

Solar Interconnection Case Studies

Daniel Kovar – Assistant Engineer

Evan Kearney – Jr Engineer

Central Hudson - Distribution Planning

Customers Served

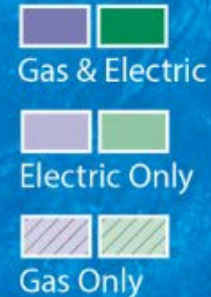
~300,000
Electric

~79,000
Natural Gas

Central Hudson service territory

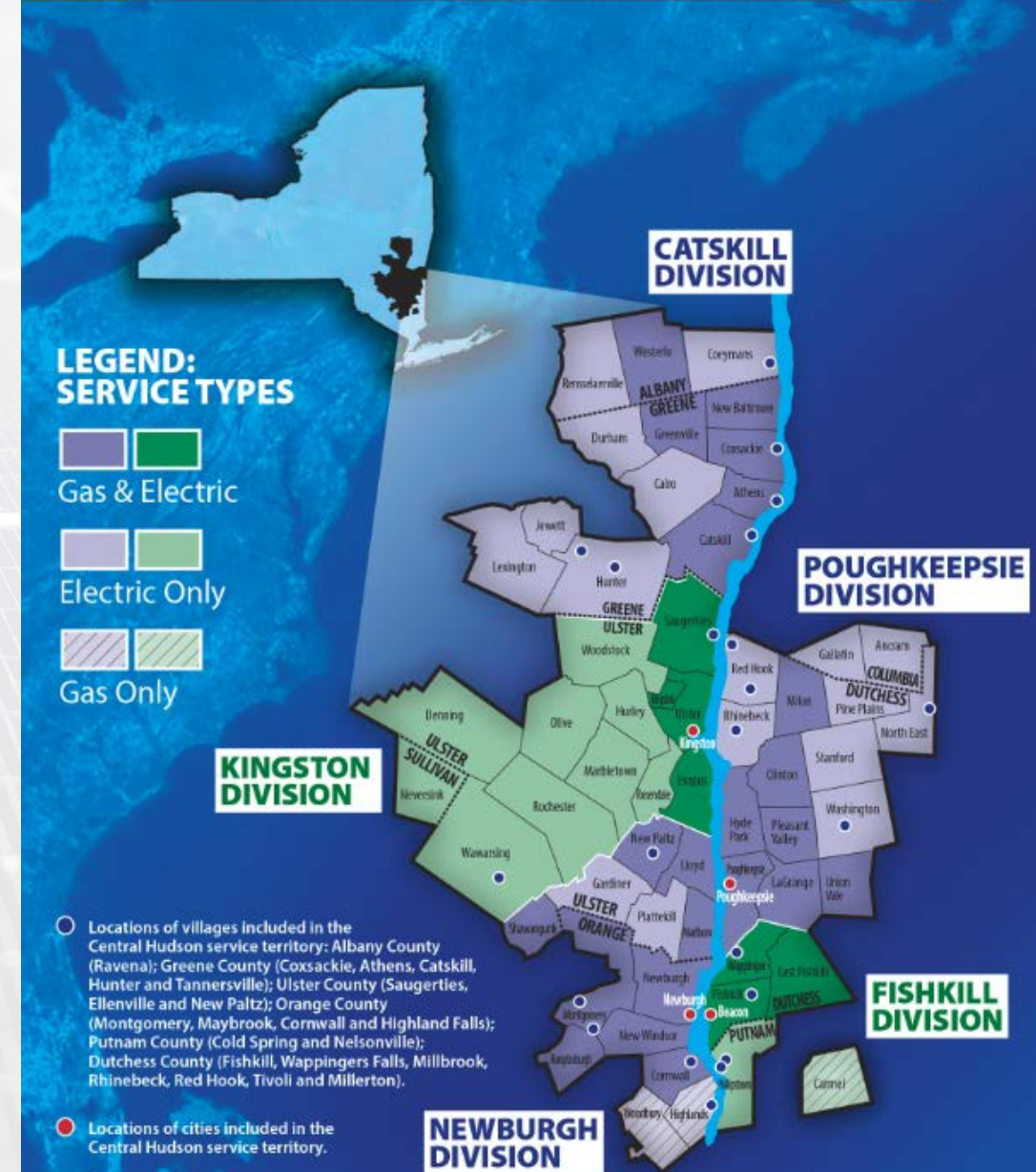
DIVISIONS & SERVICE TYPES

LEGEND: SERVICE TYPES

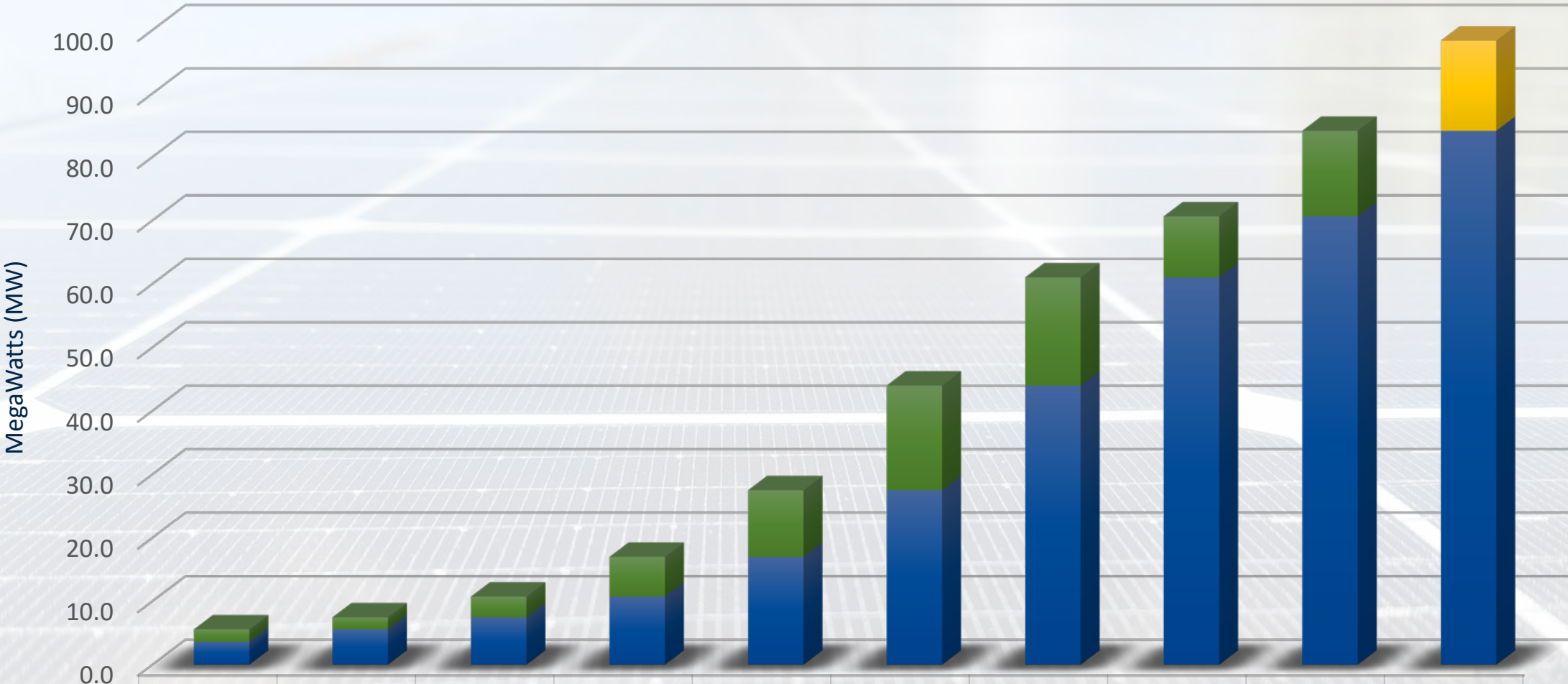


○ Locations of villages included in the Central Hudson service territory: Albany County (Ravena); Greene County (Coxsackie, Athens, Catskill, Hunter and Tannersville); Ulster County (Saugerties, Ellenville and New Paltz); Orange County (Montgomery, Maybrook, Cornwall and Highland Falls); Putnam County (Cold Spring and Nelsonville); Dutchess County (Fishkill, Wappingers Falls, Millbrook, Rhinebeck, Red Hook, Tivoli and Millerton).

● Locations of cities included in the Central Hudson service territory.



Solar Growth as of 12/31/18



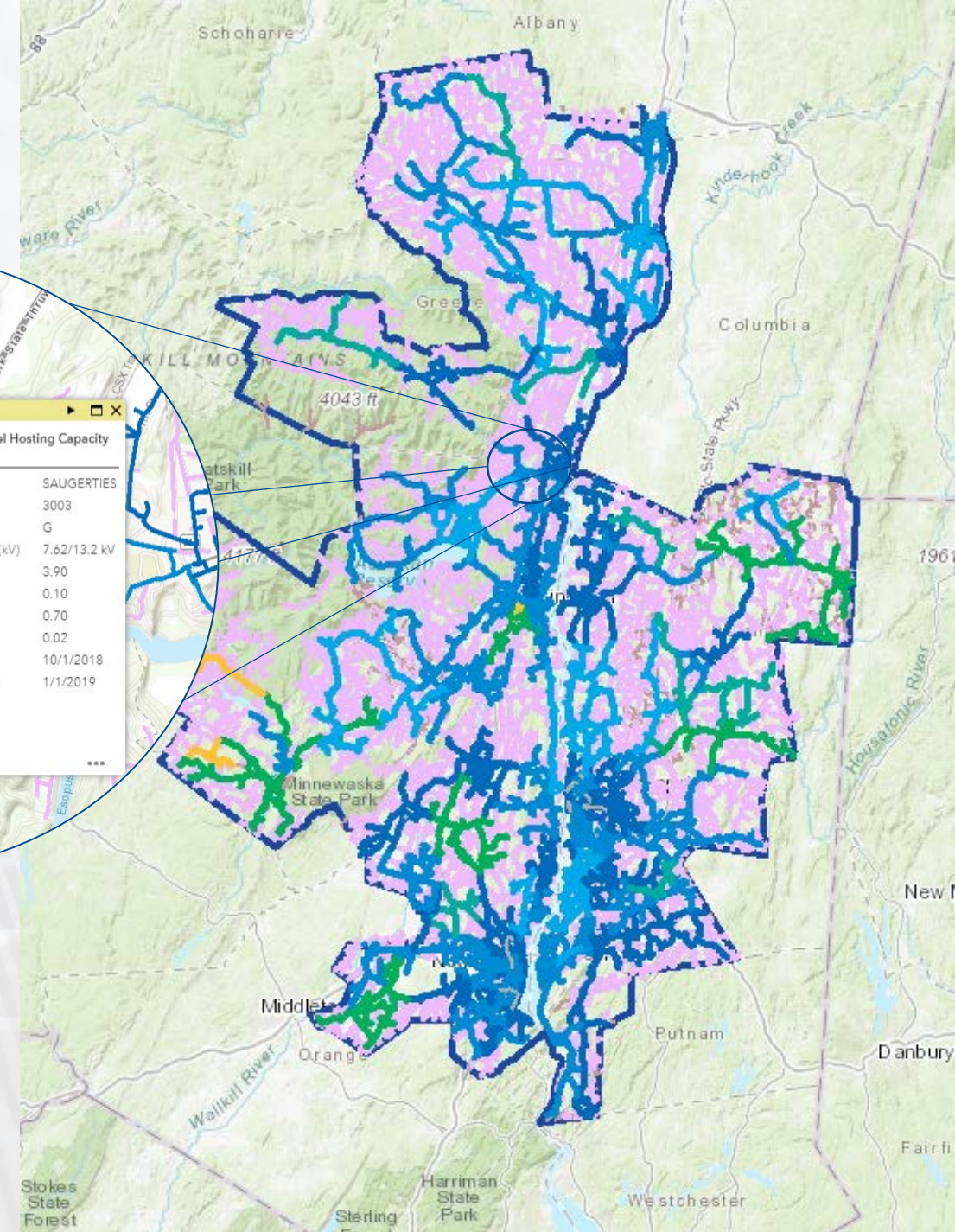
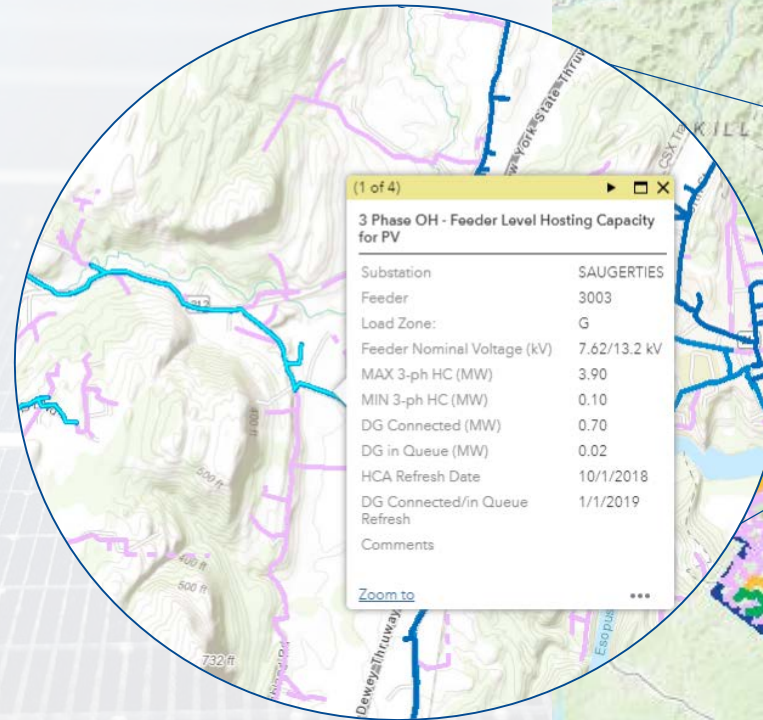
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Projected										14.2
New	2.0	1.9	3.3	6.3	10.5	16.5	17.0	9.6	13.5	
Existing	3.6	5.6	7.5	10.7	17.0	27.5	44.0	61.0	70.6	84.1

Year

■ Existing
 ■ New
 ■ Projected

Hosting Capacity Map

- Interactive online map
- Estimates amount of DER that can be accommodated per distribution circuit
- New update coming in October 2019



Hosting Capacity Map Pop-Ups

(1 of 8) ▶ □ ×

3 Phase OH - Feeder Level Hosting Capacity for PV

Substation	COLDENHAM
Feeder	4026
Load Zone:	G
Feeder Nominal Voltage (kV)	7.62/13.2 kV
MAX 3-ph HC (MW)	4.10
MIN 3-ph HC (MW)	0.52
DG Connected (MW)	0.09
DG in Queue (MW)	4.98
HCA Refresh Date	10/1/2018
DG Connected/in Queue Refresh	1/1/2019
Comments	

[Zoom to](#) ...

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Substation Level System Data:COLDENHAM #1

Substation/Bank Installed DG (MW)	1.47
Substation/Bank Queued DG (MW)	4.01
Substation/Bank Total DG (MW)	5.49
2017 Substation/Bank Summer Peak (MW)	19.10
Status of Substation 3VO Protection	Yes
HCA Refresh Date	10/1/2018
DG Connected/in Queue Refresh	1/1/2019

[Zoom to](#) ...

What Factors Affect Hosting Capacity?



Location



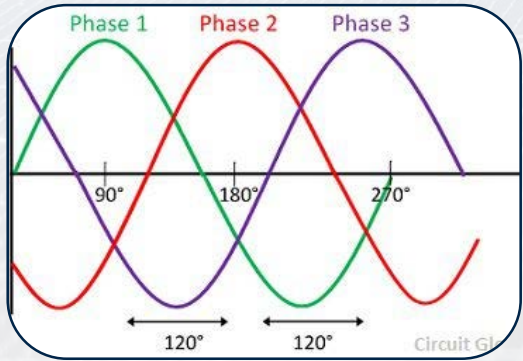
Circuit
Minimum Load



Conductor Size



Existing DG



Phasing



Voltage



Distribution
Equipment



Protective
Devices

Project 1 – 5MW PV

System Characteristics

Conductor Size	336 ACSR
Phasing	3-Phase
Peak [Substation/Feeder](kW)	12,600 / 3,350
Minimum [Substation/Feeder] (kW)	5,140 / 997
Total PV (kW)	5,778
Customers	488
Voltage (kV)	13.2
Miles from Sub	0.35
Distance from 3-Phase	N/A
Regulator Banks	1



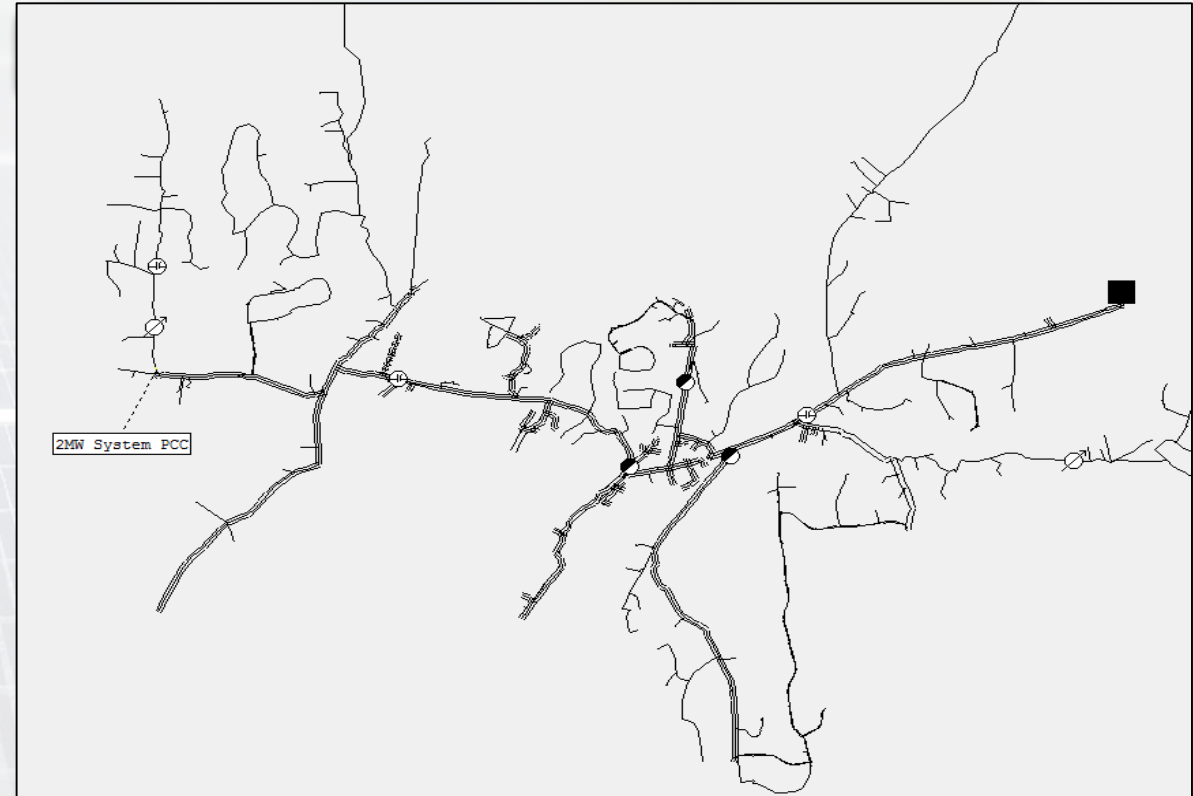
Project 2 – 2MW PV

System Characteristics

Conductor Size [POI/Mainline]	4 CU / 336 ACSR
Phasing	1-Phase
Peak [Substation/Feeder](kW)	6,206
Minimum [Substation/Feeder] (kW)	2,648
Total PV (kW)	2,446
Customers	2,317
Voltage (kV)	13.2
Miles from Sub	4.29
Distance from 3-Phase	250'
Regulator Banks	1

Total - \$360,624

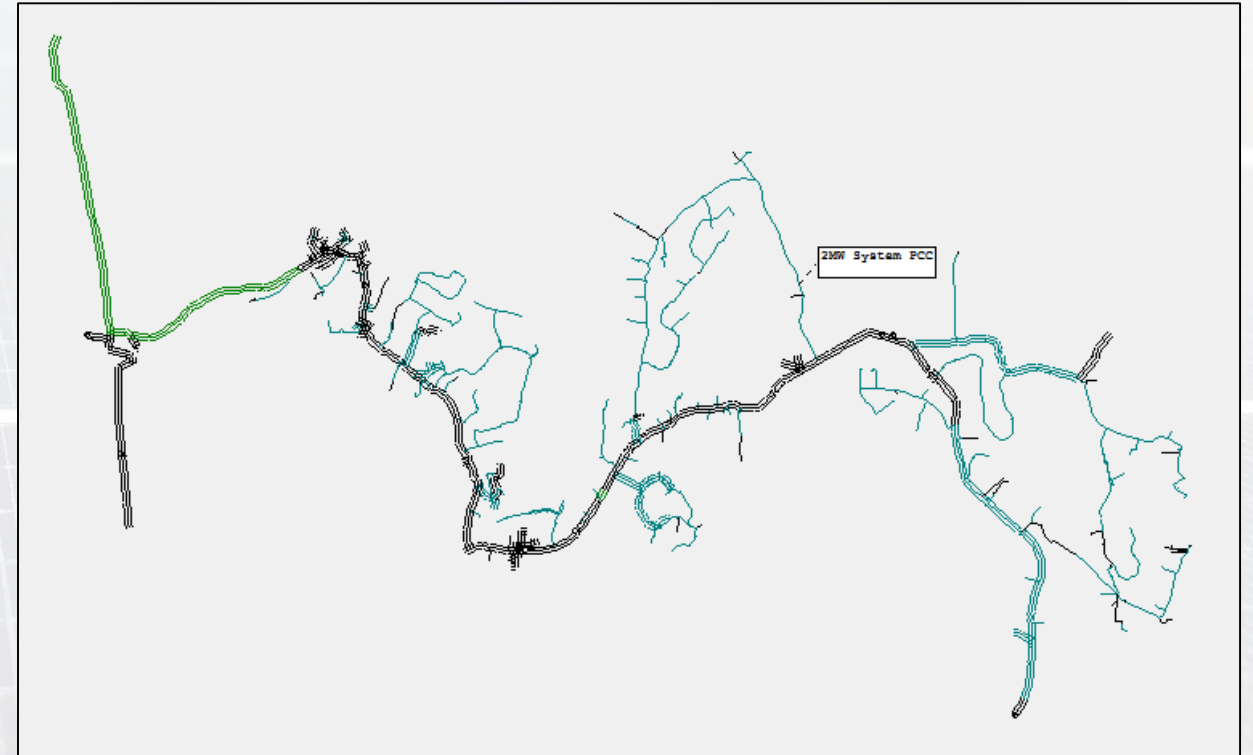
\$/kW = \$180.31



Project 3 – 2MW PV

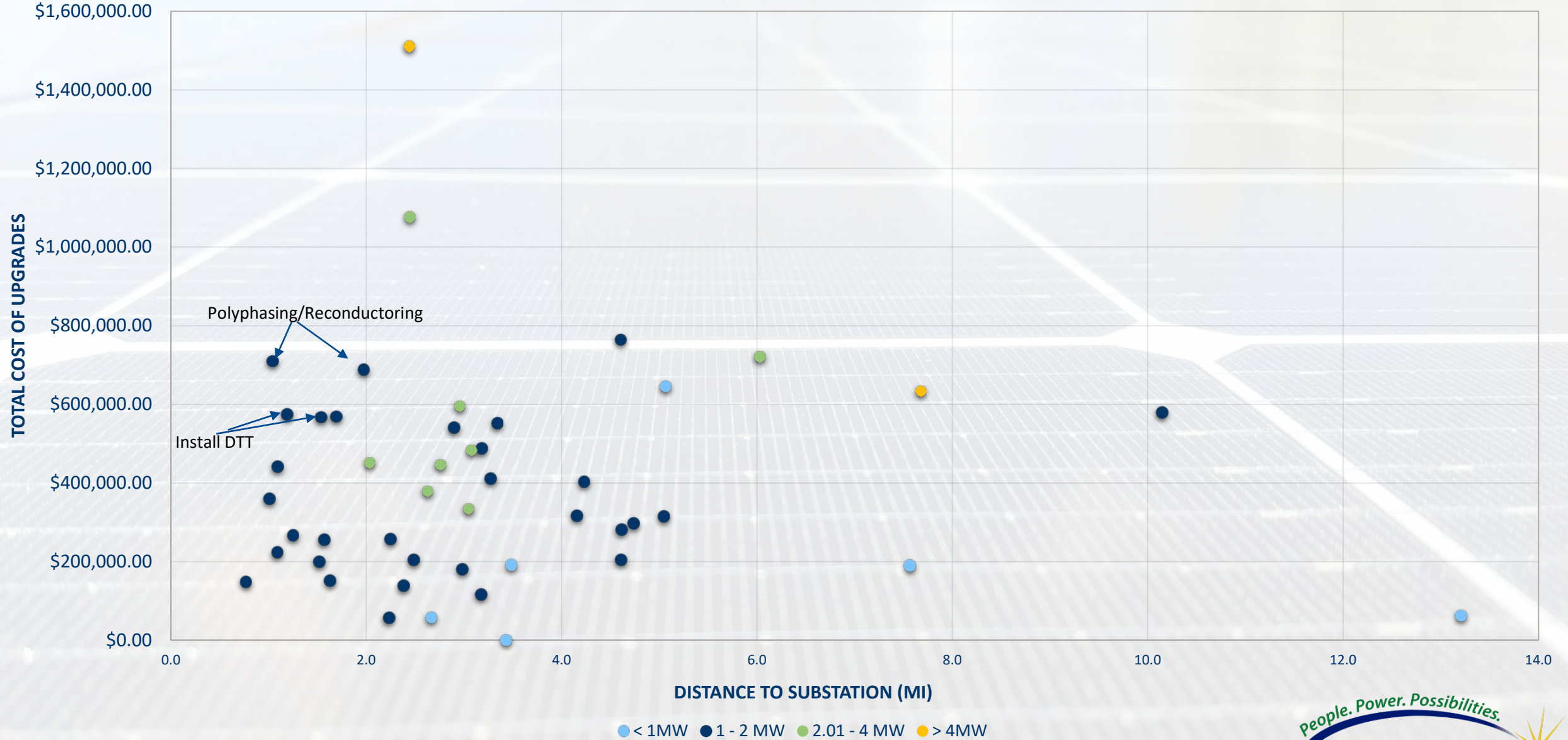
System Characteristics

Conductor Size	336 Bare Al
Phasing	1-Phase
Peak [Substation/Feeder](kW)	22,249/7,773
Minimum [Substation/Feeder] (kW)	5,351/2,322
Total PV (kW)	4,558
Customers	1,821
Voltage (kV)	13.2
Miles from Sub	8.51
Distance from 3-Phase	2700'
Regulator Banks	3
Total - \$502,423	
\$/kW = \$386.34 @ 1.3MW, \$475.61 @ 1.056MW	



* Upgrade Not Needed Upon Passing of a Detailed Voltage Flicker Study

Total Cost of Upgrades vs Distance From Substation



Final Remarks

- No single “dependent” factor on upgrade costs.
- Central Hudson’s Hosting Capacity Map can assist in finding higher quality PV locations which can potentially result in minimal upgrades.
- Higher costs expected in northern territory due to DTT requirement.

Thank You