Some Strategic Thoughts

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August 7, 2012

What is the charge?

Prioritize MFE program elements in 3 scenarios:

1) FY2013 budgeted level of effort ($213M $FY2012)
   focus on burning plasmas & AT, plasma-material interaction

2) FY2012 budgeted level of effort ($252M $FY2012)
   focus on burning plasmas & AT, plasma-material interaction

3) 1.5x FY2013 budgeted level of effort ($320M $FY2012) FY2020-24
   (27% above 2012)
   much of increase to material science, harnessing fusion power

This charge articulates some current realities

1) ITER & AT will continue to need support from domestic programs

2) The next big S&T issue is Plasma-Material Interaction

3) Moving on to harnessing the neutrons from fusion will require $$$

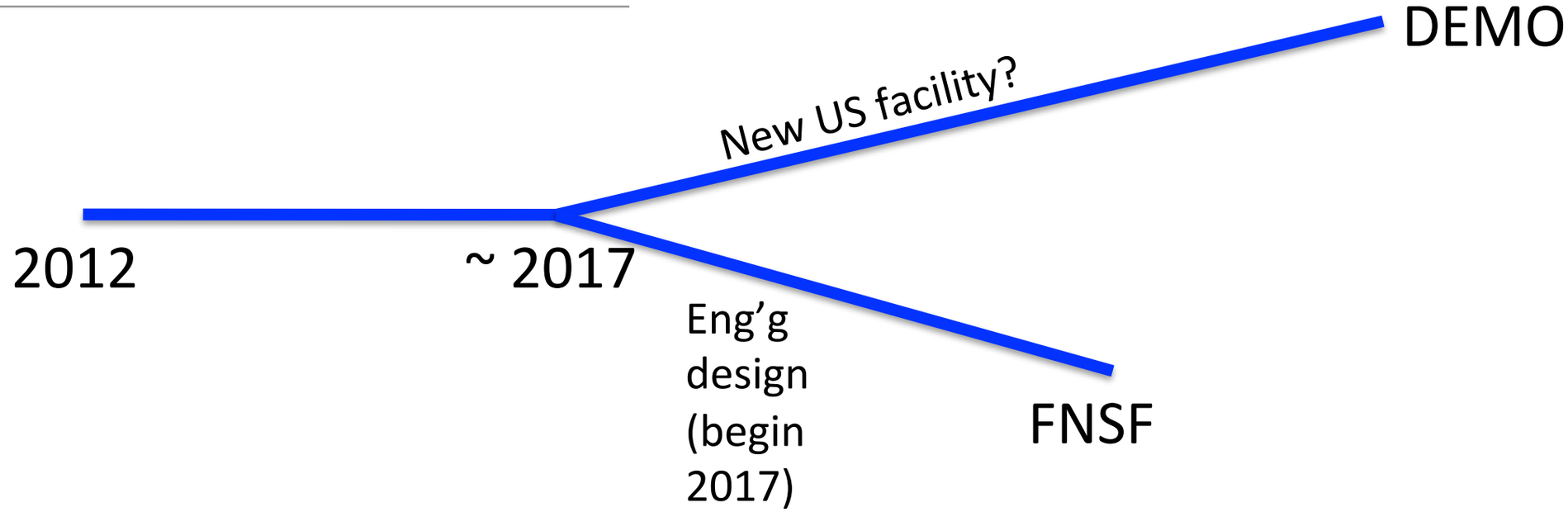
... but not some others

1) Major ITER & AT support will come from Asian S/C tokamaks in the future

2) No existing or planned machine can come close to FNSF or Demo PMI

3) To build FNSF will require an MFE program >> $320M/year

The situation could change



Perhaps by ~ 2017 there will be both:

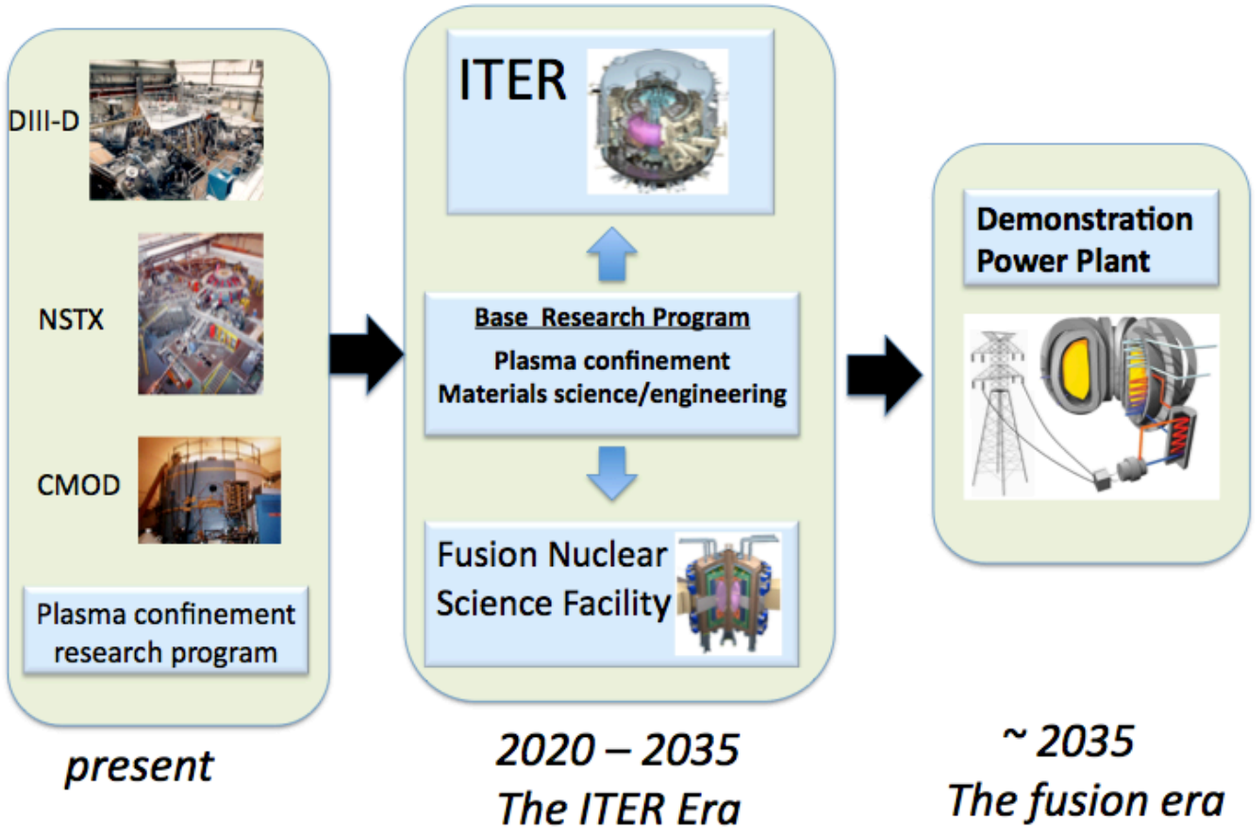
1) A solution to the PMI problem that allows engineering design of FNSF

2) Enough money to begin engineering design and R&D for an FNSF

If not, we should look at partnering in a longer-term international Demo.

- Build a new US facility to provide leading support?

The FNSF Path



Near-term goals:

1) Resolve basic design options: ST *vs*. AT, Cu *vs*. S/C, through experiments and scoping studies.

2) Develop a viable PMI concept through experiments and modeling.

The International Demo Path

Near-term goals are similar to FNSF path:

1) Resolve basic design options: AT *vs*. ST *vs*. Stellarator
   through experiments and scoping studies
   (for the near term, LHD and W7-X will be the stellarator flagships)

2) Develop a viable PMI option through experiments and modeling.

Longer-term goal (post ~2017):
U.S. leadership in one or more key areas for Demo.
Options might include:

1) Stellarator physics, if Demo is going in this direction

2) Plasma-materials interaction

3) Neutron-interactive materials

Strategic Implications

1) We should maintain near-term support for core physics of ITER, ATs, STs and Stellarators (and Innovative Confinement Concepts).

2) The U.S. should use its existing facilities and international collaboration to advance FNSF- and Demo- relevant PMI. The issues are very similar: high power density, long pulse, hot walls.

3) We should now work with others to scope out longer-term FNSF and Demo options, including $Q_{eng} > 1$ Pilot Plants.

4) We should now scope out longer-term options for new U.S. facilities in

   - Stellarator physics: *e.g.*, compact and/or quasi-symmetric
   - PMI S&T: *e.g.*, confinement device to study solid & liquid surface PMI
   - Neutron-material interaction: *e.g.*, U.S. accelerator-based options