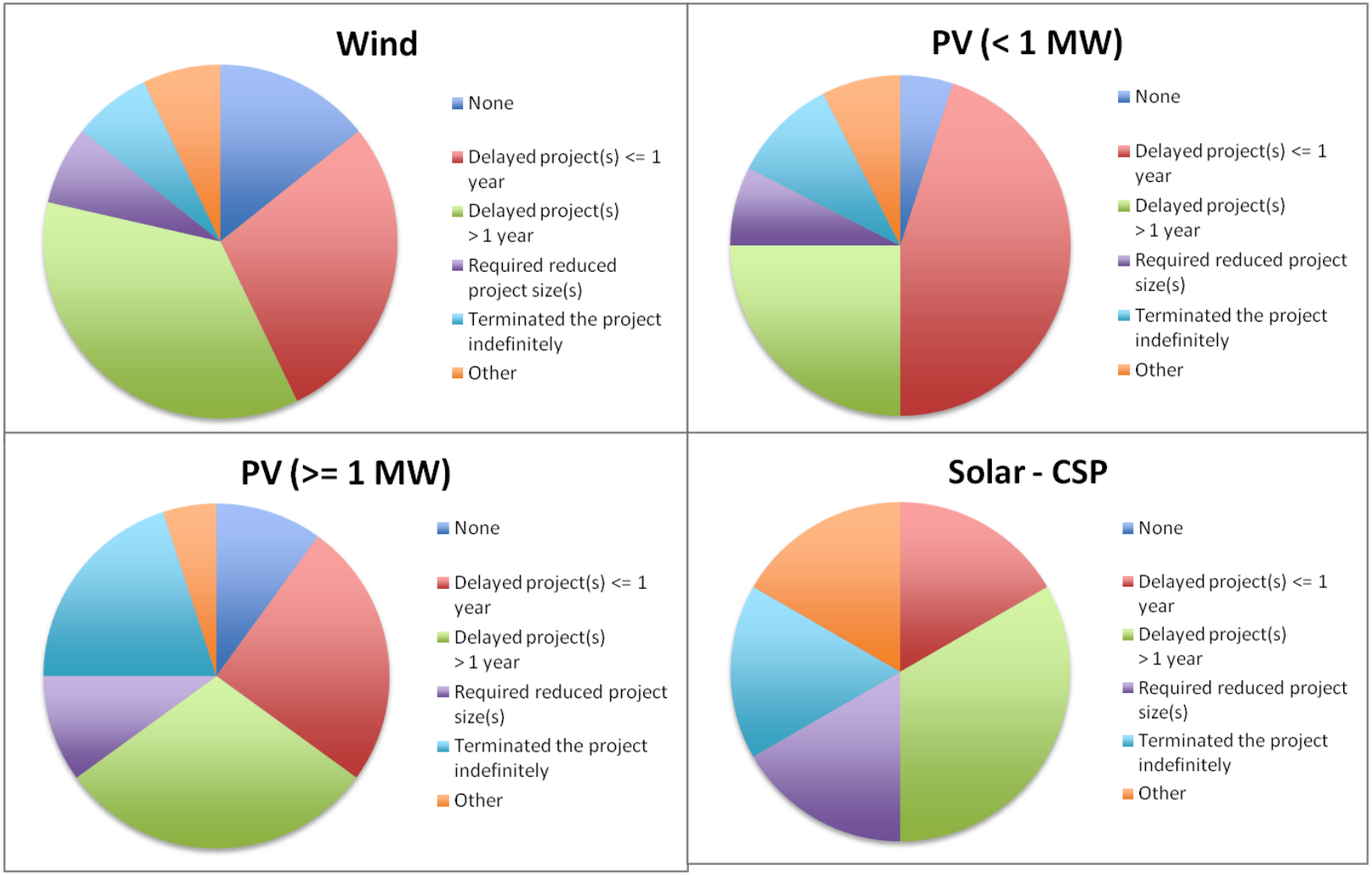
Consequence of Barriers – Tech Breakout



Large PV and CSP projects have longer delays / project terminations; small PV projects have less project resizing, termination.

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REFTI Questionnaire, Page 3, Q1 (Q7)

1. Select the primary typical FINANCIAL STRUCTURE characteristics of your projects that closed in prior quarter...

	Financial Structure	Depreciation	Federal Incentive	State Incentive
Wind				
Solar - PV (< 1 MW)				
Solar - PV (>= 1 MW)				
Solar - CSP				
Solar Thermal (non-elec)				
Geothermal				
Biomass - Elec				
Biomass - Non-elec				
Hydro				
Other Technologies				

Comments

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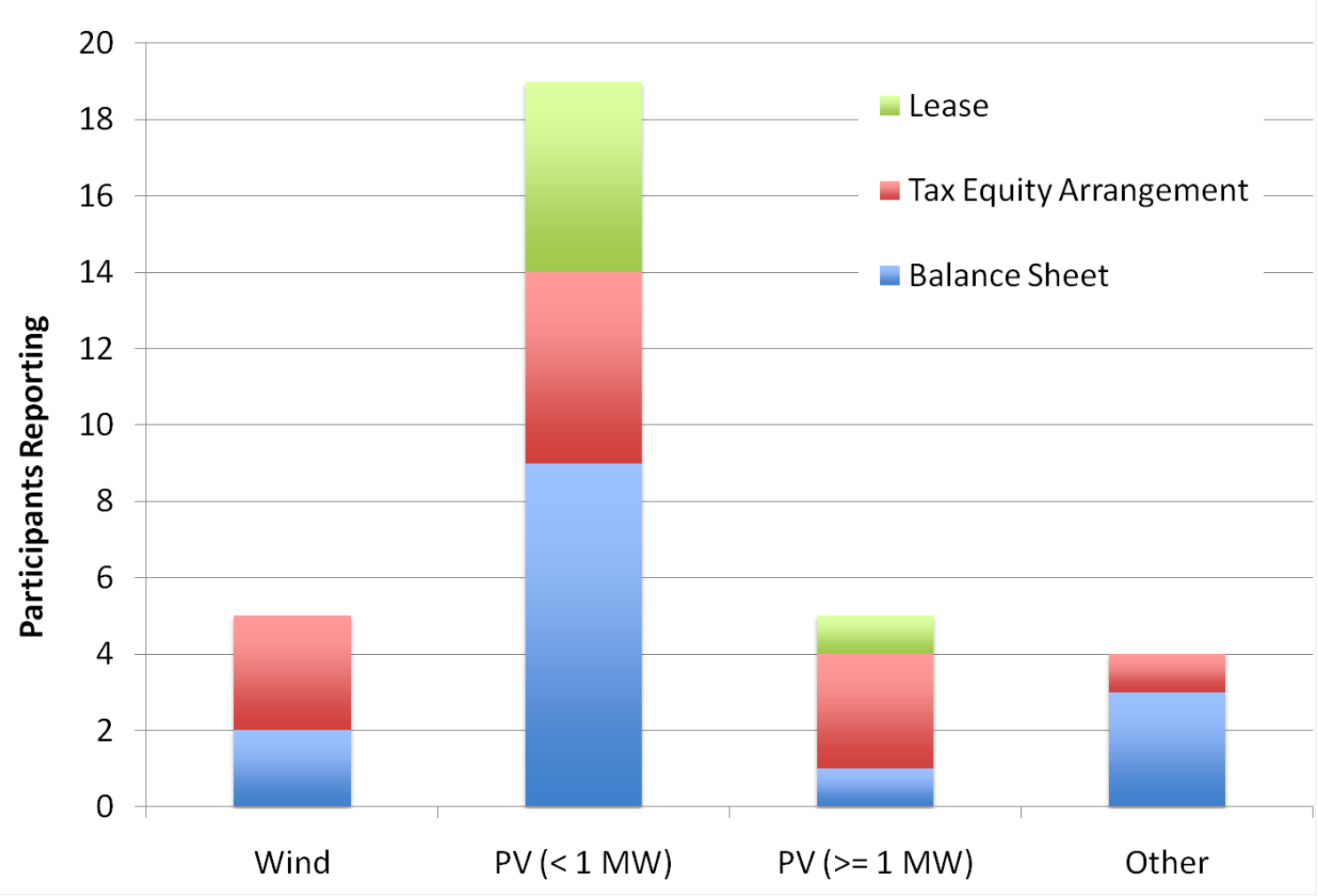
Financial Structure of Projects Reported



Balance sheet finance still critical for smaller projects. Tax equity and lease arrangements more relevant for wind and larger PV

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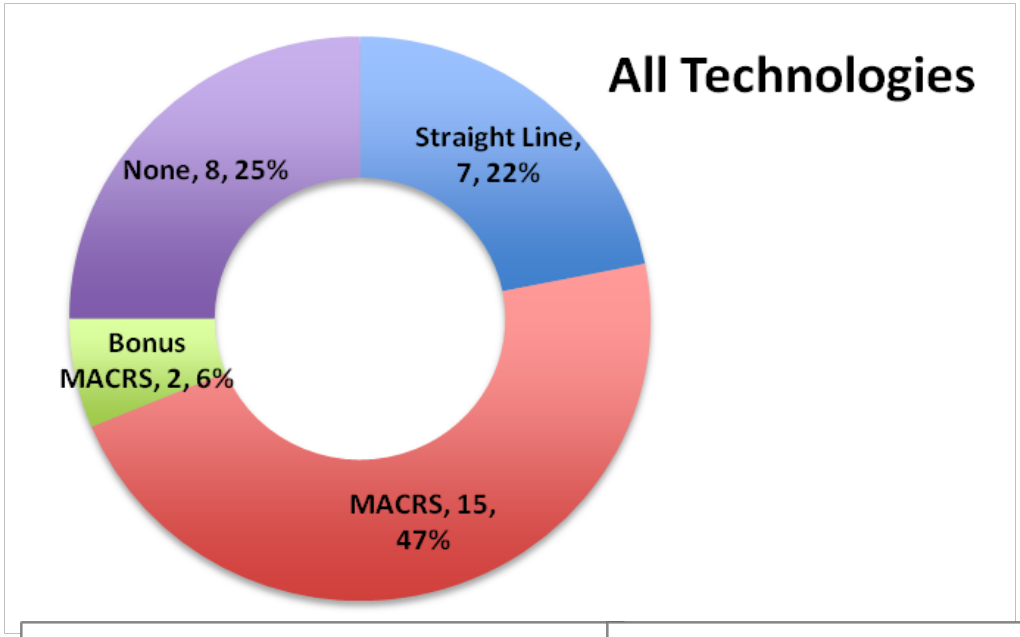
Form of Depreciation Taken



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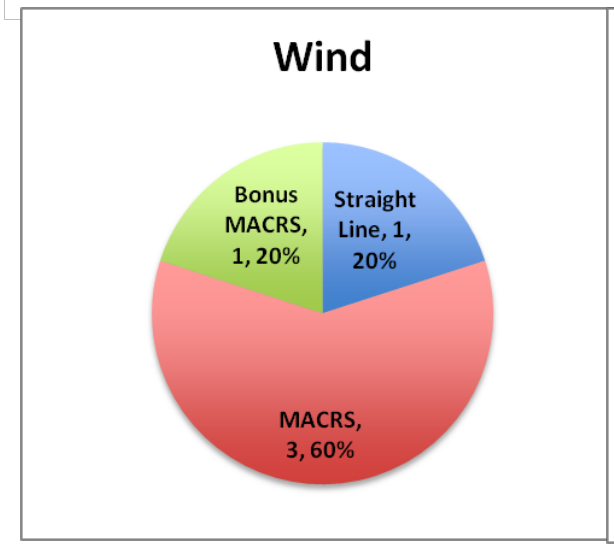
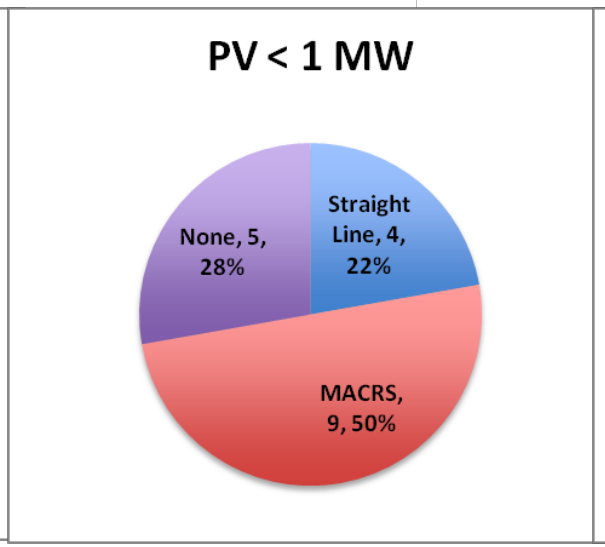
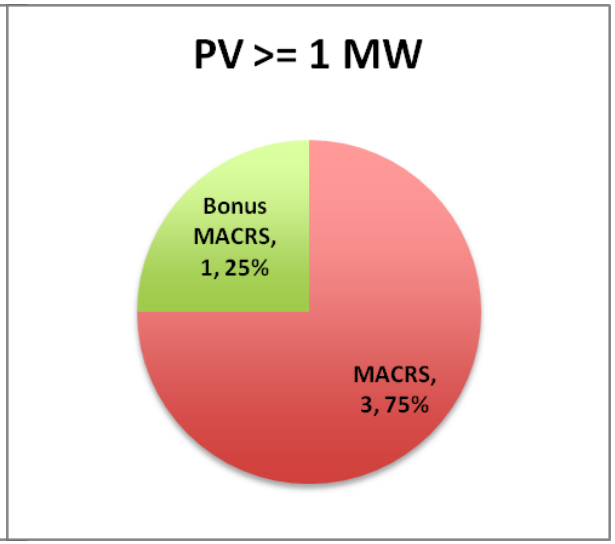
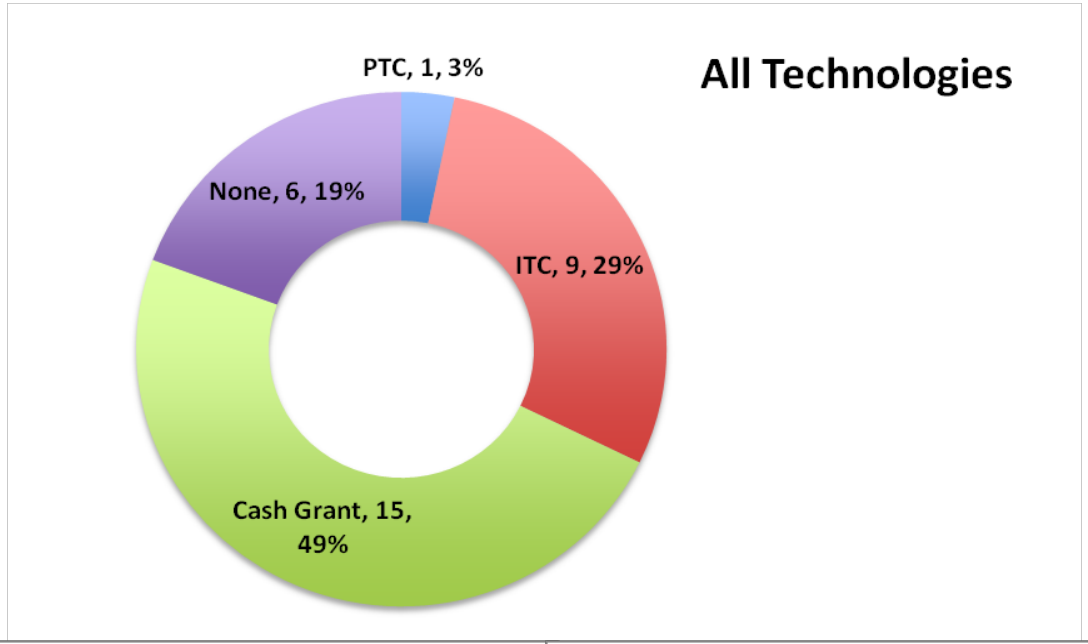
MACRS depreciation applied in roughly half of projects reported (32 participants responding)



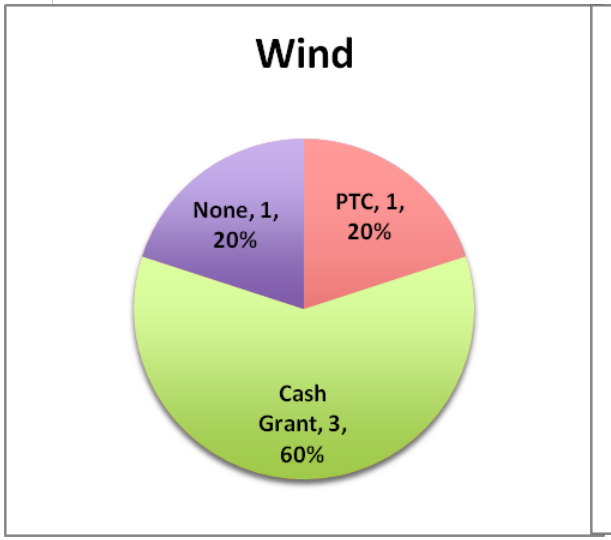


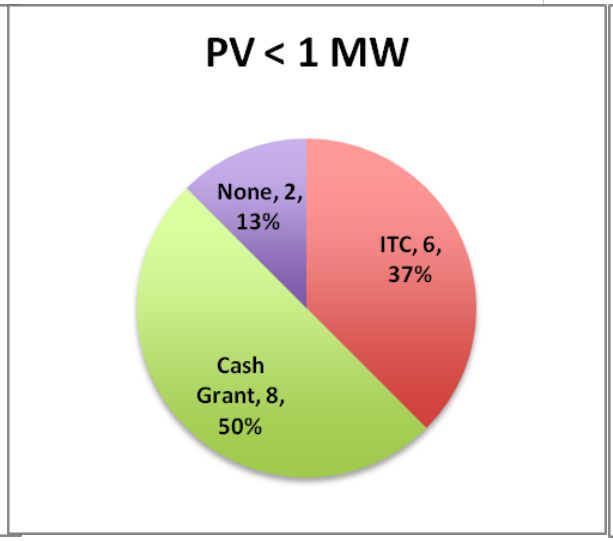


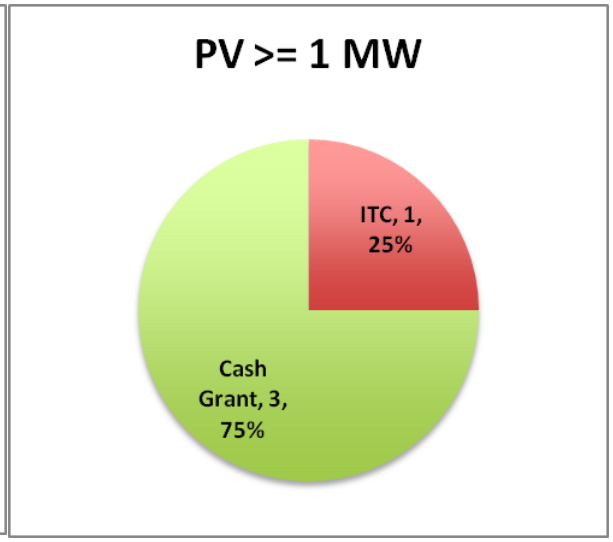
Form of Federal Incentive Taken



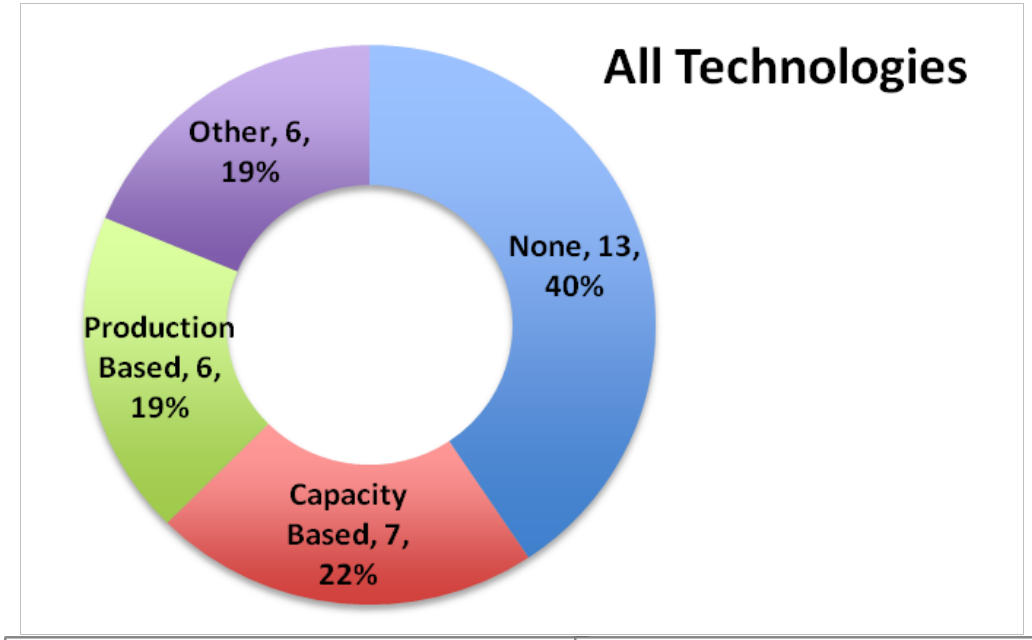
31 participants reporting, almost half taking the cash grant







Form of State Incentive Taken



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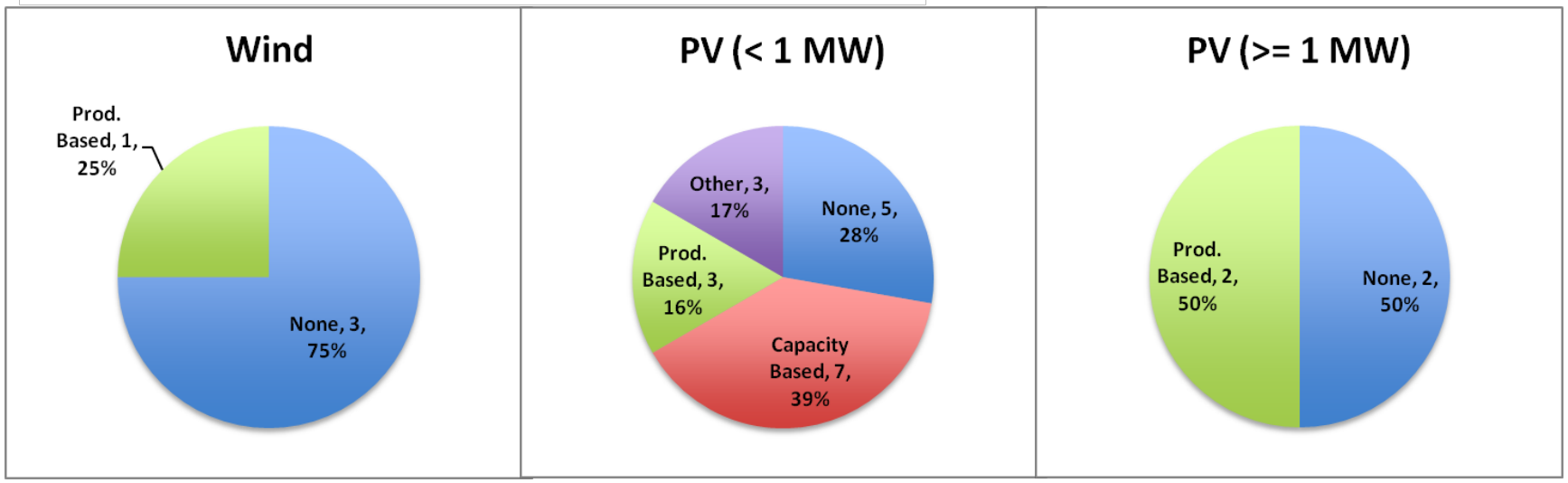

REFTI Questionnaire: Page 3, Q2 (Q8)

2. Provide the typical expected method of REC Sales, REC Type, and REC Contract Duration by technology...

	REC Sales	REC Type	REC Contract Term (yrs)
Wind			
Solar - PV (< 1 MW)			
Solar - PV (>= 1 MW)			
Solar - CSP			
Solar Thermal (non-elec)			
Geothermal			
Biomass - Elec			
Biomass - Non-elec			
Hydro			
Other Technologies			

Comments

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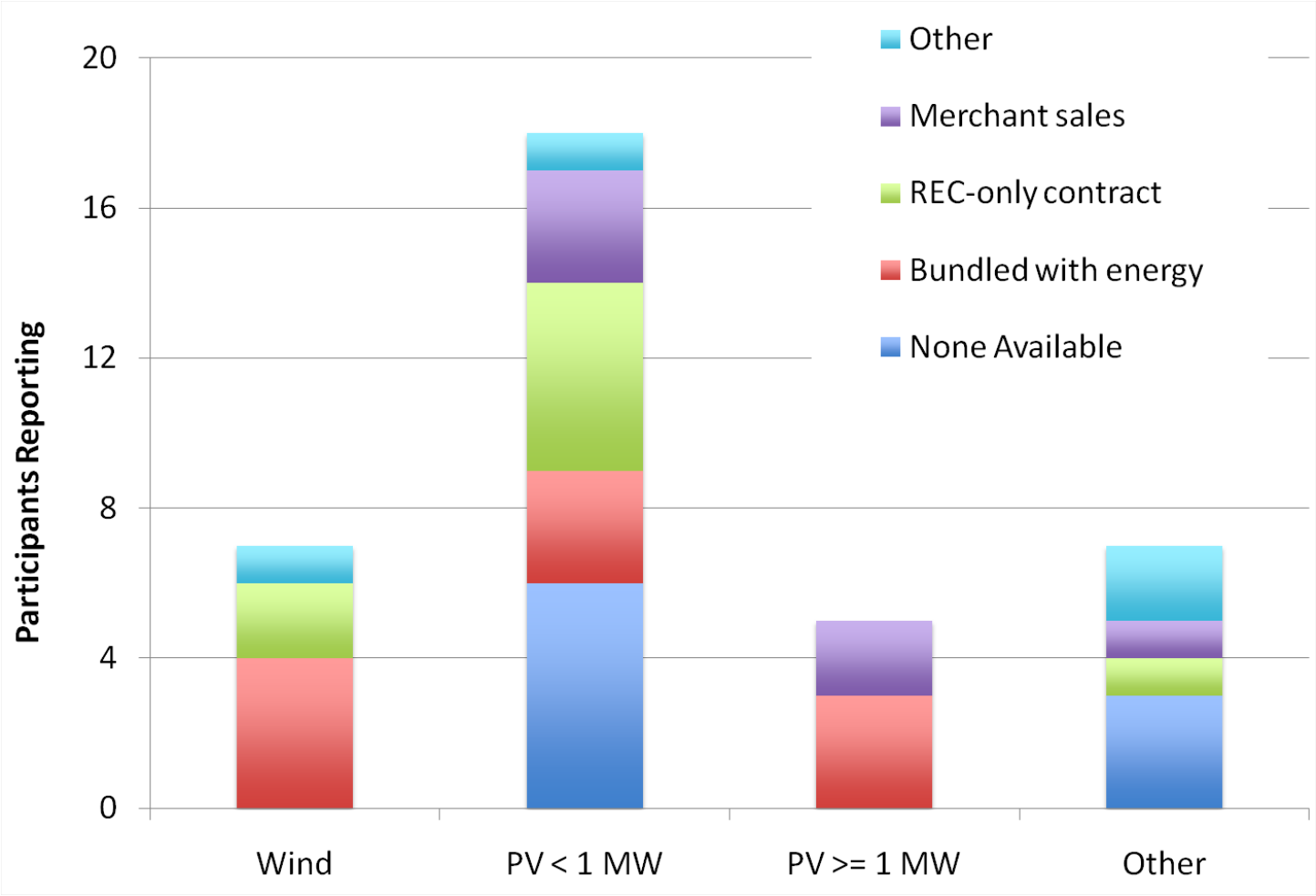
Form of REC Sales



RECs most commonly bundled with energy (10/37) but REC-only contract (8/37) and none available (9/37) were also common among REFTI participants

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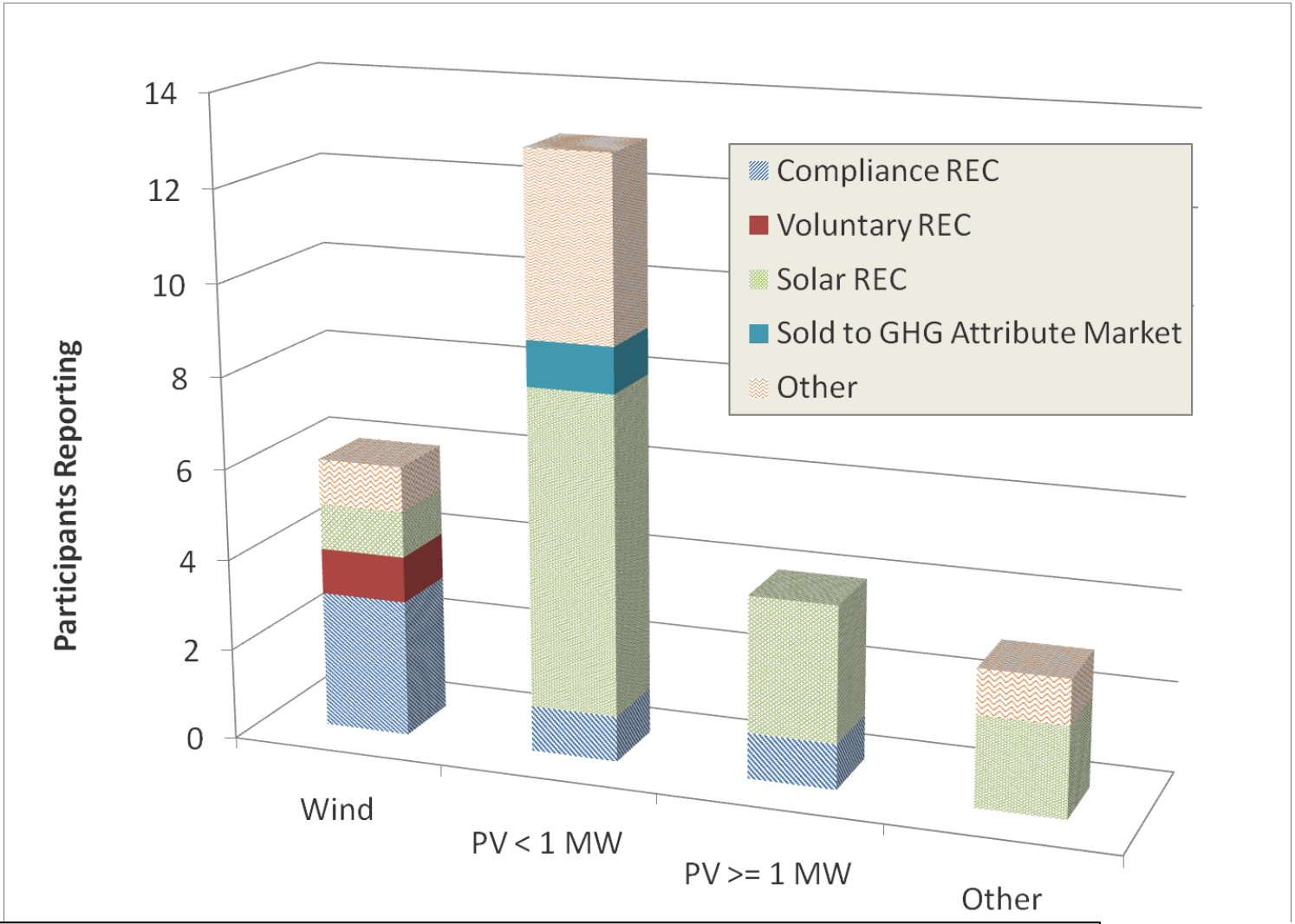
Type of RECs Sold



One half of the participants reported use of Solar RECs. Voluntary REC markets largely irrelevant

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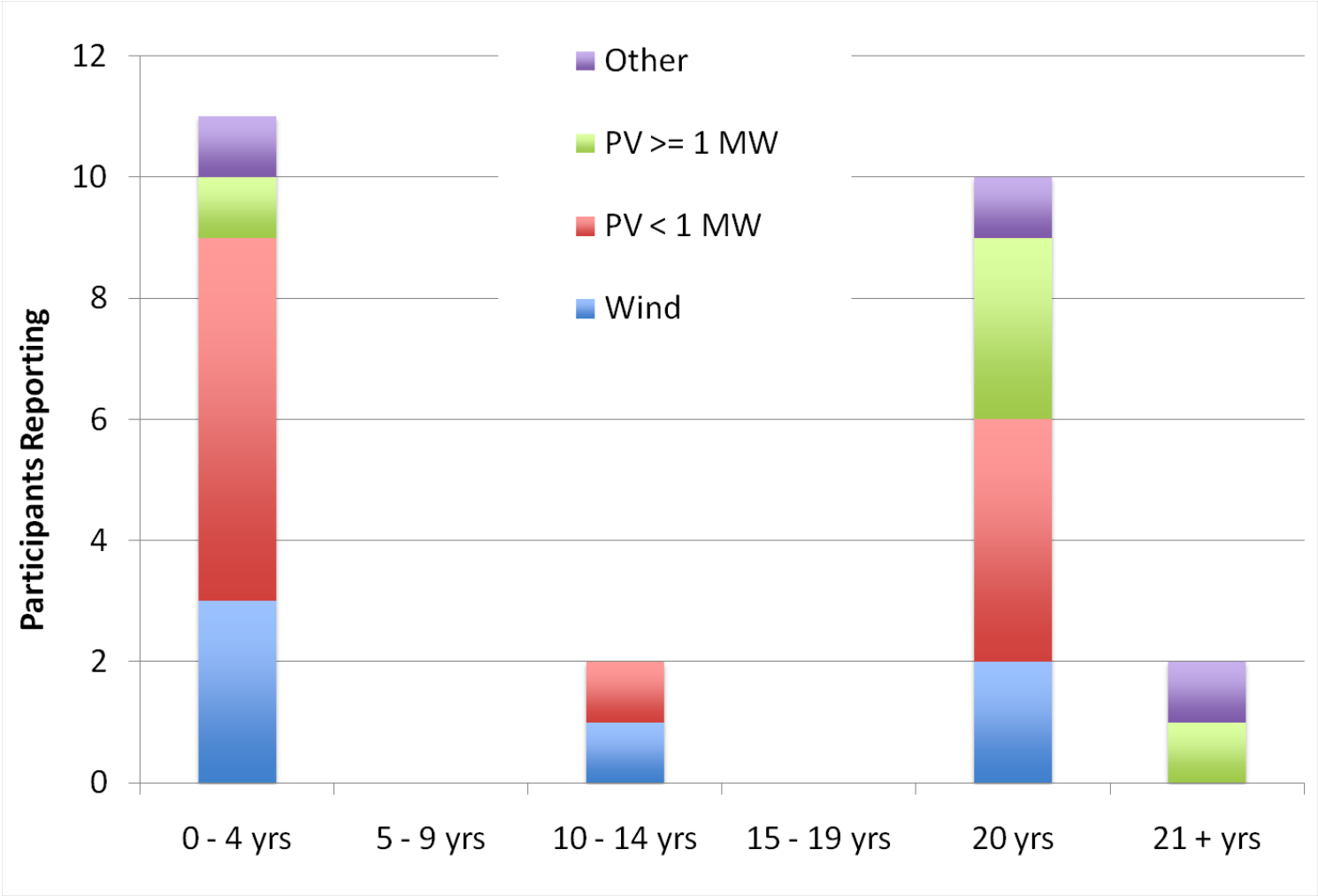
REC Contract Duration



REC contracts generally fall into very short-term (< 4 years) or 20 year long-term durations

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REFTI Questionnaire: Page 3, Q3 (Q9)

3. Please comment on the IMPORTANCE of different INCENTIVE PROGRAMS to developing your projects...

	Treasury Grants	State Incentives	Renewable Portfolio Standards (REC purchase)
Wind			
Solar - PV (< 1 MW)			
Solar - PV (>= 1 MW)			
Solar - CSP			
Solar Thermal (non-elec)			
Geothermal			
Biomass - Elec			
Biomass - Non-elec			
Hydro			
Other Technologies			

Comments

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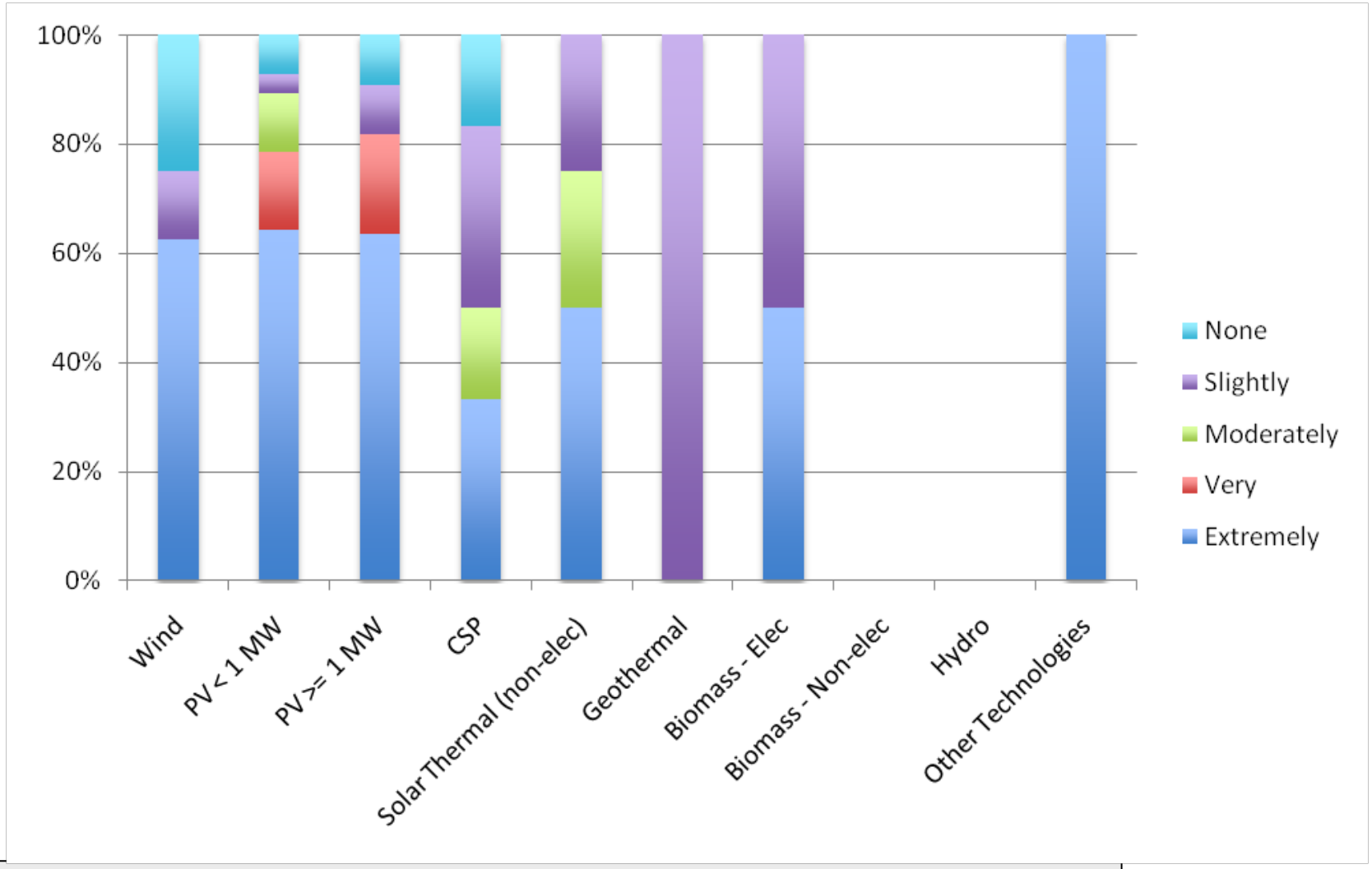
Importance of Treasury Grants



Scaled to 100%. Treasury Grants continue to be considered of extremely high importance, although (% difference from Q1)

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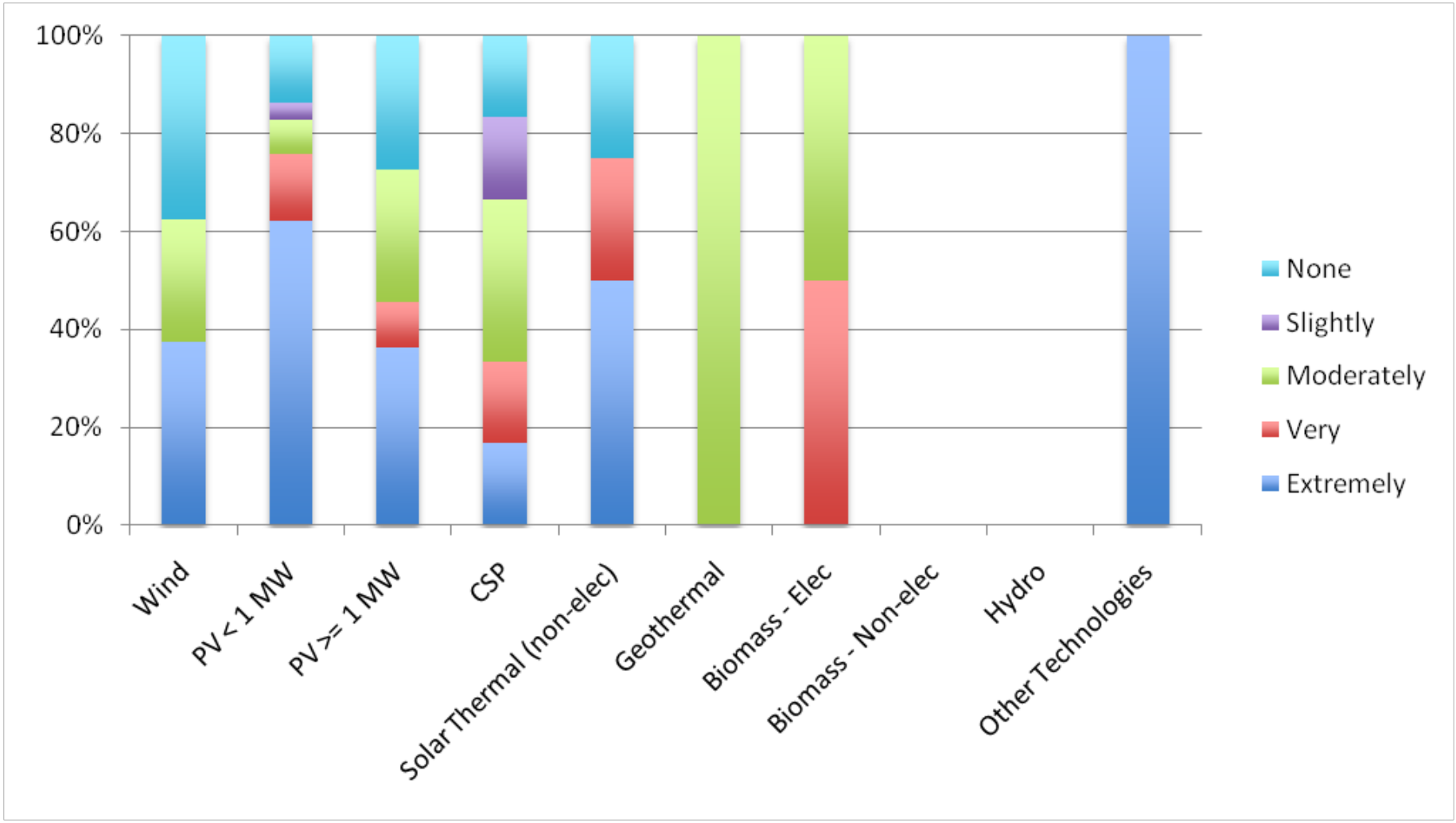
Importance of State Incentives



Scaled to 100%. Not critical for CSP or geothermal. Important for small PV

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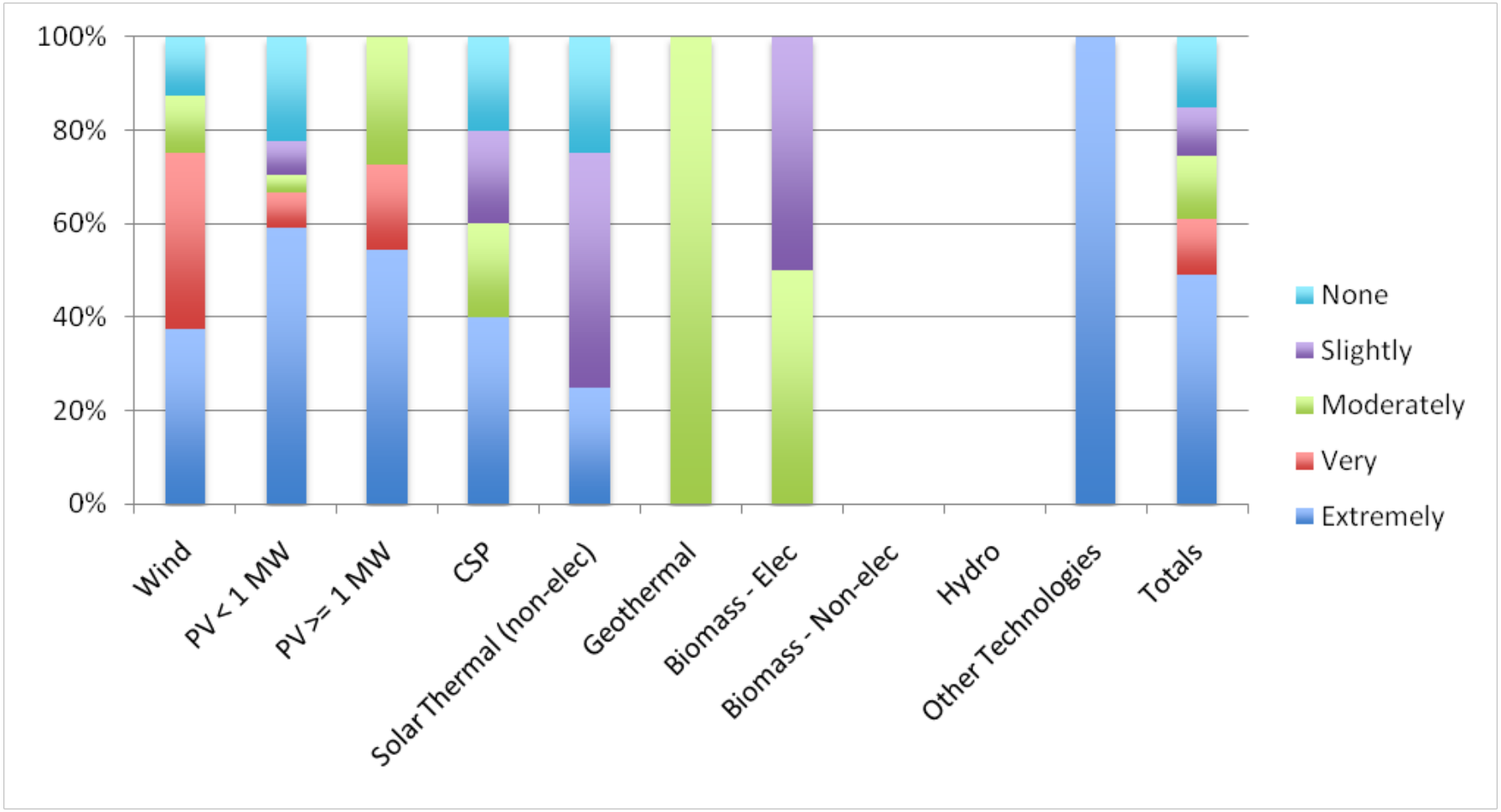
Importance of Portfolio Standards



Scaled to 100%

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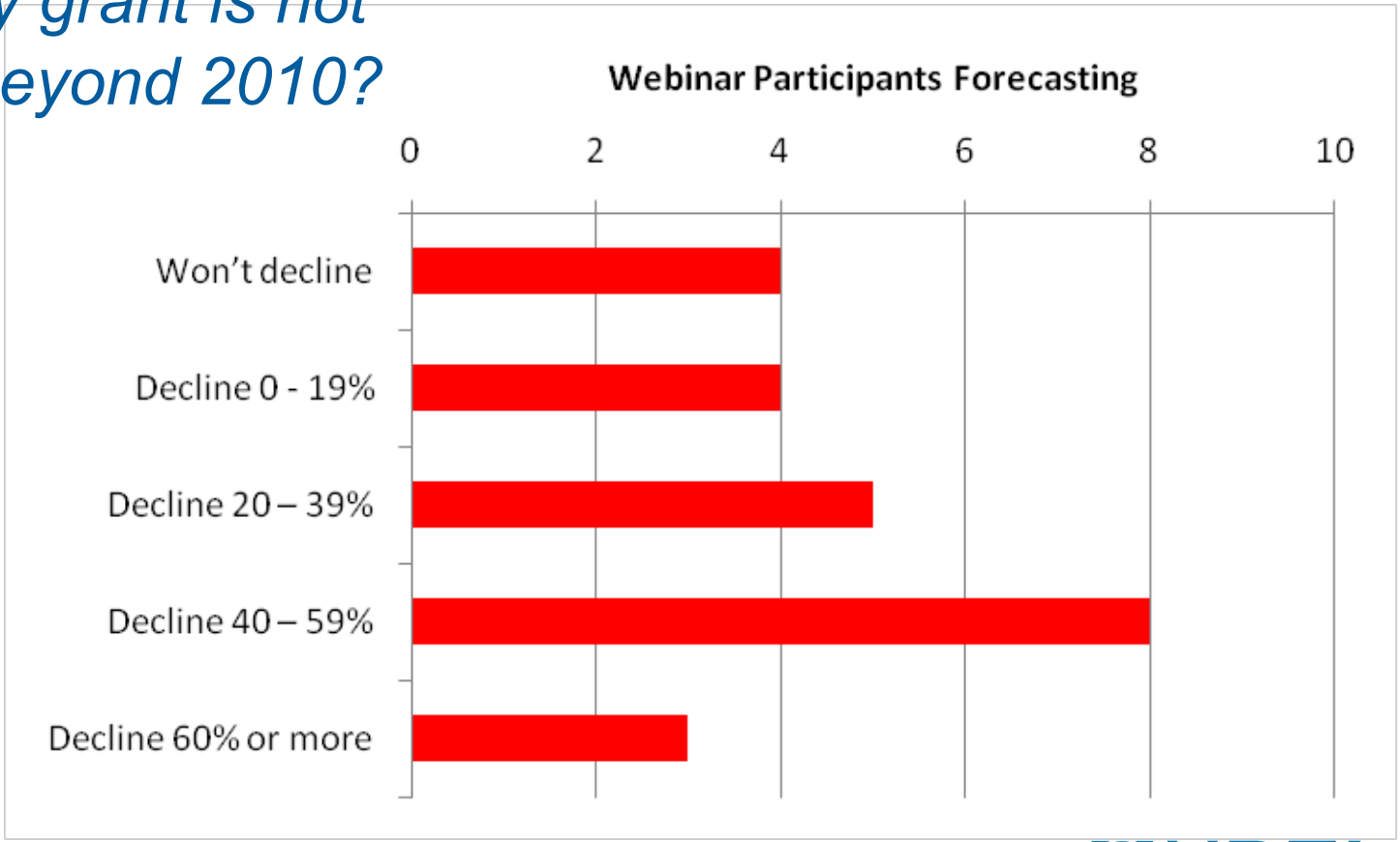
Interactive Poll #1

How much do you expect your business to change if the treasury grant is not extended beyond 2010?



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REFTI Questionnaire: Page 3, Q4 (Q10)

4. Please provide the following parameters to the typical Power Purchase Agreement (PPA) used in prior quarter...

	PPA Term (yrs)	PPA Price in Yr 1	PPA Price Escalation (%)	Customer Buyout Option
Wind				
Solar - PV (< 1 MW)				
Solar - PV (>= 1 MW)				
Solar - CSP				
Solar Thermal (non-elec)				
Geothermal				
Biomass - Elec				
Biomass - Non-elec				
Hydro				
Other Technologies				

Comments

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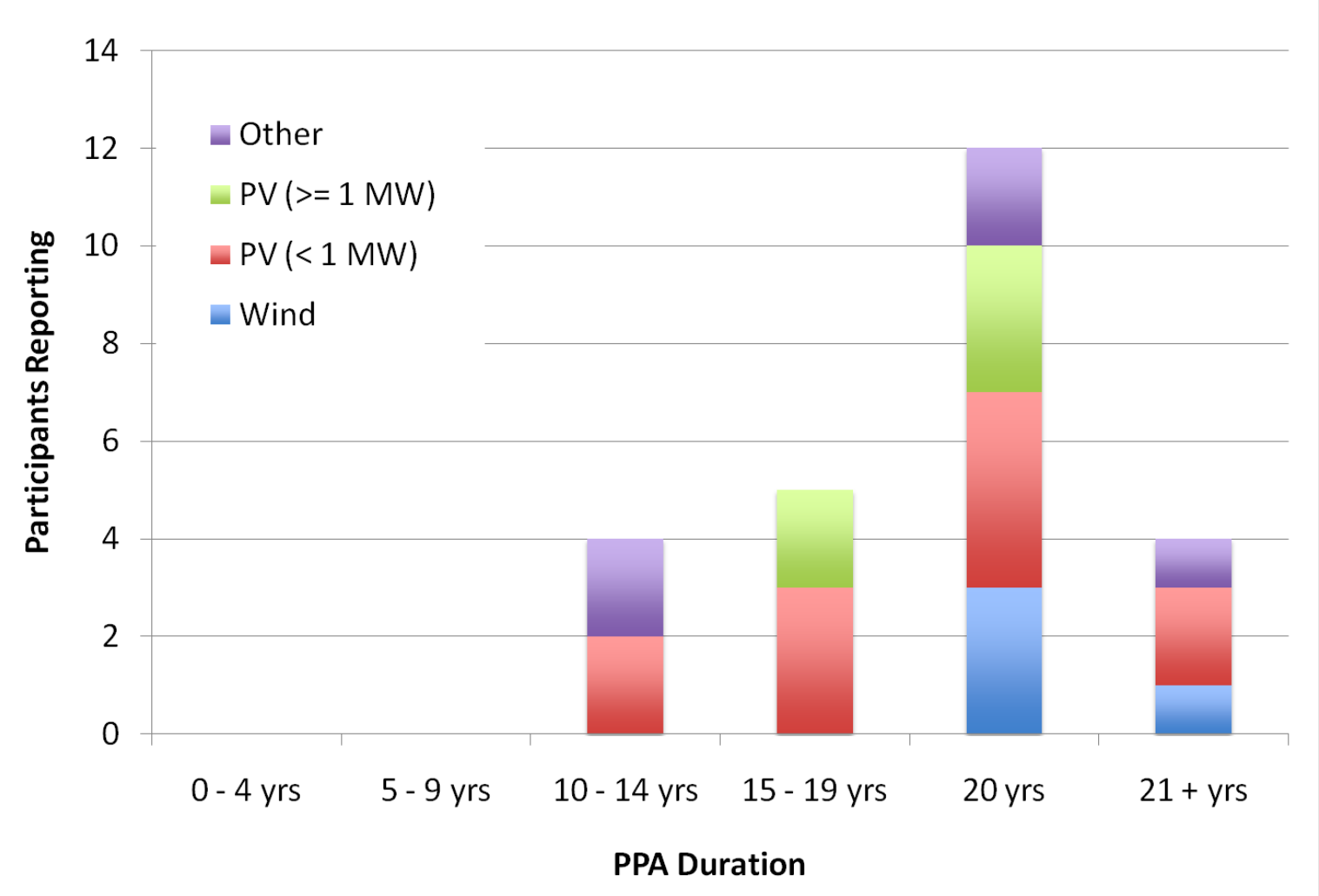
Typical PPA Duration



Most typically 20 year, all over 10 years

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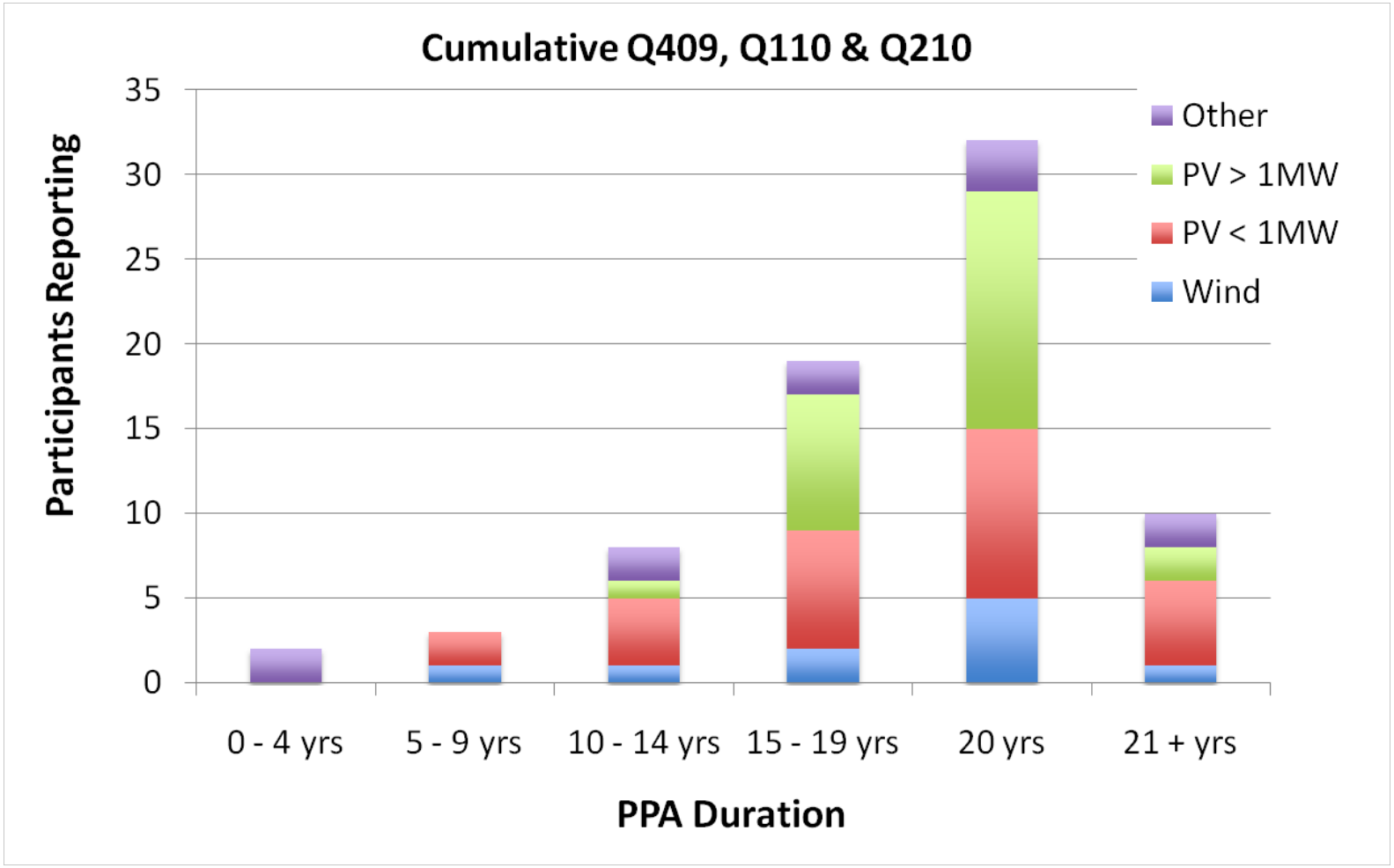
Typical PPA Duration – Cumulative



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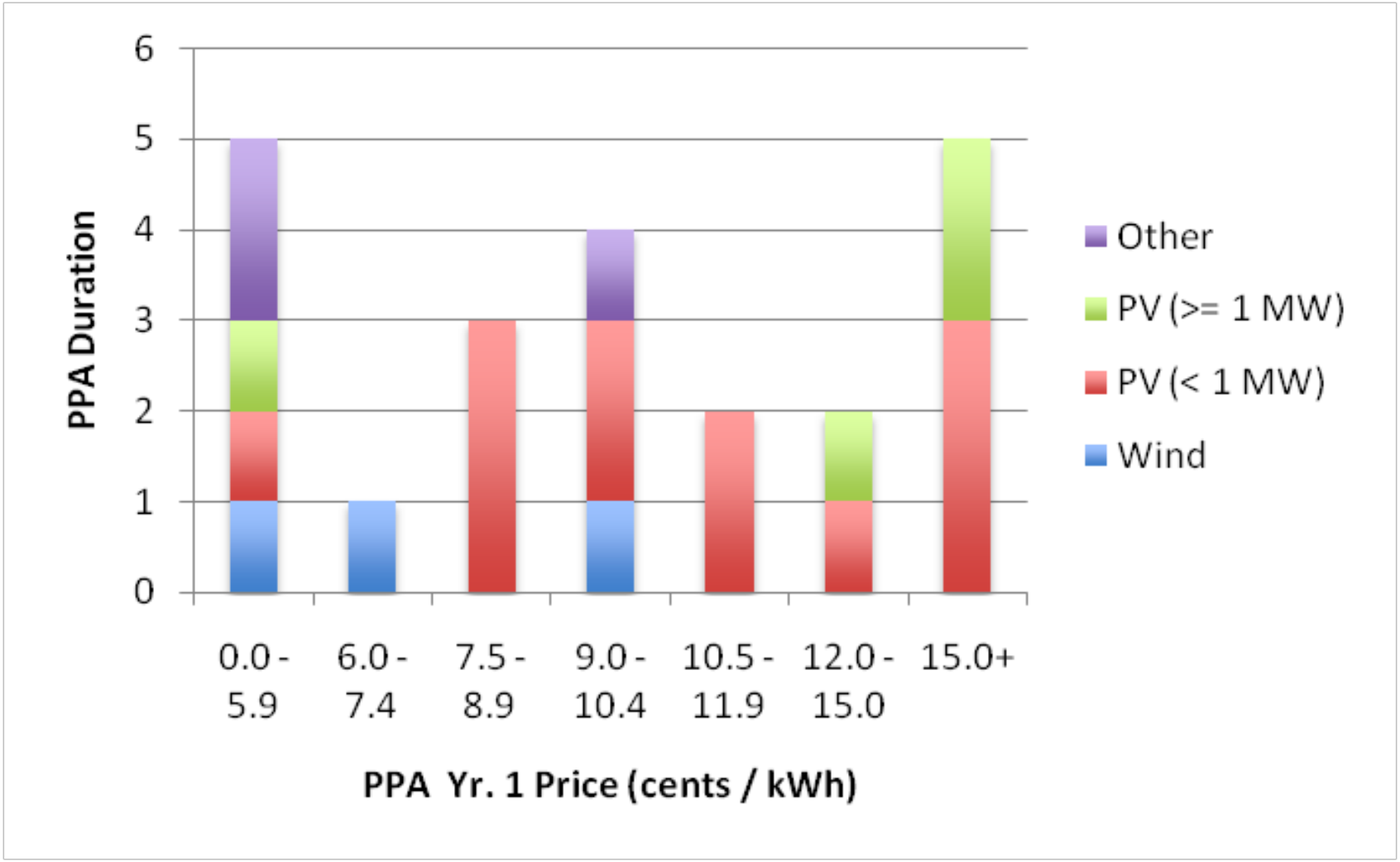
PPA Price - Year 1



PPA prices likely highly dependent on resource, state-specific incentives, and prevailing utility rates

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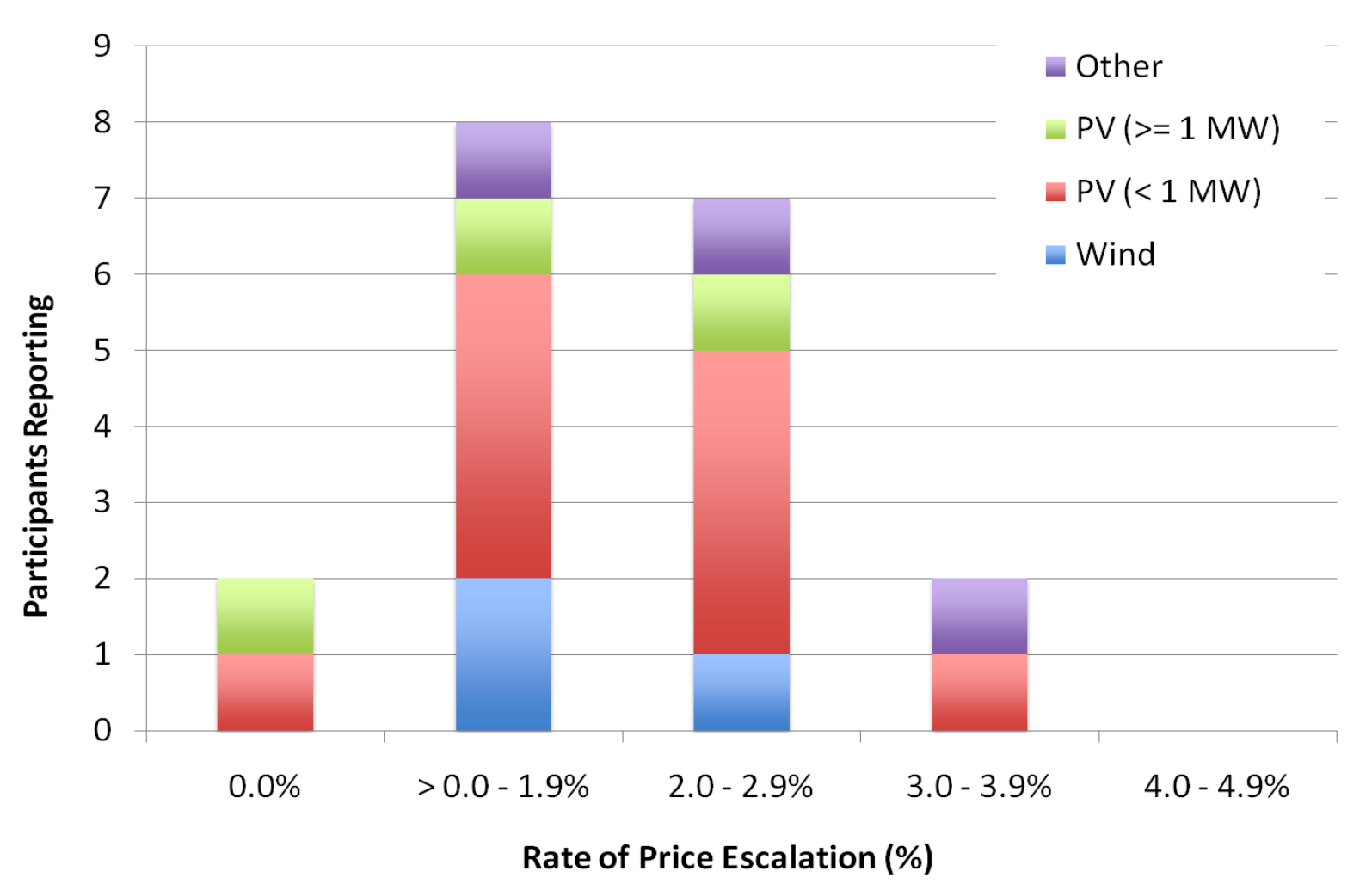
PPA Price Escalation



Most PPA contracts escalate at some rate, usually at less than 3%

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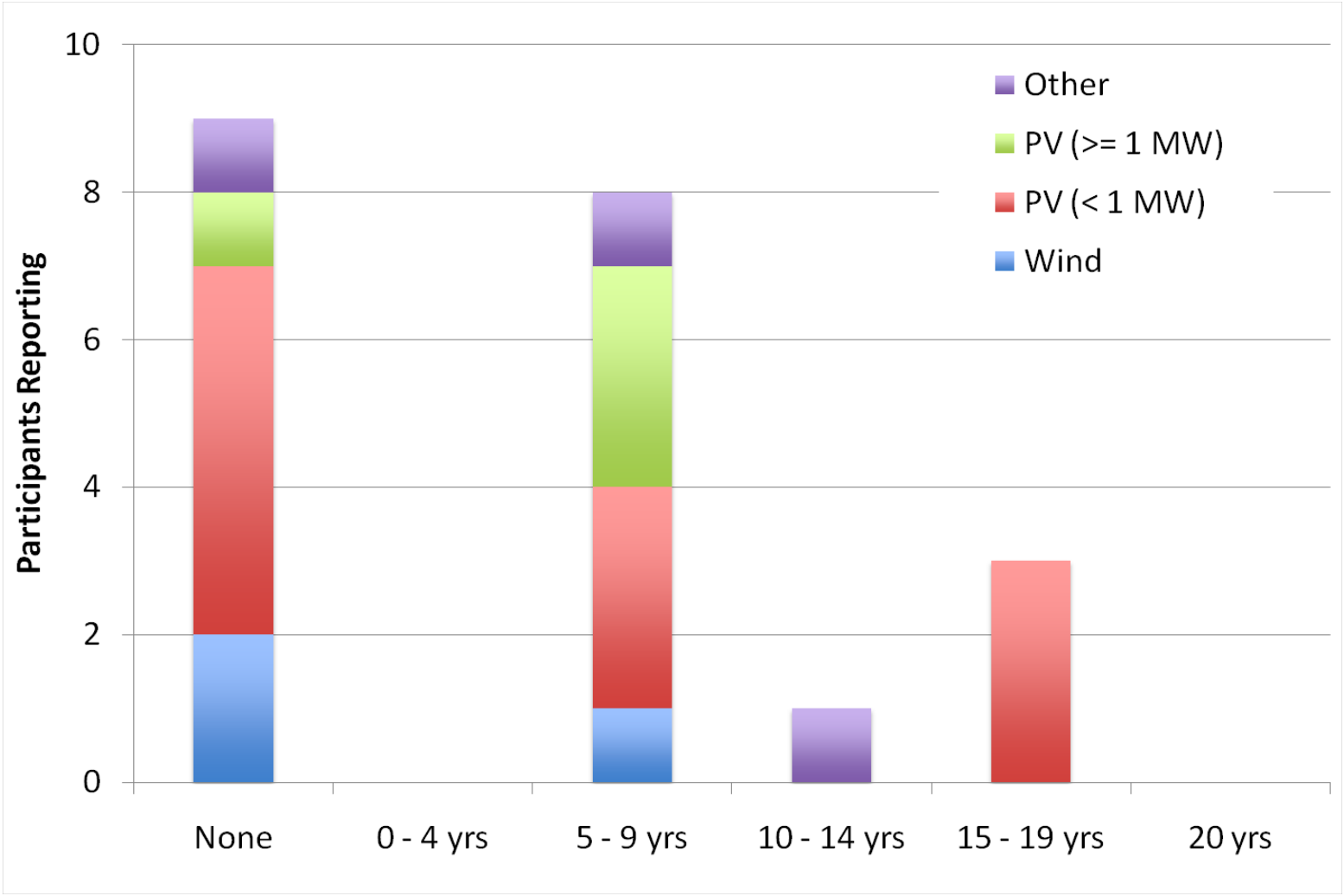
PPA Customer Buyout Option



Slightly more than half of respondents indicate no customer buyout is available, remainder say buyout most commonly at 5-9 yrs

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REFTI Questionnaire: Page 3, Q5 (Q11)

5. Regarding project EQUITY CAPITAL (based on after-tax returns), please tell us how your projects are generally structured...

	Ratio of Tax-Investor Equity / Total Capital	Expected Return on Tax-Investor Equity	Ratio of Developer Equity / Total Capital	Expected Return on Developer Equity
Wind				
Solar - PV (< 1 MW)				
Solar - PV (>= 1 MW)				
Solar - CSP				
Solar Thermal (non-elec)				
Geothermal				
Biomass - Elec				
Biomass - Non-elec				
Hydro				
Other Technologies				

Comments

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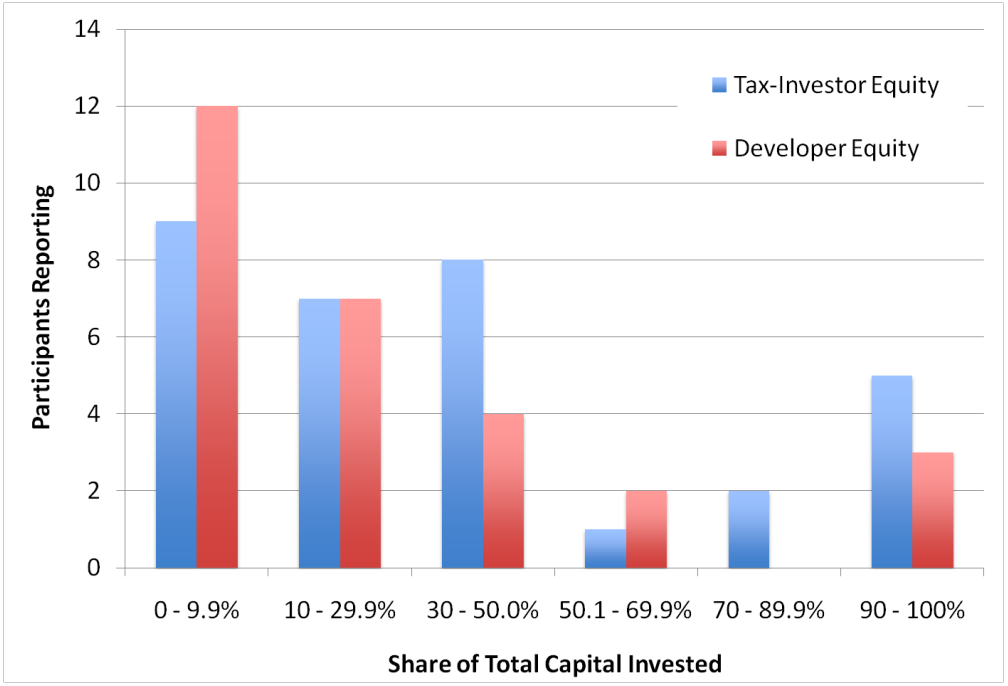
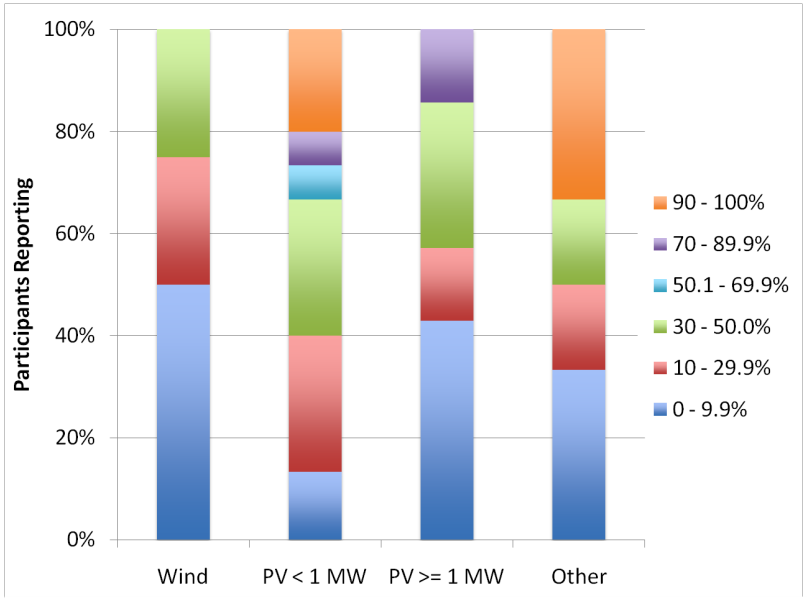
Equity Ratios

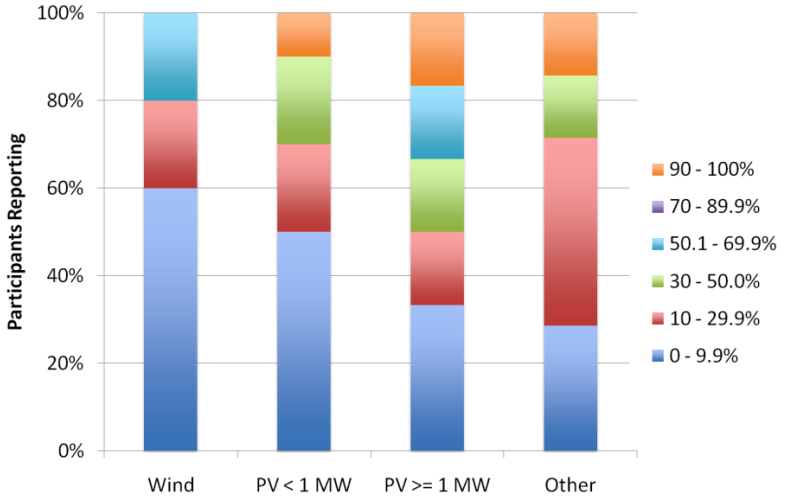


Tax and Developer equity each less than 50% of total capital. TE for small PV represents high % of total capex

Tax Equity



Dev. Equity



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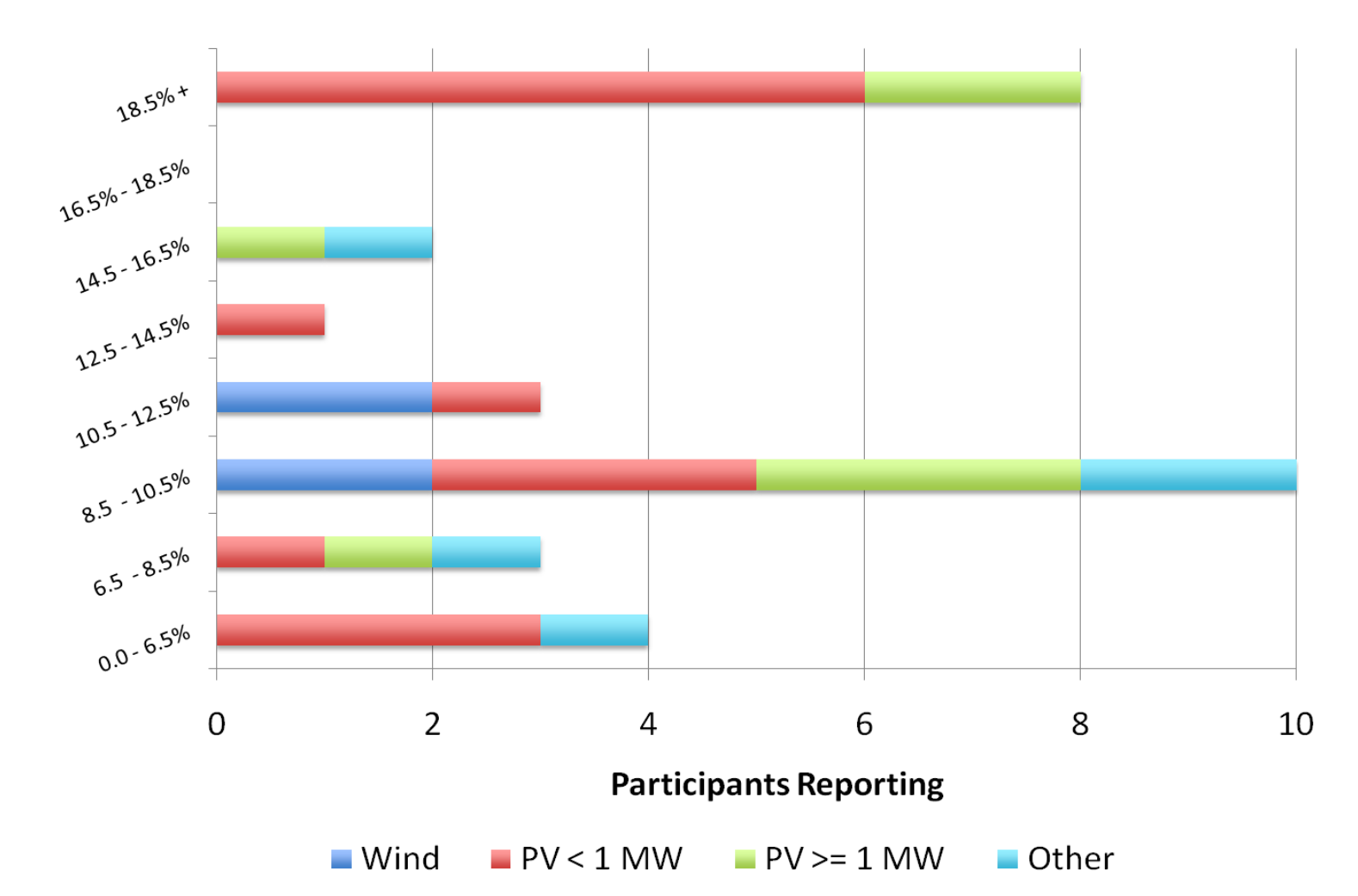
Expected Return on Tax-Investor Equity



Tight bandwidth for wind projects. Much wider for PV, esp. small PV

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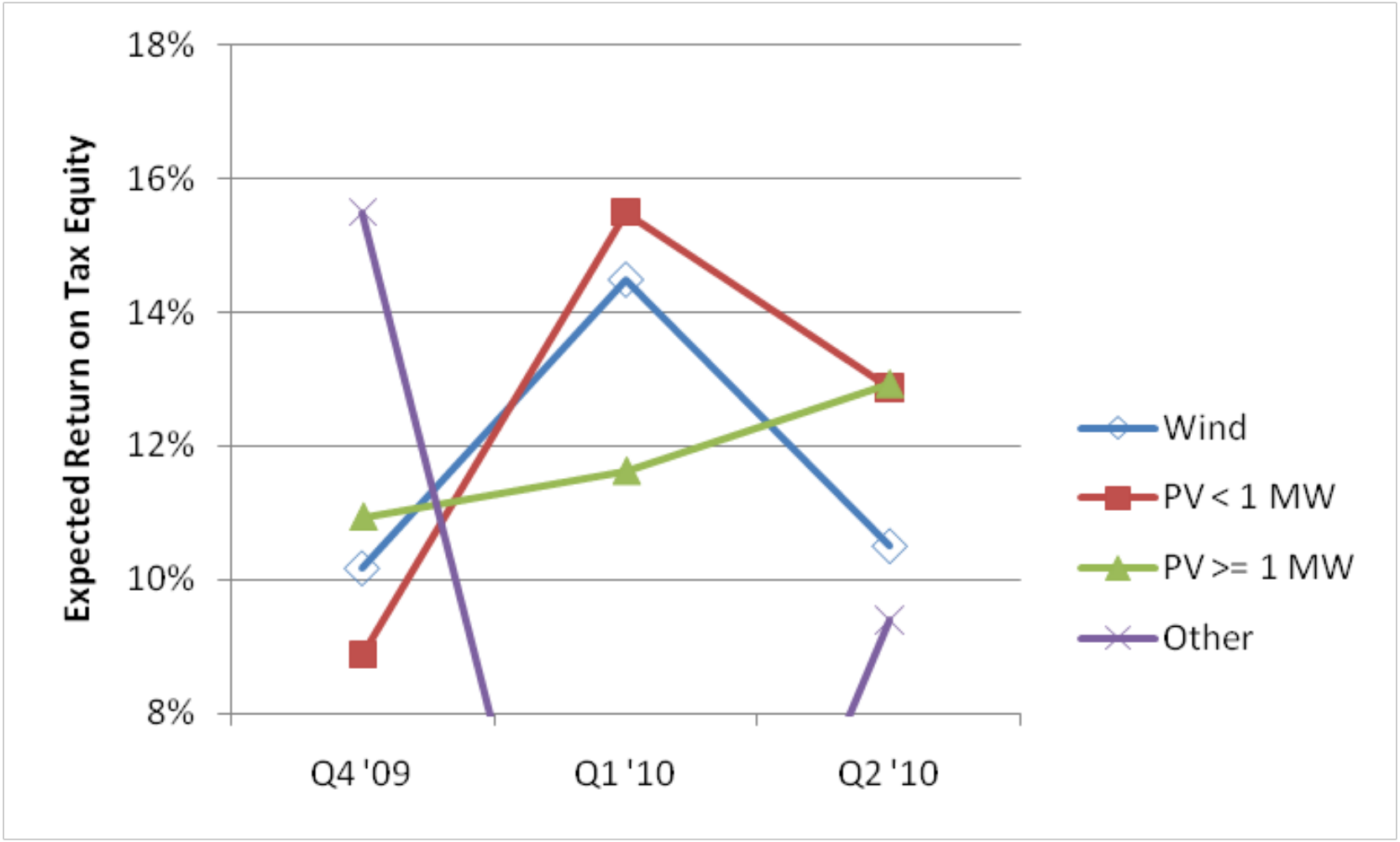
Exp. Return on Tax Equity – Trend



From Q4 ‘09 to Q2 ‘10, cost of tax equity appears to have increased in Q1 ‘10 and eased a bit in Q2 ’10 (on wtd. avg. basis).

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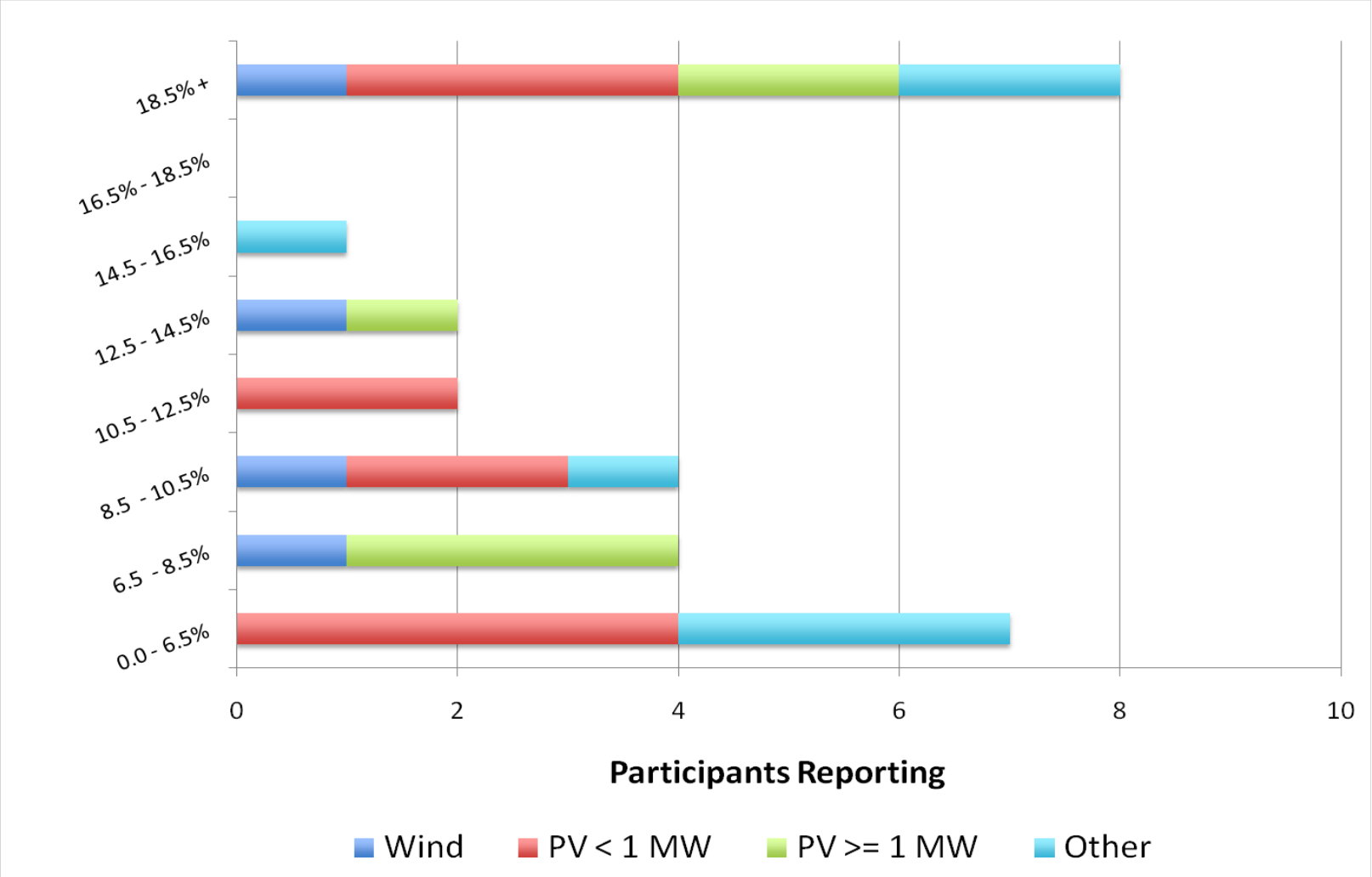
Expected Return on Developer Equity



Wide range of expected returns on developer equity – either very low or very high

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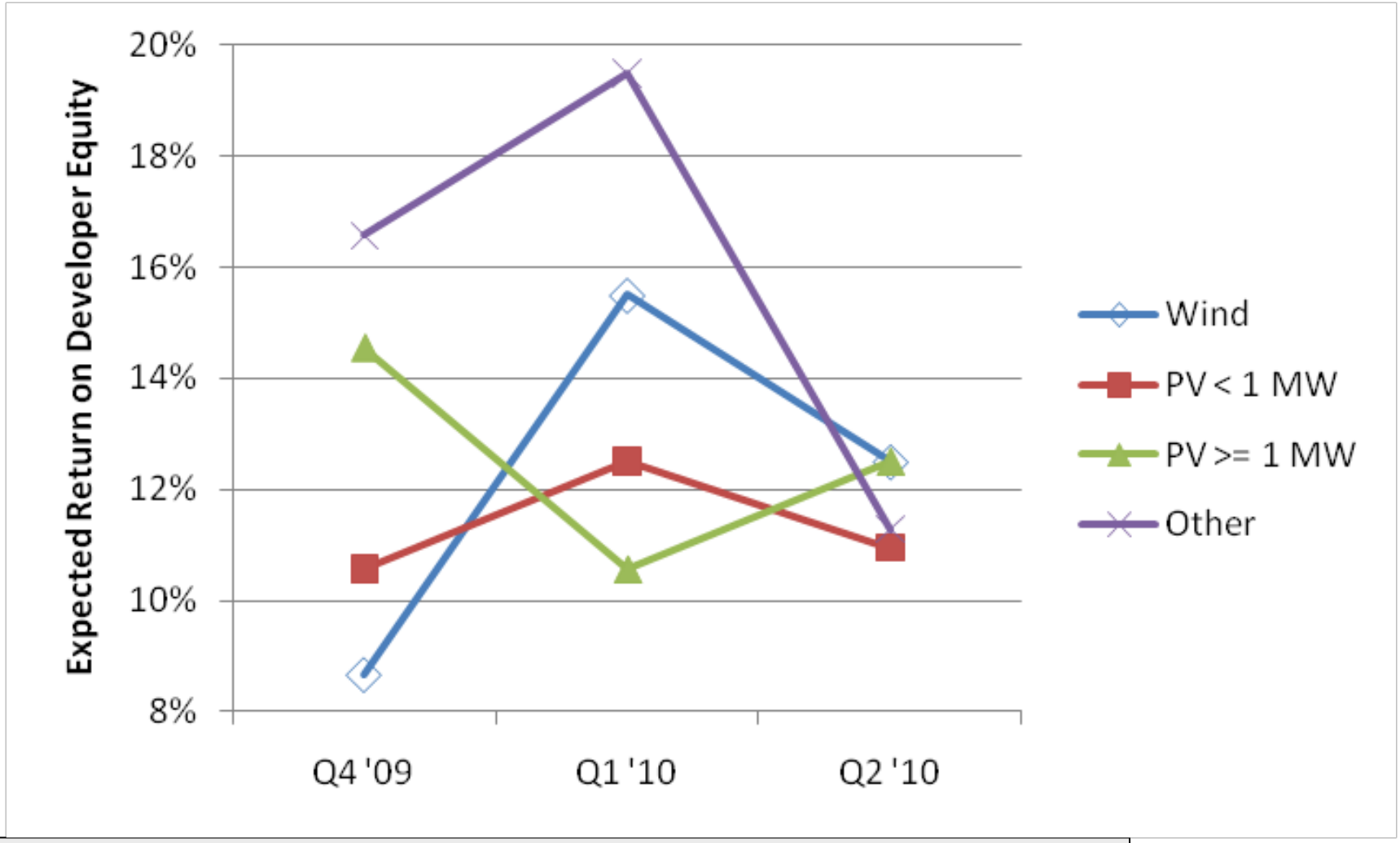
Exp. Return on Developer Equity - Trend



Expected return on developer equity in Q1 ’10 increased for wind projects, decreased for large PV. Both met at exact same point in Q2 ‘10

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REFTI Questionnaire: Page 3, Q6 (Q12)

6. Regarding project-level CONSTRUCTION debt, please tell us how your projects are generally structured...

	Source of Const. Debt	Ratio of Const. Debt / Total Capital	Average All-In Cost of Const. Debt (%)	Const. Debt Term (months)
Wind				
Solar - PV (< 1 MW)				
Solar - PV (>= 1 MW)				
Solar - CSP				
Solar Thermal (non-elec)				
Geothermal				
Biomass - Elec				
Biomass - Non-elec				
Hydro				
Other Technologies				

Comments

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REFTI Questionnaire: Page 3, Q7 (Q13)

7. Regarding project-level TERM debt, please tell us how your projects are generally structured...

	Source of Debt	Ratio of Debt / Total Capital	Ratio of Fed Loan Guarantee / Debt	Avg. All-In Cost of Debt (%)	Debt Term (yrs)	Avg. Debt Coverage Ratio Required
Wind						
Solar - PV (< 1 MW)						
Solar - PV (>= 1 MW)						
Solar - CSP						
Solar Thermal (non -elec)						
Geothermal						
Biomass - Elec						
Biomass - Non-elec						
Hydro						
Other Technologies						

Comments

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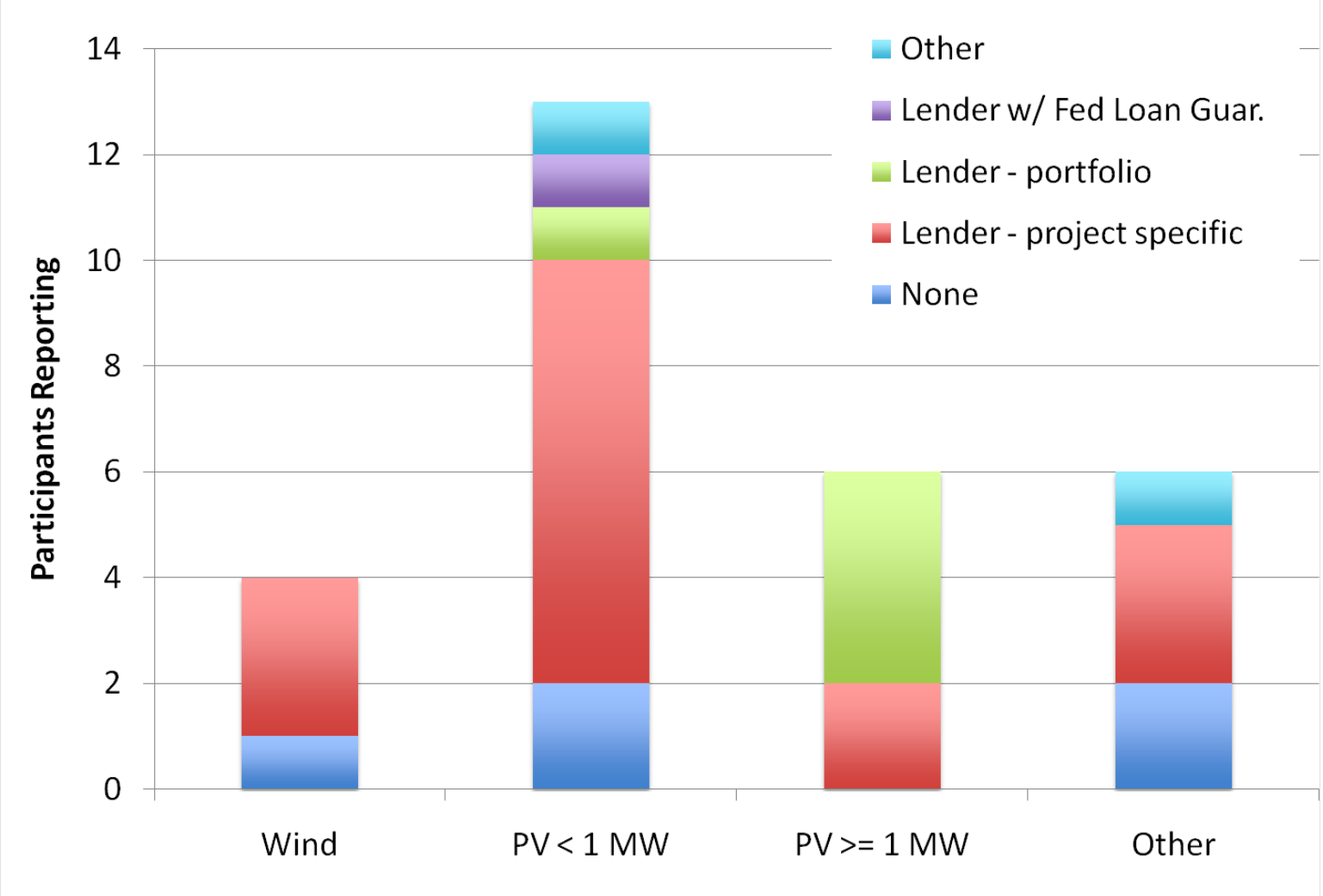
Source of Term Debt



Project specific lending reported for projects less than 1 MW

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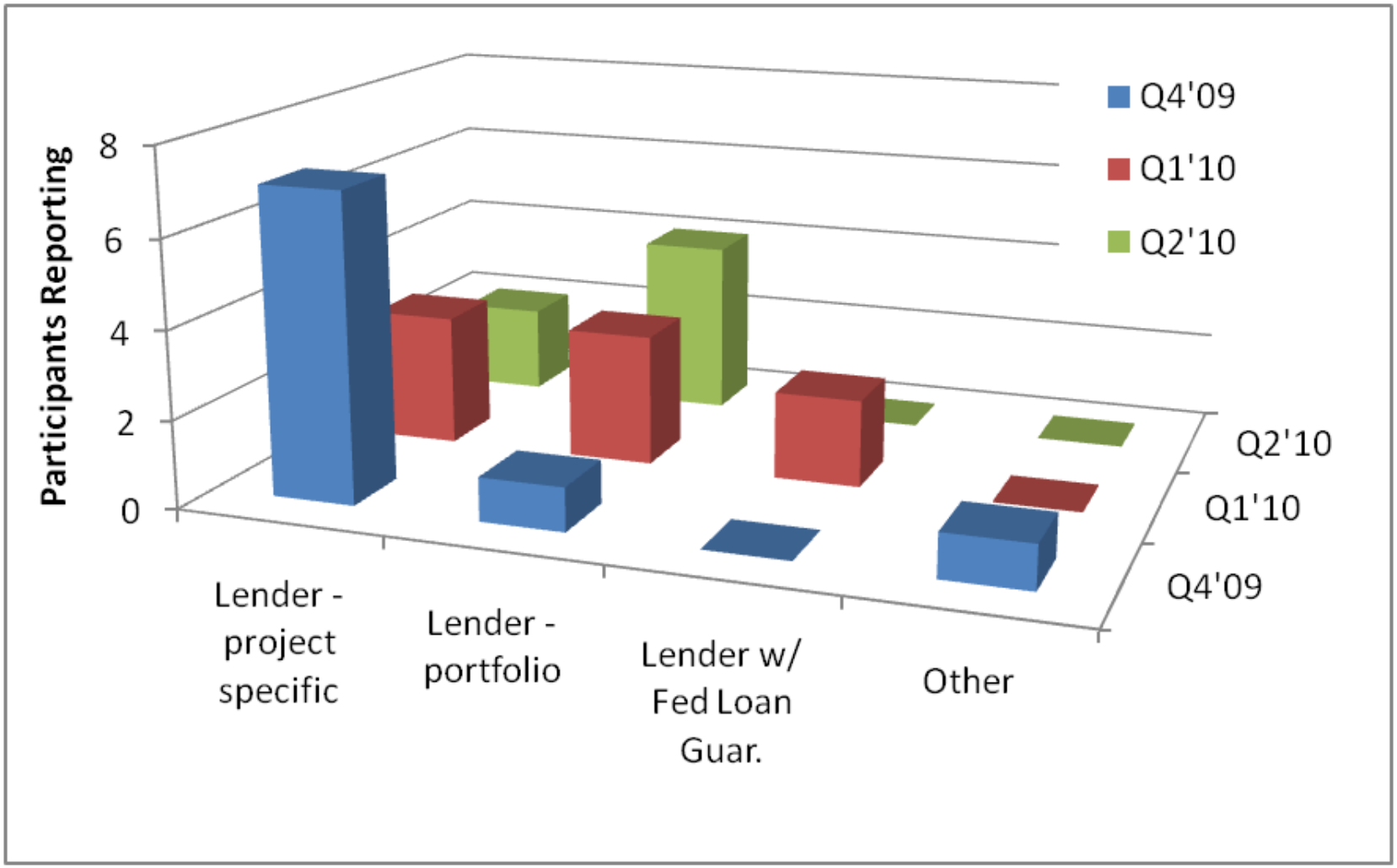
Source of Term Debt – Trend Analysis



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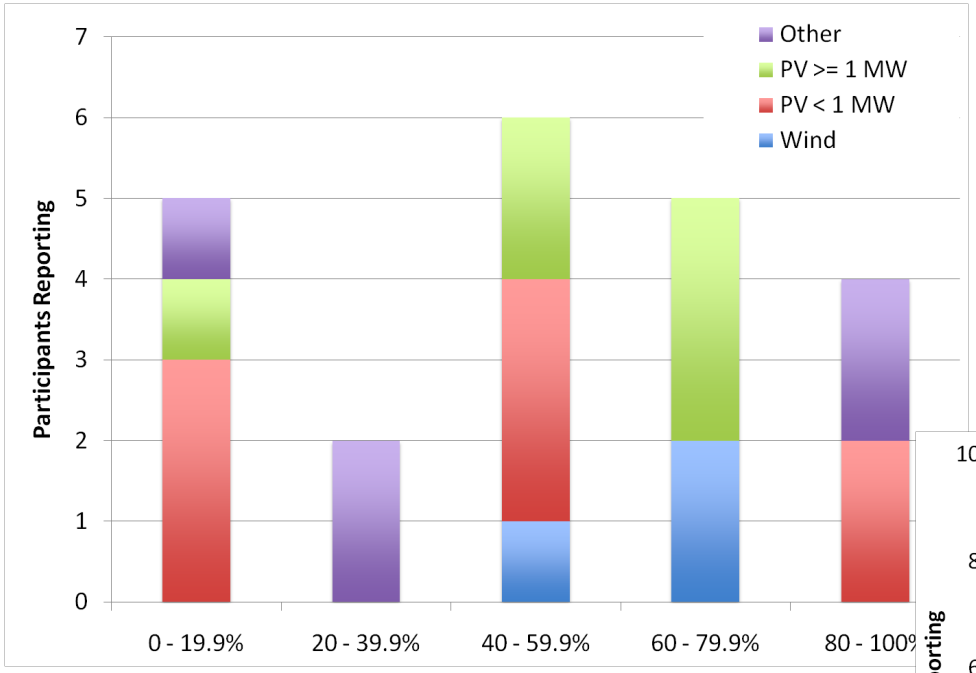
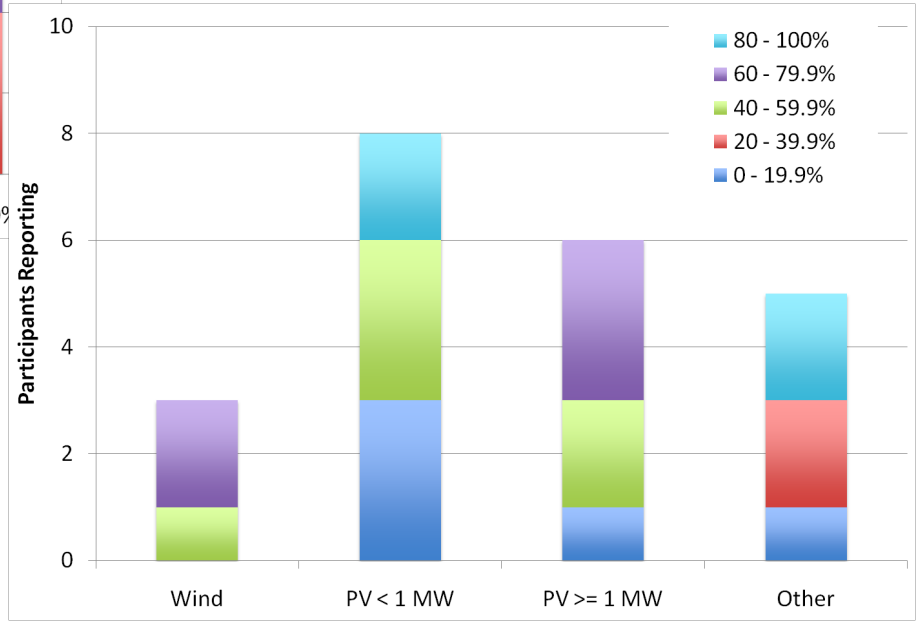
Reported project specific debt declining and portfolio debt increasing over time.

Term Debt as % of Total CapEx





Wind projects able to take on more debt. Small PV ranges from <20% to >80%.

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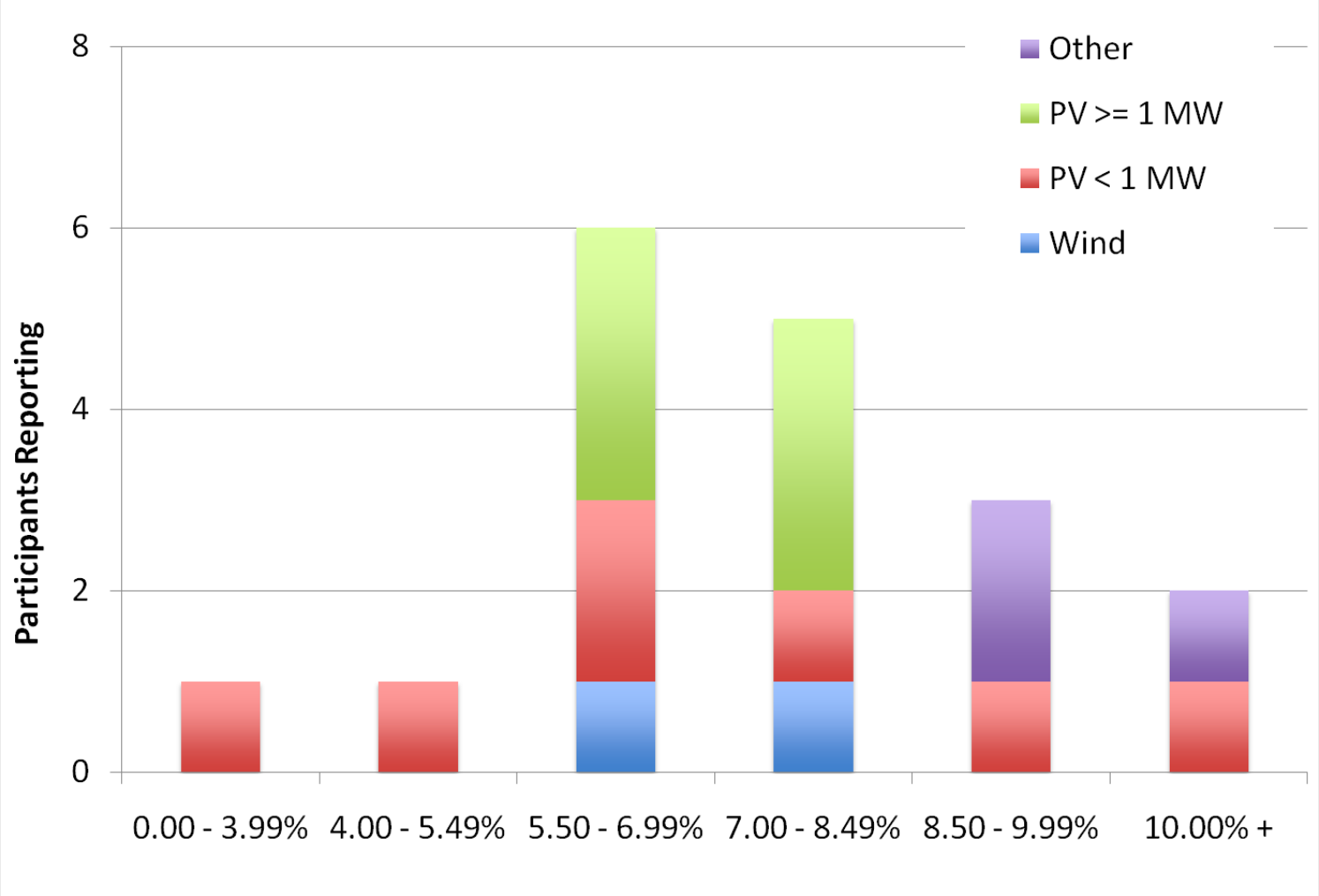
Cost of Term Debt (all-in)



Most commonly in the 5.5 – 8.5% range. But REFTI participants reporting very wide range.

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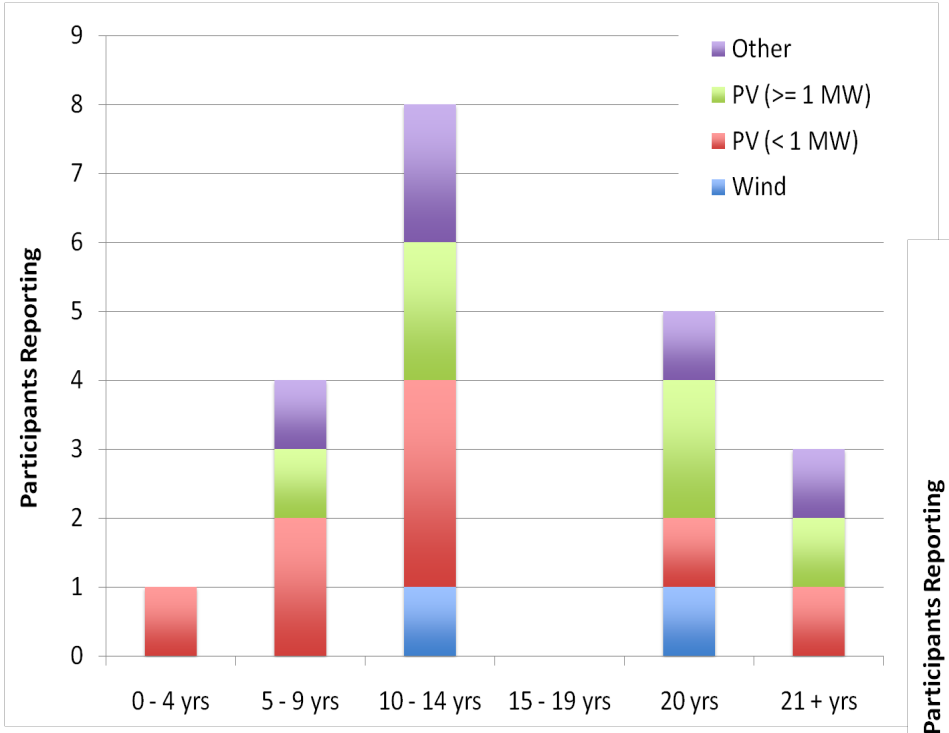
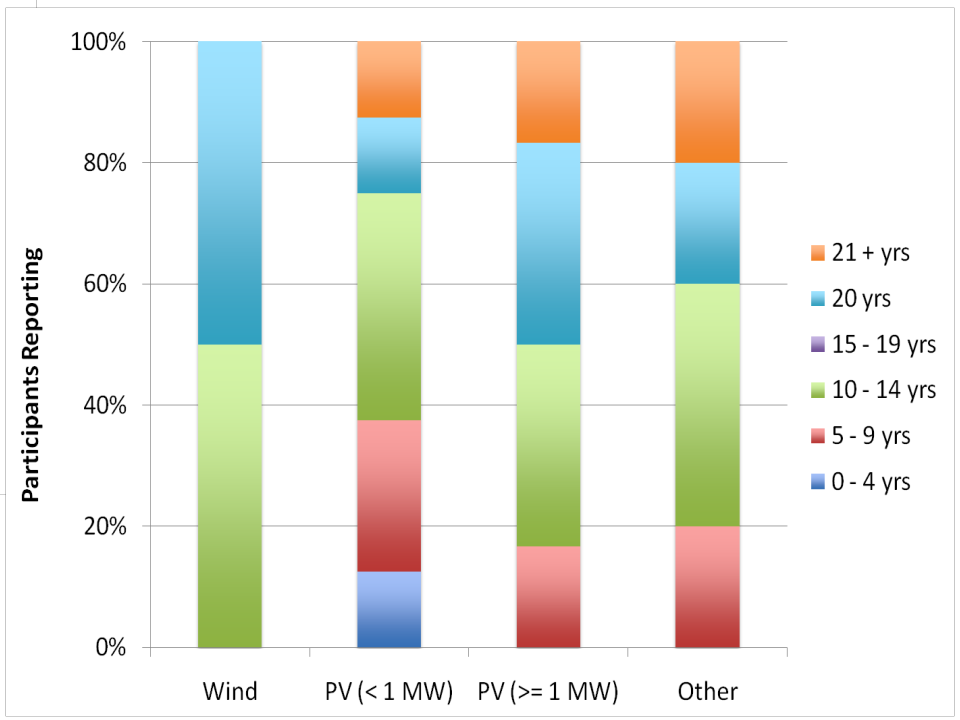
Term Debt Duration

by bin range



by technology, scaled to 100%



Small and large PV and other technology acquiring very short term debt

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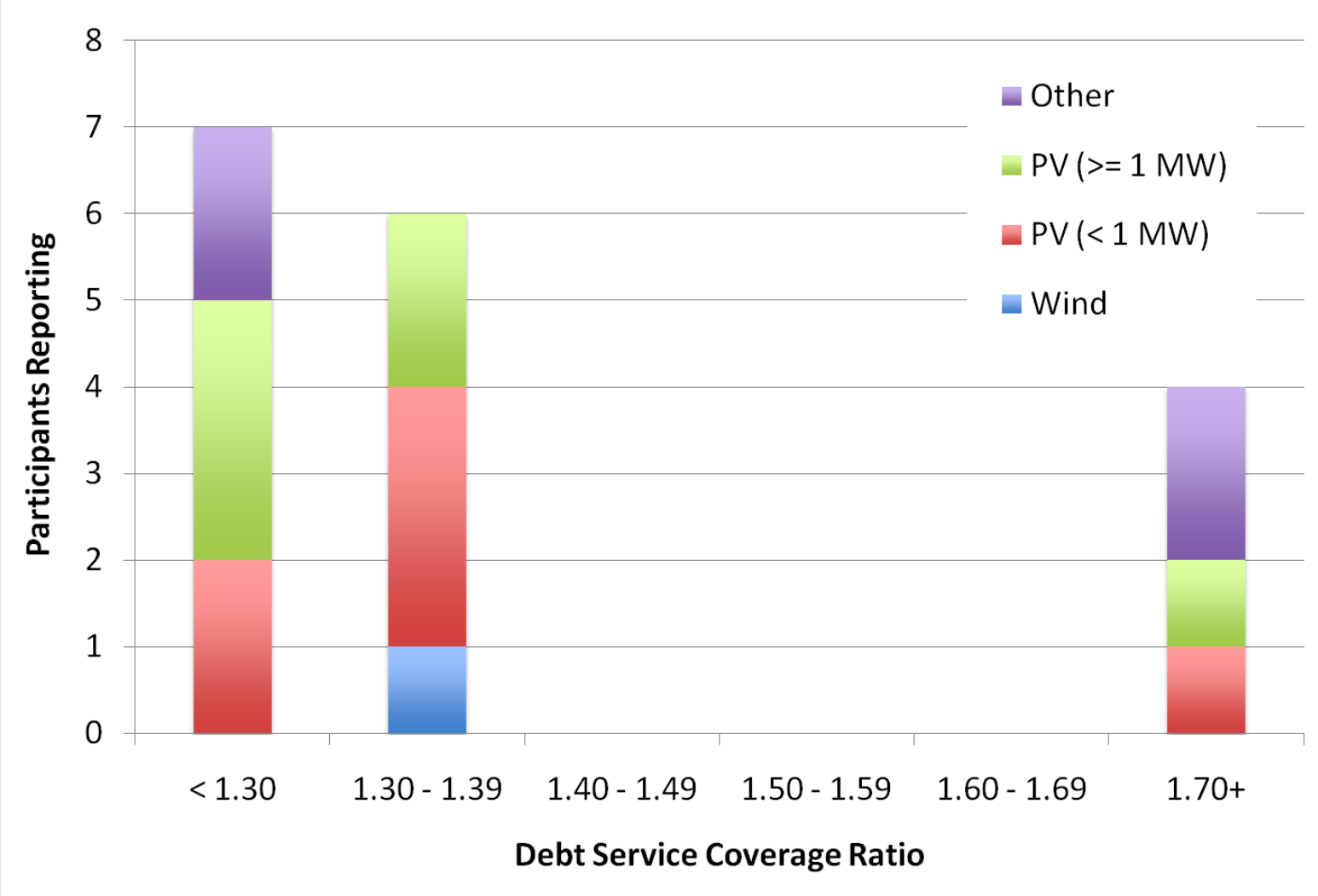
Debt Service Coverage Ratios Required



Min debt coverage ratios most commonly below 1.3x

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REFTI Questionnaire: Page 3, Q8 (Q14)

8. Provide the average INSTALLED COSTS (before incentives) and LEVELIZED COST OF ENERGY (LCOE) (after incentives) from your projects

(LCOE is generally the present value of costs divided by the present value of energy delivered)

	Installed Costs ($ / Watt - net output)	LCOE (cents / kWh)
Wind		
Solar - PV (< 1 MW)		
Solar - PV (>= 1 MW)		
Solar - CSP		
Solar Thermal (non-elec)		
Geothermal		
Biomass - Elec		
Biomass - Non-elec		
Hydro		
Other Technologies		

Comments

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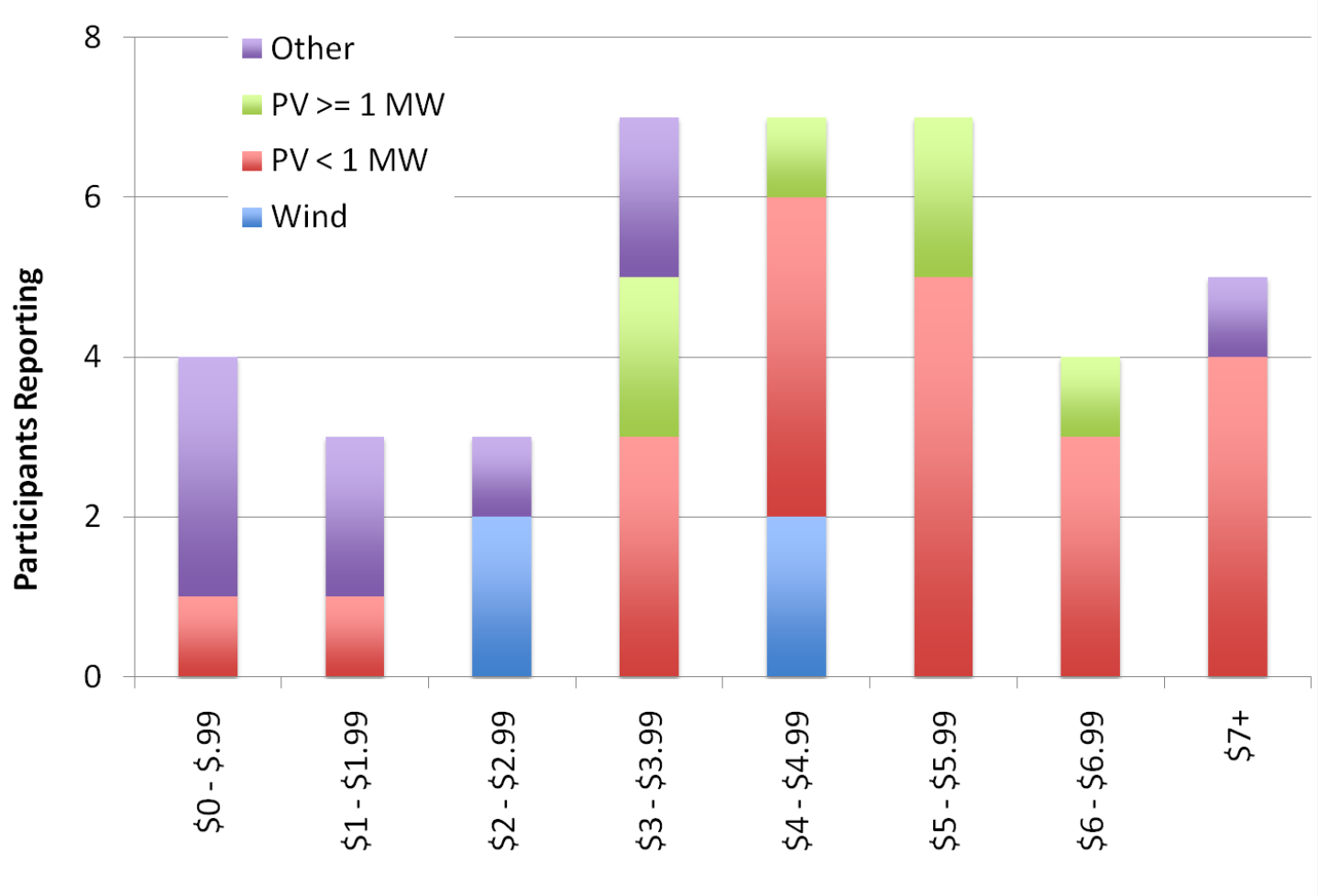
Installed Costs (before incentives)



Very wide range for small PV reported. Less than $1 /W installed?

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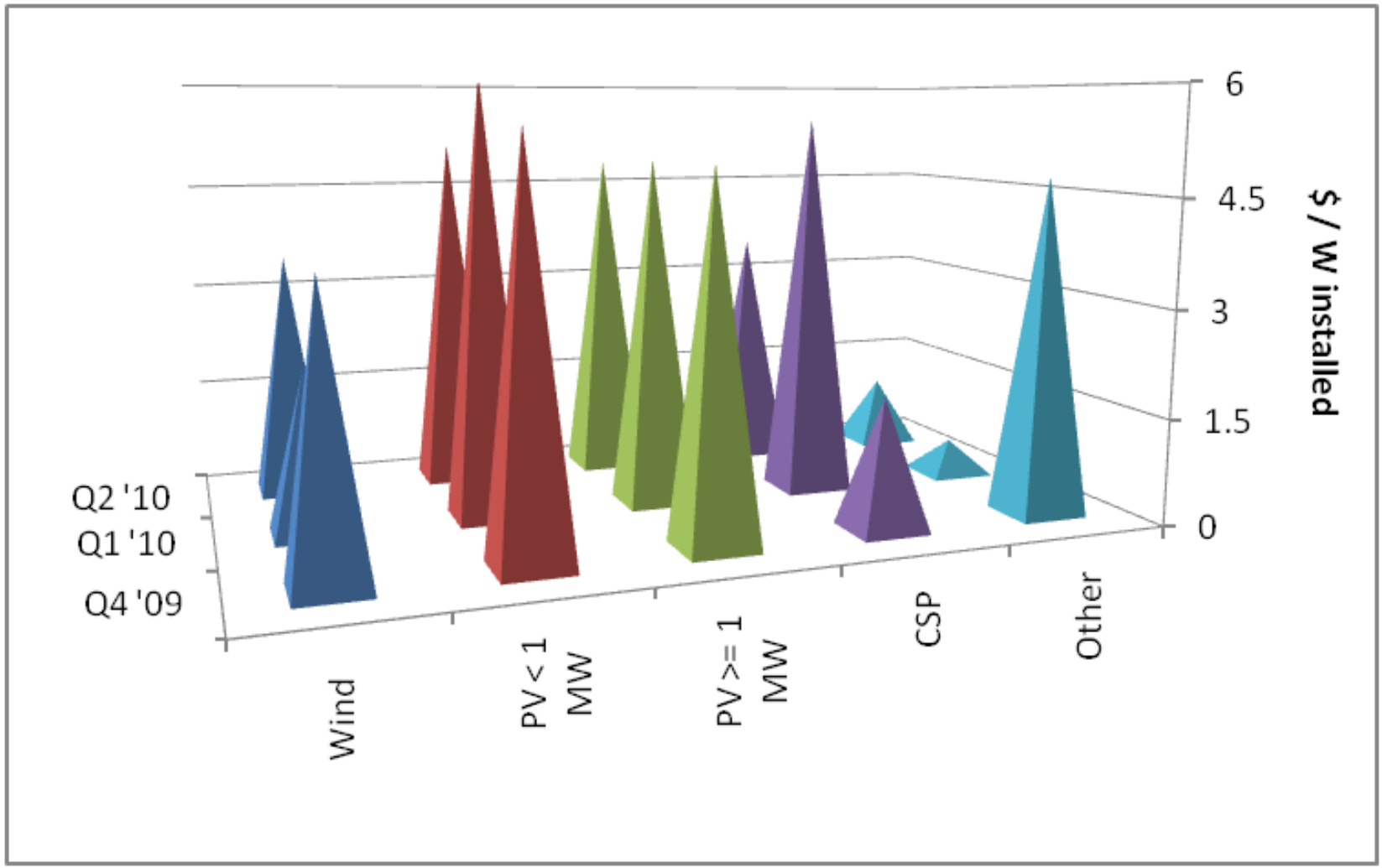
Installed Costs – Trend Analysis (wtd. avg.)



On a wtd. avg. basis, most techs hold relatively consistently across multiple quarters of REFTI data

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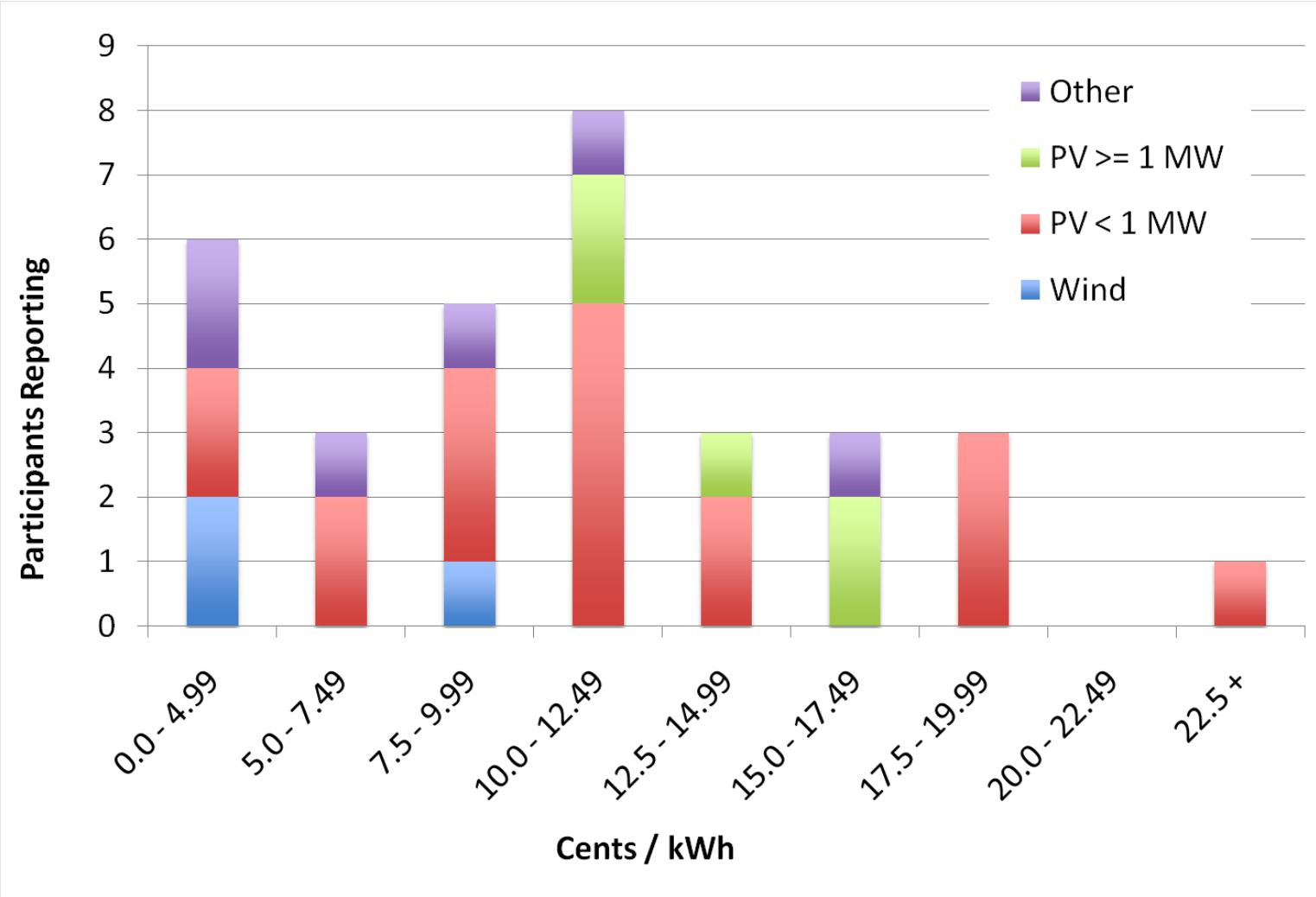
Levelized Cost of Energy (cents/kWh)



Large PV within reasonable range 10 – 17.5 cents/kWh. Small PV reported in very wide range.

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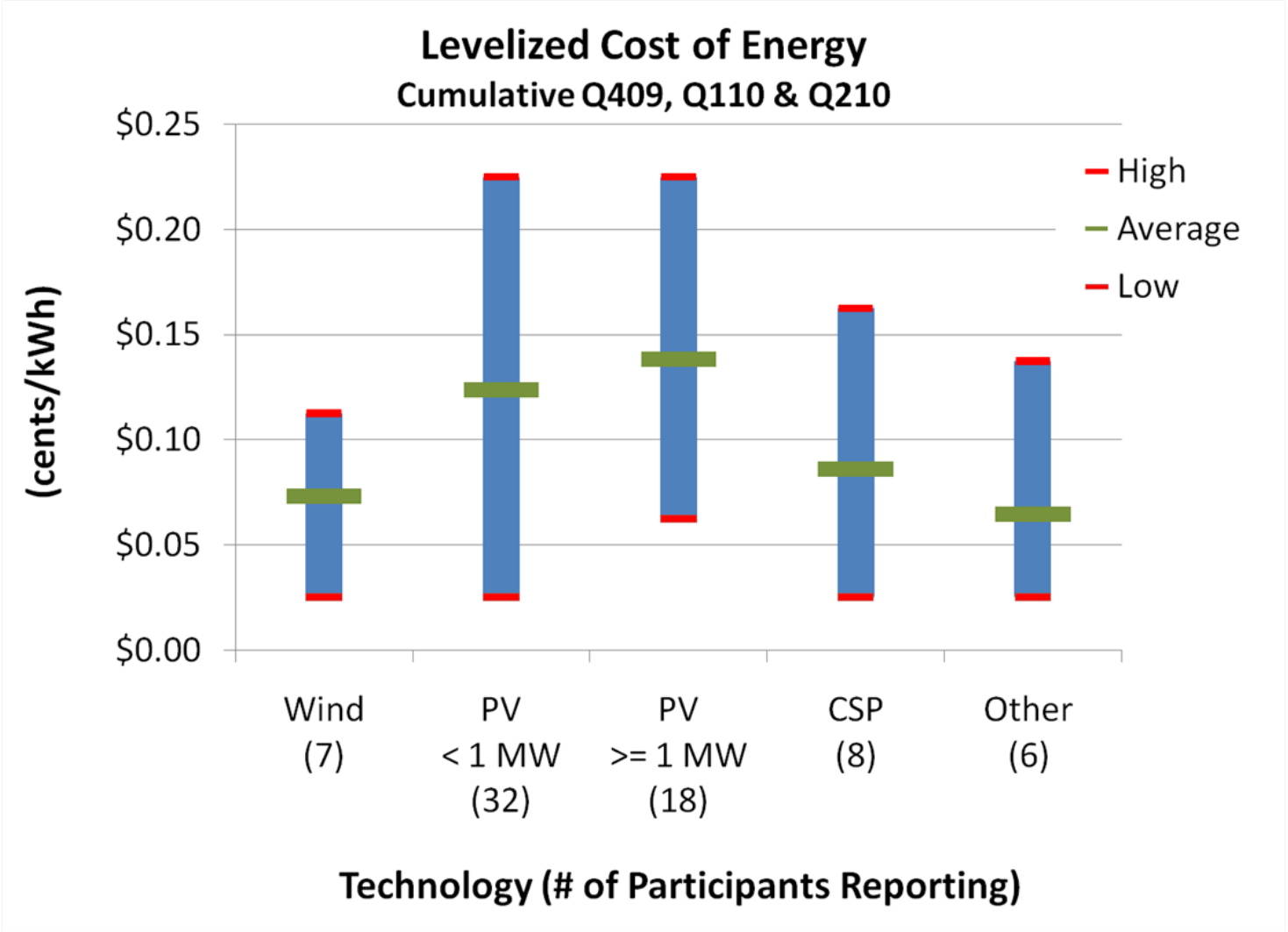
LCOE – Cumulative Range and Avg. (cents/kWh)



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REFTI Questionnaire: Page 4, Bonus Q1

1. What was the transaction cost (as a % of total dollar value) to monetize tax equity and/or MACRS depreciation benefits?

	TE Transaction Cost
Wind	
Solar - PV (< 1 MW)	
Solar - PV (>= 1 MW)	
Solar - CSP	
Solar Thermal (non-elec)	
Geothermal	
Biomass - Elec	
Biomass - Non-elec	
Hydro	
Other Technologies	

Comments

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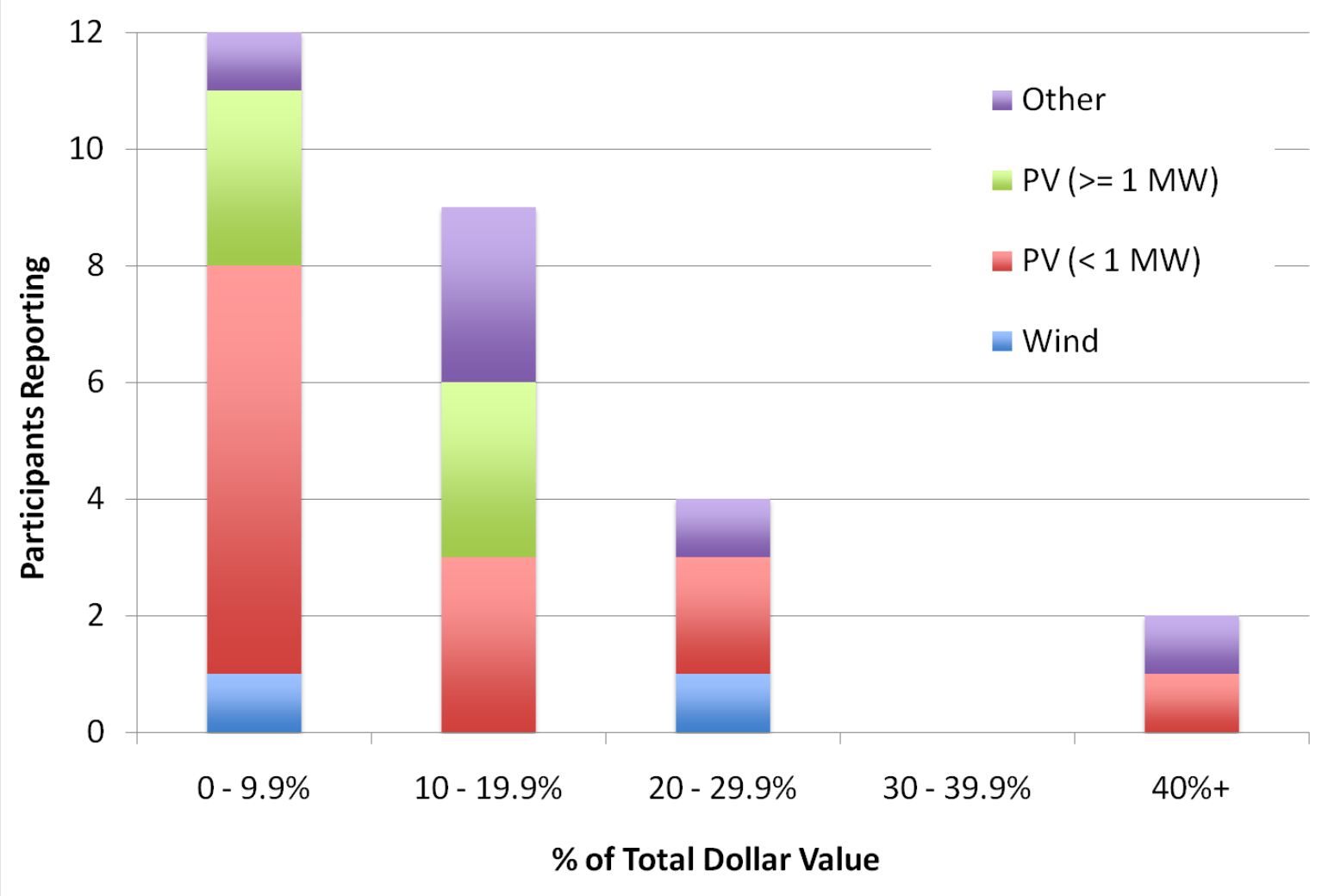
Transaction Cost as % of ITC / MACRS Benefit



Transaction cost primarily less than 20%. Some very high numbers reported

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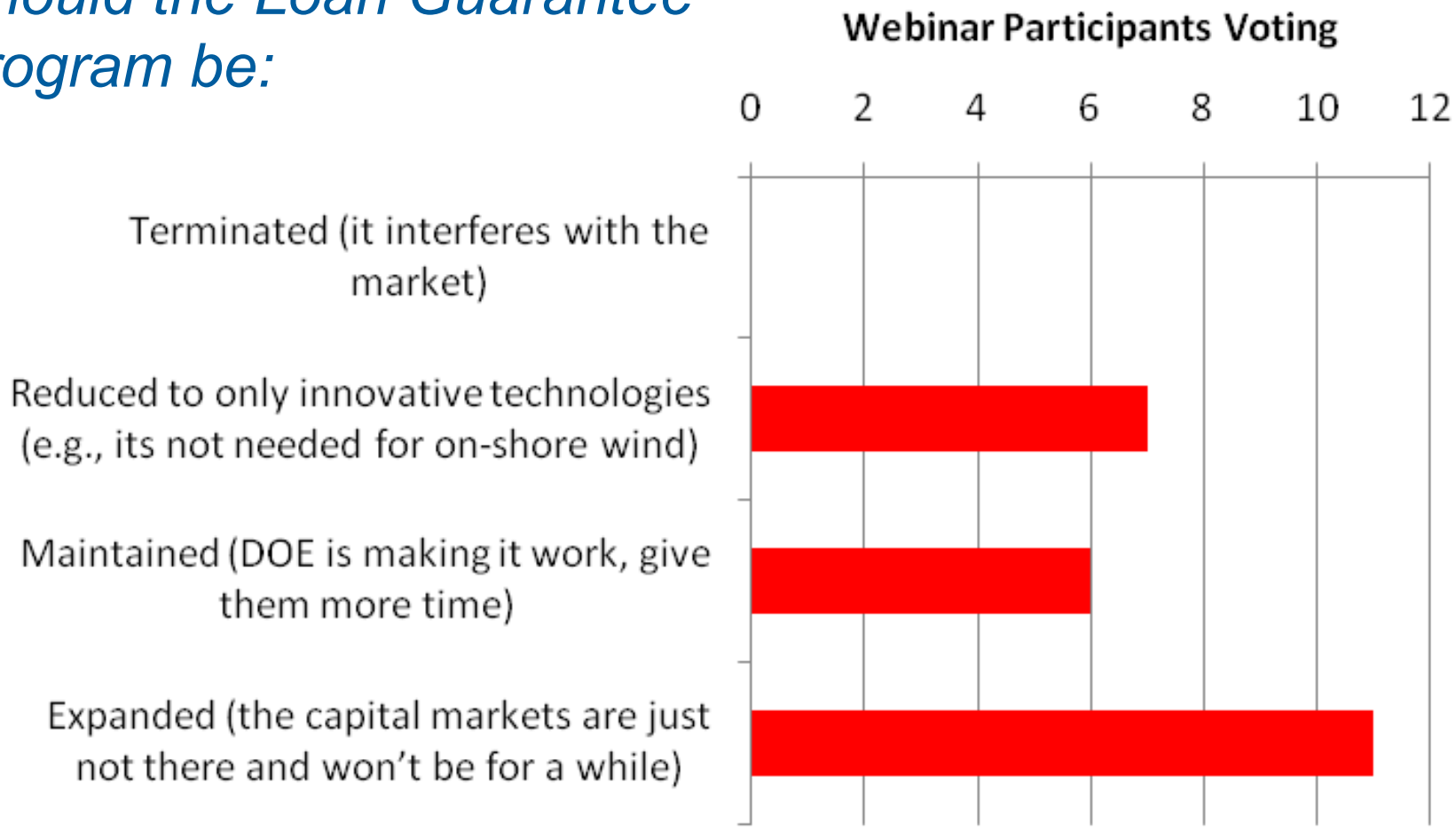
Interactive Poll #2

Should the Loan Guarantee program be:



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Data Confidentiality

- Ensuring REFTI data confidentiality critical to NREL
- Data gathered through REFTI will only be utilized for:
  - *Providing aggregate values for model inputs*
  - *Reporting trends*
  - *Participant-specific data will not be utilized or distributed in any way*
- Non-disclosure agreements are available
  - *Executing an NDA is fully voluntary*
  - *3 – 12 month NDAs are available*
- Please let us know if you have any concerns over data provided through this webinar
  - *Slides will not be made available immediately to allow time to raise concerns*
- Q2 Survey still available for review only

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Thank you!!!

We appreciate your participation!

Michael Mendelsohn
michael.mendelsohn@nrel.gov
303/384-7363

Current (Q3 2010) REFTI Questionnaire available at:

http://www.surveymonkey.com/s/K2ZXYJW

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