

**GREENHOUSE GAS EMISSIONS REDUCTION AND AVAILABILITY OF ENERGY-SAVING PRACTICES
IN THE SPECIAL CONTEXT OF A HOSPITAL ENVIRONMENT**

Yonsei University Health System

GGHH Agenda Goal

- Energy (Green-house Gases)

Hospital Goal

- To reduce GHG emissions by 30% of the forecasted emissions up to the year 2020, by means of implementing a low-carbon, green growth law and GHG energy target management system.
- Creating Green Severance Task Force Team : to provide an eco-friendly healing environment for patients and to achieve sustainable green hospital management goals through reasonable energy use, and ultimately contribute to the prevention of global warming.

Progress Achieved

- Financial benefits (savings, spending reductions or costs reductions)
 - ◆ Expense reduction by energy saving in the year 2011 : 1,901,686,000 won
(≒\$1,730,000)

Division	Electricity	Gas	Water
Unit price	96won/kw	858won/m ³	1,249won/m ³
Reduction price(KRW)	352,224,000	1,462,032,000	87,430,000

- Electricity : supplied by Korean Electric Power Corporation

- Gas: LNG (Liquefied Natural Gas)

- ◆ Amount of GHG emission reduction: 5,316 tons of CO₂

< Application Standards >

○ Electricity: adopted the coefficient of GHG emission offered by Korean Electric Power Corporation. (1kw=0.0004662ton CO₂)

- Electronic GHG reduction: amount of energy reduce × coefficient of GHG emission
= 3,771,000kw × 0.0004662 ton/kw = 1,758tonCO₂

○ Gas: Calculated GHG and energy emission management by The Framework of Low Carbon and Green Growth

-Gas Calculation: Amount of GHG Emission= Amount of Reduction ×Emission

Coefficient

- Environmental benefit (amount of energy consumption saved, kilograms reduced, etc.)
 - ◆ Natural increase rate: Calculated the average annual increase of Severance Hospital's energy usage in 2007~2010 and applied it to the expected emission amount for 2011.
 - ◆ Real usage: the actual energy usage measured by means of a meter of the energy saved by all members of staff who are trying to reduce
 - ◆ Amount of energy use from year 2007 to year 2010
 - Average rate of increase in electricity use : 5.83%
 - Average rate of increase in gas use : 5.41%
 - Average rate of increase in water use : 3.9%
 - ◆ Year 2011 energy reduction

Division	Electricity (kwh)	gas(m ³)	water(m ³)
Natural increase in the average amount	80,750,000	7,404,000	994,000
Actual usage in 2011	76,979,000	5,822,000	921,000
Saved amount	3,771,000	1,582,000	73,000

- ◆ Information of local meteorological data and GHG emission data for measure load decrease and weather modification were not accumulative, so we except it to apply. After setting up the monitoring system, we will regulate the conflicts rules between metrological data and amount of emission is scheduled.
- Extra activity for eco-friendly implementation (Extra/Other eco-friendly activities)
 - ◆ Introduced a non-paper parking ticket (electronic parking ticket), and a computerized expense statement.
 - ◆ Creation of a phone book system by using PC programming .
 - ◆ Installation of an electronic visitor's book, eco-friendly LED boards and a LED parking guide system.
 - ◆ Implementation of the Reduce Food Waste Campaign.
 - ◆ Running electronic shuttle vehicles and commuter buses for customers and employees to motivate usage of public transportation.
 - ◆ Purchase of biodegradable material patient registration cards.

Issue

- Whether it is possible to implement GHG (greenhouse gas) reduction and energy-use conservation in a special environment of a hospital.

Sustainability Strategy Implemented

- Reviewing the hospital's (energy) greenhouse gas usage promotes strategic development. And at the same time, we are proceeding with a series of energy-environment response activities equipped with an effective management system and a continual improvement policy. We are also pursuing strategies, slogans, and goals for a sustainable future.
 - ◆ **Management Strategy** : a globally competitive medical institution .
 - ◆ **Slogan**: Green Severance! The First & the Best.
 - ◆ **Strategic Goal** : No.1 in hospital green management; the pursuit of sustainable growth, strengthening of international leadership.
 - ◆ **Promotional Strategies**: Optimize energy consumption; introduction of renewable energy; establishment of a low-energy consumption hospital; green areas within hospital; nature friendly hospital; environmentally sustainable hospital through community contributions; customer healing facilities; implementation of a green-hospital by purchasing green products; creation of a green-hospital network ("Hospital Environment Society"); become a member of an international environment NGO; promotion of green healthcare environment by means of strengthening international leadership to convince all employees to actively participate in energy saving activities.

Implementation process

- To reduce energy that is used in the process of medical care, research, education, as well as to minimize greenhouse gas emissions, Severance Hospital has constantly applied high-efficiency equipment since the very beginning of the hospital construction and planning. At the strategic management level, Severance created the "Green Severance Task Force Team" (TFT) to conduct continual energy savings activities, and through this, plans to accomplish a more sustainable, eco-friendly hospital in the future.
 - ◆ Green Severance TFT Composition
 - i. A team made up of a total of 25 members from different departments - nursing, administrative, construction , facilities, medical information, and Gangnam Severance sector committee – and it is lead by a TF team leader appointed by the CEO.
 - ii. Activities
 - In December, 2010, after its creation, by conducting 10 rounds of TFT discussion meetings, the Green Severance TFT established short-term business projects, medium- and long-term strategies, as well as 10 activity projects.
 - 10 activity projects (*Implementation of energy saving activities by a continuous investment in highly effective/efficient facilities, operate efficiencies and energy save campaigns with all members of the staff.)
 - Main energy saving contents
 - Replace old heating/air conditioning equipment with highly effective/efficient facilities.
 - Change all lights at fire exit to LED

- Switch to high efficiency transformer by renovating the Cardiovascular Hospital, Rehabilitation Hospital and Jae-Jung building.
- Increase thermal efficiency of boiler and refrigerators
- Set up sunlight generated streetlights
- Change parking lot light/lamp's power save ranking from 'fair' to '1stclass'
- Control the supply of air conditioning and heating during summer/winter seasons.
- Set up banners at the entrance/exit to keep the proper temperature
- Build BEMS(Building Energy Management System) for monitoring GHGs
- Distribute energy-reduction guide and energy-reduction regulations. (Save-energy guide/save-energy regulations)

Tracking Progress

- Tracked through an annual report that Yonsei University Health System submits to the Korean Government.

Challenges and lessons learned

- **Need for a Change in Awareness:** To reduce GHG(green-house gases) and save energy use in the hospital's special environment, we recognized that our own awareness and understanding of green hospital is most important.
- **Conducting a Campaign for Green Hospital:** At Yonsei University Health system , there are approximately 7,000 employees, including around 2,000 physicians and 5,000 support personnel. Thus it is difficult to reduce GHG(greenhouse gases) and to save energy by making it only an administrative task or policy. Therefore, a campaign is more effective.

Next Steps

- Severance Hospital intends to protect the global environment, to satisfy customers and stakeholders through an ongoing practice of energy reduction and to carry out these activities in order to minimize pollution and to create efficient use of resources.
 - ◆ Realization of 'Zero Energy Hospital' through a constant promotion of green management.
 - ◆ Continuous operating of Green Severance TFT.
 - ◆ Carrying out of energy efficiency projects for aging facilities and equipments.
 - ◆ Nature and eco-friendly hospital architectural design plan.
 - ◆ Expanding the purchase of eco-friendly products by establishing a specific green purchasing system.
 - ◆ Continuing education for Green Severance practices and increased awareness.
 - ◆ Review the introduction of renewable energy such as solar lamps, etc.
 - ◆ Joining international environment networks and strengthening activities.

Demographic information

- Yonsei University Health System is led by its CEO and President, who also serves as the Vice-President for Health Sciences of Yonsei University. He oversees 2 graduate schools (Public Health and Nursing), 3 colleges (Medicine, Dentistry, Nursing) and 5 hospitals (Severance Hospital, Gangnam Severance Hospital, Yongin Severance Hospital, Severance Mental Health Hospital, and the Dental Hospital). Other YUHS facilities include the Medical Library, Medical Research Center, Medical Technology and Quality Evaluation Center, Multidisciplinary Endoscopic Center, Clinical Trials Center and various research institutes. Administrative support facilities include Internal Auditing, Planning and Coordination, Public Relations, Medical Informatics, Administration, International Relations, Fundraising Affairs, the Chaplaincy and a Medical Mission Center. There are approximately 7,000 employees throughout the Health System, which include some 2,000 physicians and 5,000 support personnel. In addition, a total of 24,000 students have graduated from the colleges and graduate schools. The hospitals have around 3,700 beds and see around 3 million outpatients and 1 million in-patients annually. The total lot size is 95,000 Pyung (77 acres) with a building size of 18,000 Pyung ($59,508\text{m}^2=640,538\text{ft}^2$), and a total floor area of 140,000 Pyung ($462,840\text{m}^2=4.98\text{ million ft}^2$).

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