

Community Solar for the Southeast workshop: Solar Project Economics

December 11, 2017

Community Solar Projects: Farm A

	Farm A
AC	500
DC	675
Fixed/Tracker	Fixed
PPA Rate	\$62.74
Yield (kwh / kw)	1,527
Kwhrs (Annual)	1,030,455
Cost / Watt	\$1.43
EPC Cost	\$1.41
Developer Margin Avail.	\$0.02
IRR	6.69%
Cost (\$)	\$ 965,250
Lease Rate / Acre/ YR	650
Acres	5
Kw/Acre	135

Farm A Context

- Micro utility-scale projects tend to have higher costs
 - There is no scale to construct
 - Land owners ask for more to “make it worth it” in the form of a higher cost per acre or a minimum # of acres leased.
- This project assumes a zero interconnect cost.
- This project assumes a fixed tilt with a typical generation for a system this size in NC
- Assumes Solar post-Section 201 tariff of 30% equates to ~\$0.45 mono perc module pricing

Community Solar Projects: Farm B

	Farm A
AC	2,000
DC	2,401
Fixed/Tracker	Tracker
PPA Rate	\$62.86
Yield (kwh / kw)	1,696
Kwhrs (Annual)	4,071,163
Cost / Watt	\$1.53
EPC Cost	\$1.39
Developer Margin Avail.	\$0.14
IRR	7.06%
Cost (\$)	\$ 3,673,530
Lease Rate / Acre/ YR	725
Acres	14.5
Kw/Acre	166

Farm B Context

- Smaller projects tend to have higher costs
 - There is some scale to construct
 - This project has an unusual AC/DC ratio driving the cost per watt higher than benchmark.
 - Tracking systems cost more, but accretive to value.
- This project assumes a zero interconnect cost.
- This project assumes a tracking tilt with a typical generation for a system this size in NC
- Assumes Solar post-Section 201 tariff of 30% equates to ~\$0.45 mono perc module pricing

Community Solar Projects: Farm C

	Farm A
AC	5,000
DC	6,797
Fixed/Tracker	Fixed
PPA Rate	\$62.74
Yield (kwh / kw)	1,527
Kwhrs (Annual)	10,376,300
Cost / Watt	\$1.34
EPC Cost	\$1.18
Developer Margin Avail.	\$0.16
IRR	7.02%
Cost (\$)	\$ 9,107,980
Lease Rate / Acre/ YR	750
Acres	35
Kw/Acre	194

Farm C Context

- Typical NC QF
- Construction costs scale significantly
- Project assumes some higher grading costs than usual
- This project assumes a nominal interconnect cost, \$100k.
- This project assumes a fixed tilt with a typical generation for a system this size in NC
- Assumes Solar post-Section 201 tariff of 30% equates to ~\$0.45 mono perc module pricing

What Drives Solar Economics

Input	Definition	Impact of project viability
Power Purchase Agreement	Contract at which off-taker will pay you for power generated. Can be fixed or time & use schedule based	Tenor, Rate, and Rate escalation are huge drivers of value.
REC Revenue	Renewable Energy Credits can be contracted with the utility or a third party.	Can increase value marginally as revenue per REC is low. 1 REC = 1 MWh.
Ground Lease	Lease agreement for property solar farm stands on. Typically at least 30 years in length, with a escalating rate annually after a short fixed rate period.	Hugely impactful. The better the land, the less you need. The land leased needs to cover shade easements as well.
Utility & Interconnection Costs	Electricity costs to run inverters, costs to administer your account and monthly costs per your Interconnection agreement.	Marginal. Exception, DEC charges large monthly interconnection costs vs. upfront I/A costs.
O&M Costs	The cost for preventative maintenance on your project as well as vegetation management.	Hugely impactful, but market competitive rates are easily available. ~\$6 – 8 per KW/ year. Picking the right O&M provider can be a major decision that can affect other aspects of the financial model.
Property & Real Estate Taxes	Payments to the county, city, Fire District etc	Very inconsistent. Target low millage rates in county land. City property can literally double your rates.

What Drives Solar Economics *(continued)*

Input	Definition	Impact of project viability
Corrective Maintenance	Costs to repair system over time not included in O&M or an EPC warranty.	Models vary. Most include basic replacement of inverters, but often assume “nothing else will go wrong”
Audit & Taxes	Costs to have your project company audited (if required by investors), and to file / prepare tax returns	Models vary. If financing assumes third party debt or tax equity, these will be required.
Insurance	The cost to ensure your property against hurricanes/storms.	You get what you pay for here.
Asset Management	Costs to comply with investor needs, submit tax listings, prepare financial statements, manage REC agreements, etc.	Usually an internal costs, but can be outsourced.
ITC eligibility	Some costs are not eligible for ITC	Projects with excess grading or large scale tree removal not only cost more to construct, but will drive down eligibility for ITC.
Closing costs	Legal and third party validation fees	Tax equity and debt providers need a lot of external diligence that the developer/sponsor has to pay for. Sometimes, its uncapped / unpredictable. Good thorough project development mitigates costs dramatically.

Discussion: How do you make a 4 c PPA work on a small project, without a tax credit, and make it available to lower-income communities?

Construction Costs (EPC)	Find a local EPC, one that may be willing to build at zero cost. Find donations for major materials. Have the project sponsored by a non-profit to enable tax deductibility of any donated materials. Work with county to provide permits at zero cost.
Developer Costs	Self develop.
REC Revenue	Negotiate a PPA without RECs, find a corporate that will buy them at a premium to help finance the project. (Even pre-pay for them)
Ground Lease	Find a low cost, or zero cost land. Maybe the utility has extra space adjacent to an interconnection?
Utility & Interconnection Costs	Negotiate with the off-taker, finding one with a strong desire for community solar will help.
O&M Costs	Find an O&M provider that do this at costs, or for free.
Property & Real Estate Taxes	Negotiate an abatement with the county.
Corrective Maintenance	Use a quality EPC
Audit & Taxes	Find a firm that will donate time for this
Closing costs	Find local law firm that will do the work pro-bono. Reduce necessity for outside diligence.

Discussion: How do you make a 4 c PPA work on a small project, without a tax credit, and make it available to lower-income communities? *(continued)*

Debt / Equity	Use of tax free bonds can be a drastic rate improvement. Only available if ITC isn't taken.
	Find a debt provider that will waive fees
	Find a non-profit that will provide debt financing at low/zero costs.
	Find a non-profit that will donate capital necessary to finance the project.
	Find a federal grant that can provide upfront capital.
	Find a sustainability conscious firm that will overpay / cover upfront costs for a disproportionately lower ownership % to provide the benefits of long term ownership to others in need.
	Find an off-taker that will provide partial pre-payment of revenue on a long term contract.