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Ladies and gentlemen,

Surveys in most countries show, that women's attitude towards nuclear energy differ quite a bit from that of men. Why is this so and what can be done about it? I am grateful that this topic can be discussed at PIME.

For all laymen, male and female, it is more and more difficult to distinguish between "good" and "bad" technology. Recent mishaps seem to have demonstrated very clearly the potential danger of technologies. The confidence, especially the confidence of women, in technology in general and especially in nuclear power has given way to a kind of love-hate relationship. I will try to give you my explanation for this situation and present measures to change this.

Since the first encounter of mankind with atomic power, the atomic bombs over Hiroshima and Nagasaki, atomic power inspires dread and fear. It is exceedingly difficult for many people to keep the productive, peaceful uses of atomic energy clearly separated in their minds from the destructive bomb. The driving force in the political discussion of nuclear energy is fear. It is not economics, it is not energy production, it is fear. But the debate on nuclear power in Switzerland and elsewhere is hinged on fear of a particular kind: It is not the fear of what did happen but of what could have happened. After the accident of Chernobyl especially women were worried about the hypothetical radiation danger. They worry that some time in the next generation something could happen. But at the same they are not aware of the real health danger burning between their lips.

The difference is that a cigarette is a familiar risk. But only few women are familiar with nuclear risks, especially radioactivity, be it scientifically or emotionally. Women in general are less inclined to technical subjects. Technical matters still are male. Technical issues are -by education and in schools- (at least in Switzerland) no female subjects. Therefore we have to change this in order to change women's attitudes towards technical subjects. How can women become more technology-oriented?

Obscured technology

The advance of technical know-how has become so prolific during the last few decades, and technical products are now so complicated, that experts are leaving laymen further and further behind as far as knowledge is concerned. For the layman, technology is more or less a black box. Something is plugged in at one end, and the desired result comes out at the other end, after pulling a lever or pressing a button. The growing incomprehensibility of technical equipment naturally contributes towards this black box approach. In fact more and more machinery is being so well packaged that it is no longer possible to understand how it really works. In earlier times, anyone making use of technology needed to have some degree of technical knowledge before he could even operate such equip-ment. Take the drivers of the first motor cars: They had to understand the entire mechanics of their vehicle before taking to the road. To operate the first computers, a knowledge of programming was indispensable. Maybe that's why women entered technical professions later than men, because at the beginning they had not only to understand technical matters but they had to use (heavy) tools, technical (male) instruments.

Today's technological equipment has reached such a high degree of sophistication that technical knowledge is no longer required for its operation. The push-button or key has become the laymans only interface with things technical.

The advent of the push-button society

Our consumption of technology has become our second nature. At the touch of a button we expect light or dark, heat or cold, music or silence, and information. We expect our chores to be taken over by machinery, but we have very little idea as to the why and the wherefore of such machines, or how much energy they consume. We hardly consider the consequences of our actions, and take no trouble to find out. Technology, electricity is being consumed, but it is no longer understood. We are becoming a lazy, affluent society.

This very lack of understanding leads to uncertainty and insecurity, for the unknown is sinister and threatening. We are burdened down with the fear that our highly complex technology may well become too much for us, for our scientists and technicians - despite all their skills - or even destroy the entire human race.

This is especially the case with nuclear power, and even more so for women.

Technology pervades our lives

Each of us is surrounded with technology in his daily life. Especially business women need technical equipment to organize their life. But nevertheless the attitude of women towards technology has changed radically over the last few years. Formerly, technology was regarded as synonymous with progress, as a boon and a blessing, but today this has been replaced by a general fear and anxiety. What is the best way of breaking down this fear and combating our "push-button mentality"?

On one hand I think especially women should try harder to understand technology. I am sure that many aspects of our lives would probably be simpler if we took more heed of some elementary physical laws. Let us take for example the law governing braking distances. If all drivers realized that their stopping distance depends on a physical law rather than on pure luck or skill, they would certainly keep their distance when travelling at high speed on motor-ways. Thanks to technology and technical appliances, many people have been able to fulfill the majority of their material needs. This represents a positive contribution to our standard of living, but the immediate fulfillment of material needs at the touch of a button has become so natural these days, that some people now ask also for the fulfillment of immaterial needs such as love, warmth and security, recognition, happiness, etc. and they tend to blame technology for not being able to fulfill these needs as well. Many people have come to believe that without technology we could be happier. In other words, now that our material requirements have been fulfilled, we think we can do without technology. We forget, however, that technology makes our standard of living possible. Technology is the pillar our society is built on, without which it would collapse like a house of cards.

Like all big technologies, nuclear energy too bears the odium of something new and mysterious. People have always been afraid of new and large machines be it the Dutch telescope, the steam locomotive, automobiles, the mechanical weaving loom, street lighting - all these had to overcome considerable resistance from part of the society at the time. But in earlier times, the mass media weren't there to steer these fears into common channels and to amplify them.

The trump card today is the abandoning of technologies such as nuclear energy. How could we solve the problems of today and tomorrow without using any technology? If we think this to the very end we will find out quickly, that over five billion inhabitants of today's world can never survive without technology! They need more and more environmentally clean energy, nuclear energy.

We are faced with the great challenge of solving our environmental pollution and energy problems. Let us meet this challenge with all the technological means at our disposal, not only for our own good but to the benefit of our environment. One of these technical solutions is nuclear power. But in order to find out the benefits of nuclear power we have to come to know nuclear energy. How can we get women to know this complex technical subject?

Technical information is not enough

When experts discuss damage probability and risk factors, they forget that people affected by such risks always assess the risks on a purely emotional basis. But in the information policies emotions play only a minor part if any at all. This has to be changed. The pros and cons of technology in general, and nuclear power in particular, have to be discussed at three different levels:

- the technical and scientific level
- the economic level
- the level of ethical values and emotions

If one of these levels is missing in the discussion on technical matters -be it nuclear power or special waste incineration plants- it is completely unfruitful - because technical and scientific argumentation is worthless at the ethical and emotional level!

Specialist jargon hinders discussion

Moreover, specialists often use technical jargon which is misunderstood by the layman as something quite different to the intended meaning.

To illustrate this point: What does the phrase mean "the reactor has gone critical" ? Those who understand nothing about reactor technology naturally think a dangerous and crucial point has been reached - for this is what we normally understand by "critical". In reactor physics, however, the word critical means nothing else

than, that a self-supporting chain reaction has started to take place in the reactor. The point has been reached where one neutron splits one atomic nucleus, freeing one neutron, and thus the reactor produces energy.

This example should show how important it is for scientists to use the same language as their audience if they want to be understood properly - a great many specialists have sinned in this respect. Furthermore if the technician or scientist is to help his fellow citizens to make political and social decisions, he then must not only take part in technical discussion but also involve himself in the emotional argumentation surrounding the cause of ethical values. Unfortunately, many specialists tend to retreat to their ivory towers of science and technology under such circumstances, which only widens the rift in political and social attitudes between experts and the public.

Here I think women have a great duty to fulfill, because they for themselves argue emotionally. Moreover motherhood brings ethical values much closer to them. That means we desperately need more women to take part in technical discussions! But this is a vicious circle since women need identification figures, shining examples. If we have more women in technical professions we will have more students in the technical faculties. It is the same with the professional career of women. There too, more women in top positions are needed as examples.

Up to now reason was predominant in the discussion of nuclear energy, because managers in nuclear power stations mostly are male. Now we have arrived at a turning point, we are threatened by the reign of pure emotion! Both are wrong - we must combine reason with emotion. Here I think women have to play an important part in informing the public about nuclear energy. The question as to whether nuclear energy is a boon or a bane to mankind cannot be answered by logical thinking alone because reason will not dispel fear of nuclear energy.

Reason and emotion are needed in the discussion

We have to reduce the fear of women by increasing the understanding of nuclear power, but we should not forget, that technical arguments will only be understood if the public is emotionally ready to grasp the information!

We know the advantages for the environment of nuclear energy. But how can we explain these to women? How can we transmit this message to women. How can we explain to them, that life without risk does not exist! Will they accept this message? And are they then ready to accept nuclear power?

By definition technical activity is a mixture of applied natural science and intuitive ingenuity. Intuition is said to be female whereas technology still has the odium of male. Nowadays equality should enter technology, technology should approach male and female equally. Female technology is more global, because it combines reason with emotion, science with intuition. Perception of the whole is in great demand today, for it offers a way of setting realistic limits to the craving for unlimited progress in all aspects of life. Technology with reason and emotion

Stagnation is retrogression, and retreat is not possible without destruction. We should not think in terms of "back to Nature", but our motto must be "forward to Nature" with better and better technology. We must preserve our environment in such a way that Nature has a chance to regenerate. If we do not succeed in this, we run the risk of destroying everything we have achieved.

Our economy can only function properly in a healthy environment. On the other hand, only a healthy economy earns the money to look after our environment properly. We need to fulfill both these conditions.

If nuclear energy offers more people a greater chance of living a better, more positive, intensive and less arduous life, then it represents a boon to mankind.

We have to win the souls in order to win the heads

Let us take measures to overcome our aversion - by taking a look behind the push-buttons! Further we have to take into account, that our best, rational, logical, scientific arguments for nuclear power will ever only play a secondary role in the public discussion of nuclear energy. If we were aware of this fact, we would not treat nuclear power as a complex technological problem. Because this increases the fear and further erodes the public's confidence in nuclear experts. If nuclear power is to play a meaningful role in our energy future, and I sincerely hope it will, the fear of the public and especially of women has to be accepted and dealt with in the information. We have to understand these fears, otherwise we can never transmit any information. We have to win the souls with an emotional information policy in order to win the heads to accept the nuclear power!

As president of the association "Women for Energy" in Switzerland, I always express my understanding for women's fears. I start by telling them for instance: That I would have exactly the same fears about radioactivity, had I not studied the mechanisms of the transfer of radioactivity from dust, rain and soil to plants in my thesis. Then I make them express their own detailed points of doubt and fear so that I can give them the particular information needed to fight this fear. And of course I always have an experimental set with radioactive stones, watches, samples, absorbing materials etc. with me for their own experience. They have to witness themselves, that radioactivity is something natural. This is the only way of persuading them, because radioactivity cannot be seen, smelled or tasted. But the public forgets or doesn't want to know that radioactivity has been present on earth since the very beginning. And at least since the invention of the Geiger-counter radioactivity can be heard and measured accurately.

Not only women need identification figures. When informing the public we shouldn't be the brainy types, we shouldn't be industry spokesmen. We have to behave like ordinary human beings, trying to transmit our knowledge with all our emotions to the public. This of course is much easier for women, because this attitude is female after all. Fear is a psychological phenomenon primarily inaccessible with rational means. Managers trained rationally and accustomed to rational argumentation must try to put themselves in ordinary people's shoes, try to think and feel as the public does - which is not always the same as their own and not always easy.

It is known that people living in the immediate vicinity of nuclear power stations feel little if any fear, because they accept what is close to them, comprehensible and familiar.

That means open information policies are needed. Explanations in homely language, oriented on people, are particularly effective. Here we have to learn from the popular press. Its articles appear usually with a picture of the author. Technical jargon is avoided. The information is condensed to a few statements that are easily understood: snappy and witty journalism.

How can nuclear energy become a familiar technology and thus less fear inspiring?

Nuclear energy is unique in terms of the public perception. It is widely believed that only brainy people really understand it. From the early experiments of the Curies via the bombs of Hiroshima and Nagasaki to the accidents of Harrisburg and Chernobyl, the public experienced nuclear energy as scary and potentially evil and especially women think they cannot understand it. So we have to prove that they are able. That at least they can believe us as a person. The problem is that people do not believe in technical installations controlled by powerful, remote establishment organizations, energy companies etc. but they believe in people. That means people, male and female human beings have to stand up for their organization.

My point of conclusion is, that if nuclear power is to play a meaningful role in our energy future, and I am sure it will, the fear of the public must be accepted by the people of the electricity companies. Men and women have to persuade other men and women with an emotional information policy in order to give confidence or at least enhance the confidence in nuclear energy.

Let us begin!

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