NCSX Power Systems

- The NCSX power systems will primarily use existing equipment from PPPL's C- and D-Site power conversion installations.
- D-Site equipment will be used to replace older supplies (PBX-M OH and EF) and to augment the existing C-Site capability.
- Utilizing D-Site equipment is a cost effective and flexible way to upgrade the C-Site power conversion capability both for NCSX and for future devices that may be located at C-Site.

C-Site (MG, SF, & LING (

- C-Site Motor Generator (MG) Facility
  - 3 MG sets (1 Motor, 4 Generators, 1 Flywheel) rated 22.3 kA DC (pulsed) @ 750 VDC, 2 sec ESW at 5 % duty cycle including all necessary switchgear and protective equipment.
- C-Site SF (PBX-M) Power Supplies
  - Six (1 - 20 kA / 500 V, 1 - 10 kA / 200 V, 4 - 5 kA / 300 V, 1 % duty cycle pulsed) 12-pulse AC-DC converters (including switchgear and AC / DC protection systems).
- LING
  - 2 kA / 50 V high speed linear amplifier.

C-Site (MG, SF, & LING (

The cost of reconfiguring the SF and LING supplies for NCSX use is minimal (< $20 K)

The costs to recommission C-Site MG sets 1 and 2 is approximately $660 K. There will be an additional cost of $300 K to recommission set 3.

D-Site FCPC equipment

Move (10 - 12) 12-pulse TRANSREX AC - DC converter assemblies (2 x 24kA / 1 kV pulsed at 1 % duty cycle), transformers, and switchgear from D-Site to C-Site for NCSX.

Add a 13.8 kV feed from the D-Site variable frequency (MG) bus to the C-Site power yard. NSTX and NCSX can both simultaneously draw power from the same D-Site MG set.

Utilize existing D-Site CLR / AC Breaker arrangement to limit short circuit capability of the D ⟹ C-Site feed.

D-Site FCPC equipment

- Modify the existing TRANSREX/PPPL firing generator or design a new firing generator so that the A and B sections of the TRANSREX supplies may be operated independently. This will give us "2N" power supplies where N is the number of TRANSREX boxes moved from D to C-Site, each capable of 24 kA / 1 kV pulsed operation.

D-Site FCPC equipment

- Estimated cost to use D-Site supplies at C-Site with a D-Site feed is $ 2.15 M .
- The estimated cost of a new 13.8 kV substation at C-Site* to use with TRANSREX power supplies at C-Site is $3.5 M.
- The estimated cost to purchase, install, and commission new power supplies for NCSX would be more than $4.5 M.

* A suitable agreement between the lab and PSE&G would be required to permit us to draw power from the utility system at this level.