

Subject: Re: ITER Power
From: [REDACTED]
Date: 5/9/2017 9:56 AM
To: steven

First, the “steady-state” power drains of up to 75 to 110 MWe are never less than 75 MWe, even when the tokamak is not operating.

Second, far more external power is required at the start of each discharge than to maintain it. About 300 MWe is needed for approx. 20 seconds, mainly for the various magnet and electrical systems to start up the discharge and reach operating conditions. This 300 MWe is not used when the plasma is producing fusion power up to 500 MW (the hoped-for maximum).

Third, during the 400-sec power pulse, the total electric power consumption for tokamak heating systems, current drive, magnetic controls and the like is about 200 MWe. That should be added to the non-interruptible power drain of 75 to 110 MWe. The latter will be close to 110 MWe because the cooling water pumping must be maximum during a D-T discharge. So the actual drain during the power pulse is probably about 300 MWe.

A total of about 600 MWe (sum of the previous two paragraphs) may be needed at some point during the approx. 20-sec startup phase, but this period should not be used when comparing with fusion power output.

The 500 MW of fusion is of course thermal power, and should not be compared with the electric power input. If by some series of miracles ITER could be equipped to produce electricity with 40% conversion efficiency, the maximum electric power output would be about 200 MWe, or two-thirds of the 300 MWe power consumption during the 400-sec power pulse.

Thank you,
Daniel Jassby