



Fusion Power versus Fusion Power

Two meanings of the phrase "fusion power" are used in thermonuclear fusion research:

- 1) A general term to indicate hoped-for net power produced by a fusion reactor
- 2) The gross power value of the fusion-produced particles that does not account for or deduct the reactor's required overall electrical input power.

When the phrase appears in sentences, only experts and fusion-savvy members of the public can distinguish between the two. They do so based on context and their historical knowledge of the subject. For everyone else, they're not likely to realize that a second meaning exists. The second meaning does not appear in any of the online glossaries of the major fusion organizations.

The 2018 U.S. National Academies of Science, Engineering and Medicine Final Report of the Committee on a Strategic Plan for U.S. Burning Plasma Research contains more than 200 occurrences of the term "fusion power." It contains many uses of both meanings of the phrase.

Listed below are all instances of the phrase "fusion power" in the first 22 pages of the NAS report. After each instance, I have noted which of the two meanings is implied.

1. Following decades of scientific research, including the successful production of 11 MW fusion power in the Tokamak Fusion Test Reactor experiment in the United States and 16 MW in the Joint European Tokamak in the United Kingdom. **(SECOND)**
2. ... demonstrate fusion power production at least 10 times greater than the power needed to sustain the plasma. **(SECOND)**
3. Although fusion power holds the possibility of providing abundant energy ... **(FIRST)**
4. ... appear to offer a viable pathway to lower the cost and shorten the time required to demonstrate fusion power. **(FIRST)**
5. ... with the potential to transform fusion power systems to become more economically attractive for commercialization. **(FIRST)**
6. ... but the knowledge obtained would be sufficient to design the first commercial fusion power systems. **(FIRST)**

7. Research needs to show how to increase the fusion power density beyond that obtainable in ITER. **(SECOND)**
8. The most successful concept and the subject of this report is a fusion power plant ... **(FIRST)**
9. Although significant fusion power has been generated for short periods in the laboratory, a burning plasma, which is heated predominately by fusion reactions, has never been created. **(SECOND)**
10. While ITER is a science and technology experiment, a future fusion power system will be built with additional advanced technologies ... **(FIRST)**
11. ITER is a critical step along the path to advance the science and technology of a fusion power source. **(FIRST)**
12. In the largest experiments, significant fusion power was produced for seconds. **(SECOND)**
13. Scientists will use ITER to test methods to control plasma stability, plasma interactions with first wall materials, plasma confinement, and fusion power output. **(SECOND)**
14. While experiments with ITER will lead to major gains along the path to fusion energy, additional science and engineering challenges need to be addressed before fusion power can be produced in a reliable, economical, and socially acceptable way. **(FIRST)**
15. In a commercial system, the fusion power density would need to increase and uninterrupted operation should be available for more than a year. **(SECOND)**
16. Any strategic plan for fusion power requires both study of a burning plasma experiment and research beyond what will be done in a burning plasma experiment to improve and fully enable commercial fusion power. **(FIRST)**
17. National strategic plans leading to the demonstration of fusion power have been adopted by our international partners. **(FIRST)**
18. The U.S. DOE Office of Science has not presented a plan for research and technology programs needed to progress beyond ITER to a source of fusion power. **(FIRST)**
19. This focus gives them a clear goal for their development of fusion power ... **(FIRST)**
20. Similar national roadmaps leading to the demonstration of fusion power guide research in China and Japan ... **(FIRST)**

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