Major fusion projects in France and the U.S. have consumed billions of dollars and are nowhere close to generating enough energy to even sustain their own operation, much less create commercial power. Smaller, simpler designs are now being explored, in some cases by private companies. Preliminary results have raised hope that there might be more practical, less expensive paths to fusion power plants. The newcomers face daunting scientific hurdles, however, such as preventing turbulence within super hot plasmas from snuffing out fusion reactions as soon as they start. Moving from brief experiments to the continuous, reliable operations needed for power plants raises formidable engineering challenges, too.