

Exceptional service in the national interest



New after ReNeW: increased understanding in physics and the plasma edge and modeling, computational capability (materials, CFD), impacts of convected power to walls in ITER

Eye on the Final Fusion Solution

Integrated machine design; self-consistent approaches for power exhaust, power input, fueling and pumping, startup and shutdown; self-sufficient tritium supply

Personal comments and observations by

*Richard Nygren
Sandia National Laboratories*



Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000. SAND NO. 2011-XXXXP

Integration vs. ~~DIS~~-integration

- Don't DIS the program.

Not all hardware options to confine, heat, fuel, startup and shutdown D-T plasmas, pump particles, handle power, make and harvest tritium and power, can work together. The best options may differ with the confinement schemes.

Leaders need to develop and use this cross-cutting information to establish a vision (FNSF/DEMO) and credible path.



ReNeW+ tend to disassemble any vision of an integrated solution into activity-level tasks of subpanel-specialists.



We need a multi-disciplined approach to reassemble input from the sub-panel level, identify and integrate what is missing.

Examples: 1) disruptions, 2) placement, volume and remote handling for snowflake or super-X divertors, 3) liquid surface PFCs and integration of requirements for plasma heating and startup, 4) requirements on density and proximity to the plasma edge for RF and/or ECH power input versus the problem that launchers in a DEMO will probably have to project from a wall that is recessed behind poloidal limiters that handle transient heat loads from ELMs, 5) solutions for detached plasma with related restrictions on the geometry (?slot), gas injection perhaps with prompt dynamic feedback and control, startup scenario, etc.

Fusion must get past an old confinement barrier.

Pigeon hole confinement (PH) deflects us from a needed New Vision (NV).

Our planning workshops, program structure, motivations in our own specialized fields, drive us in this direction.

We characterize fusion's challenges with issues.
We love issues.

mapfusion.com (not real)

- Everything there except (how to make choices).
- Funders (Congress) see timeline as commitment independent of funding.