

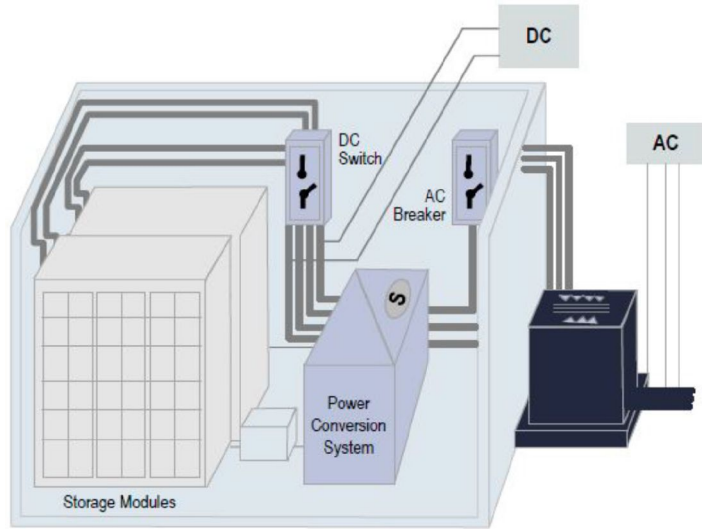
TENETS OF AUGMENTATION PLAN

An augmentation plan is to identify:

- Original system size (To avoid oversizing)
- Optimal number of schedules
- Overall augmentation system size (number of strings to be added)
- Space required

AUGMENTATION

SYSTEM



SOW: BESS, PCS, Containers EPC

Costs involved:

- Augmented BESS costs
- EPC

Parameters to consider:

- New system starts to decay at BOL efficiency rate

STRING



SOW: Battery strings, labor costs, (EPC and containers applicable)

Costs involved:

- Battery pack costs
- Labor costs and hours required
- EPC cost if new container is to be added

Parameters to consider:

- Same no. of packs in the string to match voltage levels
- Same number of strings added to each PCS in case of multiple PCS
- Added string does not operate at BOL efficiency. It operates at original system's level of degradation

METHODOLOGY

Try to figure out: Optimal original number of strings > optimal number of schedules > augmentation string combination

Step 1: Oversize the system (if required) so as to ensure the system's capacity does not drop below minimum capacity in the first few years

Step 2: Use different numbers of strings in original system

Step 3: Identify the total number of additional strings required for augmentation over the system life

Step 4: Figure out permutations for each schedule. Use a smaller number of strings in the early schedules

Step 5: For each original string, calculate NPV with the least number of augmentation strings in early schedules to figure out the optimal original string

Step 6: Then identify the number of strings in each augmentation schedule by NPV calculation

	Original string	New strings
2-schedule	62	2,13
	64	2,11
		3,10
		4,9
		5,8
		6,7
	66	4,7
		5,6
		6,5
3-schedule	62	2,2, 11
	64	2,2,9
		2,4,7
		2,6,5
		2,8,3
	66	2,2,7
		2,4,5
		2,6,3