Panel Discussion: A Fast-track Approach to Fusion Energy

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Some Observations…

- **Goal:** Minimize the time for fielding fusion energy in large scale
  - Objective driven as opposed to Device driven approach.
  - Trying to do the Next Step (EDemo, …) faster and therefore, with a lower extrapolation from today, makes the extrapolation between the Next Step and commercial larger and may delay large-scale deployment of fusion back.

- “Bigger” is the enemy of “Faster”
  - Compare the time for fielding ITER with that of the previous generation of tokamaks!

- **Questions:** Can we divide what needs to be done among several smaller (i.e., cheaper) devices/facilities?

- **Premise:** Cheaper devices can be fielded faster and can operate in parallel. They reduce the overall risk. More options can be examined.

- **Issues:** 1) Integration Risk, 2) Feasibility/cost of smaller devices?
Integration Risk Can Be Minimized

- Integration risk can be minimized if the device is divided along “Physical” boundaries as opposed to scientific/technical disciplines.
- MFE devices naturally divide along the in-vessel components:
  - **Plasma** only sees the first < 1mm of the in-vessel components and the EM field. (ITER results are applicable to power plant although no power producing blanket exists!)
  - **Power technologies** (all components between plasma and coils) see only neutron, heat, and EM loads (and the first <1mm also sees particle loads). It does not matter if the plasma is ignited or not!

Questions: Can we get “prototypical” neutron, heat particle, and EM loads in a smaller (i.e., “cheaper”) device?
- Developing power technologies is a “wider” mission than blanket or component testing.
We need to evaluate carefully if smaller/cheaper devices can deliver “prototypical” fusion conditions?

- Define what needs to be done in order to certify fusion power technologies and what are the prototypical neutron heat, particle, and EM loads!
  - Probably only “tokamak-based” machine would be able to deliver prototypical conditions.

- Several proposal are on the table for small, low-power, driven devices:
  - ST-based
  - Conventional aspect ratio tokamaks with normal-conducting coils.

- These proposals (and others) should be evaluated and compared with the same “physics/technology” rules to assess if this option is feasible.
A “Faster Track” Approach to Large Scale Fusion Deployment

- Can be made faster by accelerating IFMIF and fielding Fusion Power Technology Development devices earlier.