FIP-P7/21 - DEMO DESIGN USING THE SYCOMORE SYSTEM CODE: CONSERVATIVE ASSUMPTIONS AND PATHWAYS TOWARDS THE REACTOR

- The SYCOMORE code was used to study DEMO design starting from conservative present-day assumptions then relax the constraints.
- Present-day assumptions include H-factor=0.9, f_{GW}=0.9, κ_{95}=1.4, $Q_{peak,\ target}$=5MW.m^{-2}, q_{95}=4.0, $\sigma_{stress,TF}$ = 500 Mpa, TBR=1.12, among others.
- The starting point for a 325 MW net electric power, 2 hours design is a large machine with R/a = (13.5m/5.9m)
- Relaxing plasma performance constraints (H, f_{GW}, κ_{95}) brings the largest gains although insufficient to bring the major radius below 10 m if taken alone.
- Technological constraints only become design-driving for higher net electric power (>500 MWe) and/or smaller machines (<10m)
- Performances become very sensitive to small changes on the assumptions when the size is reduced below 8.50 m.