

# Hitachi's Global Business and R&D Strategies

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## GROWING IMPORTANCE OF REGIONAL FOCUS IN GLOBAL BUSINESS

WITH emerging economies increasingly surpassing advanced industrial economies as the world's key markets, Hitachi is pursuing specific business strategies in each market. With products and services that span a wide range, it is important that the activities of Hitachi's internal and group companies in each region of the world be coordinated by both group and regional headquarters. It has also become more important for the group and regional headquarters to coordinate their activities and plot further strategies.

Aiming to expand its Social Innovation Business globally, Hitachi has identified key regions\*<sup>1</sup> as being of critical importance in the future, and is proceeding with measures that include collaboration with local partners and adopting a locally focused approach to operating its businesses. This issue contains articles that describe Hitachi's business activities in China, India, Brazil, and Russia, and its research and development activities in North America, Europe, China, and India.

\*1 Arab Republic of Egypt, Central and Eastern Europe, Federative Republic of Brazil, India, Kingdom of Saudi Arabia, People's Republic of China, Republic of Indonesia, Republic of South Africa, Republic of Turkey, Russian Federation, and Socialist Republic of Viet Nam (alphabetic order)

## HITACHI'S GLOBAL BUSINESSES

Hitachi has designated six hubs, located in Japan, USA, Europe, Asia, China, and India, to undertake product development, production, sales, and servicing relevant to their respective regions. Hitachi has 599 subsidiaries spread across 54 countries, with activities spanning the continents of America, Africa, Europe, Asia, and Australia (see Fig. 1 and Table 1). This issue includes articles on how Hitachi is operating its Social Innovation Business in global markets, and on its global research and development activities. In pursuing its international business activities, it is becoming ever more important that Hitachi's involvement starts from the research and development phase.

The following sections use examples from China, India, Russia, and Brazil to describe the activities of Hitachi's Social Innovation Business.

### Social Innovation Business in China

China is experiencing rapid economic growth with ongoing social infrastructure construction anticipated, including in the northeast and interior regions. There is also a need to create an environmentally conscious society, namely a "low-carbon society." Hitachi has formulated its business strategy with the aim of

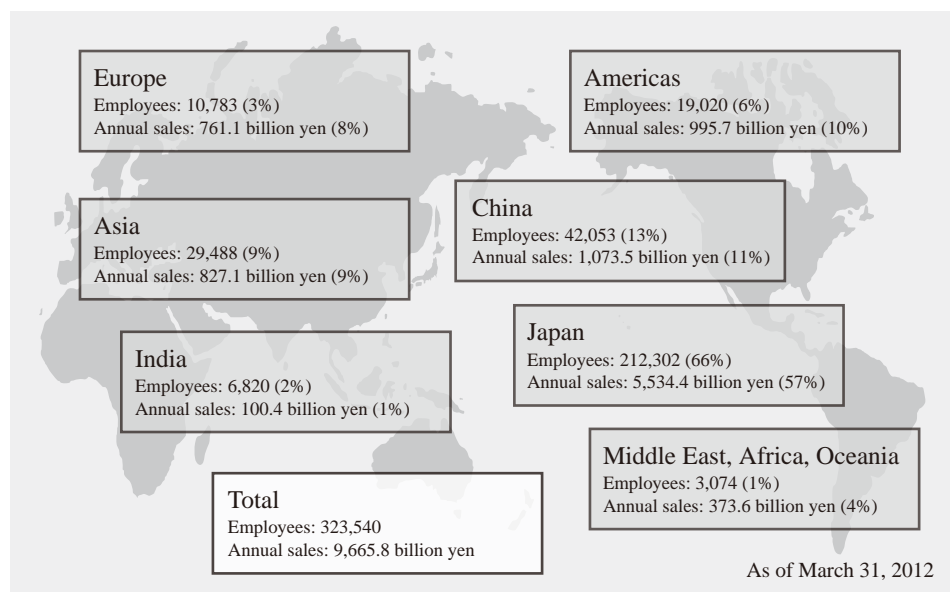


Fig. 1—Overview of Hitachi's Global Business.  
Hitachi's global business is based around six hubs, including Japan.

TABLE 1. Number of Hitachi Companies in Each Country

The number of Hitachi companies in each country. Hitachi currently has 599 companies spread across 54 countries.

| Country or region                                    | No.          | Country or region                | No. | Country or region           | No. |
|--|--------------|----------------------------------|-----|-----------------------------|-----|
| People's Republic of China                           | 173          | Spain                            | 10  | State of Israel             | 2   |
|  | Hong Kong 20 | Federative Republic of Brazil    | 8   | Kingdom of Norway           | 2   |
|  | Taiwan 19    | Kingdom of Belgium               | 6   | New Zealand                 | 2   |
|  | Macau 1      | Republic of South Africa         | 6   | Ukraine                     | 2   |
| United States of America                             | 63           | Republic of Austria              | 5   | Republic of Bulgaria        | 1   |
| United Kingdom of Great Britain and Northern Ireland | 35           | Russian Federation               | 5   | Republic of Chile           | 1   |
|  | Bermuda 1    | Czech Republic                   | 4   | Arab Republic of Egypt      | 1   |
| Kingdom of Thailand                                  | 33           | Hungary                          | 4   | Republic of Ghana           | 1   |
| Malaysia   | 26           | Republic of Italy                | 4   | Hellenic Republic           | 1   |
| Republic of Singapore                                | 25           | Socialist Republic of Viet Nam   | 4   | Republic of Kenya           | 1   |
| India  | 21           | Swiss Confederation              | 3   | Republic of Mozambique      | 1   |
| Federal Republic of Germany                          | 19           | Kingdom of Denmark               | 3   | Federal Republic of Nigeria | 1   |
| Republic of Korea                                    | 14           | Ireland                          | 3   | Republic of Panama          | 1   |
| Republic of Indonesia                                | 13           | Republic of Poland               | 3   | Portuguese Republic         | 1   |
| Republic of the Philippines                          | 13           | Slovak Republic                  | 3   | Romania                     | 1   |
| Australia  | 12           | Kingdom of Sweden                | 3   | United Republic of Tanzania | 1   |
| Canada   | 12           | Bolivarian Republic of Venezuela | 3   | Republic of Uganda          | 1   |
| United Mexican States                                | 12           | United Arab Emirates             | 2   | Republic of Zambia          | 1   |
| Kingdom of the Netherlands                           | 12           | Argentine Republic               | 2   |                             |     |
| French Republic                                      | 11           | Republic of Finland              | 2   |                             |     |
|  |              |                                  |     | Total                       | 599 |

\* As of March 2012

helping China progress in accordance with the nation's Five-Year Plan.

Specifically, Hitachi established a China Energy Conservation and Environment Commercialization Promotion Project Team at Hitachi (China) Ltd. in April 2006. It has also helped China Central Television with filming, factory visits, and similar activities in Japan, based on the idea that China can draw on Japan's experience as it seeks to combine protection of the environment with economic growth.

In addition to signing the Model Project for Energy Saving and Utilization of Waste Heat/Pressure through Electrical System in the Steel and Chemical Industries in Yunnan Province, one of the Japan-China Energy Conservation and Environmental Business Promotion Model Projects<sup>(a)</sup> agreed upon between the Japanese and Chinese governments in 2007, Hitachi is also participating in a number of other projects, including

(a) Japan-China Energy Conservation and Environmental Business Promotion Model Projects

Projects that seek to encourage the development of energy conservation and environmental businesses involving Japanese and Chinese companies with the aim of expanding mutually beneficial cooperation between Japan and China in these fields. In addition to ensuring that business activities such as energy efficiency assessments, feasibility studies, and the supply of equipment proceed smoothly, and that wider use is made of Japan's excellent technology and management experience in the fields of energy conservation and the environment, the projects also aim to act as model examples.

an energy efficiency assessment model project in Ningbo City, a joint project with the National Development and Reform Commission, and a joint project with Dalian City. Elsewhere, Hitachi is helping to establish the infrastructure for resource recycling in China through home appliance recycling as well as in the fields of smart grids and water treatment. In October 2011, Hitachi signed a memorandum of understanding on collaboration in fields such as resource recycling and the low-carbon economy with the Liangjiang New Area of Chongqing City. In the future, Hitachi intends to continue meeting the need for social infrastructure that takes account of the environment and energy efficiency by supplying its know-how, technology, products, and services, and by making extensive use of its local operations.

### Social Innovation Business in India

Hitachi is involved in a range of social infrastructure businesses in India, a nation where robust economic growth is driving vigorous investment in infrastructure. In the field of information, telecommunications, and networks, where the government published a draft National Telecom Policy in 2011, Hitachi is strengthening businesses that handle Big Data. In electric power generation and transmission, Hitachi

has established a joint venture company with BGR Energy Systems Limited, a large Indian company in the field of thermal power plant construction, and is seeking to win ongoing orders for boilers and turbine-generators for thermal power plants to help meet the shortfall in India's electric power supply. Hitachi has also established a base for the design, manufacture, and maintenance of monitoring and control systems for thermal power plants to put in place the capabilities for helping these plants achieve higher efficiency.

In the field of infrastructure systems for industry, Hitachi is working to expand its photovoltaic power generation systems business, including participating in "The Model Project for a Microgrid System Using Large-scale PV Power Generation and Related Technologies" being run by Japan's New Energy and Industrial Technology Development Organization (NEDO) along with the Indian government and others. Hitachi is also speeding up its provision of complete system support in the field of control systems for steel mills, from sales through to design, manufacturing, and maintenance services.

With predictions of water shortages becoming more severe in the future, Hitachi also intends to contribute to the use of water resources in India through its seawater desalination and recycling businesses.

In the railway systems field, Hitachi's activities include working to promote the adoption of aluminum carbodies in high-speed and quasi-high-speed trains, and supplying solutions for the modernization of railway signaling systems, including digital automatic train control (ATC)<sup>(b)</sup>. It is also actively promoting monorails.

Hitachi now has 22 local subsidiaries and 6 branches or offices operating in India, and these are working as a group on Hitachi's social infrastructure business.

### Social Innovation Business in Russia

Hitachi has had business activities in Russia since 1982, and currently 10 group companies have a presence in the form of a subsidiary, branch, or permanently staffed office.

To achieve economic stability over the long term, the Russian government is adopting an "Economic Modernization Program" aimed at

shifting from a resource-dependent economy to an innovative economy. As the five sectors prioritized for modernization are energy efficiency, healthcare, space and communications, information technology (IT), and nuclear energy, there is a good fit between Russian government policy and Hitachi's technologies. This has set the stage for business expansion.

Rapid market growth is anticipated, with per capita personal income having more than doubled in real terms over the eight years from 2002, and a willingness to spend evident among the middle classes. The Russian market is one with great potential, including the construction of new social infrastructure to cater to the series of major events being hosted over coming years, namely the Asia-Pacific Economic Cooperation (APEC) Russia 2012 summit in Vladivostok, the Sochi 2014 Winter Olympics, and the 2018 FIFA<sup>\*2</sup> World Cup Russia.

While the size of its business in Russia remains very small compared to the size of the potential market, Hitachi intends to take a strategic approach to business development.

### Social Innovation Business in Brazil

Hitachi has been doing business in Brazil for more than 70 years, starting with the supply of hydroelectric generation equipment for the Macabu Hydro Power Plant in 1939 and the establishment of a Brazilian Office in 1940. Already boasting the largest economy in South America, it is predicted that the nation will enjoy strong economic growth in the future. Scheduled to host the FIFA World Cup Brazil in 2014 and the Rio de Janeiro Olympics in 2016, expansion is anticipated in the Social Innovation Businesses on which Hitachi is focused, including ongoing investment in infrastructure. Hitachi is undertaking a range of measures aimed at expanding its businesses in the future, including plans to enhance further its sales organization as well as building and strengthening its local production capabilities and working with local partners.

## GLOBAL RESEARCH AND DEVELOPMENT ACTIVITIES

Hitachi has been progressively globalizing its research and development since establishing research and development centers in the USA and Europe in 1989. Centers have also been established in China, Asia (Singapore), and India since 2000, and Hitachi now operates research and development sites in six hubs of the world based around the core made of its Japanese

(b) Digital automatic train control (ATC)

A railway signaling system for preventing collisions and other incidents on busy railway lines such as those used by Japan's Shinkansen. A feature of digital ATC is its use of digital signals for communications between the wayside equipment and on-train systems.

\*2 FIFA is a trademark of Fédération Internationale de Football Association (FIFA).

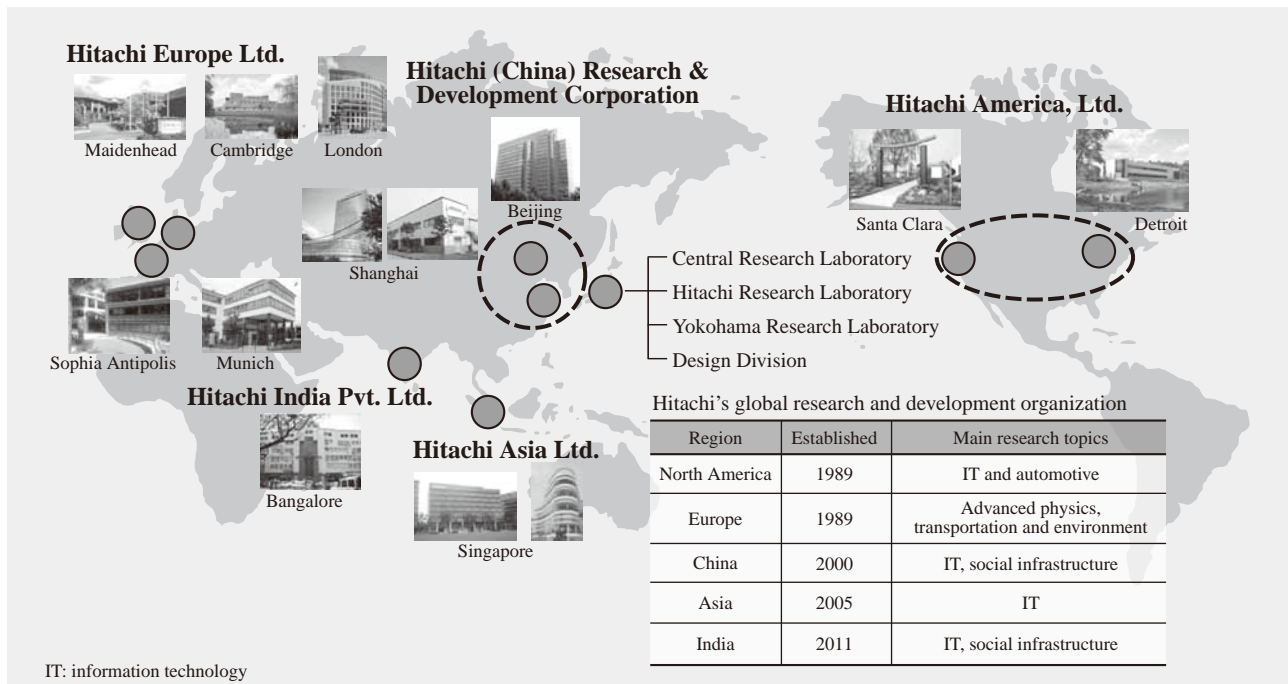


Fig. 2—Hitachi's Global Research and Development Organization.

Hitachi is expanding its locally managed research and development in North America, Europe, China, Asia, and India.

laboratories (see Fig. 2). To keep pace with its global business expansion, Hitachi is seeking to build local research and development systems that are managed by local headquarters and can devise solutions to the specific needs of different regional markets, while also utilizing core technologies developed in Japan. The following sections describe the research and development missions of each site, along with their main research topics and recent activities.

Development in North America is focused mainly on supporting local business operations targeted at sophisticated markets and customers. To accelerate its development of next-generation data storage systems, Hitachi is developing virtualization technology for data storage systems at its Santa Clara laboratory by utilizing its contacts with leading customers in Silicon Valley. Hitachi also established an "Innovation Laboratory" in conjunction with Hitachi Data Systems Corporation in 2011. Meanwhile, Hitachi's Detroit laboratory is working closely with customers on the development of technology for environmentally conscious vehicles.

In Europe, Hitachi has been researching commercial applications of leading-edge technologies and participating in European Union (EU) projects based around joint work with world-leading research institutions. It also established the new Transportation, Energy and Environment Research Laboratory (TEEL) in 2011 to strengthen its social infrastructure business

in that region. Key research topics include spintronics<sup>(c)</sup> for use in revolutionary new computer systems, the development of technology for complying with European regulations on vehicle exhaust emissions, and the development of railway technologies that can contribute to Hitachi's comprehensive capabilities that extend from the manufacture of rolling stock to operation and maintenance (O&M).

Hitachi's laboratory in China has more than 100 staff members and acts as a center for local research and development, developing technology suitable for China and engaging in collaborations with leading Chinese universities. Hitachi also established a Social Infrastructure System Laboratory in 2010 with the aim of participating in Social Innovation Businesses at a national level. Its work includes eco-city development and the development of a smart grid simulator.

In Asia, Hitachi is working on the development of cloud storage for social infrastructure targeted at social experiments in Singapore. It also built a research and development center in India in 2011 to develop technology that will facilitate market access based on Indian market conditions. Its main mission is to conduct locally based technology development

(c) Spintronics

Spin is the magnetic property of an electron, analogous to its electrical property of charge. The technology of spintronics seeks to utilize the transport of both spin and charge. Research in the field is accelerating in anticipation of its use in the development of revolutionary new devices in semiconductors and other applications.



to help open up IT business opportunities and expand Hitachi's social infrastructure business in India.

This issue contains articles describing some of the research and development work for social infrastructure business being conducted by these centers, including model-based design technology for automotive systems in North America, railway research in Europe, smart grids in China, and social infrastructure research in India.

### Cyber-physical Model-based Design

Model-based design is used in the development of power trains, transmissions, vehicle control, vehicle information systems, and other vehicle-mounted embedded systems. The Automotive Products Research Laboratory of Hitachi America, Ltd. uses virtual ("cyber") spaces to link sensor outputs and other control information from these embedded systems to perform design work efficiently in a virtual environment, and to provide links that allow design work to be shared across sites in different parts of the world. This issue includes an article that describes this concept and the results of a demonstration, using the development of a fuel pump control system for gasoline engines as an example.

### Railway Research in Europe

Hitachi has achieved considerable success with its Class 395 high-speed trains in the UK, the birthplace of railway. In addition to the supply of rolling stock and maintenance services in conjunction with the Intercity Express Programme, a major upcoming project of the UK's Department for Transport for the replacement of high-speed trains, Hitachi is also seeking to undertake extensive work as a total systems integrator, including electrical components and railway signaling systems. An article in this issue describes Hitachi's railway business operations in Europe and what its research and development center is doing to support these activities.

### Chinese Smart Grid

The growth in energy demand and the increasing urbanization of the population that come with economic progress mean that strengthening its energy supply capabilities while simultaneously protecting the environment represents an important challenge for China, and it is anticipated that the nation will proceed with the construction of smart grids and smart cities. While Hitachi also supplies solutions that incorporate equipment, control systems, and information systems

to contribute to the development of each region, an article in this issue focuses on current progress in the field of smart grids and smart systems, as well as on Hitachi's research and development strategy.

### Research into Social Infrastructure in India

While investment in social infrastructure in India continues to grow, its infrastructure systems need to be redesigned to cope with the wide diversity within the nation in the level of infrastructure provision. This includes some cases where an advanced level of infrastructure is already in place, and others where infrastructure has yet to be installed. An article in this issue covers Hitachi's activities in India, as well as the issues faced in the research and development of social infrastructure intended to serve such a diverse market.

## EXPANDING GLOBAL BUSINESS AND RESEARCH AND DEVELOPMENT ACTIVITIES

Having set itself a target of achieving more than 50% of its sales from outside Japan in the near future, Hitachi is strengthening its global business and research and development capabilities. This issue focuses on business activities in emerging markets (a particular target for Hitachi in the future), and on how Hitachi works closely with local businesses on research into social infrastructure, including in developed economies. This includes articles that describe activities in North America, Europe, China, India, Brazil, and Russia from a global point of view.

As its business becomes more global in the future, Hitachi intends to continue expanding its business activities and research and development work, with a focus on key regions.

### ABOUT THE AUTHORS



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