

Introduction : Conference on Energy and Sustainability
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Our Common Agenda

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As you know, there is a long history of the study of environmental issues by scientists that even goes back to the late 19th century. By 1980 there was serious research on the environment, and there were also the beginning of warnings by scientists. In 1972 there was a United Nations Conference on Human Environment in Stockholm, and it was very well publicized. That might be considered the real star of the official discussion about humanity and the environment.

There was another well-known development in 1987. Under the guidance of Mrs. Gro Harlem Brundtland, a report was issued by the World Commission on Environment and Development (WCED). Mrs. Brundtland was the Prime Minister of Norway before she became the leader of the WCED. The report issued was known as the Brundtland Report and it became a book by the title, *Our Common Future*. This was the very beginning of the definition of sustainable development.

Since then, the concept of sustainable development came to be accepted by more and more official organizations, but it was with the United Nations Conference on Environment and Development held in Rio de Janeiro in 1992, the so-called first summit, when all nations became conscious of sustainable development.

A few years later, in 1999, there was the big World Conference on Science held in Budapest by the International Council for Sciences (ICSU) and jointly hosted by UNESCO. Later I will explain a little bit about ICSU. Then came the World Conference on Science and Technology held in Tokyo in 2000 by the Inter Academy Panel on International Issues. The IAP is a gathering of academies from all over the world. I believe the number of members is now about 85. And in 2002 there was the

UN World Summit on Sustainable Development in Johannesburg, South Africa. That meeting was largely a confirmation of what had been done after the 1992 World Summit in Rio. Just one month after the Johannesburg summit, there was the ICSU General Assembly which met in Rio.

It seems that the two terms, sustainability and development, are in some sort of contradiction to each other, for if you have development you must violate the environment of the earth. It seems impossible for human beings to improve sustainability and development at the same time. But the Brundtland Report said that if we have progress in science and technology, simultaneous improvement of sustainability and development may become possible.

At the World Conference on Science in 1999 quite a new concept from the scientific side emerged. Scientists issued a declaration saying that science is not just for scientists. Traditionally, scientists have just been concerned with creating new ideas in the scientific world, and most scientists up to that point had felt that was the only purpose of scientists and scientific research. But, in the declaration of the World Conference on Science in 1999, scientists attending the conference declared that science must also be devoted to the development of useful knowledge and peace. It also said science must be devoted to development, both in society and for society. This was conceptually a big shift for scientists on how they should conduct research activity.

At the 2000 World Conference on Scientific Academies in Tokyo, scientists pointed out that we have limited resources of air, water, land, minerals, and sources of energy, and by 2050, the world population will be 50% larger than it is now. This brings us to the question, will it be possible for human beings to support the full population of the earth at that time with such limited resources? The answer at present is in the negative. Thus it is imperative that human activities—cultural, educational, societal, industrial, and commercial—all be directed towards sustainable development for the future of all people.

If you read Agenda 21, you will see that the request from society to the scientists is that scientists work to realize sustainable development in the future. In the ICSU-UNESCO World Conference on Science held in Budapest in 1999, scientists declared that science was for knowledge, peace, development, and society. This was the reply from the scientific community to society.

Prof. Jane Lubchenco, who is now president of the ICSU, has already written a paper addressing these issues. We, the scientists, she says, need to enter into some kind of new and reliable contract with society. A reliable contract between society and scientists means that some scientists will do something for sustainable development. But there is a gap between what is a possible offer by scientists and what society is requesting from them. Even so, there must be something that can be offered to society by the scientific community, even if it does not well match what society wants.

The ICSU was founded in 1931. It is a traditional institution. When it began, the ICSU was composed mainly of scientific unions. By scientific union I mean some kind of national scientific society. The ICSU has become very large and has 26 scientific unions, including unions for physics, chemistry, biology, and so forth. The ICSU also has another kind of member, the national scientific academy whose members are mainly scientists in academia. The Science Council of Japan which is hosting this Conference is one example of a national scientific academy member, and there are about 92 others. Many nations are now involved in ICSU activity. I think the gathering of these two kinds of members will build an international and multi-disciplinary structure which will be very useful for discussing non-disciplinary subject such as sustainability. All of you well know that sustainable development can never be discussed within a very narrow discipline. Scientists within ICSU should collaborate to create knowledge necessary for Sustainable Development.

The ICSU has connections with UNESCO and is supported partly by UNESCO, and the fundings of UNESCO are, in turn, supported by national governments. The ICSU is a body where scientists can come together to discuss inter-disciplinary issues on subjects which are crucial for humanity. As it produces results, the ICSU will give advice to institutions, perhaps international institution such as the United Nations or the World Bank.

I think it is necessary for all political leaders today to make important decisions on sustainable development. But to do this, they need to have some knowledge about science. Without scientific knowledge, it is very difficult to decide anything. Having scientific advisors is very important, but it is not as easy as it sounds. The idea of scientists giving advice to politicians is a very delicate subject. Scientists are always petitioning government to give them money for research. But I think the advice

scientists should give to politicians should be neutral as well as useful for decision makers. That is a very difficult challenge.

Thus I think each scientist must act in two ways, one, as a researcher getting money from the government, and the other, as a very practical researcher who gives useful advice back to government. That is why the Budapest Declaration says scientific research must be devoted to peace, development, and society. But, as you know, no scientific conclusion is absolutely certain, as it can be overturned some time later. So scientists must frankly say to decision makers, “ I would like to advise such and such, but with the understanding that there is certain amount of uncertainly.”

One example of uncertainty is the case of the GMO, genetically modified organisms. So far we have many experiments with GMOs but no data that suggest genetically modified organisms or foods are definitely harmful to people. But, by the same token, no one is saying that in the future there is no influence by GMOs upon biodiversity. No one knows, because no scientific data on this has yet been compiled. So the advice should be more like, “ Yes, you can eat genetically modified food, but at this moment we cannot scientifically say anything definitely about the impact of GMOs on biodiversity.” That way, some governments may decide, “ Yes, we can eat a lot of genetically modified food in order to get rid of famine or starvation,” while some other country might say “We shall not. We shall postpone using genetically modified food until we find for a fact that it does not influence biodiversity.” These are political decisions utilizing exactly the same scientific advice.

I would like to show you just a very short example, which is very familiar to you, that is global warming. Global warming was already pointed out by Tyndall Ahrenius Recently Henry Kendall of MIT, indicating possible climate change due to changes in the atmosphere. It was in 1985 that Scope 29, which is a part of ICSU, and UNEP, which is part of the United Nations, collaboratively organized an international conference where they discussed the scientific aspects of global warming and at the same time the influence of human industrial activity upon the environment. I think this was the first occasion where people came together, both scientists and policy makers, to discuss scientific observations and the relationship between human activity and the natural environment.

Sometimes there will be scientific findings, and then maybe warnings to society will follow based on those findings. But warnings just by individual scientists to society

will never be listed to. Through ICSU, the strong voice of many scientists to society message will be sent to society, the policy makers, or politicians. Then a meaningful dialogue between scientists and policy makers can come about.

In this Conference, we shall focus our discussion to Energy. The ultimate target should be sustainability, but the energy can be the key for the advanced discussion about sustainability. We have achieved certain amount of knowledge of environment, especially of scientific data through observation. On the contrary, it is less understood how we should go in the future, concerning the protection, remedy, and reconstruction of the environment, for the sustainable development, through our individual, industrial, economical and social actions. We, humankind, have not yet discovered the central road on which we proceed toward the sustainability. There are diversified means that may be undertaken, but we do not know which is the most urgent and important now and which in future. We have no feasible programme. Energy is, needless to say, one of the most influential elements for sustainability. But, more importantly, it is one that can be dealt with quantitatively and definitely identified in relation to human activities. Therefore we may be able to depict the sustainable human activity we should start now through discussion about energy. This is one of the reasons why we focus our discussion to energy in this Conference.

It is true that energy is a very tough subject to discuss. There are studies from various perspectives.

1. Energy is one of the most important factors(determiners) of sustainable development. It is evident from the fact that economic growth is closely correlated with energy consumption, while energy consumption has bearing on various types of environmental load on the earth.
2. Energy is studied from various perspectives. Such perspectives make a long list, classified diversely into aspects such as purpose, technical field, standpoint and so forth.
 - (1) Purpose
Energy source development, energy utilization, energy storage, energy consumption, etc.
 - (2) Technical field
Physical science, engineering, medicine, social science, humanities, etc.
Each field has subsets of fields that are further segmented.

(3) Standpoint

Analytical study, application study, business, policy.

Each perspective has a unique set of categories for the above-listed aspects, so energy problems can exhibit extremely diverse characteristics.

3. In fact, many institutions and organs are engaged in the study of energy problems.

The United Nations, for example, is promoting a multi-stakeholders dialogue program on energy problems. IIASA is engaged in energy forecasting. IHDP is dealing in energy consumption and earth environment degradation. In addition to these, several tens of international organs are involved in a study of energy problems in some way or other. Meanwhile, universities, research institutions and businesses are putting forth their respective efforts in a study of energy issues.

However, there is not enough interchange among these organs.

4. Because of the lack of interchanges, mankind has yet to form a universal vision for energy, an important factor determining the future of mankind, despite tremendous efforts being made in numerous studies.
5. For these reasons, mankind has yet to find a way to cooperate with each other for energy, leaving energy-related risks at large and to grow continually.

Interchange, overarching or collaboration are necessary. But they are not ready.

From the technological point of view, there are several energy sources, fossil, nuclear, solar, biomass. If you see a scientist who is conducting research on unclear power, he always thinks "Nuclear power is the best energy solution." But if you look at the biomass researchers, she will say "Biomass is the best." I think communication between proponents of these various energy alternatives is very important. At the same time, of course, these are other kinds of researchers who are engaged in the consumption of energy. And, of course, the conservation of energy is yet another subject. Just look at the forecasts of energy consumption or energy resources. There are many, many simulations, many forecasts being made, though they are of not enough reliability.

If you look at the economy, yes, of course, there is discussion about energy from the economic point of view, but it is only for developed countries and not for developing countries. For some regions on the earth, access to relevant energy is crucial and urgent beyond economical measure.

Can we do something to change this situation from the scientific side?

To do, that is my dream. So I am proposing that physicists, chemists, theoretical scientists, and social scientists come together to discuss energy. Then the voice of science and the voice about energy will become strong unified advice to society.

If we have such a strong voice about energy by scientists, then society many listen to what the scientists say. But at this moment, there are many scientists saying many different things, and society cannot listen to all of the voices of scientists. So, a unification of scientific voice for advice is very important. Of course, such unification must be enough scientific.

In the case of energy, business is very strong compared to the arena of global warming, which still has no industry behind it. Although it was rather easy for scientists and policy makers to collaborate for global warming without anyone else, if you look at energy, it is almost completely managed by the private sector, by industry and the big firms, that is, quite different from the global warming. So invitation to the business sector will be essential at some stage of discussion.

There are many problems of energy to solve at short-term future and long term-future. ICSU has established an ad hoc Working Group on Energy and Sustainable Societies, which will learn a lot about its possible direction in the future from this Conference.

In this Conference, participants will discuss sustainable development. Although the focus will be mainly about energy, it is aimed that effective discussion about sustainable development will be possible through consideration of energy, because energy can be the key for the real action toward sustainability by anyone this globe.

I can not forecast what discussion will arise during this Conference, because we have distinguished participants here from wide variety of societies and disciplines. But now, my expectation is swelling.