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The High Field Path to Practical Fusion Energy ROBERT MUMGAARD, D. WHYTE, M. GREENWALD, Z. HARTWIG, D. BRUNNER, B. SORBOM, E. MARMAR, J. MINERVINI, P. BONOLI, J. IRBY, B. LABOMBARD, J. TERRY, R. VIEIRA, S. WUKITCH, MIT PSFC — We propose a faster, lower cost development path for fusion energy enabled by high temperature superconductors, devices at high magnetic field, innovative technologies and modern approaches to technology development. Timeliness, scale, and economic-viability are the drivers for fusion energy to combat climate change and aid economic development. The opportunities provided by high-temperature superconductors, innovative engineering and physics, and new organizational structures identified over the last few years open new possibilities for realizing practical fusion energy that could meet mid-century de-carbonization needs. We discuss re-factoring the fusion energy development path with an emphasis on concrete risk retirement strategies utilizing a modular approach based on the high-field tokamak that leverages the broader tokamak physics understanding of confinement, stability, and operational limits. Elements of this plan include development of high-temperature superconductor magnets, simplified immersion blankets, advanced long-leg divertors, a compact divertor test tokamak, efficient current drive, modular construction, and demountable magnet joints. An R&D plan culminating in the construction of an integrated pilot plant and test facility modeled on the ARC concept is presented.

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