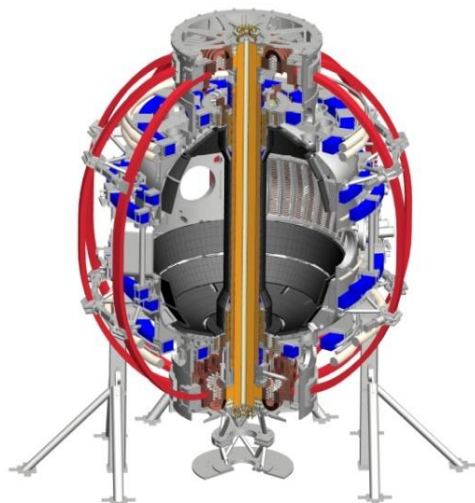


# 5 year plan update

**J. Menard, M. Ono**

**PPPL – B318  
September 17, 2012**

*Coll of Wm & Mary  
Columbia U  
CompX  
General Atomics  
FIU  
INL  
Johns Hopkins U  
LANL  
LLNL  
Lodestar  
MIT  
Lehigh U  
Nova Photonics  
Old Dominion  
ORNL  
PPPL  
Princeton U  
Purdue U  
SNL  
Think Tank, Inc.  
UC Davis  
UC Irvine  
UCLA  
UCSD  
U Colorado  
U Illinois  
U Maryland  
U Rochester  
U Tennessee  
U Tulsa  
U Washington  
U Wisconsin  
X Science LLC*



*Culham Sci Ctr  
York U  
Chubu U  
Fukui U  
Hiroshima U  
Hyogo U  
Kyoto U  
Kyushu U  
Kyushu Tokai U  
NIFS  
Niigata U  
U Tokyo  
JAEA  
Inst for Nucl Res, Kiev  
Ioffe Inst  
TRINITI  
Chonbuk Natl U  
NFRI  
KAIST  
POSTECH  
Seoul Natl U  
ASIPP  
CIEMAT  
FOM Inst DIFFER  
ENEA, Frascati  
CEA, Cadarache  
IPP, Jülich  
IPP, Garching  
ASCR, Czech Rep*

# 5 year plan schedule and budget guidance

- 5 year plan guidance from S. Eckstrand - August 2, 2012
  - The five year plan would be due ~April 1, 2013
  - Review would be held in early May
  - Budget guidance:
    - Use the FY 2012 level as the base - regard FY 2013 as an anomaly
    - For FY 2014 and beyond escalate the FY2012 to each successive year using ~2.5% inflation rate.
    - It would also be OK to include an over target case that is 10% higher than the baseline in each year
- **End of August 2012** – Chapter introductions (were) due
- End of October 2012 – First drafts of plan chapters due
- Nov-Dec 2012 – internal review/revision/editing of plan
- Mid January – Draft written plan due for PAC review
- Jan/Feb 2013 – 5 yr plan presentation ‘dry-run’ to PAC-33
- Plan presented to review committee and FES Apr 2013

# Today's updates by 5 year plan chapter authors:

- Progress to date on writing introduction to your chapter
- Any remaining data analysis or simulation tasks you need
  - Examples of specific things I'd like to hear about, and that will be important in the 5 year plan:
    - MS: NTV calculations for NCC coils for assessing rotation profile control with and without NCC
    - BP: Detachment simulations during divertor cryo-pumping with snowflake (as promised at last PAC for next PAC)
    - MR: choice of limiter vs. divertor lithium module - why and how
    - EP: RF source requirements for AE antenna for spectroscopy and/or channeling
    - RF: simulations of EBW current drive for NSTX-U advanced scenarios
    - SFSU: Improved TSC simulations of current ramp-up from CHI start-up through NBI ramp-up and with improved gap control

# Team developed comprehensive long-range plan supporting ITER, FNSF

Budget guess: requires 10-15% increment → must reduce scope up to 1/3

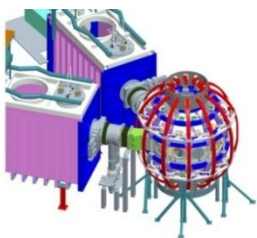
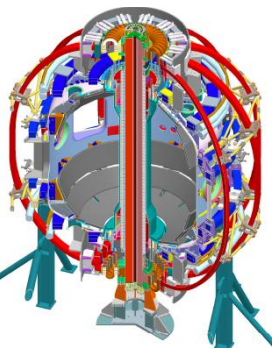
2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
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Upgrade Outage

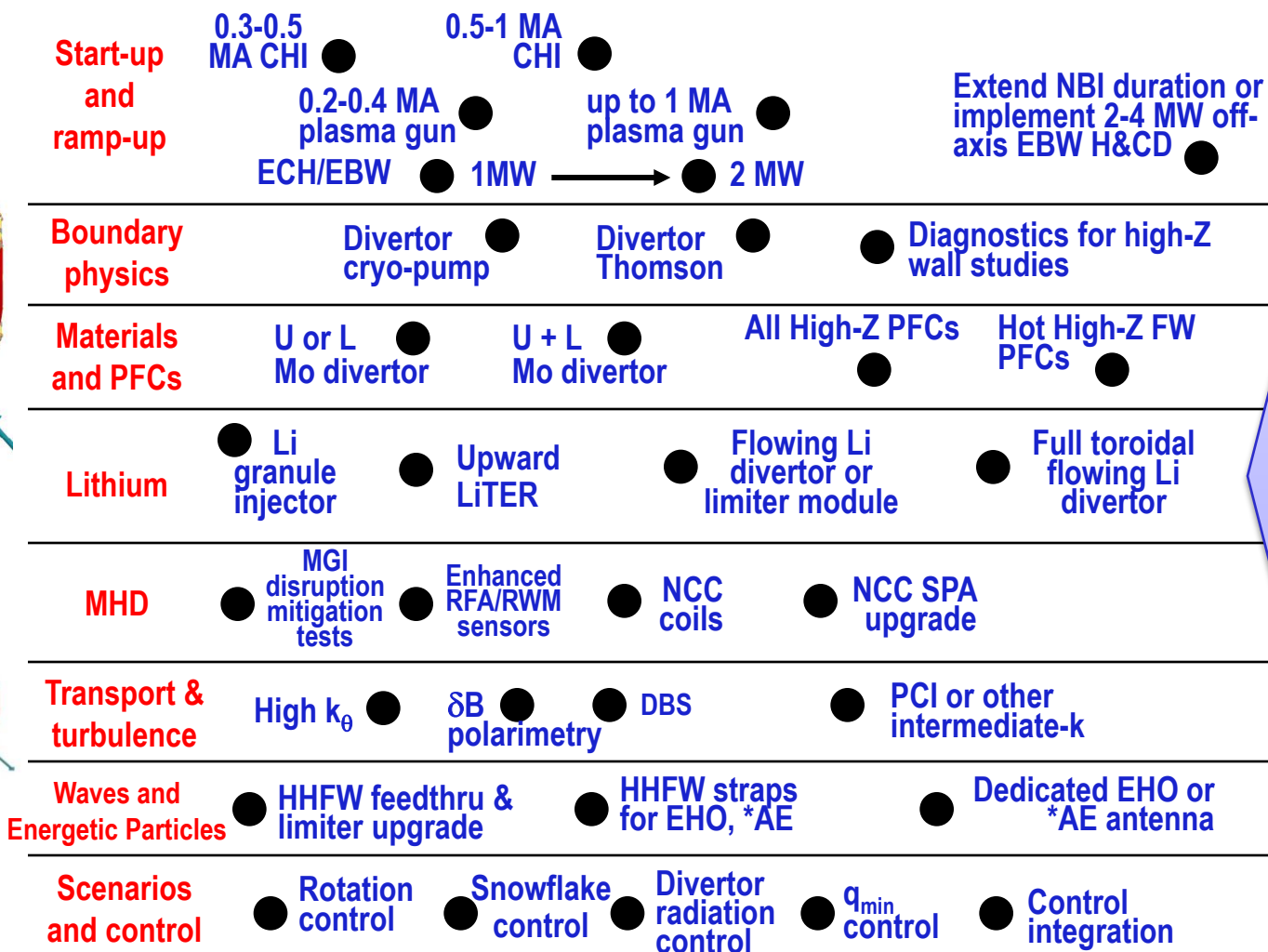
1.5 → 2 MA, 1s → 5s

Advanced PFCs, 5s → 10-20s

New center-stack



2nd NBI



**U.S. FNSF conceptual design including aspect ratio and divertor optimization**

# Strawman/draft upgrades to be in place by 2018 assuming base budget (More work needed by Masa, myself, and you to better define schedule)

2014	2015	2016- 2018					
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**Upgrade Outage**

**1.5 → 2 MA, 1s → 5s**

Upgraded CHI

**New center-stack**

**Start-up and ramp-up**

ECH/EBW 1 MW

**Boundary physics**

Divertor cryo-pump

**Materials and PFCs**

U or L Mo divertor

**Lithium**

Li granule injector

Upward LiTER

**MHD**

MGI disruption mitigation tests

Enhanced RFA/RWM sensors

**Transport & turbulence**

High  $k_{\theta}$

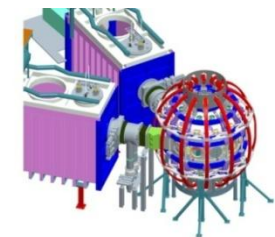
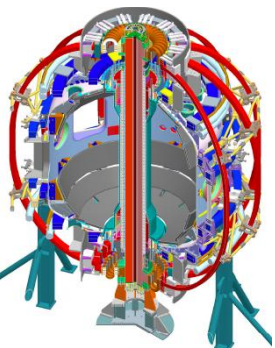
Polarimetry and DBS

**Waves and Energetic Particles**

HHFW feedthru & limiter upgrade

**Scenarios and control**

Control: rotation, snowflake, divertor radiation,  $q_{\min}$



**2nd NBI**