

## Future Development of Safe and Secure Energy & Environmental Information Technologies

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### Abstract

The 21<sup>st</sup> century is being described as the “environment century”. To address its needs, NTT Energy and Environment Systems Laboratories is aiming to expand its R&D themes on global, social, and human levels, while developing business through enhancement and innovation that takes account of the ageing demographics of modern society. This article introduces three specific technologies that are central to this vision and describes our plans for their future development.

### 1. IT and environmental protection

In the 21<sup>st</sup> century, much greater importance is expected to be given to environmental issues. Therefore, we should not stop at merely providing businesses with environmentally friendly facilities, but should also address environmental issues from the social and global viewpoints. At NTT Energy and Environment Systems Laboratories, we are using information technology (IT) to help protect the world's environment. With the aim of developing environmental business in the future, we are continuing to research and develop environmental IT and energy technologies based on three themes relating to safety and security: (i) being kind to the earth, (ii) enriching society, and (iii) enriching people's lives (**Fig. 1**). By building on the achievements of this research and development, we will meet our environmental development goals by helping to create the following:

- a culture of global environmentalism and reduced environmental impact
- a culture of efficient industry and secure recycling
- a safe & secure lifestyle for comfortable living

### 2. Core themes for supporting environmental business

An overview of the environmental business and research themes is shown in Fig. 1. The global themes include preventing global warming and protecting the earth's environment. Social themes include improving the social environment and safety/security issues. The issues listed under “zero emissions” and “clean energy” can be thought of as relating to society's responsibility to the global environment. They fall between the global and social themes. The human themes include environment management and environmental telecommunications. It is vital that core research themes are chosen and concentrated on at an early stage by closely examining the development of these future business themes.

### 3. Three core technology elements

The research and development carried out by NTT Energy and Environment Systems Laboratories is therefore organized by dividing each theme into three core technology element groups, as shown in **Fig. 2**: clean energy, social environment platforms, and environment assessment.

Environment assessment includes techniques for electromagnetic environment assessment (electromagnetic compatibility (EMC)), network construction, and environment sensing including air pollution measurement/evaluation techniques and electromagnetic shielding. It aims to provide environment sens-

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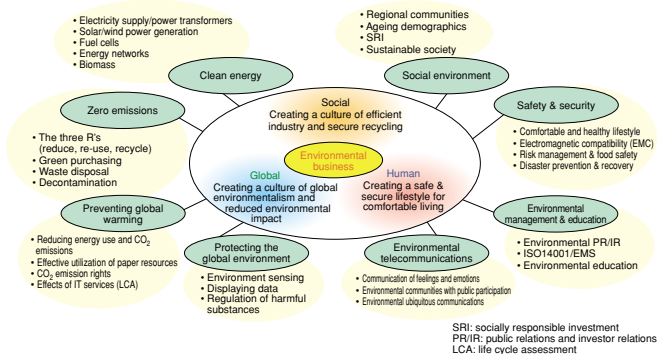


Fig. 1. Environmental business fields and research themes.

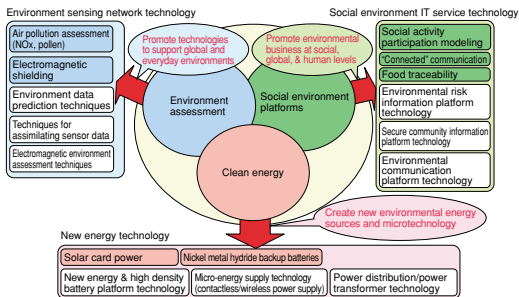


Fig. 2. Technical elements of the research themes.

ing, electromagnetic security, a comfortable and healthy lifestyle, and services such as ones for assessing IT services (i.e., through life cycle assessment (LCA)).

Social environment platforms provide ways to

gather information and process it using techniques such as social activity participation modeling, “connected” communication, and food traceability to create services dealing with risk management, countermeasures to cope with the ageing society, telecom-

munications that convey feelings and emotions, food safety, disaster prevention/recovery, and environmental education.

With regard to clean energy, we are developing power sources such as Solar Card Power and backup power sources such as nickel metal hydride batteries to improve energy efficiency, save energy, and cut CO<sub>2</sub> emissions.

These technologies are discussed in more detail in the other feature articles in this issue.

#### 4. Future developments

At NTT Energy and Environment Systems Laboratories, we are concentrating our efforts on constructing social environment platforms and environment assessment techniques to provide services that will create a safe and secure environment in the future (Fig. 3). Specifically, for the time period three to five years from now we are investigating the construction of information platforms for national/autonomous bodies, environment risks, secure communities, and so on. For this purpose we aim to establish new core

technologies such as technology for assimilating sensor information and predicting environment data.

In the energy field, we are supporting the creation of a pleasant society by linking with society environment platforms to create clean energy that will form a technological platform to support environmentally aware societies in the future.

#### 5. Concluding remarks

To realize our vision of an environmental 21<sup>st</sup> century, we will develop our business through a process of enhancement and innovation while expanding our research and development themes to encompass global, social, and human issues taking into account the impact of ageing demographics. Specifically, we will make a safe and secure environment by resolving issues that threaten our lifestyles and create new business scenarios using clean and ubiquitous energy\*3 (Fig. 4).

\*3 Ubiquitous energy supply is a core technology for a ubiquitous society.

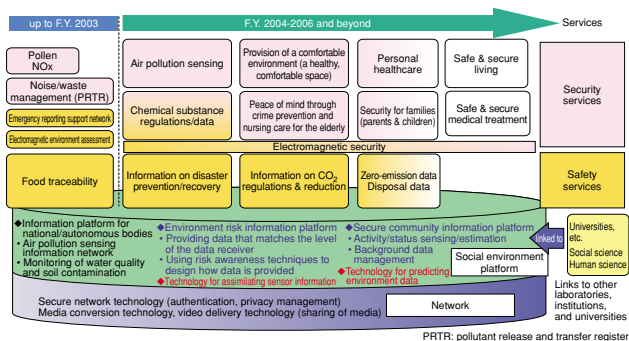
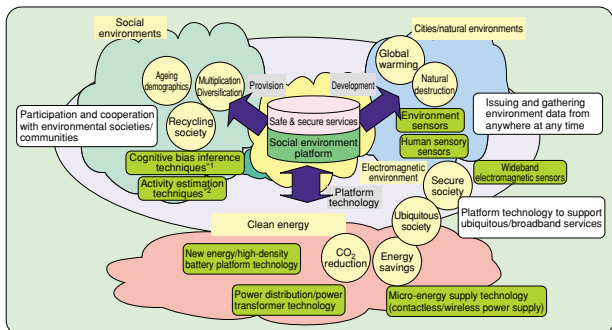


Fig. 3. Society environment platform that provides safety and reliability.



\*1 Cognitive bias inference techniques: Techniques for extracting lifestyle attributes based on an individual's subjective values (risk perceptions) and designing how risk information is presented in accordance with them.

\*2 Activity estimation techniques: Techniques for generating information that allows people to infer and make judgments about the actions and status of others using unrestricted sensing that people are unaware of and thus places no load on the individual.

Fig. 4. Future development of safe and secure energy and environmental information technologies.



#### Hiroki Tanaka

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He received the B.E. degree in electrical engineering from Niigata University, Niigata in 1976. In April 1976, he joined Nippon Telegraph and Telephone Public Corporation (now NTT), where he engaged in developing digital switching systems and switching software in Musashino Electrical Communication Laboratories, Tokyo, Japan. From 1983 to 1987, he worked on provisioning the Digital Data Switching System (DDX) and facsimile transmission systems in the engineering office of NTT headquarters. From 1987 to 1998, he was a member of NTT Network Systems Development Center, where he was involved in BDN system develop-

ment and various switching system improvements. From 1998 to 2000, he was engaged in development of the Intelligent Network (IN) system and its service software systems in NTT Network Service Systems Laboratories, as a project manager, and as an executive research manager. From 2000 to 2003, he was the project manager responsible for the HIKARI Service Promotion Project aiming to create a wide range of services and business appropriate for the full-scale broadband and ubiquitous era that optical access will engender. Currently, he is the director of NTT Energy and Environment Systems Laboratories, which is working to achieve a safe and comfortable society, based on two key approaches: environmental IT and R&D of clean energy technologies.