The current reference fusion development scenario in Europe assumes the sequential achievement of key milestones. Firstly, the qualification of the DEMO/power plant physics basis in ITER, together with the qualification of materials for in-vessel components in IFMIF. Secondly, the qualification of components and processes in DEMO. Although this scenario is constrained by budgetary considerations, it assumes the resolution of many challenges in physics, technology and engineering.

The circumstances, within which fusion development planning is undertaken, are changing. Publications by the Inter-governmental Panel on Climate Change and by the Stern Review (by the former Vice-President and Chief Economist of the World Bank) have removed most of the residual uncertainties about the reality, causation, pace and costs of climate change. Government decisions and public support are displaying increasing commitment to mitigating climate-changing emissions. It is becoming widely appreciated that during the second two-thirds of this century continued world economic development must co-exist with the reduction of carbon emissions to very low levels - and that this will give rise to large political and economic forces. Concerns over energy security and diversity of supply have markedly increased. The ITER Treaty and the Broader Approach Agreement have removed uncertainty, and greatly increased confidence, relating to fusion development.

Thus, it has become reasonable to plan on the assumption that within twenty years ITER and IFMIF will have been successful and the world will be eager for clean, secure energy supplies. This motivates supplementing the fusion development reference scenario with the consideration of reduced targets for the economic performance of a first generation of fusion power plants that could be deployed as early as possible, and so reduced targets for the technical performance of early DEMOs - as might be evinced, for example, by pulsed operation, ITER design-basis plasma physics, lower fluence-limited lifetime for components, and lower power density. These ideas are now beginning to be analysed seriously in Europe. The implications of the reference scenario and variants for fusion materials development are considerable, and these are expanded in some detail in this paper.