Template Narrative & Flowchart (please note this is a very rough draft, just for consideration of the TSRG energy storage subgroup)

Goal: Draft a simple to use template guideline for developer self-identification of system specifications for consideration in interconnection.

Purpose: Reduce required iterations of submission (developer) and study (utility) by receiving pertinent information up-front. Determine how standard energy storage use cases can be identified, grouped, and evaluated for interconnection.

1.1 System Identification (complete all that apply)

	New (check all that apply)	DC Rating (kW)	AC Rating (kW)	kWh Rating
Solar				
Wind				
CHP				
Energy Storage				

	Existing onsite (check all that apply)	DC Rating (kW)	AC Rating (kW)	kWh Rating
Solar				
Wind				
CHP				
Energy Storage				

1.2 Intended Programmatic Participation Identification (check all that apply)

	SMART Program	RPS	APS	ISO-NE Market Enrollment	Utility Demand Response	EE
Solar						
Wind						
CHP						
Energy Storage						

1.3 System Ratings (where system includes all relevant generation and storage included in this application, complete all that apply)

Maximum Import (Operational, Energy Storage only)	kW
Maximum Export (Operational)	kW
Maximum Ramp Rate (Operational, +/-)	kW/s
Maximum Import (Energy Storage system only, ratings)	kW
Maximum Export (Total inverter & spinning generator AC ratings)	kW

1.4 Operational Controls (if Operational are different from Total ratings above, complete all that apply)

	Control 1: Inverter Settings	Control 2: PLC Settings	Control 3: Power Relays (describe)	Control 4: BBM Switching of Inverters Connected	Control 5: Other
Controls leading to difference between Maximum Import Ratings vs Maximum Import Operational					
Controls leading to difference between Maximum Export Ratings vs Maximum Export Operational					
Maximum Ramp Rate Controls					

1.5 System: Physical Configuration Flowchart (Check and complete all that apply)

This could be turned into a web-tool (or interactive spreadsheet) where selecting a box determines what the next available question is.

Example: Standalone AC coupled 1 MW solar 300kW/600kWh ES with simple configuration for ITC and operationally PLC limited to cumulative 1MW export completed

Check	New/ Existing	kW/ kWh	Method of import / export control	System Configuration Description
X		1,000	#2	**1. Solar + Storage**
X				1.1. AC Coupled (solar and storage behind separate inverters)
X	N	1,000		1.1.1.Solar Yes Export Capable
X	N	300/ 600		1.1.1.1. Storage Yes Export Capable
				1.1.1.1.1. Storage Yes Import Capable
				1.1.1.1.1.1. System Yes Intentional Island Capable
				1.1.1.1.1.2. System No Intentional Island Capable
X			#1	1.1.1.1.2. Storage Not Import Capable
				1.1.1.2. Storage No Export Capable
				1.1.1.2.1. Storage Yes Import Capable
				1.1.1.2.1.1. System Yes Intentional Island Capable
				1.1.1.2.1.2. System No Intentional Island Capable
				1.1.1.2.2. Storage Not Import Capable
				1.1.1.2.2.1. System Yes Intentional Island Capable
				1.1.1.2.2.2. System No Intentional Island Capable
				1.1.2.Solar Not Export Capable
				1.1.2.1. Storage Yes Export Capable
				1.1.2.1.1. Storage Yes Import Capable
				1.1.2.1.2. Storage No Import Capable

				1.1.2.2. Storage No Export Capable
				1.1.2.2.1. Storage Yes Import Capable
				1.1.2.2.1.1. System Yes Intentional Island Capable
				1.1.2.2.1.2. System No Intentional Island Capable
				1.1.2.2.2. Storage No Import Capable
				1.1.2.2.2.1. System Yes Intentional Island Capable
				1.1.2.2.2.2. System No Intentional Island Capable
				1.2. DC Coupled (solar and storage behind the same inverter(s))
				1.2.1.Solar Yes Export Capable
				1.2.1.1. Storage Yes Export Capable
				1.2.1.1.1. Storage Yes Import Capable
				1.2.1.1.1.1. System Yes Intentional Island Capable
				1.2.1.1.1.2. System No Intentional Island Capable
				1.2.1.1.2. Storage No Import Capable
				1.2.1.1.2.1. System Yes Intentional Island Capable
				1.2.1.1.2.2. System No Intentional Island Capable
				1.2.1.2. Storage No Export Capable
				1.2.1.2.1. Storage Yes Import Capable
				1.2.1.2.1.1. System Yes Intentional Island Capable
				1.2.1.2.1.2. System No Intentional Island Capable
				1.2.1.2.2. Storage No Import Capable
				1.2.1.2.2.1. System Yes Intentional Island Capable
				1.2.1.2.2.2. System No Intentional Island Capable
				1.2.2.Solar No Export
				1.2.2.1. Storage Yes Export
				1.2.2.1.1. Storage Yes Import
				1.2.2.1.2. Storage No Import
				1.2.2.2. Storage No Export
				1.2.2.2.1. Storage Yes Import
				1.2.2.2.2. Storage No Import
				2. Stand-Alone Storage
				2.1. Storage Yes Export Capable
				2.1.1.Storage Yes Intentional Island Capable
				2.1.2.Storage No Intentional Island Capable
				2.2. Storage No Export Capable
				2.2.1.Storage Yes Intentional Island Capable
				2.2.2.Storage No Intentional Island Capable
				3. CHP + Storage
				3.1. AC Coupled
				3.1.1.CHP Yes Export Capable
				3.1.1.1. Storage Yes Export Capable
				3.1.1.1.1. Storage Yes import capable
				3.1.1.1.1.1. System Yes intentional island capable
				3.1.1.1.1.2. System No intentional island capable
				3.1.1.1.2. Storage No import capable
				3.1.1.1.2.1. System Yes intentional island capable
				3.1.1.1.2.2. System No intentional island capable
				3.1.1.2. Storage No Export Capable
				3.1.1.2.1. Storage Yes import capable
				3.1.1.2.1.1. System Yes intentional island capable
				3.1.1.2.1.2. System No intentional island capable

				3.1.1.2.2. Storage No import capable
				3.1.1.2.2.1. System Yes intentional island capable
				3.1.1.2.2.2. System No intentional island capable
				3.1.2.CHP No Export Capable
				3.1.2.1. Storage Yes Export Capable
				3.1.2.1.1. Storage Yes import capable
				3.1.2.1.1.1. System Yes intentional island capable
				3.1.2.1.1.2. System No intentional island capable
				3.1.2.1.2. Storage No import capable
				3.1.2.1.2.1. System Yes intentional island capable
				3.1.2.1.2.2. System No intentional island capable
				3.1.2.2. Storage No Export Capable
				3.1.2.2.1. Storage Yes import capable
				3.1.2.2.1.1. System Yes intentional island capable
				3.1.2.2.1.2. System No intentional island capable
				3.1.2.2.2. Storage No import capable
				3.1.2.2.2.1. System Yes intentional island capable
				3.1.2.2.2.2. System No intentional island capable
				3.2. DC Coupled
				3.2.1.CHP Yes Export Capable
				3.2.1.1. Storage Yes Export Capable
				3.2.1.1.1. Storage Yes import capable
				3.2.1.1.1.1. System Yes intentional island capable
				3.2.1.1.1.2. System No intentional island capable
				3.2.1.1.2. Storage No import capable
				3.2.1.1.2.1. System Yes intentional island capable
				3.2.1.1.2.2. System No intentional island capable
				3.2.1.2. Storage No Export Capable
				3.2.1.2.1. Storage Yes import capable
				3.2.1.2.1.1. System Yes intentional island capable
				3.2.1.2.1.2. System No intentional island capable
				3.2.1.2.2. Storage No import capable
				3.2.1.2.2.1. System Yes intentional island capable
				3.2.1.2.2.2. System No intentional island capable
				3.2.2.CHP No Export Capable
				3.2.2.1. Storage Yes Export Capable
				3.2.2.1.1. Storage Yes import capable
				3.2.2.1.1.1. System Yes intentional island capable
				3.2.2.1.1.2. System No intentional island capable
				3.2.2.1.2. Storage No import capable
				3.2.2.1.2.1. System Yes intentional island capable
				3.2.2.1.2.2. System No intentional island capable
				3.2.2.2. Storage No Export Capable
				3.2.2.2.1. Storage Yes import capable
				3.2.2.2.1.1. System Yes intentional island capable
				3.2.2.2.1.2. System No intentional island capable
				3.2.2.2.2. Storage No import capable
				3.2.2.2.2.1. System Yes intentional island capable
				3.2.2.2.2.2. System No intentional island capable

System: Operational Plan Charts

System Operational Plan Chart I; Primary Storage Use (check all that apply)					
Solar + Storage		Standalone Storage		CHP + Storage	
Solar export to grid		Demand charge reduction		CHP export to grid	
Storage export to grid		Islanding		Storage export to grid	
Storage import from grid		Capacity charge reduction		Storage import from grid	
Solar self-consumption		Wholesale market participation		Demand charge reduction	
Solar firming/ramp rate control		Utility demand response program		Islanding	
Demand charge reduction		Onsite power quality remediation		Capacity charge reduction	
Islanding				CHP energy arbitrage	
Capacity charge reduction				Wholesale market participation	
Wholesale market participation				Utility demand response program	
Utility demand response program					

System Operational Plan Chart II; Wholesale market participation intentions (check all that apply)					
Solar + Storage		Standalone Storage		CHP + Storage	
Day Ahead Energy		Day Ahead Energy		Day Ahead Energy	
Real Time Energy		Real Time Energy		Real Time Energy	
Forward Capacity		Forward Capacity		Forward Capacity	
Financial Transmission Rights		Financial Transmission Rights		Financial Transmission Rights	
Forward Reserve		Forward Reserve		Forward Reserve	
Regulation		Regulation		Regulation	
Voltage Support		Voltage Support		Voltage Support	
Black Start		Black Start		Black Start	
Demand		Demand		Demand	

** note: add note about second wholesale participant on a circuit goes to ISO interconnect*

System Operational Plan: Export Times; Hours energy storage may export to the grid (check all that apply)											
1	2	3	4	5	6	7	8	9	10	11	12
13	14	15	16	17	18	19	20	21	22	23	24

Expected configurations and evaluation considerations:

This may be a good survey to provide to DG community to get a sense of what install types to initially expect. Once we have survey results, we could try to address specific evaluation considerations for the most common/most likely upcoming interconnection requests. Each configuration could lead to simple evaluation results (no export means not cumulative etc.). Next level of intricacy will be if a system configuration or operating profile can demonstrate it won't impact minimum loading (only applicable to systems where some form of export occurs). Etc.

4. Solar + Storage
   4.1. AC Coupled
      4.1.1.Solar Yes Export Capable(likely common)
         4.1.1.1. Storage Yes Export Capable (tbd if common)
            - (Borrego fill in?)
            4.1.1.1.1. Storage Yes Import Capable (tbd if common)
               4.1.1.1.1.1. System Yes Intentional Island Capable
               4.1.1.1.1.2. System No Intentional Island Capable
            4.1.1.1.2. Storage Not Import Capable (tbd if commong)
         4.1.1.2. Storage No Export Capable (likely common)
            - What are acceptable techniques to ensure the storage is not export capable?
               - E.G. Inverter has Cal 21 compliant settings
            - Result of demonstration of acceptable technique;
               - If storage export is not possible, its inverter should NOT be considered as cumulative for system evaluation
            4.1.1.2.1. Storage Yes Import Capable (tbd if common)
               4.1.1.2.1.1. System Yes Intentional Island Capable
               4.1.1.2.1.2. System No Intentional Island Capable
            4.1.1.2.2. Storage Not Import Capable (likely common)
               4.1.1.2.2.1. System Yes Intentional Island Capable (likely common)
               4.1.1.2.2.2. System No Intentional Island Capable
      4.1.2.Solar Not Export Capable (tbd if common)

Method of ensuring not export capable				
Control 1: Inverter Settings/limitations	Control 2: PLC Settings	Control 3: Power Relays	Control 4: BBM Switching of Inverters Connected	Other

            - What are acceptable techniques to ensure the solar is not export capable?
            - If solar export is not possible, solar inverter should Not be considered as cumulative for system evaluation
         4.1.2.1. Storage Yes Export Capable (unlikely)
            4.1.2.1.1. Storage Yes Import Capable(unlikely)
            4.1.2.1.2. Storage No Import Capable(unlikely)
         4.1.2.2. Storage No Export Capable (tbd if common)
            - If storage export is not possible, storage inverter should Not be considered as cumulative for system evaluation
            - Any reason for this system (and all subsets) to not go through a simplified process?
            4.1.2.2.1. Storage Yes Import Capable (tbd if common)
               4.1.2.2.1.1. System Yes Intentional Island Capable

4.1.2.2.1.2. System No Intentional Island Capable
4.1.2.2.2. Storage No Import Capable (tbd if common)
4.1.2.2.2.1. System Yes Intentional Island Capable
4.1.2.2.2.2. System No Intentional Island Capable

4.2. DC Coupled

- For all DC coupled systems, Only the inverter size is considered for determination of Simplified eligible (<10kW single phase, <25 kW 3 phase etc.)?

4.2.1.Solar Yes Export Capable (likely common)
4.2.1.1. Storage Yes Export Capable (likely common)
4.2.1.1.1. Storage Yes Import Capable (tbd)
4.2.1.1.1.1. System Yes Intentional Island Capable
4.2.1.1.1.2. System No Intentional Island Capable
4.2.1.1.2. Storage No Import Capable (tbd)
4.2.1.1.2.1. System Yes Intentional Island Capable
4.2.1.1.2.2. System No Intentional Island Capable
4.2.1.2. Storage No Export Capable (likely common)
4.2.1.2.1. Storage Yes Import Capable (tbd)
4.2.1.2.1.1. System Yes Intentional Island Capable
4.2.1.2.1.2. System No Intentional Island Capable
4.2.1.2.2. Storage No Import Capable (likely common)
4.2.1.2.2.1. System Yes Intentional Island Capable (likely common)
4.2.1.2.2.2. System No Intentional Island Capable
4.2.2.Solar No Export (tbd if common)
4.2.2.1. Storage Yes Export (unlikely)
4.2.2.1.1. Storage Yes Import (unlikely)
4.2.2.1.2. Storage No Import (unlikely)
4.2.2.2. Storage No Export (tbd)
4.2.2.2.1. Storage Yes Import (tbd)
4.2.2.2.2. Storage No Import (tbd)

5. Stand-Alone Storage
5.1. Storage Yes Export Capable (unlikely)
5.1.1.Storage Yes Intentional Island Capable
5.1.2.Storage No Intentional Island Capable
5.2. Storage No Export Capable (likely)
5.2.1.Storage Yes Intentional Island Capable
5.2.2.Storage No Intentional Island Capable
6. CHP + Storage
6.1. AC Coupled
6.1.1.CHP Yes Export Capable (unlikely)
6.1.1.1. Storage Yes Export Capable
6.1.1.2. Storage No Export Capable
6.1.2.CHP No Export Capable
6.1.2.1. Storage Yes Export Capable (unlikely)
6.1.2.2. Storage No Export Capable (likely)
6.2. DC Coupled