

Technotalk

## Achieving Energy Security and a Sustainable Society through Technical Developments that Contribute Globally



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Amid the challenges shared by the entire human race—global warming, resource depletion, damage to ecosystems arising from population growth, as well as economic and industrial development on a global scale—energy and the environment are crucial factors that will affect the future of global society. In the wake of the recent Great East Japan Earthquake, Japan too has been reevaluating its energy policy from the perspective of security. Internationally, there is also a need to strengthen measures for dealing with environmental problems such as global warming. In view of these circumstances, corporations need to consider current and future trends of the increasingly complex environmental and energy sectors, as well as consider means that will help to support the creation of a sustainable society. Hiroaki Nakanishi, Representative Executive Officer and President of Hitachi, Ltd. discusses these issues with Nobuo Tanaka, Executive Director of the International Energy Agency (IEA), an organization that was set up to establish reliable and sustainable mechanisms for energy supply, and to promote energy security, protection of the environment, and economic growth.



## Avoiding an Energy Crisis

**Nakanishi:** With problems of global warming and resource depletion being issues for the entire world, how to overcome the technical and social challenges posed by energy and the environment are important factors that will shape the future of our society and economy. I would like to hear your views about current trends and future outlook for energy and the environment, two areas in which Hitachi is investing considerable effort.

**Tanaka:** The Great East Japan Earthquake has certainly created a stir in discussion of energy policy throughout the world. I understand Hitachi too suffered substantial damage in the earthquake.

**Nakanishi:** That is right. We have many plants in Ibaraki Prefecture, which sustained considerable damage to buildings and equipment, and in the immediate aftermath it was thought that recovery would be difficult and take a long time. As it turned out, however, after conducting hasty assessments of buildings and machinery, in some cases we were able to resume production in less than a week. The experience provided me with a powerful reminder of Hitachi's "workplace strength."

**Tanaka:** That is a remarkable achievement. The lost capacity due to the earthquake of Hitachi's and Japan's manufacturing industry has an impact on global manufacturing trends and the global economy. (The state of the global economy) also affects energy supply and demand, particularly demand/supply for oil. Thus, the whole world will be affected. Even before the earthquake, the recent growth in energy demand in countries like China and India has raised uncertainty about oil supply. There have also been other problems, including the drop in crude oil production in Libya due to the political unrest in that country, which has hurt the operations of refineries in Europe, the major destination for Libyan oil. These days, crude oil supply, demand, as well as its price, are strongly influenced by political factors, and to minimize this the IEA is encouraging measures such as increasing oil stockpiles, even in non-

member countries. However, as such measures is also influenced by economic trends, we are keeping a close watch on the direction of the Japanese and global economy.

**Nakanishi:** At Hitachi, we have been making efforts to get affected operations back up and running quickly and, where possible, making up for delays in product delivery that affect our customers' businesses. Furthermore, we have been striving to assist with reconstruction of the affected areas and the rebuilding of social infrastructure, and also to support the economic recovery of the affected areas.

On the other hand, how do you think the earthquake has affected energy security? It seems to me that having a range of different energy sources remains as important as ever.

**Tanaka:** That is right. Although the accidents at the nuclear power plants that resulted from the earthquake are a major problem, nuclear energy remains an important energy source.

While thermal power generation will have to supply a higher proportion of our energy in the short term, if utilization of nuclear power remains low in the long term it could have a serious impact on our energy security. In addition to the problems of securing supplies of oil, natural gas, and other fuels and dealing with price fluctuations, reduced reliance on nuclear power is also a concern as it could obstruct our efforts to reduce CO<sub>2</sub> (carbon dioxide) emissions, which help prevent global warming. Although we need to continue shifting towards renewable energy, it is still expensive and the new developments in this area will effectively result in higher electricity pricing.

In my view, the scale of the current accident is not so much the result of the technology of nuclear power itself but has much to do with risk assessment. The accident in Japan has already started to influence nuclear policy in Europe. The trends in global demand for nuclear power generation will affect the future energy security, and how Japan brings the accident to a close and what direction it decides to adopt for the future will be the key factors that will affect the world's energy policies. In consideration of those affected by the accident we must conduct thorough investigations to identify the causes and to put countermeasures in place. For our future energy policy, it is important that we gain the understanding of the nation by presenting a comprehensive vision expressing how we intend to balance considerations of safety, reliability, energy security, global warming prevention, and the costs involved.

**Nakanishi:** To begin with, while Hitachi is doing all it can to help get the Fukushima Daiichi Nuclear Power Station into a state of cold shutdown, what to do after the plant has been stabilized is also an important question. Because such considerations as energy security, depletion of fossil fuel resources, and global

warming make nuclear energy essential, we intend to enhance further our technologies for improving its safety.

**Tanaka:** In the past Japan has in general—and not just in the field of nuclear power—tended to think that preventive measures alone will make safety perfect and less costly. We need to change this outlook to one in which we consider the hazards that will arise when accident occurs, even if it is highly unlikely, and implement countermeasures. Putting in place a range of different technologies on the assumption that unlikely situations may indeed occur is a prudent and worthwhile measure. I believe this is one of the lessons of the Great East Japan Earthquake.

### Greater Adoption of Smart Grids to Allow Wider Use of Renewable Energy

**Nakanishi:** The earthquake also posed major challenges for business continuity and social sustainability. The problems associated with energy and the environment are not limited just to global warming prevention; we also need to consider strengthening resilience to natural disasters such as earthquakes and tsunamis. In response to the current electricity shortage, Hitachi is working actively to supply products that can increase power generation as well as energy-saving products for industry and consumers. At the same time, we are also seeking to bring our businesses and services in line with measures to help prevent disasters and be more resilient when they do occur.

**Tanaka:** The IEA has been offering the Japanese government advice on energy security for some time, and the most important point we have made is the need to increase the capacity of the link between the electricity grids of eastern and western Japan. Although the underlying problem is that the two grids operate with different frequencies, expanding link capacity provides the flexibility needed at times of crisis. While it is unfortunate that the current situation has come about, we strongly urge that the current electricity shortage be used as an opportunity to implement proper measures. I believe that such steps will also help improve sustainability.

Expanding the interconnection between grids is also important for allowing greater use of renewable energy. As you know, the output of renewable energy varies with weather conditions and the larger the grid the easier it is to increase the capacity. The reason Europe has made so much progress on introducing renewable energy is because of the extensively interlinked grid in the European Union (EU), which extends across national borders. The large cross-border system supports an extensive electricity trading market and is such that excess power produced in Denmark can be stored in pumped storage hydroelectricity power plants in Norway. What we need are policies that successfully

combine technology with well-designed systems and markets like they have in Europe. While this is clearly a difficult challenge that will require significant changes from the current framework, it is also a chance to take a huge step forward in both technical and business terms.

**Nakanishi:** We need to have a debate about how to restructure our electricity system that takes account of the fundamental issues, namely reliability of supply, environmental friendliness, and economic efficiency. You have talked about the need to enlarge the electricity grid to find an appropriate role for the use of renewable energy as energy sources become more diverse. Along with this, we also require an expansion of investment in technologies that allow distributed autonomous power sources and small-scale grids to interconnect reliably with the core grids.

**Tanaka:** Looking at global trends, we need to speed up progress on adopting smart grids.

**Nakanishi:** Hitachi is actively involved in smart grid demonstrations and we are developing a range of related technologies including electricity storage control systems and energy monitoring and control systems for districts, households, and other consumers. In the field of technologies for maintaining a stable grid voltage and frequency, we are also utilizing simulation techniques and are working to develop technologies that minimize the effects of output fluctuations by photovoltaic and wind power generation.

**Tanaka:** We have already achieved a high level of technology. What is important now is a market design that allows renewable and other distributed power sources to coexist harmoniously alongside fundamental power sources with stable output.

**Nakanishi:** It is important that this design be considered at a national level as it was in the past, or at a cross-border level as in the case of Europe. My impression is that Europe has already opened up a considerable gap over Japan.

**Tanaka:** I am also very concerned about this. There are geographic constraints, but given that we already have a high level of technology, we should make the most of



this and devise initiatives for establishing a cross-border electricity network with a common energy market covering East Asian countries like China and South Korea.

### Low-carbon Technologies with Potential to Mitigate Global Warming

**Nakanishi:** Although the earthquake recovery is our top priority right now in Japan, measures for responding to global environmental problems like global warming and ecosystem preservation cannot be put off any longer. In addition to renewable energy and smart grids, what other technologies do you see as having promise?

**Tanaka:** CCS (carbon dioxide capture and storage). Without this, I believe halving our CO<sub>2</sub> emissions will be impossible and I hope it will become practical in the near future.

**Nakanishi:** Hitachi is participating in a demonstration project in Europe as well as working on another in Japan that combines CCS with IGCC (integrated coal gasification combined cycle). Furthermore, we signed a collaboration agreement on energy and environmental technology with the Saskatchewan state government in Canada which includes participation in a CCS demonstration project run by the state's electricity company Saskatchewan Power Corporation. This project is conveniently located to allow the captured CO<sub>2</sub> be used in natural gas extraction.

**Tanaka:** This is the way to produce a system that can operate economically.

**Nakanishi:** CCS is not a purely technical challenge and the question of how to recover the associated costs is contributing to delays in implementation. However, the practicality of CCS increases when one considers how it can be integrated into social and industrial systems, taking account of factors such as geography.

There is a growing trend in people's evaluation of environmental protection measures, including global warming prevention, whereby the measures are considered from the perspective of sustainability rather

than mere cost, as was more common in the past. In view of this, Hitachi is seeking to boost adoption of technologies such as hydro, wind, photovoltaic, and other forms of renewable energy, highly efficient thermal power generation, and CCS.

**Tanaka:** Energy and the environment should be thought of as two sides of the same coin, and in the same sense, sustainability, energy security and energy efficiency are also important elements of the same issue. It is difficult to get the citizens of emerging nations in particular to appreciate the importance of minimizing energy consumption to help prevent global warming, given its detrimental effects on economic growth, but perceptions will change once they realize that such efforts are also important in order to maintain the country's energy security.

The way we are proposing to counter global warming is not to solely pursue a top-down approach, whereby worldwide reduction targets are spread among individual countries, but rather to adopt a bottom-up approach, whereby countries reduce their CO<sub>2</sub> emissions by pursuing the economic benefits of energy security and more efficient energy use. I believe this approach will be more effective encouraging countries such as China and the USA, the two largest emitters, to take stronger measures.

**Nakanishi:** Certainly, the commitment of China is particularly important. At Hitachi, our Social Innovation Business, which creates infrastructures that support a sustainable society, is at the core of our activities, and we are striving to develop it in the global market. China is a region where we have had considerable success in the environmental and energy sectors and we are involved in numerous projects including those that deal with smart grids and smart cities.

**Tanaka:** China became the world's largest emitter of CO<sub>2</sub> in 2007, the largest consumer of energy in 2009, and is expected to be the biggest consumer of oil by around 2014 or 2015. Modern China has become the biggest "game changer" whose energy policies now affect global energy markets. At the IEA, we are deepening our relationship with China and also with other non-member countries such as India which is also expected to experience strong growth. Having leading emerging nations act as for sustainable growth is extremely important for the ongoing development of the global economy.

### Active Approach to Bringing Promising Technologies to Market

**Nakanishi:** Growing markets like China cannot be left out of any discussion of the world's energy problems and the same is true of (global) businesses. For us, emerging markets where the scale and other conditions are very different from Japan also serve as an important field for development of technical ideas and for refining



our technologies.

**Tanaka:** To achieve further growth in such businesses, are there any actions you would like to see from governments or international agencies like the IEA?

**Nakanishi:** I would like them to clearly define the content of the global policies and initiatives you mentioned earlier. What Hitachi does is supply superior technology. Our ability to convince customers that we will be able to deliver the types of infrastructure and technologies described in IEA's proposals will also depend upon the rationale for construction, policies, and cooperative arrangements between governments and international agencies. On the other hand, is there anything the IEA would like from Hitachi?

**Tanaka:** We are counting on them for all sorts of things. Various factors, including changes in the political climate and demand growth in emerging nations, are likely to result in a tight energy market in the future; and with it the potential for an energy crisis. Although the IEA, through its publications, forums and other activities, issues policy proposals to encourage stable energy supplies and measures for tackling global warming, we are counting heavily on private companies such as Hitachi that possess superior technology to develop and apply the required technologies.

To avoid an energy crisis and to minimize global warming, we first want Hitachi to achieve even better safety in nuclear power generation. Also of particular importance for preventing global warming is to make trial applications of promising new technologies. Analysis by the IEA indicates that 46 trillion dollars in additional investment will be needed to halve global CO<sub>2</sub> emissions by 2050 and that the bulk of this will come from the private sector. The key to increasing private investment is to turn technologies into businesses that can generate benefits through things like energy efficiency. This is the only way.

Hitachi in particular, with its advanced technology, still has many other technologies in the incubator. I hope that you can become a leader in global warming prevention by bringing these technologies to fruition in the global market. If there is anything the IEA can do to



facilitate this, we will not hold back.

**Nakanishi:** That is reassuring. Regarding technology development, I believe the only way to develop technologies that can contribute to the world in a meaningful way is to have the global market in mind from the outset. In addition to the benefits for Hitachi's own businesses, the results of such technology development should also be beneficial for Japan's energy security as well. This is why we are putting our efforts into the global deployment of our environmental businesses which include the construction of smart cities and the development of energy-efficient products.

**Tanaka:** Hitachi has hitherto helped us to prepare a "roadmap" of low-carbon technologies among others, and in future, I hope we can work together closely in finding solutions to the world's environmental and energy problems.

**Nakanishi:** Based on our Corporate Credo—"to contribute to society through the development of superior, original technology and products"—our aims are to help solve the world's environmental problems and to help Japan recover from the recent earthquake, while building a sustainable society. There is still much to discuss, but for now our time is up. Thank you for your participation today.

### Nobuo Tanaka

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Entered the Ministry of Economy, Trade and Industry (METI) in 1973, served at the Embassy of Japan in the USA and held positions as Vice President of the Research Institute of Economy, Trade & Industry, Director General of the Multilateral Trade System Department in METI, and Director of Science, Technology and Industry at the Organisation for Economic Co-operation and Development (OECD). He was the Executive Director of IEA from 2007 to 2011.

### Hiroaki Nakanishi

Representative Executive Officer and President, Hitachi, Ltd.

Joined Hitachi, Ltd. in 1970 and was appointed Deputy General Manager of Omika Works in 1993, Managing Director of Hitachi Europe, Ltd. in 1998, Vice President and Executive Officer, General Manager, Global Business and Chief Executive for Europe of Hitachi, Ltd. in 2003, Senior Vice President and Executive Officer in 2004, Chairman & CEO, Hitachi Global Storage Technologies, Inc. in 2005, and Executive Vice President and Executive Officer of Hitachi, Ltd. in 2006. He was appointed to his current position in 2010.