

NEC's Smart Energy Vision

NEC's fusion and orchestration of ICT and energy technologies are paving the way for the optimization of the supply and demand of energy in the society of tomorrow. Moreover, our technologies are contributing to both energy savings and a more comfortable life.

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Senior Vice President

1. Introduction

According to the United Nations, the global population reached 7 billion in 2011, and it is forecast to exceed 8 billion by 2025 and continue to increase to 9.6 billion by 2050. Moreover, the migration to cities is expected to continue, expanding the global urban population from 3.5 billion in 2011 to 6.3 billion by 2050. This growth will be accompanied by increased demand for all of life's essentials. Demand for food will rise to 1.7 times current levels. Water demand will increase 1.6 times. Energy demand will nearly double to 1.8 times. At the same time, greenhouse gas emissions are expected to reach 1.5 times the current volume (**Fig. 1**). If current population and consumption trends were to continue unabated, we would need resources equivalent of 2 earths to support our urban-centric lifestyle in 2050. Innovative social infrastructure is required to maximize efficient use of the earth's limited resources and achieve a future that provides sustainability and equality for people everywhere in the world.

With the aim of orchestrating a brighter world, the NEC Group is exploiting the power of ICT for its Social

Solutions Business and advancing social infrastructure to provide people everywhere with the values of safety, security, efficiency and equality. We will provide innovative solutions that deliver both customer and social value and contribute to solving diverse social issues.

This special issue will introduce the reader to our solutions, services and technology that are paving the way for the Smart Energy society – solutions for general us-



Fig. 1 The Earth in 2050.

ers and enterprises as well as end-user solutions for the customers of energy industry and utility companies.

2. Global Energy Issues and the Direction of Future Development

Keeping pace with the population increase and economic growth, global energy consumption is also rapidly rising. Heightened reliance on fossil fuels and increased use of thermal power generation have contributed to the increase in greenhouse gas emissions – one of the causes of global warming. While tackling ways to reduce the load on our environment is a major challenge that must be met on a global scale, it is equally vital to supply sufficient electrical power to satisfy the growing demand for energy and to sustain economic growth.

In recent years, while seeking a good energy balance through a combination of thermal and nuclear energy power generation, the pursuit of power generation through low environmental-load, renewable energy sources such as solar and wind power have been promoted with the aim of reducing greenhouse gas emission volume. Renewable energy is steadily becoming accepted as a new source of energy to power offices, factories and homes around the world.

On the other hand, as power from these renewable energy sources begins to flow in large quantities into existing power grids that have operated with a high degree of stability up to now, it may impact the stability of the

power supply. Moreover, the supply of renewable energy fluctuates due to weather conditions and the time of day, necessitating constant measures to maintain a balance with the power grid. In order to solve these issues and maintain the stable supply of energy, a new structure and approach are demanded.

3. NEC's Vision of Social Infrastructure

NEC boasts the unique position of possessing both ICT (Information Communication Technology) ranging from computer to cloud technologies and Energy Component Technology including energy storage systems and quick charging devices for electric vehicles. By combining these and other various assets, NEC is contributing to the optimization of energy supply and demand through the promotion of local production for local consumption of electrical power, the management of fluctuations in generated power volume and the development of new services (Fig. 2).

Scalable energy storage systems and ICT that controls them play a very important role in the construction of the networks that will support the stable supply of energy. In a society that introduces the large-scale utilization of renewable energy, it is vital to tackle the efficient use of energy from both the supply side and the demand side.

For example, the impact of adopting renewable energy sources on the demand side makes it necessary to either

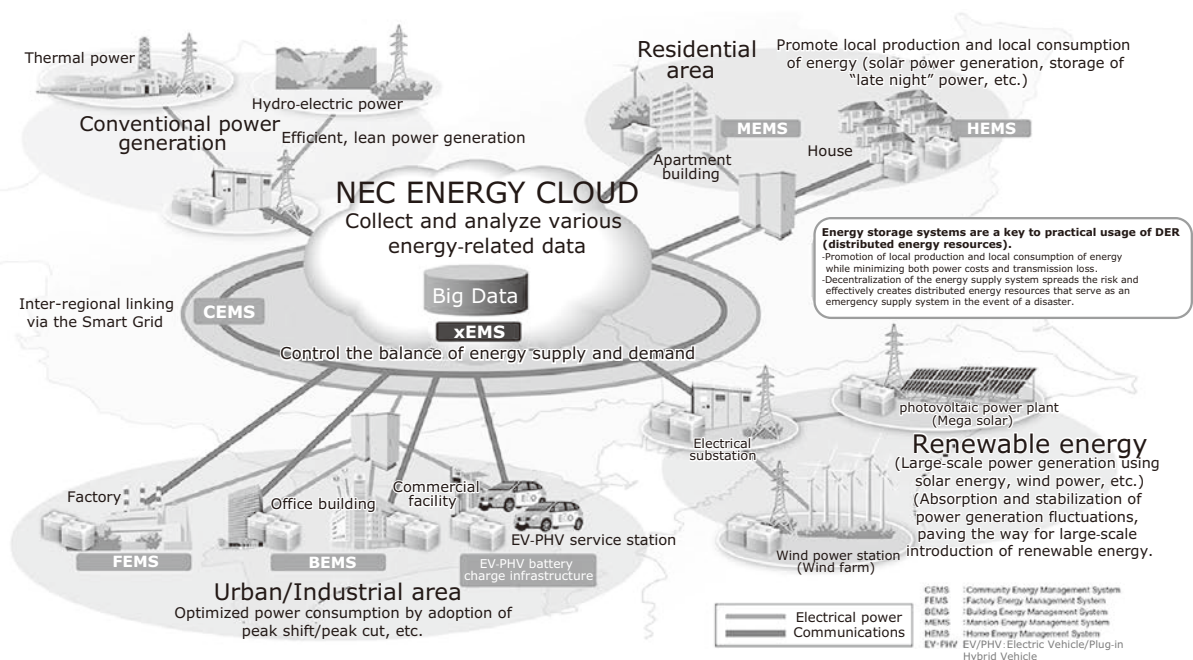


Fig. 2 NEC's Smart Energy Cloud.

restrain energy usage by grasping the amount of energy generated and consumed, or encourage to use energy for specific objectives by employing a storage system that enables the temporary storage of energy and its time-shifted use. On the supply side, balancing energy supply and demand will require systems for large-scale storage of energy to facilitate its temporary storage and the efficient utilization of the stored energy. Connected by ICT, the supply and demand sides can act in concert, enabling the coordinated utilization of respective storage systems. In addition, more efficient usage of power throughout entire communities can be achieved during peak electrical power demand periods by the flexible coordination of power storage and management assets within the community.

4. NEC Solutions: Contributing to the Advance of Social Infrastructure

In order to contribute to realizing the advanced social infrastructure shown above, NEC seeks to grasp the structure of energy supply and demand from the perspective of both the supply and demand sides, and then provides optimized solutions aligned with the axes of services, systems and hardware (Fig. 3).

In this special issue, we would like to introduce the reader to the solutions and ICT that will provide broad-based cloud services to the diversity of social infrastructure users and customers of energy-related enterprises.

4.1 Visualization Technologies

NEC is providing visualization solutions that enable a bird’s-eye view of the state of operations and the amount of generated power by obtaining an accurate electrical power data via the cloud computing. They also make it possible to grasp monitoring of dispersed power

sources and market conditions in real time.

Capable of providing the centralized management of data acquired from multiple data sources, visualization enables intuitive management of this extremely complex infrastructure.

4.2 Analysis and Predictive Technologies

Electrical power systems produce a vast diversity and quantity of data. They can be broadly categorized into: operational data including maintenance history and productivity plans; energy device control data such as power generation status, storage batteries and HEMS; and various external data such as the weather changes. Tagged with space, time and node information, these data are used in our solutions that detect abnormalities and provide analysis and forecasts with a high degree of accuracy. While maintaining productivity, NEC solutions enable the efficient utilization of energy.

4.3 Optimization Technologies

Optimization of energy input and output is achieved with peak shift/cut control devices. Linking of the systems on the energy generation and demand sides enables energy management proposals that respond to demand and the needs of daily life. In addition, in close coordination with corporate partners, NEC is expanding services including provision of energy-saving advice, equipment/device monitoring and functions for apartment complexes that contribute to the visualization of energy usage by the entire community.

5. Conclusion

Working in close collaboration with customers in diverse fields and industries and with our corporate

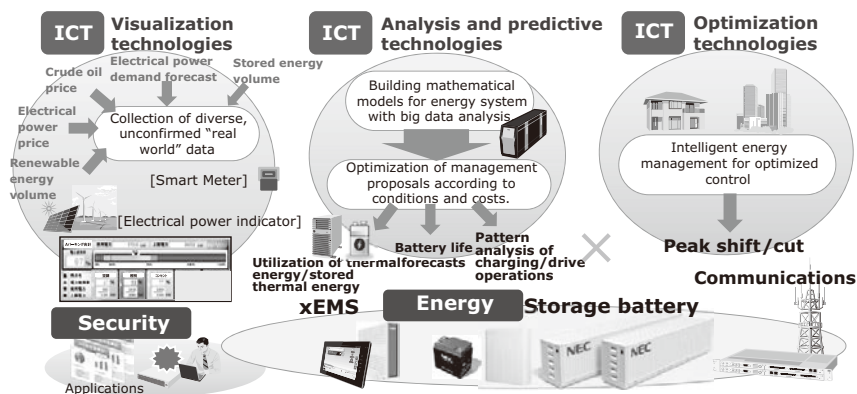


Fig. 3 NEC assets.

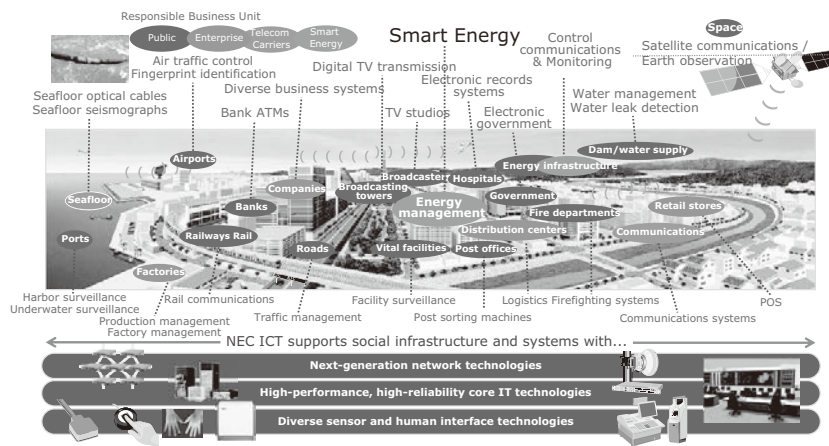


Fig. 4 Advanced social infrastructure by implementing ICT.

partners, NEC is proactively meeting challenges. In the future, we will continue to contribute to the safety, security, efficiency and equality of society, and provide the world with new value in an expanding range of fields through the fusion of our ICT and energy technologies (Fig. 4).

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Remarks for Special Issue on NEC's Smart Energy Solutions Led by ICT
NEC's Smart Energy Vision

Solution for general customers

NEC's Cloud-Based HEMS Solution Advances with Data Utilization
HEMS Data Utilization Solutions Using Autonomous Adaptive Control
Cloud-Based EV/PHV Charging Infrastructure Service
A Compact Energy Storage System for the "Storage and Smart Use of Electricity"
Lightweight, Long-Life Lithium-ion Secondary Battery Pack for Communications Equipment

Solution for enterprises

The Introduction and Deployment of NEC's Smart Energy Management System - "Smartizing" Energy Management at Obayashi Corporation Technical Research Institute and NEC Tamagawa Plant, Building 9 -
Cooling Technology to Reduce Air-Conditioning Power Consumption in Data Centers
Validating the Performance of NEC's Tamagawa Building Smart Energy System
EMS (Energy Management Systems) Technologies Optimizing Energy Consumption for Mobile phone Base Stations

Solution for energy enterprises

Development of Energy Supply & Demand Management System at the Core of Our Electric Power Supplier Solution
Power Plant Fault Sign Monitoring Solution Based On System Invariant Analysis Technology (SIAT)
Situational Intelligence for Resource Optimization
Power Supply-and-Demand Balancing Solution Using Distributed Storage Batteries
Using Energy Storage to Prepare the Electricity Grid for a Clean, Reliable, Renewable Future
Grid Stabilization Solution That Helps Ensure a Stable Supply of Electric Power: Grid Energy Storage System for Italy's ENEL
NEC's Contribution to Advanced Metering Infrastructures (AMIs)

Technology development and standardization

Methodology for UN/CEFACT Standards
The Current Status of OpenADR (Automated Demand Response) Technology and NEC's Approach to the DR Market
Demonstration of Remote Storage Battery Control Using Standard Procedure
Electricity Fingerprint Analysis Technology for Monitoring Power Consumption and Usage Situations of Multiple Devices by Using One Sensor
Power Imbalance Reduction Solution with the Digital Grid System
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