

Does a Single Large Facility Imply Increased Risk?

R. R. Parker
MFE ITER/Exp Plenary

Does a Single Large Facility Imply Increased Risk?

Short Answer: Yes, multiple large facilities would reduce risk, but this is not an option at present.

Does a Single Large Facility Imply Increased Risk?

Various types of risks can be identified:

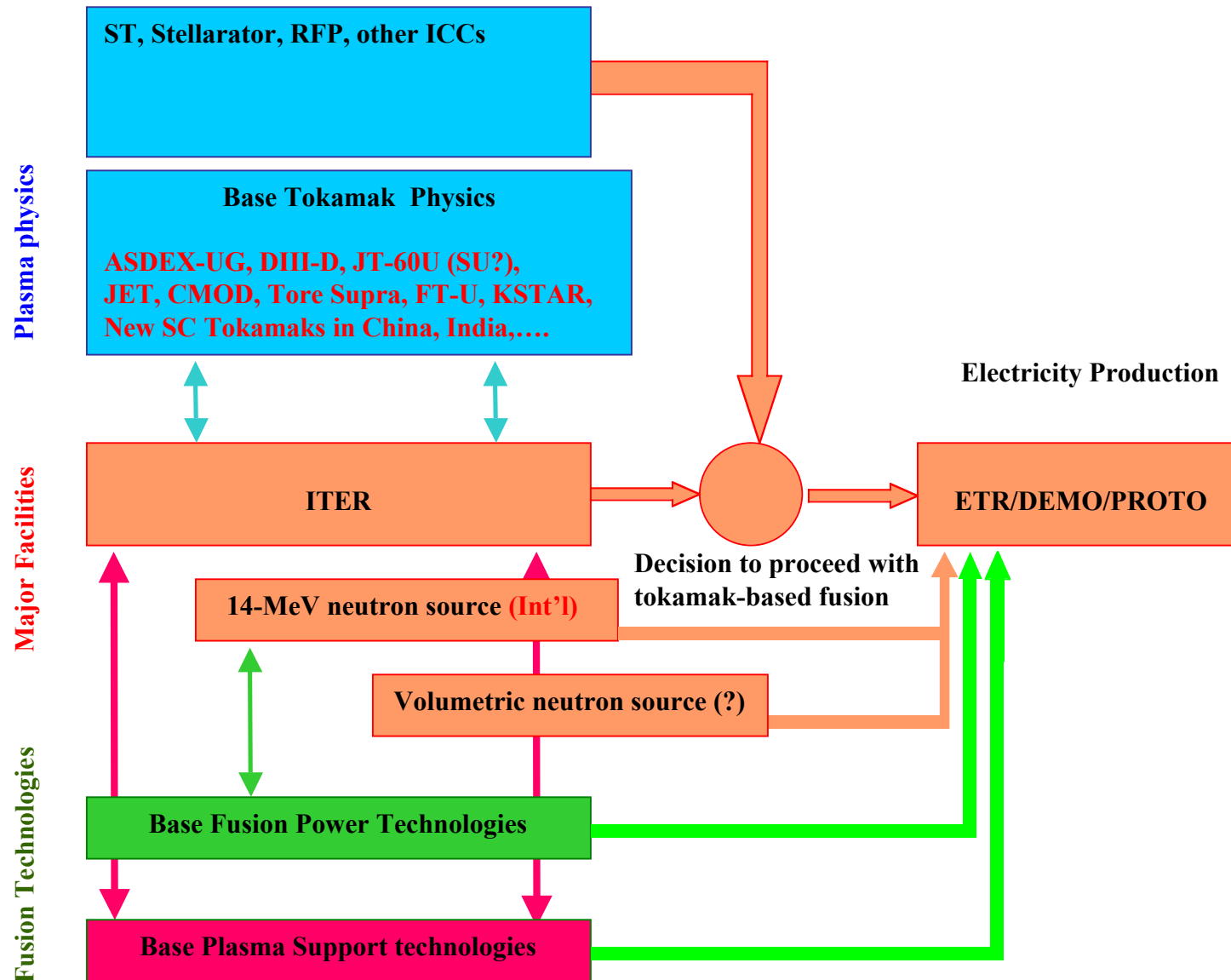
- Technical

- Physics

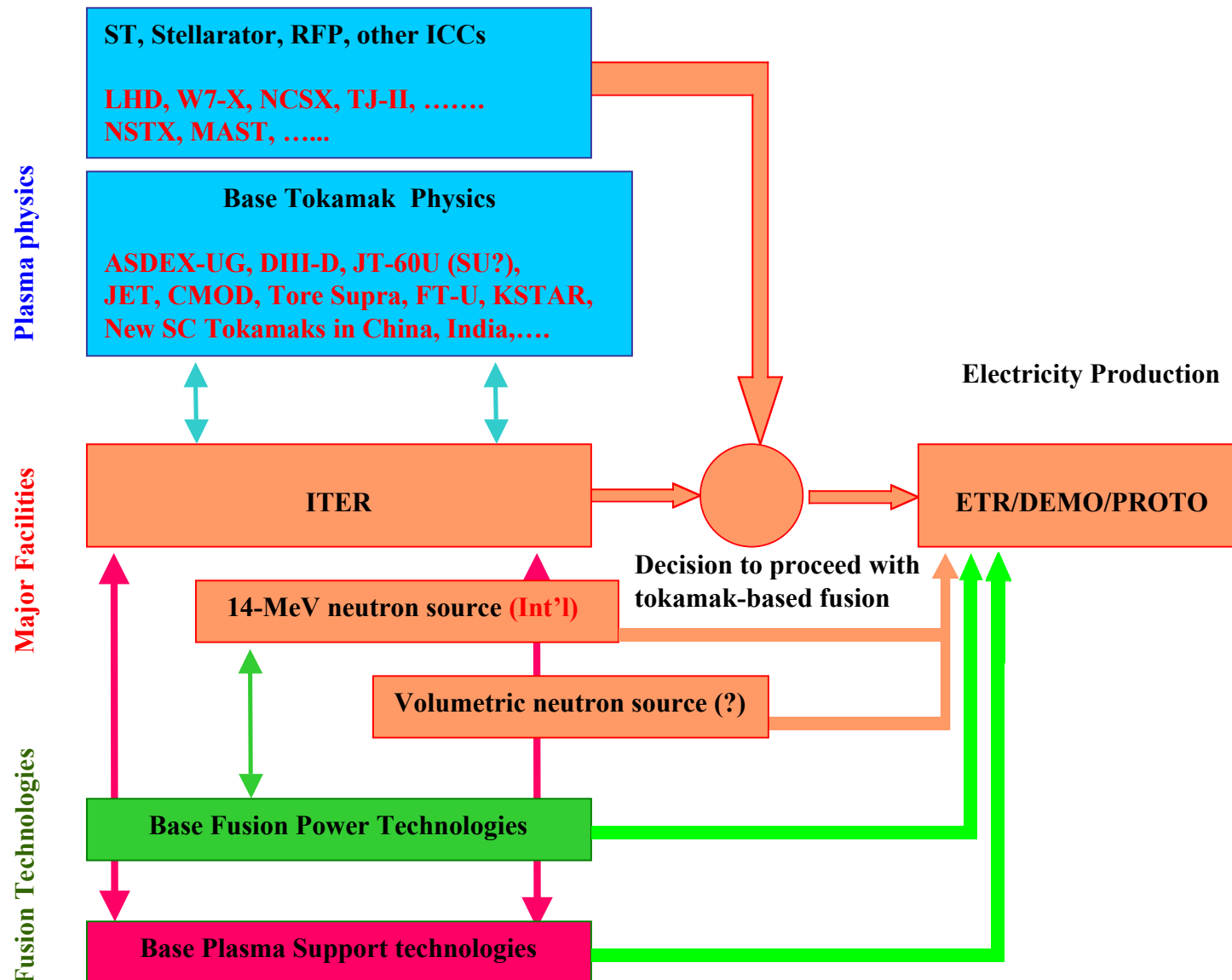
- Programmatic

The technical risks can be minimized by a substantial R&D effort.
See ITER posters.

Physics Risks are Minimized by Maintaining a Strong Base Tokamak Program



Programmatic Risks are Minimized by a Strong Base Stellarator/ICC Program



ITER or a Sequence of Smaller Steps ?

The key issue confronting development of the tokamak into an attractive reactor is sustaining an efficient steady-state ($f_{BS} > 70\%$) at high beta ($\beta_n > 3$) and good confinement ($H_H > 1.5$ @ $q \sim 4.5$).

Control of such regimes *must* be demonstrated in a burning plasma under steady-state conditions ($T \gg \tau_{res}$). For this purpose, a device of the ITER class will be necessary before proceeding to ETR/Demo/Proto.

Postponing the construction of ITER in favor of more modest steps only adds delay and cost to the possible realization of fusion energy.

Ultimately an ITER-class machine must be successfully built and operated before An ETR/Demo/Proto -- Therefore risk is not reduced, only postponed.

Does a Single Large Facility Imply Increased Risk?

Short Answer: Yes, multiple large facilities would reduce risk, but this is not an option.

Longer Answer: A sequence of smaller, possibly “safer” steps would entail lower risk, particularly with regard to investment. But finally an ITER class machine would be required before proceeding to ETR/DEMO/PROTO. Thus the risk is not reduced, only postponed.

Risk can be “minimized” by aggressive, focussed R&D and maintaining strong tokamak, stellarator and ICC base programs (including theory and computation!)