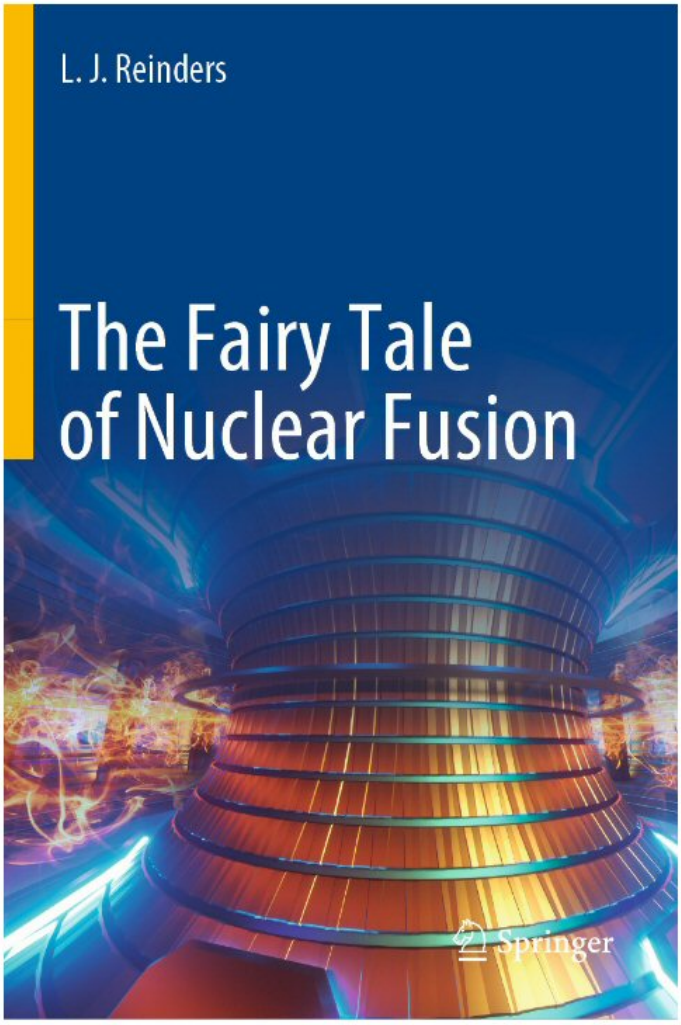

18.3 Painting Rosy Pictures

It is common practice in the fusion business to paint rosy, if not dishonest, prospects. For instance, in the abstract to a 2005 "Status report on fusion research" (IFRC 2005) published in a *scientific* journal by the International Fusion Research Council (IFRC), an august body created by the International Atomic Energy Agency (IAEA) in 1971 to advise the agency on its activities in the field of nuclear fusion, it is stated: "Fusion is, today, one of the most promising of all alternative energy sources because of the vast reserves of fuel, potentially lasting several thousands of years and the possibility of a relatively 'clean' form of energy, as required for use in concentrated urban industrial settings, with minimal long term environmental implications. The last decade and a half have seen unprecedented advances in controlled fusion experiments with the discovery of new regimes of operations in experiments, production of 16 MW of fusion power and operations close to and above the so-called 'breakeven' conditions." This is on the verge of outright lying, and in any case grossly misleading and unscientific, as fusion in its current state is in no way promising (is promising a scientific term? Moreover, should I trust a scientist who calls his own work promising? What would he actually mean?) and the advances of the last decade or so may have been unprecedented (in the field of nuclear fusion not much is needed to be unprecedented, as there simply is no precedent), but certainly not promising or even encouraging. The fact that there are vast reserves of fuel is completely irrelevant if this fuel cannot be made to 'burn'! If anything, the whole fusion enterprise looks hopeless. Breakeven conditions are still very far away. The use of the word 'breakeven' in the quote above is aptly (but unscientifically) qualified by 'so-called', as 'breakeven' in nuclear fusion, as we have seen in Chap. 8, is a completely different concept from what a normal sensible person would mean by it, and is used by fusion proponents in a very misleading way, probably with the intent to mislead, a magnificent case of doublespeak if there ever was one. It is in any case not true that there have been operations above breakeven. In the report itself this is qualified by saying that "present day fusion experiments have already exceeded *conditions equivalent* to a $Q = 1$ operating power plant", without of course explaining what '*conditions equivalent*' actually means. From the discussion in Chap. 8 we know that it means by extrapolating D-D results to D-T results, so-called extrapolated breakeven, which has nothing to do with reality. Moreover, a $Q = 1$ device cannot be called a power plant, as it is just a power consuming device. The statement made above may arguably be included in a publicity or advertisement leaflet but has no place in a scientific journal.

They make matters worse by stating in the body of the report that it "appears realistic that fusion power plants delivering electricity will be available for commercial use towards the middle of this century". The statement dates from 2005 when construction of ITER had not even started (the squabble about the ITER site had just ended) and the authors must have known that there was no scientific basis for making such a statement; they cannot themselves have believed it!

The rosy pictures painted by the leaders of the various fusion enterprises have in general unquestioningly been accepted by the media, as is often the case with science. Scientists still tend to be trusted for no other reason than that they are scientists. The media often even tries to surpass them in screaming headlines of great progress made towards unlimited energy or similar nonsense. There have been pitifully few who did not fall for these fairy tales. Especially noteworthy in this respect is Steven Krivit who runs the *New Energy Times* website and was at first mainly concerned with debunking the cold fusion fiasco, one of these unfortunate cases of pathological science, where specialists from other fields lacking basic knowledge about nuclear fusion processes claim to have found a shortcut to fulfilling the dream of cheap and inexhaustible energy. After having done this rather thoroughly, from 2006 Krivit also started to cast a critical look at the statements of leaders of hot fusion projects like JET and ITER. What he discovered was really shocking: a marvellous and almost endless collection of false statements, some so blatantly untrue that they, assuming that the people who made them are competent in the field, must have been made with the clear intent to lie

and/or mislead the people they were addressing. I believe Krivit started with "The ITER Power Amplification Myth"[5] in which he pointed out that the ITER management and communications office have led journalists and the public to believe that, when completed, the reactor will produce 10 times more power than goes into it. We know by now that that is not true, but that is only so because Steven Krivit did not tire of pointing this out. The true picture (from his website) is shown in Fig. 18.2. It shows that the amount of *electric* power that goes into the reactor will be 300 MW and that 536 MW may be produced in *thermal* power. When converted into electricity at 40% efficiency (which is high), it will result in 214 MW electric power output, leaving a shortage of 86 MW.

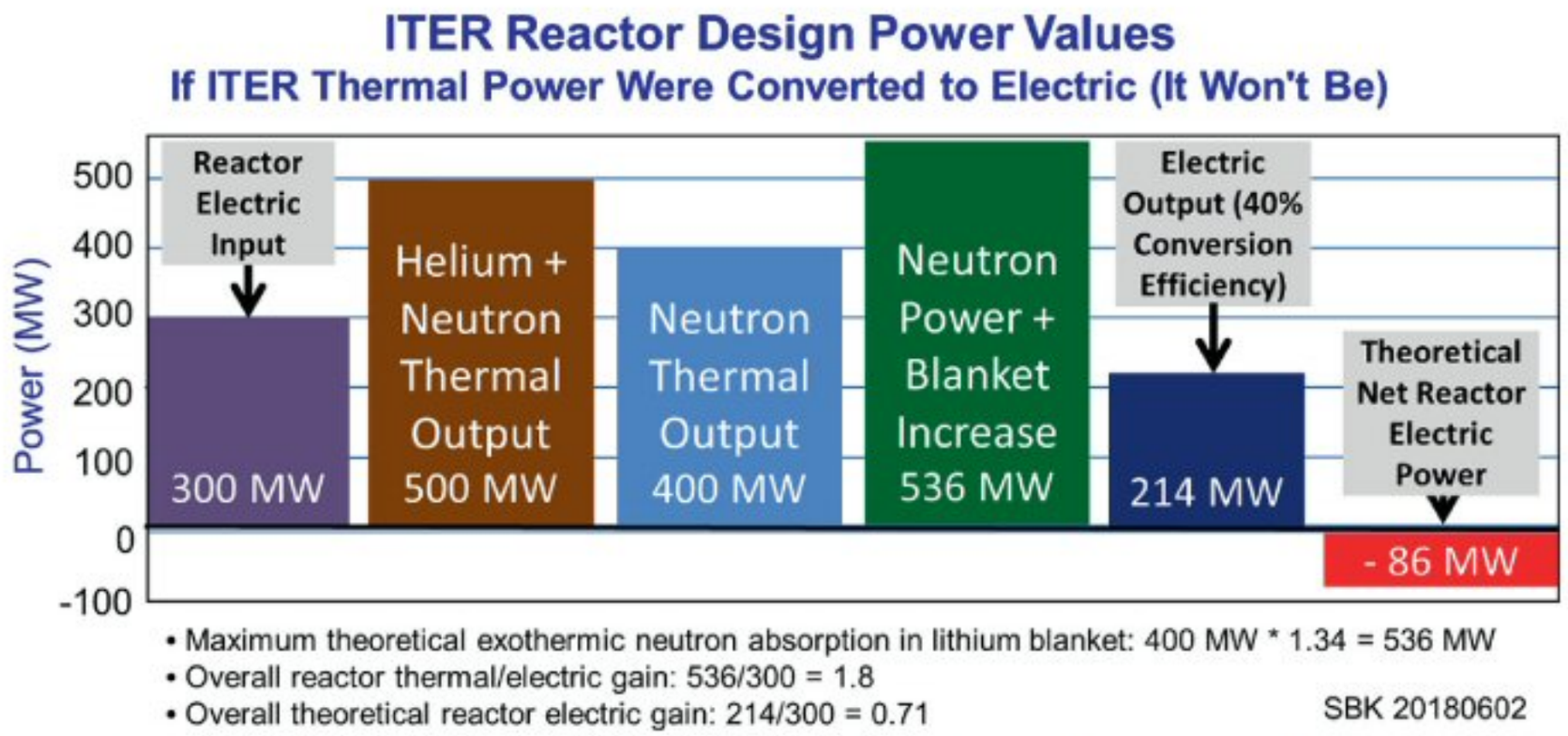

Fig. 18.2 Showing the electric power that goes into the ITER reactor, and the output in thermal power, resulting in net power usage, not power gain (from https://news.newenergytimes.net/)

This stands in glaring contrast to what the ITER website stated in 2017: "The goal of the ITER fusion program is to produce a net gain of energy and set the stage for the demonstration fusion power plant to come. ITER has been designed to produce 500 MW of output power for 50 MW of input power—or 10 times the amount of energy put in. The current record for released fusion power is 16 MW (held by the European JET facility located in Culham, UK)."

Thanks to Krivit's prodding the text on the website has now been changed into: "ITER has been designed for high fusion power gain. For 50 MW of power injected into the Tokamak via the systems that heat the plasma it will produce 500 MW of fusion power for periods of 400 to 600 s. This tenfold return is expressed by $Q \geq 10$ (ratio of thermal output power to heating input power). The current record for fusion power gain in a tokamak is $Q = 0.67$ held by the European JET facility located in Culham, UK, which produced 16 MW of thermal fusion power for 24 MW of injected heating power in the 1990s."[6]

In Chap. 8 we have already seen what JET's 16 MW of produced power actually means for the efficiency of the machine (just 2%, as also dug out first by Krivit, but kept under the rug and only released when asked for, while it is the only number that really counts!). And in Chap. 10 we already have related what ITER's 500 MW actually means and that the website of the Japanese JT-60SA has never thought it necessary to hide the truth.

The new text on the website is still not a model of clarity. No member of the public will understand it without further explanation. It nonetheless is an improvement, although still untrue. ITER has not been designed for *high* fusion power gain, but for pitifully *low* power gain. After all, it is, as the JT-60SA website states, a zero (net) power reactor. It remains common policy among fusion managers not to mention how much electricity ITER requires to operate, and it is very difficult to figure this out. For instance, the 300 MW mentioned in Fig. 18.2 does not include ITER's non-interruptible power usage;

power that will be needed regardless whether the reactor is operating or not. As we will see below, Daniel Jassby has a lot to say on this subject.

Krivit has waged a crusade against these false statements, not only by the ITER organisation, but by EUROfusion and other organisations and officials as well. They were all involved in the "Great ITER Power Deception".

A wrong statement on a website is one thing but providing confusing or misleading information to the US Congress is quite another. But nonetheless, as recent as March 2018 Congress was shamelessly misled by ITER director Bigot and the acting associate director of the Department of Energy's Office of Fusion Energy Sciences Van Dam, as Krivit reports.[7] Such statements tend to propagate through the community. Others start to repeat these inaccuracies on their own website. The wrong information spreads as a highly contagious virus and is almost impossible to eradicate, as a collection on Krivit's website shows.[8] Even reputable journals like *New Scientist* do not seem capable of getting it right or providing correct information.

Krivit's comments and criticism are of course belittled with statements like "this discussion is irrelevant in the case of ITER since its purpose is not to produce as much energy as possible but to demonstrate the technological feasibility of fusion."[9] If so, why do the fusion leaders mention these numbers and don't they tell Congress to stop asking these irrelevant questions?

Krivit has much more to tell about the probably deliberately deceptive way ITER is presented to the public. Further details can be found on the website of the *New Energy Times* (https://news.newenergytimes.net/). I will restrict myself here to repeat his conclusion:

"Given the preponderance of misrepresentations of the ITER power values on prominent Web sites, in news outlets such as the *New York Times, Bloomberg,* and the *BBC*, in science publications such as *Nature*, in major worldwide Web references such as *Wikipedia*, EUROfusion, and World Nuclear Association, and in a publication of the European Parliament, logical conclusions are that: (1) The fusion representatives who created the misrepresentations had to have known of the effects of their public relations efforts; (2) A significant number of fusion scientists who were not directly responsible for the creation of the misrepresentations must have read about their project in the news media and known of the falsehoods—yet for at least five years before October 2017, they corrected none of the falsehoods.

Even the director-general of ITER, Bernard Bigot, had to have seen the falsehood in [an article in *Nature*[10]], which says that ITER "is predicted to produce about 500 megawatts of *electricity*." He added a comment to the article after it [was] published.

Was the public broadly misled? The list above shows that, yes, it was. Was the *Q*-switch intentional on the part of the scientists? In most cases, this is difficult to prove. Was the *Q*-switch intentional on the part of the people—like Neil Calder and Laban Coblentz[11]—whose job it was to create, manage and track the worldwide public communications of their respective organizations? Clearly, they were in control of the public messaging about ITER and fully aware of the results."[12]

When entering Krivit's website please be forewarned that it is at your own peril, the peril of losing your belief in scientists, the only people on the planet you still thought could (sometimes) be trusted.

18.4 Lawrence Lidsky

The first criticism that aroused some attention goes back to a 1983 paper (Lidsky 1983)[13] by the fusion insider Lawrence Lidsky (1935–2002), at the time a professor of nuclear engineering at MIT and associate director of the MIT Plasma Science and Fusion Center. He also was the founding editor of the *Journal of Fusion Energy*. Lidsky wrote a paper, called "*The Trouble with Fusion*" in the MIT Technology Review. At the time he said that he wrote it because "I couldn't get an internal discussion going. Some didn't care and some didn't want to know."[14] I am afraid that is still the case. He actually