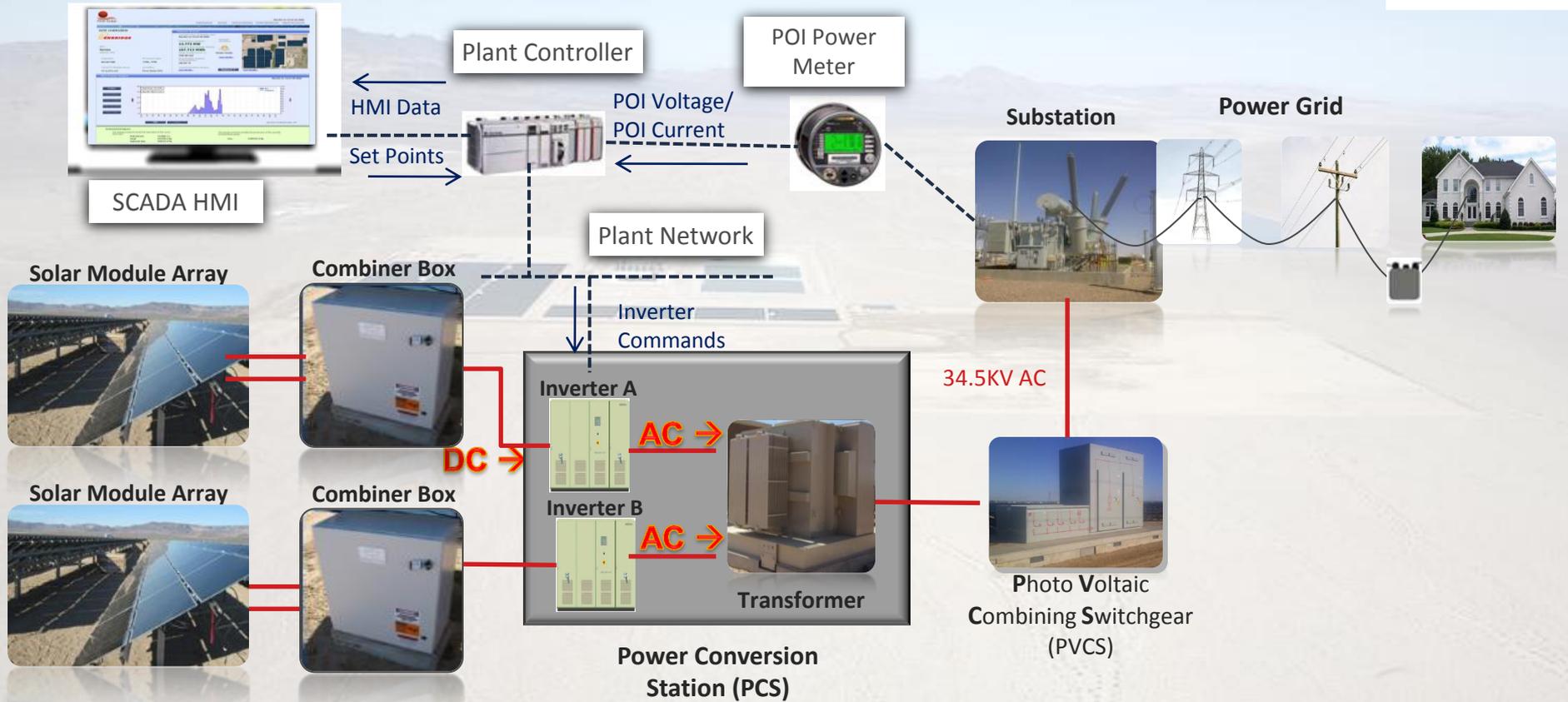




FERC Technical Conference on Reactive Power 4/12/12

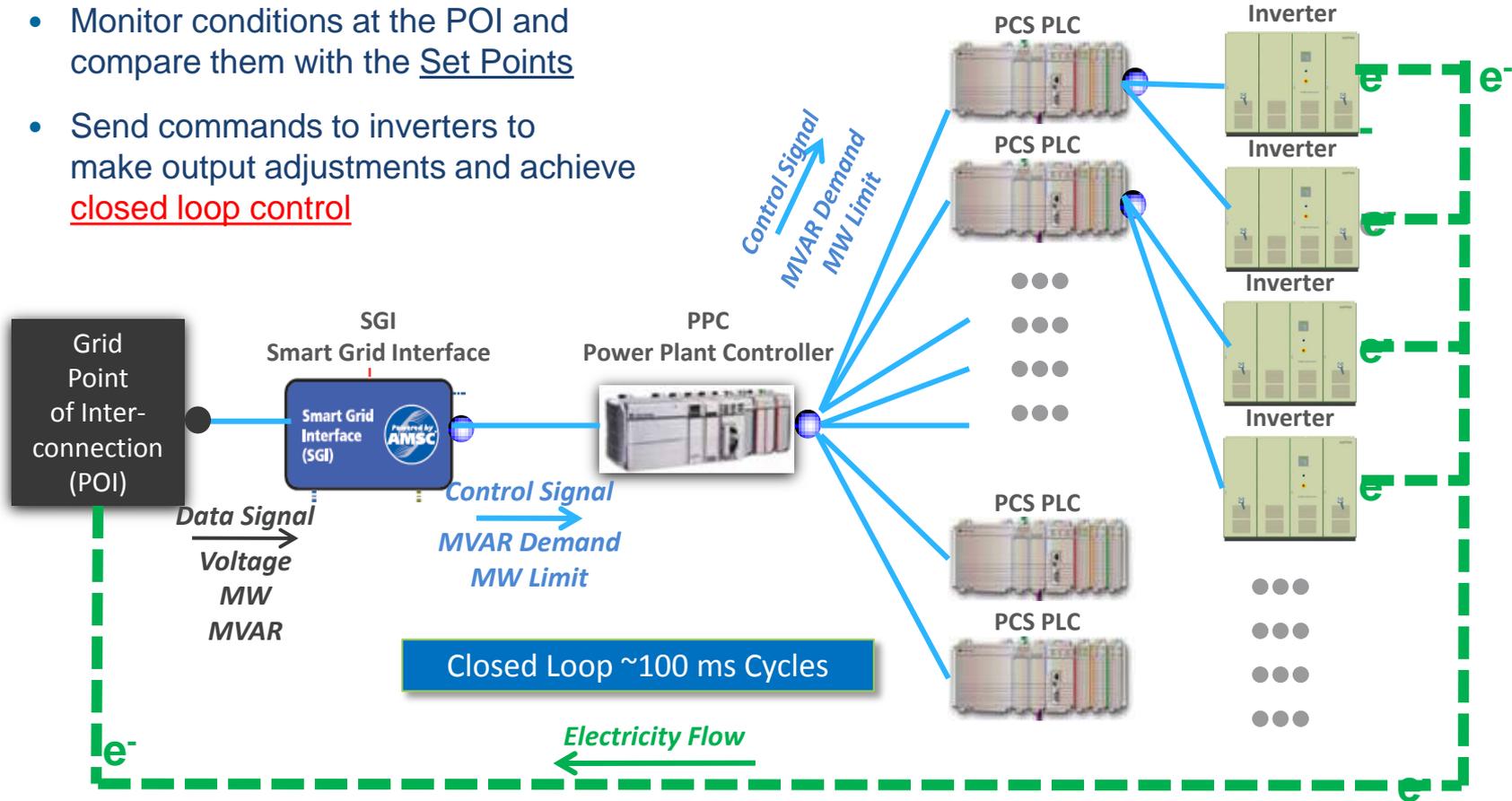
First Solar

# Power Plant Overview



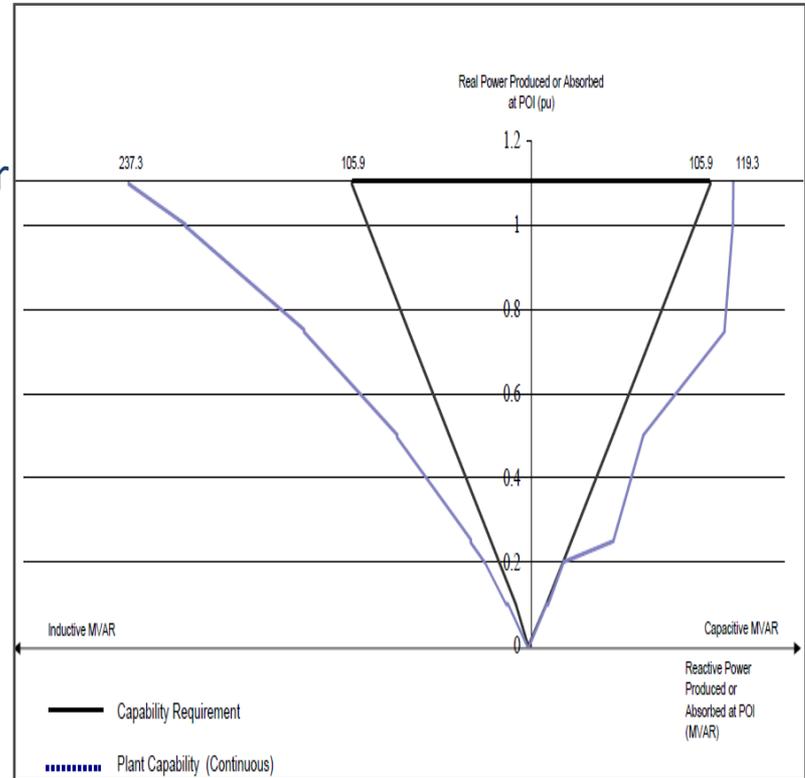
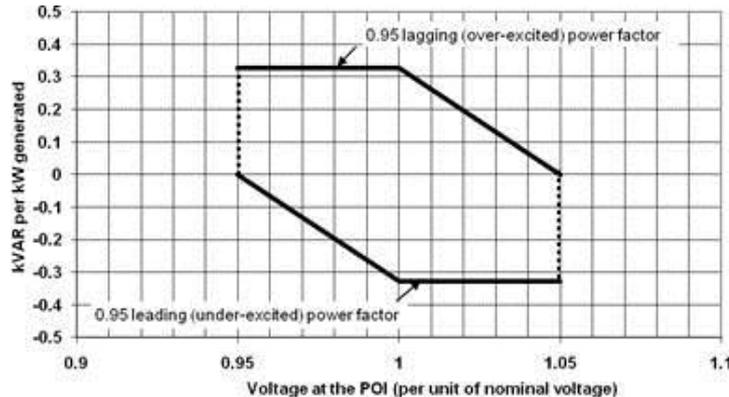
# First Solar Plant Control System Architecture

- Monitor conditions at the POI and compare them with the Set Points
- Send commands to inverters to make output adjustments and achieve closed loop control

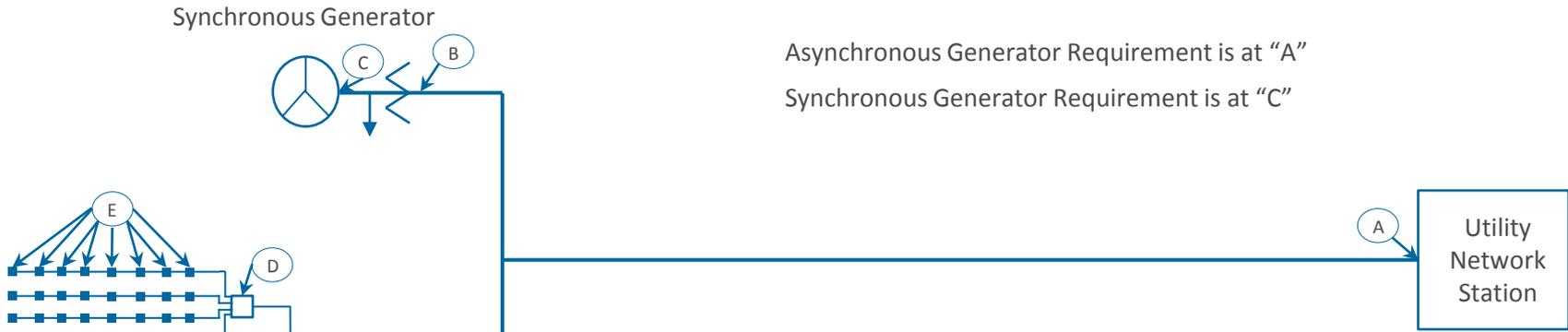


# Typical Grid Requirements:

- Provide 0.95 leading and lagging at Point of Interconnection (POI)
- Maintain specified output voltage; or Maintain specified PF
- Operate within the range of 0.95 to 1.05 per unit voltage



# Differentiated Reactive Requirements by Technology



Asynchronous Generator Requirement is at "A"  
 Synchronous Generator Requirement is at "C"

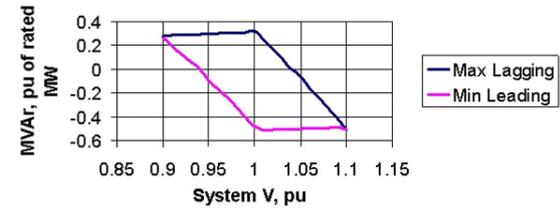
Generally, a synchronous generator with a capability of 0.90 lag at the generator terminal ("C") can provide 0.95 lag to the high side ("B") at 100% system voltage.

(NERC IVGTF Special Reliability Assessment: Interconnection Requirements for Variable Generation (March 2012))

Asynchronous Generator

- A = Point of Interconnection (POI)
- B = Power plant main transformer high voltage side
- C = Generator Terminals (or low side of main transformer if aux load is ignored)
- D = Combining Switchgear
- E = Inverter Terminals

**Reactive Output of Synch Gen at Rated Power, 0.90 lagging/0.95 leading pf at terminals, 14% reactance GSU**



## Our Mission

To create enduring value by enabling a world powered by clean, affordable solar electricity.

