

New Value Creation

Why is it Important?

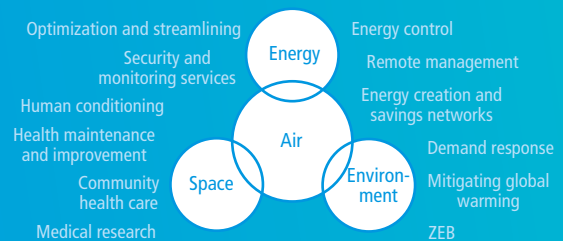
The Source of Sustainability for Society and the Company

Amid today's globalization, technology is changing and advancing at greater speed than ever. It is becoming tougher for a company to offer differentiated products or services so that customers purchase based on price. For a company to grow in this situation, it must provide advanced value by combining state-of-the-art technologies resulting in new products that help society solve problems in fields such as energy, the environment, and health.

DAIKIN'S POLICY

Sharing Dreams and Ambitions Inside and Outside Daikin to Realize a Healthy, Comfortable Lifestyle Through Air

Research Themes for New Value Creation



Feature Creating New Value to Meet the Expectations of Customers and Society

Collaborative Innovation with Other Industries and Fields

DAIKIN'S APPROACH

Creating New Value Inside and Outside the Company

In order to meet diverse customer needs and create new value that contributes to society, it is important that Daikin first build up its technological superiority by leading further advanced technologies: inverters, heat

Internal Collaboration and External Collaboration



pumps, and fluorochemicals. It is also important to combine state-of-the-art technologies from around the world—such as information-communication, sensors, materials, processing, medicine, and healthcare—with Daikin technologies to come out with products and services that provide new value to customers.

Today's world of unprecedented and rapid technological change requires the creation of new value, which is only possible through collaborative innovation that fuses a wide range of knowledge and technologies and takes us beyond current boundaries. The key to success will be how well we pool the strengths of Daikin and its external partners to create and provide new products and services that bring happiness and joy to people's lifestyles. Also crucial will be how well we come up with technologies that contribute to solving the problems society faces in the fields of environment, health, and medicine. To this end, Daikin established the Technology and Innovation Center in November 2015 with the aim of promoting collaboration with external partners in order to contribute to society through the creation of new value.



The wide-open space of the Waigaya Stage facilitates debate and discussion.

DAIKIN'S PERFORMANCE

The Technology and Innovation Center: A Core Facility Bringing Together Daikin's R&D Functions

Located in Settsu City, Osaka Prefecture, the Technology and Innovation Center (TIC) is a core technology development facility that brings together about 700 Daikin engineers from a range of disciplines. Representing the collective power of the Daikin Group's engineers, the TIC does more than just create technologies: it delves deeply into research themes, researches and develops new technologies, and promptly brings them to market in new products and services through collaboration across TIC and the other divisions in Daikin.

At the same time, a key mission of the TIC is to strengthen cooperation and tie-ups with companies, universities, and research institutes possessing unique technologies in their particular industry or field, inviting people, information, and technologies from around the world, resulting in collaboration with Daikin in giving birth to innovation.

To facilitate collaboration inside and outside the company, the TIC features a range of facilities where engineers can gather for lively and meaningful discussion. These include the Waigaya Stage, which is always ready to spur-of-the-moment meetings; the Future LAB for debate among Daikin and other industry engineers; and the CHI-NO-MORI, where participants can brainstorm with regards to Daikin core technologies as well as cutting-edge technologies currently under development.

In addition, there are fellow rooms in which guests

such as university professors and opinion leaders from around Japan and the world can give presentations. These rooms have so far been used as offices where Daikin can work with representatives of universities with which the company is conducting joint R&D, including Kyoto University, Osaka University, and the Nara Institute of Science and Technology. Eiichi Negishi, a distinguished professor at Purdue University and a recipient of the 2010 Nobel Prize in Chemistry, has also provided technological guidance to Daikin here.

The TIC has other world-class facilities. These include the Electromagnetic Semi-Anechoic Chamber, the first of its kind in the world, for the separate measurement of electromagnetic noise generated by the indoor and outdoor units of air conditioners; and the Sleep and Metabolism Laboratory, where actual human living conditions have been created for experimental purposes.

Stakeholder's Comment

Want to See Daikin Create Totally New Value Contributing to Solutions for Society

At TIC, we would like to see Daikin create totally new value solutions geared to a diverse society; for example, zero-net-energy air conditioning systems and portable mobile air conditioning systems. We believe that by developing air conditioning solutions with a focus not just on indoor air but on outdoor air as well, Daikin can contribute to solving problems such as air pollution and climate change.



Tai Lee Siang
Vice-Chairman,
World Green
Building Council

Feature Collaborative Innovation with Other Industries and Fields

“Airitmo” Proprietary Technology Developed with Outside Collaboration for Next-Generation Offices

Collaboration is more than just a way for Daikin to use air conditioning to control air environments. By undertaking extensive research covering themes such as living spaces, towns, cities, and infrastructure for regions, we seek to create new value for people’s lifestyles through the study of physiology and psychology as it involves to the relation between air environments and people’s bodies.

For example, for the past 15 years Daikin has been conducting R&D on the theme of improving people’s sleeping environment through air conditioning by using sensing technology that monitors people’s physical state. The result was the development of our proprietary sensing technology, called Airitmo. By measuring the vibration of air within a tube, the technology allows measurement of physical information such as heart rate, breathing, body movement, state of sleep, and stress. Since it does not involve attaching apparatus to a person, it places no burden on the human body. This technology made possible the development of Daikin’s Soine controller, which measures how deeply a person is sleeping so that the air conditioning can be adjusted to the most comfortable level.

In March 2016, office chairs equipped with Airitmo technology were installed in the 3x3 Lab Future of

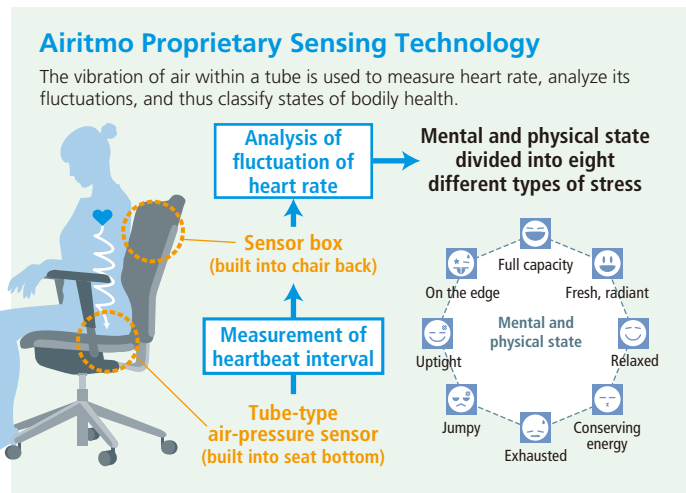
Mitsubishi Estate Co., Ltd., a site for the sharing of business ideas. The products are the result of two years of verification experiments on the correlation between office environments and people’s physical and mental state in order to realize an air environment matched to an individual’s current state of health. The aim is the realization of the next-generation office in which people enjoy greater comfort and productivity and thus get their work done smoothly.

NEXT CHALLENGE

Contribute to Solutions for Society through New Value in Air Environment

Daikin’s Airitmo sensing technology is indispensable to the development of air conditioners that achieve a comfortable and healthy air environment, as well as a key development theme at the TIC. We will continue to promote collaborative innovation both inside and outside Daikin in order to realize air environments that help solve a range of social issues, such as our increasingly aging population. Coming up with solutions requires finding technologies that can make a range of thoughts and ideas into reality. At the TIC, engineers work closely with experts in fields such as sociology, anthropology, and cognitive science in order to create new value that improves the air environments where we live.

Collaborative Innovation Creates New Value for People’s Lifestyles Based on the Relation between Air Environments and People’s Bodies and Minds



Collaboration for New Value Creation

Open Innovation through Industry-Academia Collaboration

Agreement with Kyoto University in Humanities and Sciences

In June 2013, Daikin Industries, Ltd. and Kyoto University concluded a comprehensive collaboration agreement with the goal of creating and researching new themes focusing on social values toward future-oriented solutions in the fields of air quality, environment, and energy. The aim of this program goes beyond the sciences as the two parties will actively engage the participation of researchers in the humanities as well in order to create innovations that contribute to society and economy.

At a workshop titled Concepts in Air, participants came up with six concepts for the creation of new value through air; for example, how air can make food more delicious and bring people together. Under this agreement, the parties are currently working to finalize the technological issues that are needed to realize each concept.



Prototype of air conditioner that brings people together: blending sensual stimulation and design

Areas are divided by level of temperature, images, and lighting to provide either relaxing or stimulating environments.

Future Joint Research Laboratories Established with Nara Institute of Science and Technology

In October 2012, Daikin Industries, Ltd. and the Nara Institute of Science and Technology (NAIST) established the Future Joint Research Laboratories. In conventional agreements between industry and academia, the corporation generally names the project content and the university carries out the necessary project research. But this collaboration between Daikin and NAIST begins with a quest for pressing social issues, followed by discussions on how to solve them and then the start of research toward this goal.

Daikin and NAIST are currently proceeding with research on the theme of clean innovations aimed at high-level anti-fouling. At the same time, the two parties hold periodic discussions aimed at finding the next research theme.

In December 2015, Daikin and NAIST held a contest for students to come up with ideas on the theme "air conditioning and IoT." The dreams and original ideas of the students are sure to lead to the creation of new value.

Joint Research Course with Osaka University

In 2006, Daikin launched the Daikin (Fluorine Chemistry) Joint Research Chair at Osaka University under which

Daikin provides research funds and sends researchers to the university with the aim of combining the company's fluorochemicals technologies with the university's advanced research capabilities in order to come up with innovative fundamental technologies. One of the fruits of this collaboration is the development of a proprietary n-type semiconductor PNP, a crucial component in organic thin-film solar cells, which are garnering attention as a way to generate electricity in an environmentally conscious way. In fiscal 2015, the parties succeeded in developing a new n-type semiconductor with higher voltage than PNP, and high solvent solubility that makes it ideal for manufacturing paint-on semiconductors. They are currently creating prototypes with semiconductor manufacturers.

In fiscal 2016, the 11th year of the joint research chair, Daikin's air conditioning and other divisions joined this collaboration as the Daikin (Fluorine Chemistry) Joint Research (Chair) was re-launched as the Daikin Research Alliance Laboratories in order to conduct more comprehensive collaboration with Osaka University.

Solutions for Society through Collaboration

World Sleep Conference: Better Quality of Sleep Through Air Research

In March 2016, Daikin Industries, Ltd., Showa Nishikawa, Lion Corporation, and Renaissance Inc. jointly established the World Sleep Conference, a project to improve people's health through better sleeping. The goal is to focus on the importance of sleep, define ways to create new health movements that promote better sleep, and make people's lives more fulfilling and healthy. To this end, the World Sleep Conference provides information through a range of media aimed at realizing better health through sleep, with contributions by sleep researchers and experts in cultural disciplines that cross the boundaries of industries and research fields.

It is known that sleep affects not just physical health but mental health as well, and negative sleep patterns can lead to depression and insomnia, and a fall in things like concentration and productivity.

With people increasingly suffering from sleep-related problems, Daikin Industries, Ltd. focused on the close relationship between sleep and warm environments. The company used the TIC's newly built Sleep and Metabolism Laboratory to replicate actual human sleeping environments in order to study the correlation between sleep and warmth. The result has been new products and services that will improve the quality of sleep through the power of air.



World Sleep Conference website (Japanese only):
<http://suiminkaigi.jp/>