

Company Owned Solar - Phase II

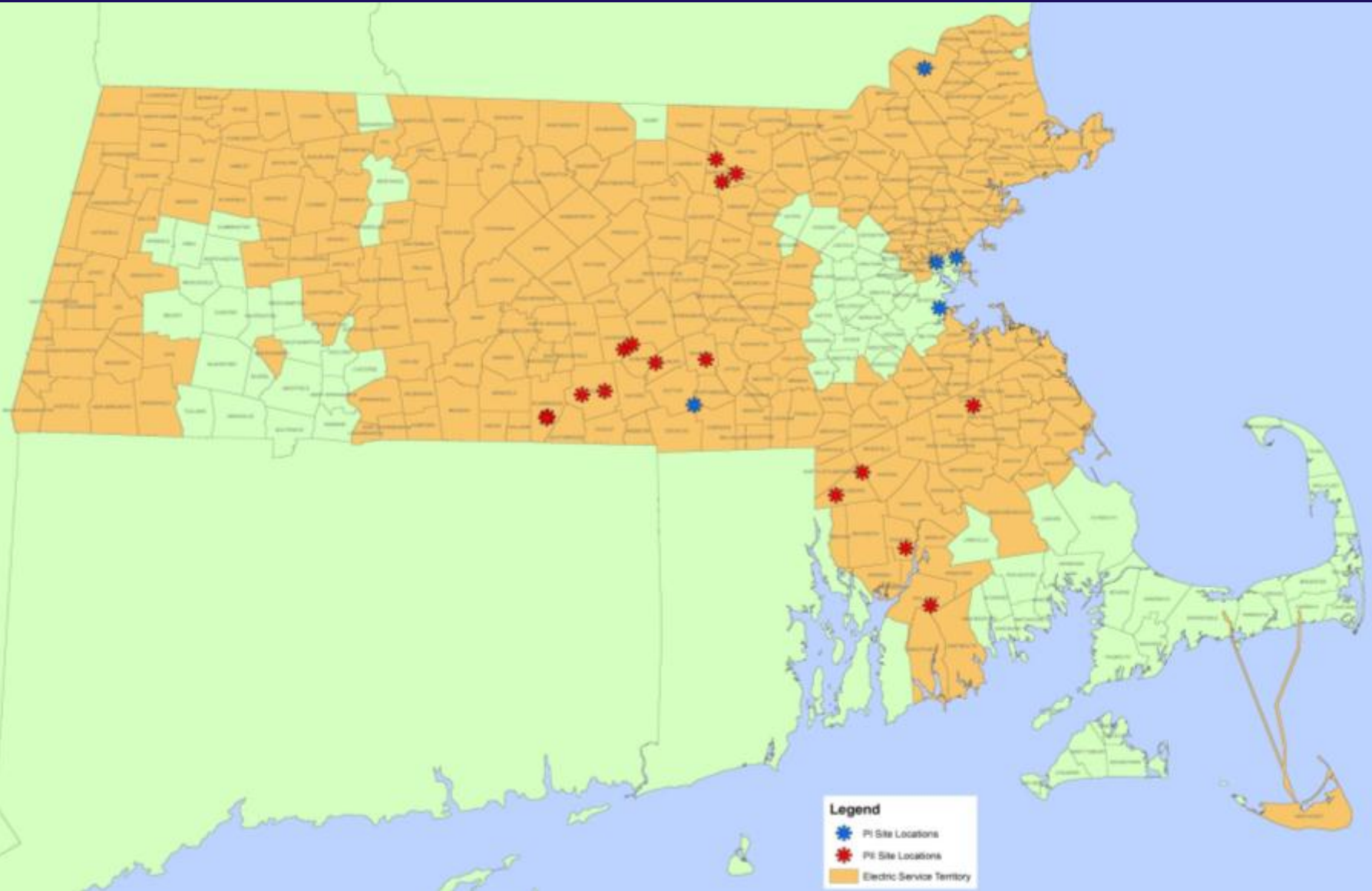


TSRG Meeting – 03/17/2016

Justin Woodard

Babak Enayati





Four sites interconnected

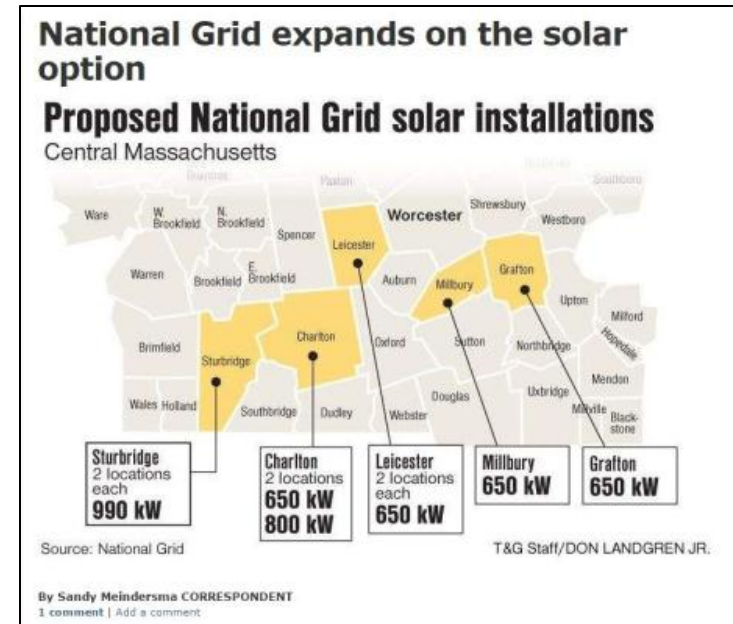
- Auburn Rd Millbury – 650 kW
- Oxford Rd Charlton – 650 kW
- Groton Road Shirley– 1 MW
- Richardson Drive Attleboro – 1MW

Sites constructed

- Boutilier Rd Leicester – 650 kW
- Kelly Rd Sturbridge (1) – 1 MW
- Kelly Rd Sturbridge (2) – 1 MW

Sites under construction:

- Carpenter Hill Rd Charlton – 800 kW
- Stafford St Leicester - 650 kW
- Main St Dighton – 1MW
- Old Upton Rd Grafton – 650 kW
- Groton Rd Ayer – 1MW



Timeline

Submitted Filing to DPU

Dec 2013

DPU Pre-Approval

Jun 2014

Program Sanction (USSC)

Oct 2014

Construction Commenced

Feb 2015

Est. Construction Complete

June 2016

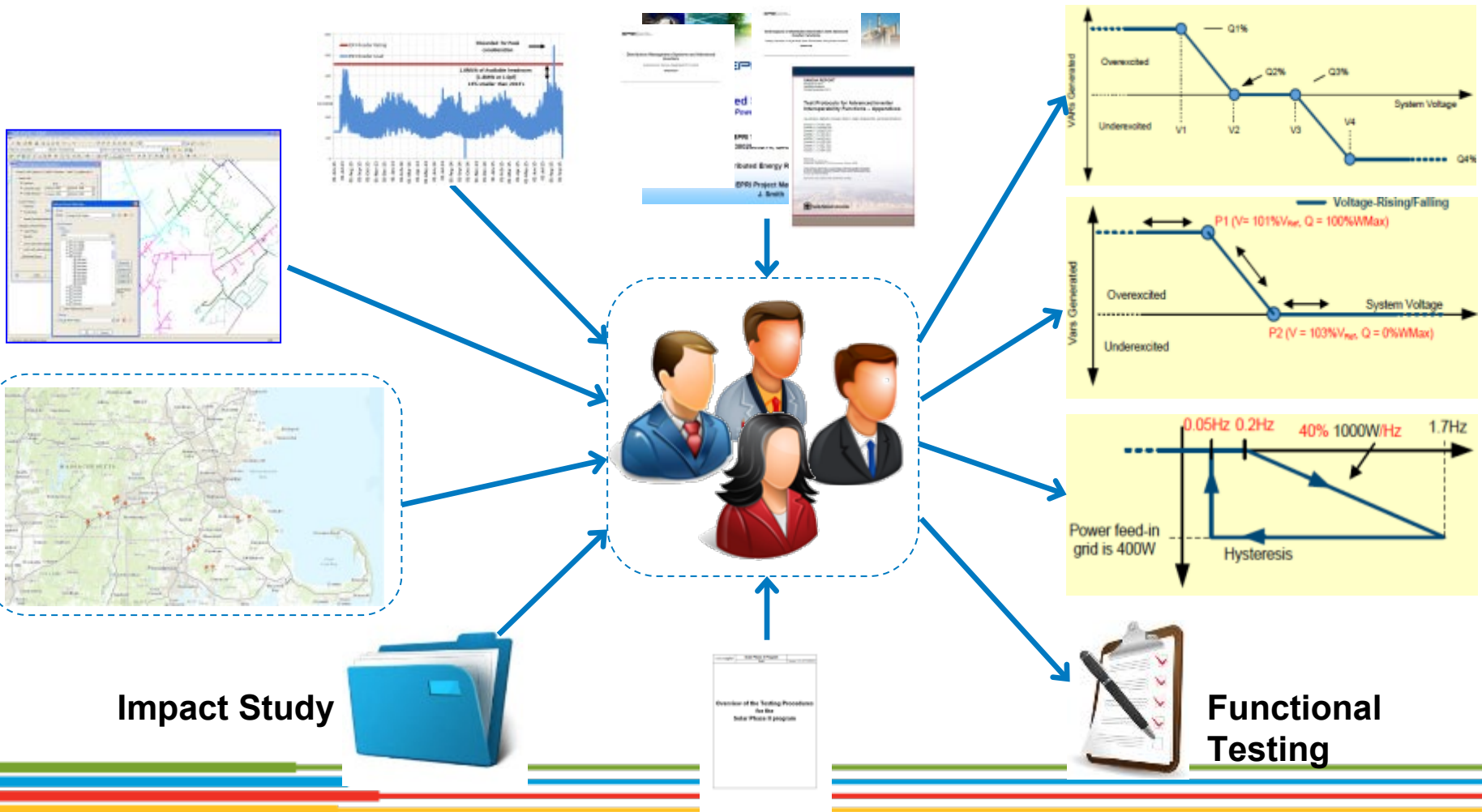
Estimated In-Service

Dec 2015 - Dec 2017



Functionality	Modes	Description
Active Power Control	Real Power Curtailment	Ability to limit the active power production of the PV site to a value below its potential
Active Power Control	Ramp Rate Control	Ability to limit the rate of change in magnitude of active power supplied
Reactive Power Control	Fixed Power Factor: P_{fixed}	Ability to maintain a power factor at the PV site's PCC by changing reactive power injection
Reactive Power Control	Fixed Reactive Set-point: Q_{fixed}	Ability to inject a fixed amount of reactive power (percentage of nameplate) at the PCC
Reactive Power Control	Power factor compensation - Power factor/active power characteristic curve $PF(P)$	Ability to establish a Power Factor level at the PCC based on actual Active Power production
Reactive Power Control	Voltage Compensation - Reactive power/voltage characteristic curve $Q(U)$	Ability to inject Reactive Power at the PCC based on actual Voltage level
Reactive Power Control	Voltage Regulation – closed loop regulation of the voltage Ramp Rate Control	Ability to establish a Voltage level at the PCC by injecting Reactive Power. Ability to limit the rate of change in magnitude of reactive power supplied
Frequency Droop Response	Real Power Curtailment	Ability to curtail Active Power during higher than normal frequency at the PCC
Low Voltage Ride Through (“LVRT”) & High Voltage Ride Through (“HVRT”)	Ride Through or Modulated Power Output	Ability to configure the tripping of the PV site during Under and Over Voltage events at the PCC (beyond what UL1741 specifies)
Frequency Ride Through (“FRT”)	Ride Through or Modulated Power Output	Ability to configure the tripping of the PV site during Under and Over Frequency events at the PCC (beyond what UL1741 specifies)

- Each site requires specific configuration settings based on the operational conditions in the area and the “purpose” of the site



Coordination of sites

- Coordination of sites at a Feeder, Transformer and Substation level
- Optimization of Assets' usage
- Improvement of system operation
- Testing of communication and integration schemes

Power Line Carrier (DTT)

- Improved DTT reliability and operation

Thank you!

