

# Evaluation of Potential Policy Adders – Initial BCA Results

Stakeholder Webinar  
September 18, 2020

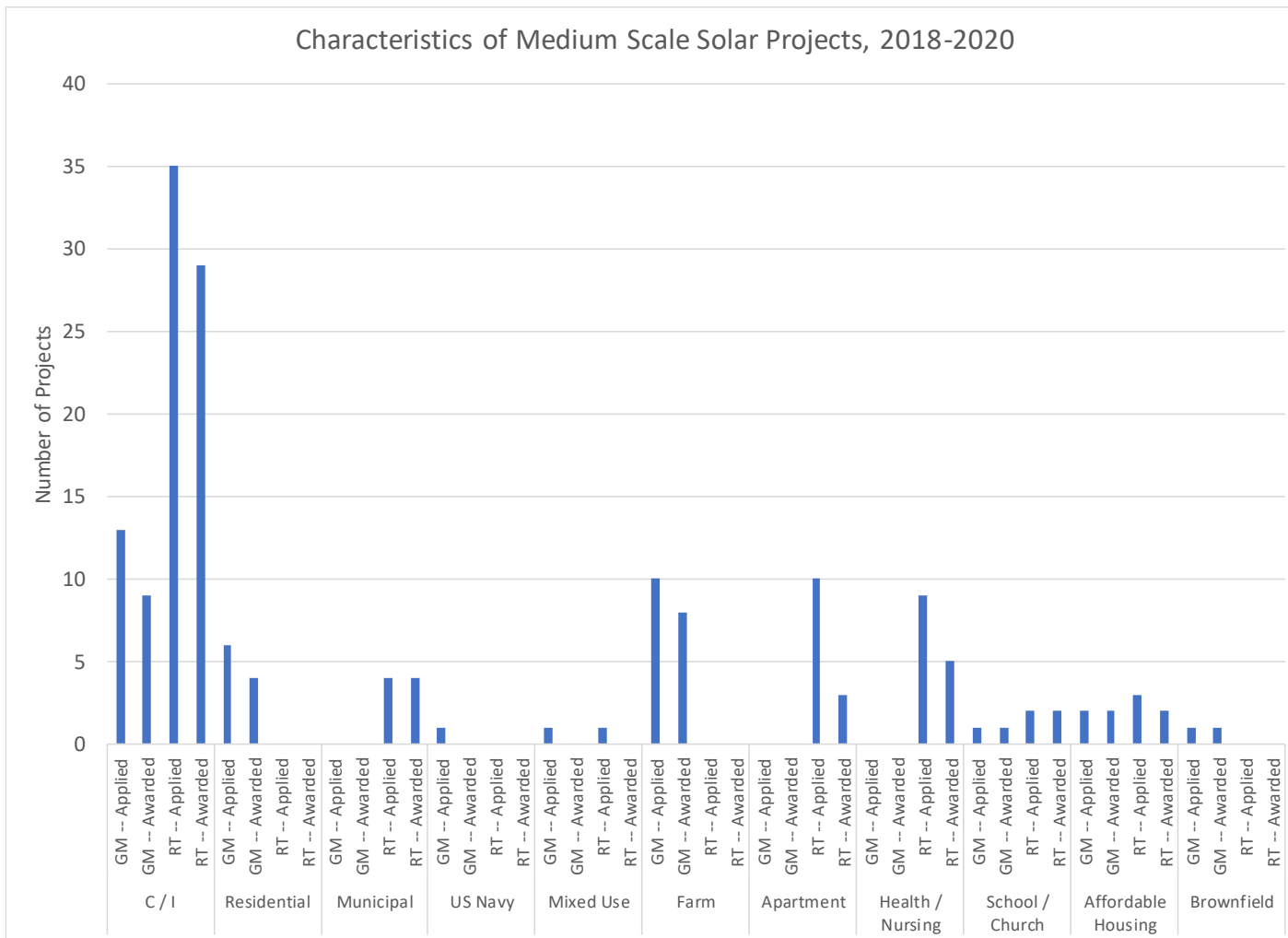
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# Objectives for today's discussion

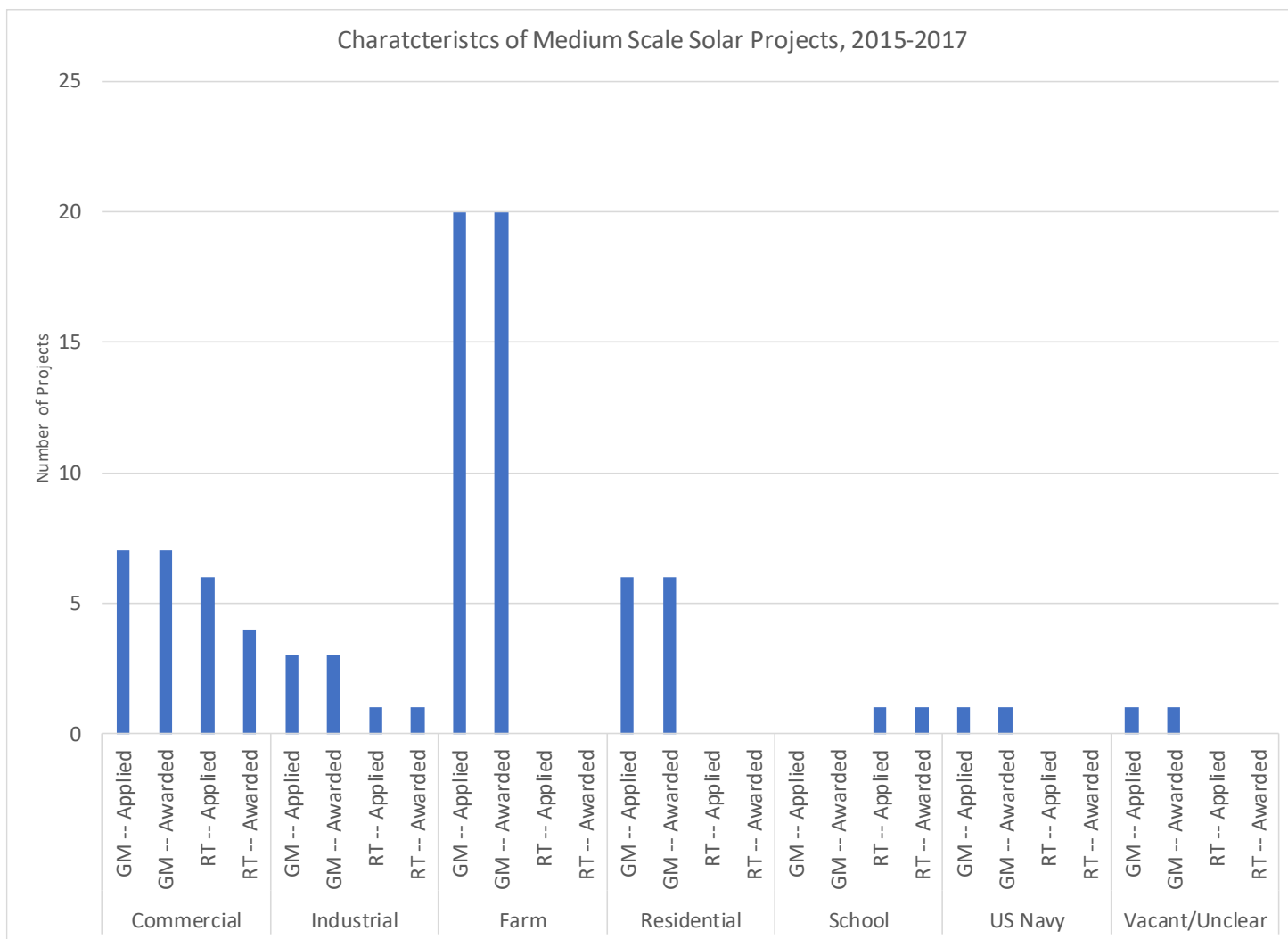
- **Review baseline questions and initial BCA results for potential adders targeting:**
  - Beneficial Siting (Medium Scale Rooftops)
  - Beneficial Siting (Disturbed Sites – landfills, brownfields, gravel pits)
  - Low-income participation in CRDG projects
  - Carport adder

# To what extent are rooftop projects observed in medium-scale solar REG applications and awarded projects?



Notes: GM=Ground Mount, RT=Rooftop .C/I GM includes one mixed RT/GM. Graphs represent preliminary representation of internal data based on information provided in applications. Some applications provide zoning designations while others provide specific uses/characteristics.

# To what extent are rooftop projects observed in medium-scale solar REG applications and awarded projects?



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## Medium-scale rooftop projects do not appear to be underrepresented in recent project applications or awarded projects.

- As shown in previous figures, rooftop projects have become increasingly prevalent in applications/awards over the course of the program

Summary of Medium Project Applications by Type of Project, 2018-2020 1<sup>st</sup> Open Enrollment

	# of Projects	Nampelate Capacity (kW)
Total Rooftop Applications	64	9,080
Awarded Rooftop Projects	45	6,990
<b><i>Percent Awarded (Rooftop)</i></b>	<b><i>70%</i></b>	<b><i>77%</i></b>
Total Ground Mount Applications	33	8,032
Awarded Ground Mount Projects	24	5,875
<b><i>Percent Awarded (Ground Mount)</i></b>	<b><i>72%</i></b>	<b><i>73%</i></b>

## Medium-Scale Rooftop Adder: Benefit Cost Analysis

Medium-scale rooftop projects tend to have lower interconnection costs than ground mount projects. However, this is the sole source of benefits in the BCA.

Summary of Interconnection Costs for Selected Medium-Scale Solar Projects, 2019-2020 (\$/kW)

	<b>N</b>	<b>Mean</b>	<b>Median</b>	<b>Capacity Wtd Avg</b>
Rooftop	25	122.89	18.33	153.94
Ground Mount	19	437.95	170.85	441.47
All Selected	44	258.94	99.27	294.75

Summary of BCA Results for 1.5 cents/kWh adder, assuming 250 kW low-cost/high-production project.

<b>Value</b>	<b>\$NPV over 20 years</b>
Adder Cost	\$45,971
Avoided Interconnection Costs	\$31,776
Societal Benefits	\$0
<i>Total Costs</i>	\$45,971
<i>Total Benefits</i>	\$31,776
<i>Total Net Benefits</i>	-\$14,195
<i>Benefit/Cost Ratio</i>	0.69

Note: Avoided interconnection cost based on difference between rooftop and all selected interconnection cost means.

# Disturbed Site Adder: Assessment of Interconnection Cost Savings

- We have integrated REF projects with interconnection costs available into the data set.
- Data do not enable us to conclude that siting projects on disturbed sites leads to interconnection cost savings.

**Summary of Interconnection Costs for Disturbed Site and All Selected Medium Scale Solar Projects, 2019-2020 (\$/kW)**

	N	Mean	Median	Capacity Wtd Avg
All Awarded Distributed Sites REG + Awarded REF	5	155.14	147.54	207.87
All REG Disturbed Sites REG applications + Awarded REF	6	414.44	208.27	557.91
All Awarded REG	44	258.94	99.27	294.75

**Summary of Interconnection Costs for Disturbed Site and All Selected Large-Scale Solar Projects, 2019-2020 (\$/kW)**

	N	Mean	Median	Capacity Wtd Avg
All Awarded Distributed Sites REG + Awarded REF	5	171.12	132.61	99.43
All REG Disturbed Sites REG applications + Awarded REF	8	145.08	103.45	124.52
All Awarded REG	15	185.43	99.65	165.08

Note: disturbed sites included in this analysis include landfills, brownfields, and gravel pits. Carports are not included in the analysis of disturbed sites. Interconnection cost comparison is performed only for medium and large-scale projects because there were no disturbed site projects in the commercial-scale capacity range.

## Disturbed Site Adder: Benefit Cost Analysis

For the purpose of evaluating *potential* benefits and costs, we assumed that disturbed sites do provide an interconnection cost savings. However, these values should be considered illustrative.

- Even if interconnection cost reductions are assumed, benefit/cost ratios are low.

Summary of BCA Results for 1.5 cents/kWh adder, assuming low-cost/high-production large scale (4500 MW) project on brownfield site.

Value	\$ NPV over 20 years		
	High Interconnection Cost Savings	Low Interconnection Cost Savings	High Interconnection Cost Savings and Max Avoided Forest Clearing
Adder Cost	\$722,998	\$722,998	\$722,998
Interconnection Cost Savings	\$277,907	\$58,879	\$277,907
Societal benefits	\$36,083	\$36,083	\$74,438
<i>Total Costs</i>	\$722,998	\$722,998	\$722,998
<i>Total Benefits</i>	\$313,990	\$94,962	\$352,345
<i>Total Net Benefits</i>	-\$409,009	-\$628,036	-\$370,654
<i>Benefit/Cost Ratio</i>	0.43	0.13	0.49

Note: Benefits included include interconnection cost savings, avoided loss of carbon sink (assuming avg. reported large scale-project forest clearing, and avoided loss of ecosystem services).

High Interconnection Cost Savings scenario assumes Capacity Wtd Avg. difference from previous slide; Low Interconnection Cost Savings uses Mean difference. Max Avoided Forest Clearing assumes clearing of 12 acres of land is avoided (maximum reported value for large scale projects).



# To what extent do REG projects serve LMI customers?

- As of July 2020:
  - about 3% of the operational small-scale REG project serving residential customers serve A-60 customers.
  - approximately 7.8% of residential customers are on A-60 rate.

*Company's analysis of potential LMI adder is focusing on CRDG projects serving low-income customers.*

- Potentially cost-effective path to providing benefits of REG to low-income customers
- Enables participation by customers residing in multiple housing types

# LMI Adder: Benefit Cost Analysis

Summary of BCA Results for LMI focused adder for Commercial-Scale CRDG projects.

Value	\$ NPV over 20 years	
	2.4 cent/kWh adder	3.6 cent/kWh adder
Adder Cost	\$1,435,449	\$2,234,353
Utility Cost Savings	\$84,429	\$84,429
Participant Benefits	\$1,014,883	\$1,606,898
<i>Total Costs</i>	\$1,435,449	\$2,234,353
<i>Total Benefits</i>	\$1,099,312	\$1,691,327
<i>Net Benefits</i>	-\$336,137	-\$543,026
<i>Benefit/Cost Ratio</i>	0.77	0.76

Note: Scenarios reflect a 500 MW GM and 500 RT project, respectively.

Summary of BCA Results for LMI focused adder for Large-Scale CRDG projects.

Value	\$ NPV over 20 years	
	2.4 cent/kWh adder	3.6 cent/kWh adder
Adder Cost	\$161,621	\$278,396
Utility Cost Savings	\$9,381	\$9,381
Participant Benefits	\$114,268	\$173,783
<i>Total Costs</i>	\$161,621	\$278,396
<i>Total Benefits</i>	\$123,649	\$183,164
<i>Net Benefits</i>	-\$37,972	-\$95,232
<i>Benefit/Cost Ratio</i>	0.77	0.66

Note: Scenarios reflect a 4500 MW GM and 4500 RT project, respectively.

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Utility cost savings include:

- Avoided arrearage carrying costs;
- Bad debt write-offs
- Terminations and reconnections
- Customer calls and collections activities
- Notices

Participant benefits include:

- The value of the portion of the adder assumed to be credited to LI customers; analysis does not currently include any additional bill credit.

Additional unquantified benefits include:

- Improved equity
- Reduced hardship to low-income customers (e.g., reduced need to move)
- Broader local economic impacts.

# Carport Adder

- Initial assessment of identifiable benefits by SEA suggests carport sites have lower interconnection costs relative to all recent selected REG solar projects.
- BCA work on carport adder is ongoing with close coordination with SEA as they perform evaluation of the PY 2020 carport adder.

*Table and excerpt below are from SEA's presentation at 8/13/20 RI PUC Technical Session (Slide 11).*

<b>Median, Average and Weighted Average Interconnection Costs and Cost Differences in Three Most Recent REG Solicitations PLUS All Carport Solar Projects in Interconnection Process (\$/kW<sub>DC</sub>)</b>				
<b>Project Class (Type)</b>	<b>N</b>	<b>Median</b>	<b>Average</b>	<b>Wtd. Avg.</b>
All Carports Currently in Interconnection Process (Representing Wide Range of Sizes)	11*	\$5.83*	\$46.81*	\$14.25*
All Selected REG Solar Projects	36	\$76.56	\$193.99	\$206.75
<b><i>Difference (All Carports in IC Process v. All Selected REG Solar)</i></b>		<b>\$70.73</b>	<b>\$147.18</b>	<b>\$192.50</b>

*Source: National Grid interconnection database. NOTE: Some NGRID data includes capacity in AC, which SEA converted to DC utilizing a 1.2 DC/AC ratio. In addition, some costs for projects still in the IC process may change with more information verified (and as additional projects are selected). One observation from NGRID data is a project that was withdrawn.*

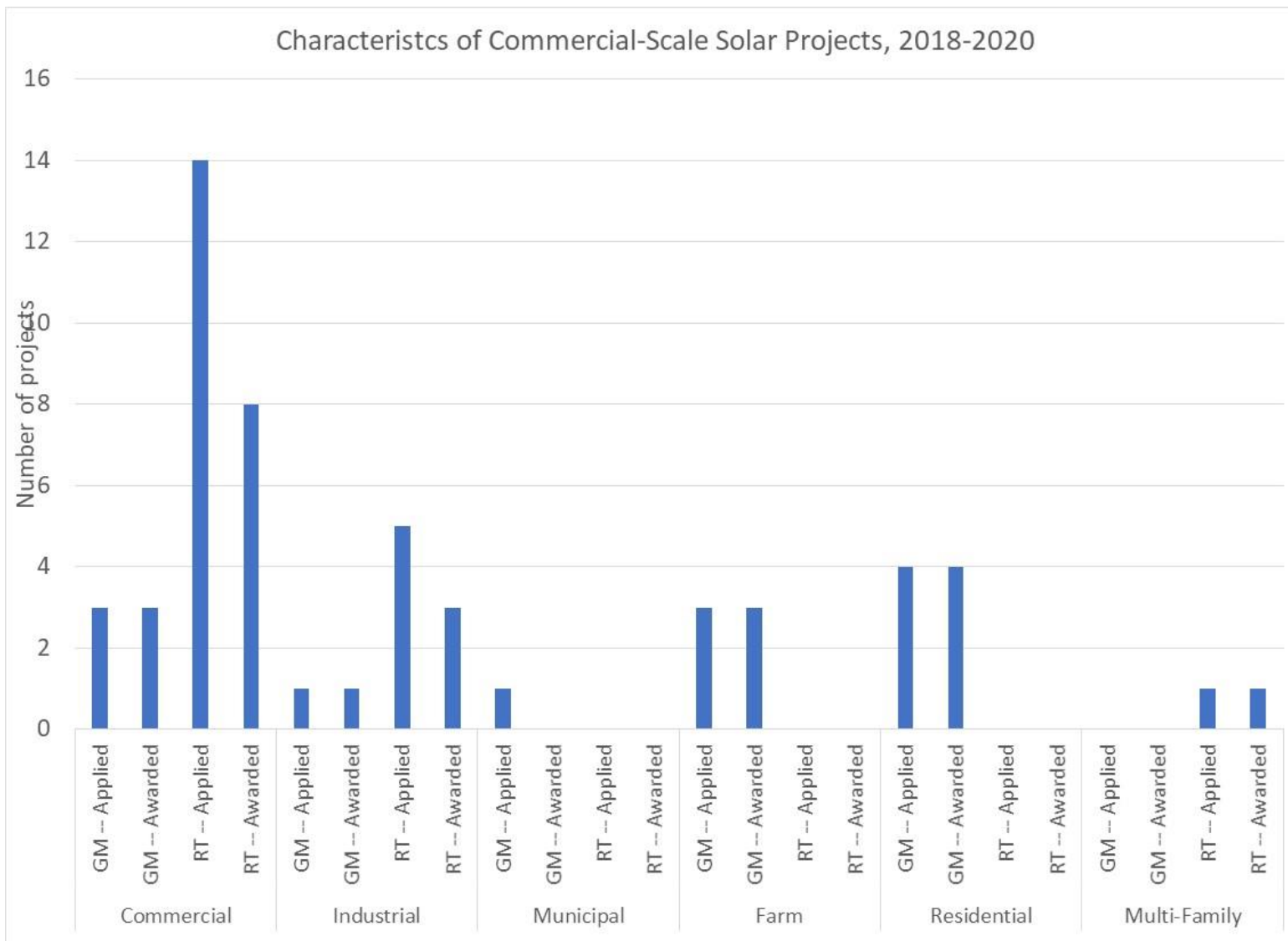
*\*Includes projects with still-to-be-verified final interconnection study, application fee, construction and/or O&M costs (which were left blank in the data provided by National Grid. Categories of unverified final costs left blank assumed to be zero for purposes of this analysis.*

# Appendix



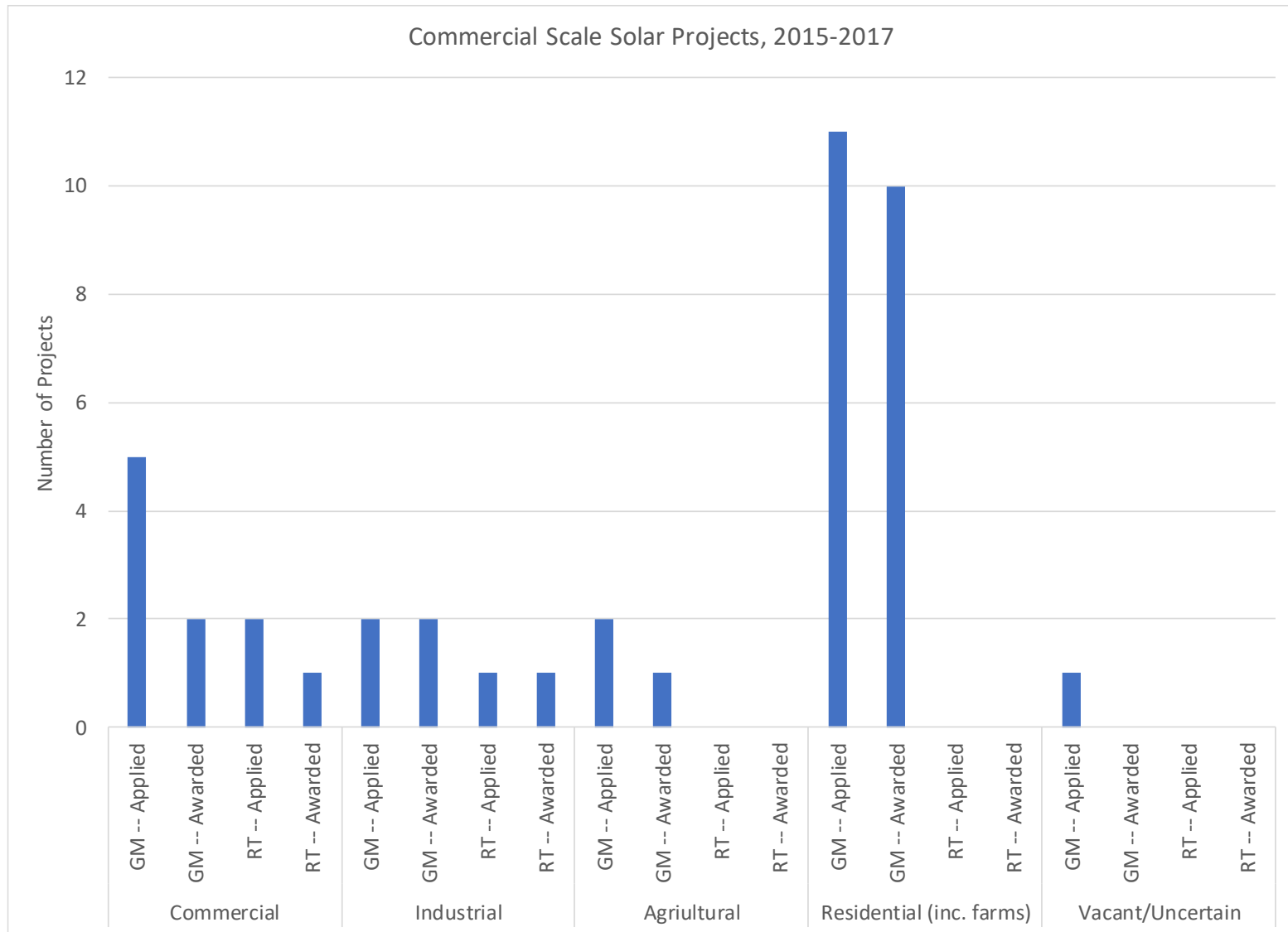
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# Site Characteristics in REG – Commercial Scale Projects



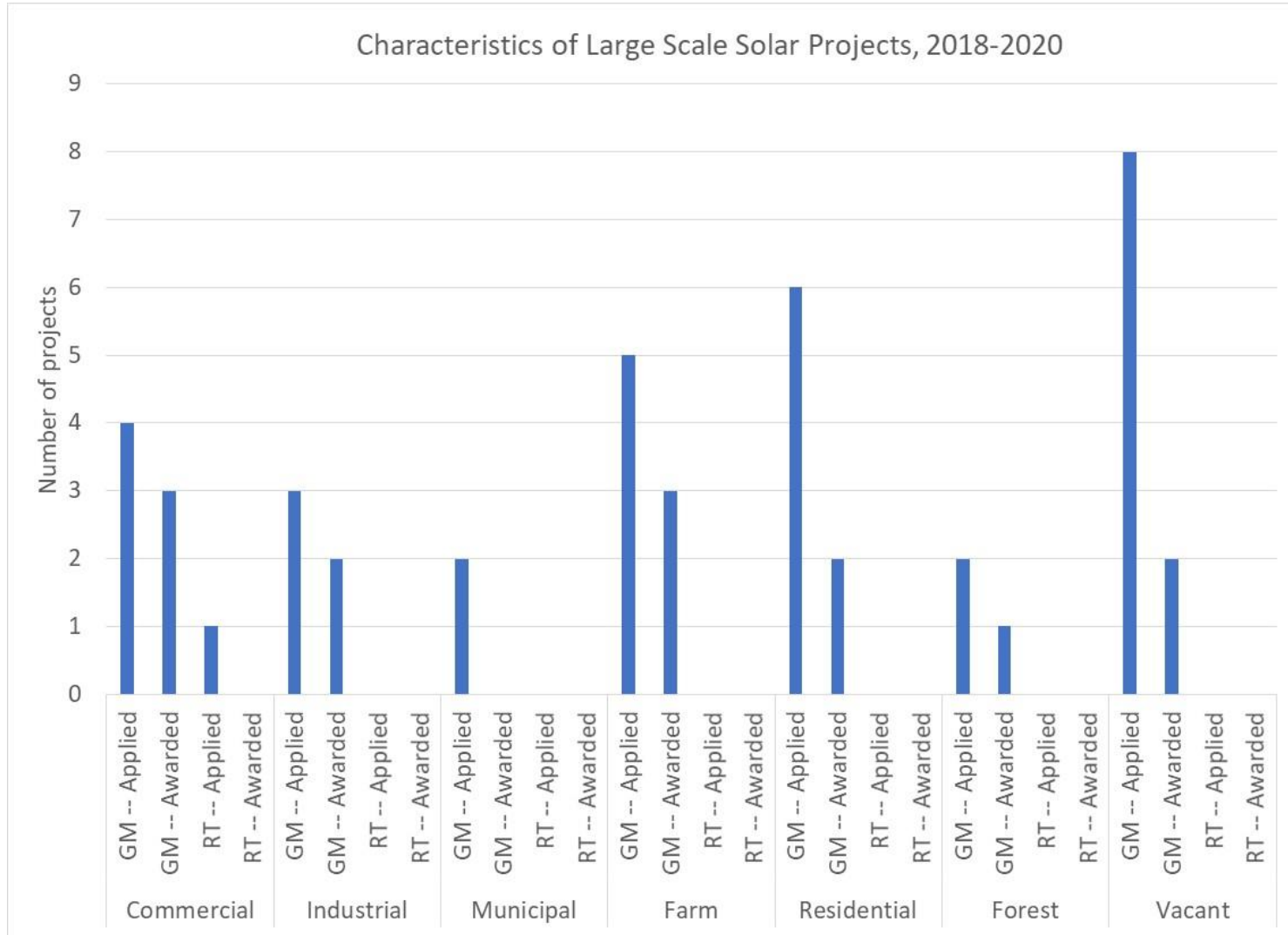
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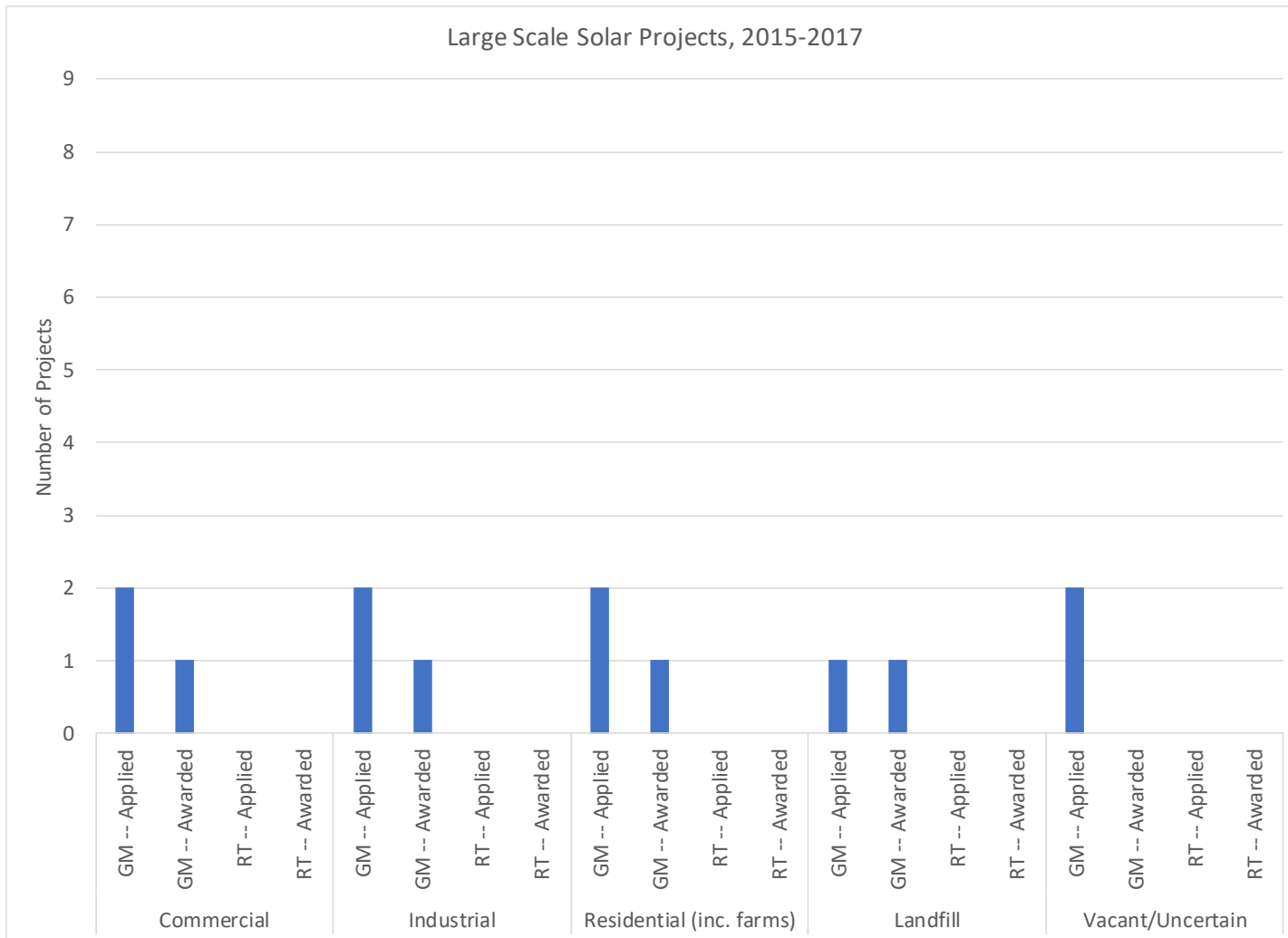
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# Site Characteristics in REG –Large Scale Projects



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# Site Characteristics in REG –Large Scale Projects



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# What are the societal benefits of increased siting in preferred locations?

Input	Source	Value
Forest cleared in recent REG projects (acres)	NG questionnaire of to recent large and commercial project developers	<p><u>Large</u>: Mean = 5.3 acres (0,12) N=5</p> <p><u>Commercial</u>: Mean = 0.21 acres (0,3) N=14</p> <p><u>All</u>: Mean = 1.55 acres (0,12) N=19</p>
Currently stored carbon (metric tons/acre)	The Value of RI Forests (2019)	76.2 (95% CI = 73.0, 79.4)
Annual carbon uptake (metric tons/acre/year)	The Value of RI Forests (2019)	1.31 (95% CI = 1.22, 1.40)
Impact per ton of CO2 (\$ per short ton)	AESC 2018	\$68
Ecosystem Services (\$ per acre, excluding carbon sink)	Proxy value informed by existing studies	\$100

Additional societal value streams being considered include:

- For brownfields, increased local property tax revenues due to remediation impact on nearby properties (quantifiable in illustrative case).

# What are the potential system impacts of increased participation by LMI customers?

Summary of current inputs to analysis of system (utility cost) benefits of LMI-adder (annual)

Input	Source	Value
Avoided arrearage carrying Costs	Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation (MA NEI Evaluation)	\$2.61 per customer
Bad debt write-offs	MA NEI Evaluation	\$3.74 per customer
Terminations and reconnections	MA NEI Evaluation	\$0.58 per customer
Customer calls and collections activities	MA NEI Evaluation	\$0.43 per customer
Notices	MA NEI Evaluation	\$0.34 per customer