

Project Title

Placing Sustainability At The Core Of Everything We Do At Juronghealth Campus

Project Lead and Members

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Project members:

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- Sim Siew Ngoh, Deputy Director, Specialty Operations, NTFGH & JCH
- Vijayarani D/O Navasivayam, Nurse Clinician II, Operating Theatre, NTFGH & JCH
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- Lim Meng Keong, Senior Manager, Logistics, NTFGH & JCH
- Lim Tow Peng, Principal Engineer Group Facilities Management, NTFGH & JCH
- Ronnie Liu, Senior Manager, Group Facilities Management, NTFGH & JCH
- Ryan Ye, Senior Engineer, Group Facilities Management, NTFGH & JCH

Organisation(s) Involved

Ng Teng Fong General Hospital (NTFGH) & Jurong Community Hospital (JCH)

Healthcare Family Group(s) Involved in this Project

Healthcare Administration, Nursing

Applicable Specialty or Discipline

Specialty Operations, Facilities Management, Food Services, Operating Theatre

Project Period

Start date: June 2020

Completed date: On-going

Aims

To embark on a “Go Green Journey” by embedding sustainable practice into everyday business life, ensuring sustainability strategy are fully executed across Ng Teng Fong general Hospital (NTFGH) & Jurong Community Hospital (JCH).

Background

See poster appended/ below

Methods

See poster appended/ below

Results

See poster appended/ below

Lessons Learnt

Sustainability provide a greener and more comfortable environment for our patients and staff. It is also our responsibility to protects our ecosystem and preserves natural resources for future.

Conclusion

The innovation initiatives have been adopted and integrated into our operational workflows since 2020. The initiatives and results achieved are also shared with other hospitals under NUHS for their consideration to scale up and replicate at their respective hospitals. Alexandra Hospital (AH) has adapted and completed the Economical Mode (OT Setback) initiative at their OT in 2021. Through this initiative, AH has achieved annual energy savings of 70,574kWh which equivalent to supply of electricity to 15 units of 4-Room HDB flats for a year. National University Hospital (NUH) has adapted the initiative on the Economical Mode (OT Setback) at their OT when not in use. This initiative is currently at pilot stage and expected to achieve energy savings of 71,344kWh per year for each OT once completed. The savings from each OT is able to supply about 16 units of 4-Room HDB flats for a year.

At NUHS Cluster, when one institution piloted green initiatives and yield positive results other hospitals will also adopt the implemented initiatives. For example, the Economical Mode (OT Setback) at OT at NUH and AH.

At hospital level, we are working on reviewing the operation needs of the user departments and to propose initiatives to improve efficiency where possible. Sustainability is a journey, we continue to explore and learn to improve our hospital efficiency.

Additional Information

2022 National HIP Best Practice Medal – Automation, IT & Robotics Innovation

Project Category

Technology

Product Development

Care & Process Redesign

Build Environment, Green Building, Eco-Building, Smart Building, Facilities

Engineering

Keywords

Energy Efficiency, Water Conservation, IoT Sensors, Sustainability Innovation

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PLACING SUSTAINABILITY AT THE CORE OF EVERYTHING WE DO AT JURONGHEALTH CAMPUS

- SAFETY
- PRODUCTIVITY
- QUALITY
- COST AVOIDANCE
- PATIENT EXPERIENCE

MEMBERS:

NG KIAN SWAN (LEAD), KELVIN QUEK, JONSON SOFIAN TEO, SIM SIEW NGOH, VIJAYARANI D/O NAVASIVAYAM, CHOO KOK SENG, LIM MENG KEONG, LIM TOW PENG, RONNIE LIU, RYAN YE

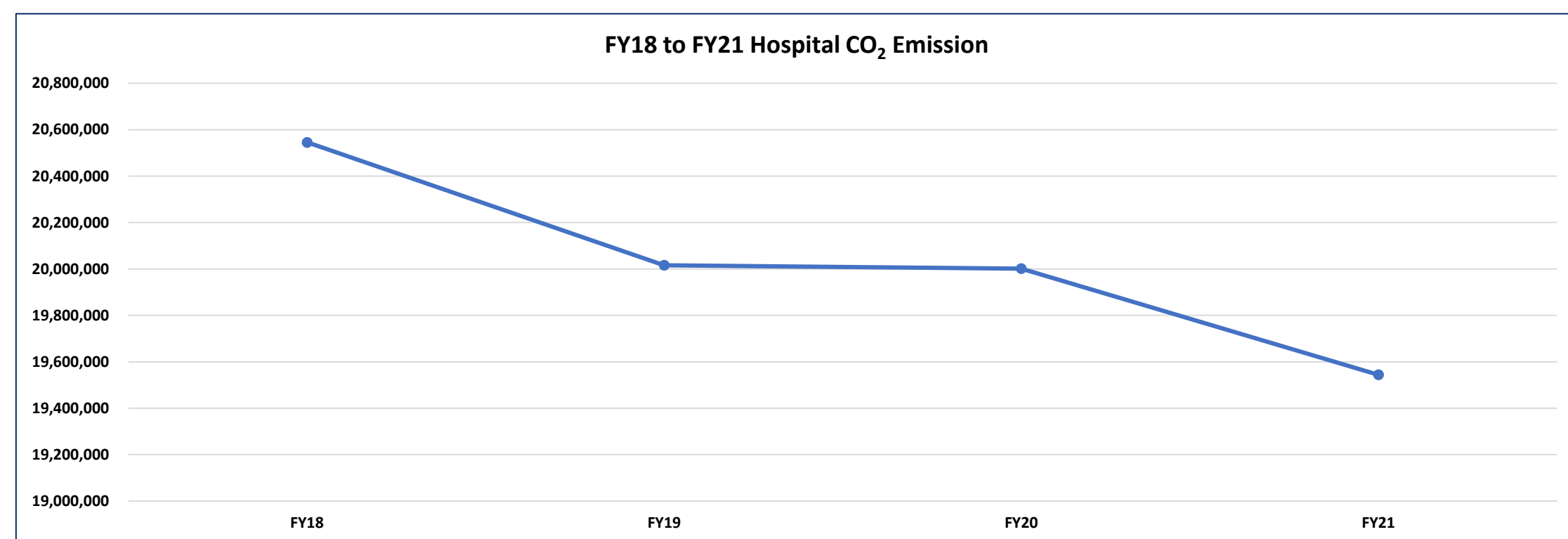
Background

“Go Green” Journey

There is an interesting paradox in healthcare. Hospitals uses a lot of energy to deliver clinical services and the environmental footprint like energy use, CO2 emission, waste production can be harmful to people health and the ecosystem. However, the interdependence of healthcare and climate change provides a unique opportunity for us to mitigate climate change and have a positive impact on people’s and planet health, through a combination of organizational and infrastructure levers.

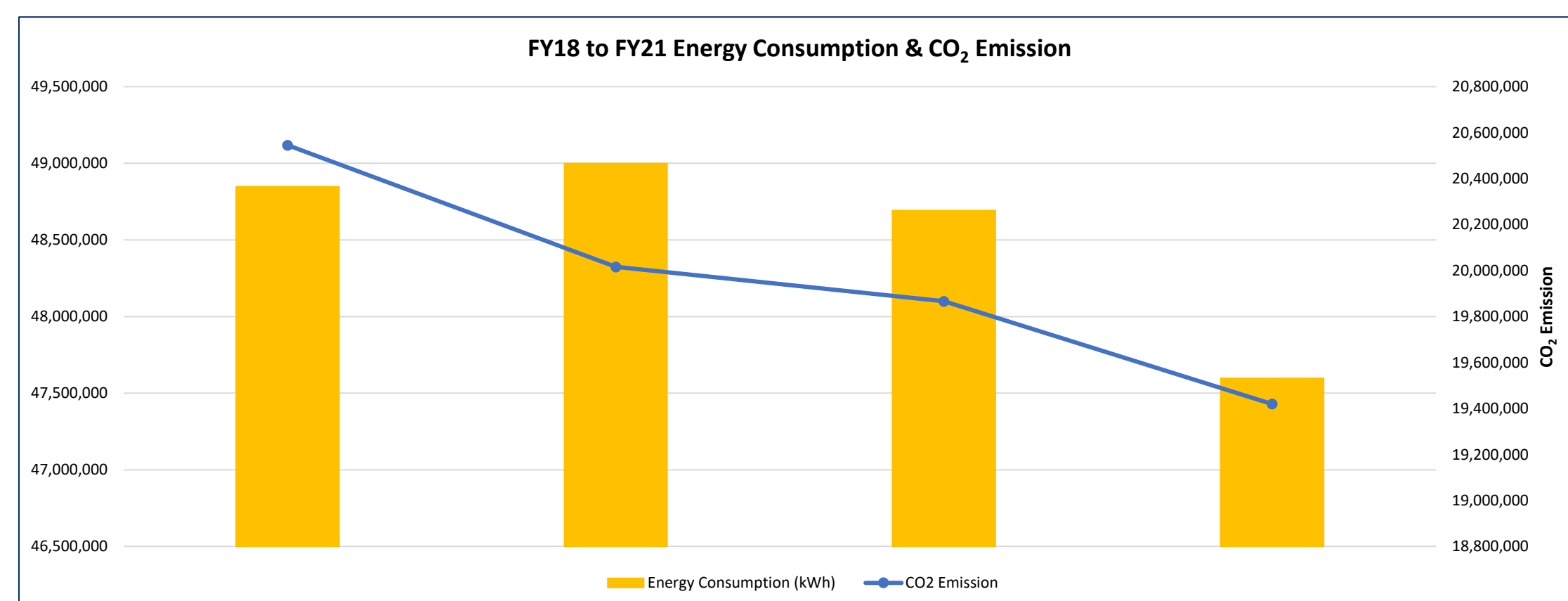
Since 2020, JurongHealth Campus (JHC) Green Committee has embarked on a “Go Green Journey” by embedding the sustainable practice into everyday business life, ensuring sustainability strategy are fully executed across Ng Teng Fong general Hospital (NTFGH) and Jurong Community Hospital (JCH), continue to manage and tighten the goal-setting and reporting processes and strengthening relations with external stakeholders, and ensure overall accountability to improve energy and water efficiency.

NTFGH and JCH emitted at least 20,000,000 kg CO2 yearly for the electricity consumed to keep the hospitals up and running. The JHC Green Committee has worked with the users and specialist vendors to identify and explore the potentials of energy efficiency improvement. By leveraging technology and implementation of intervention strategies, we have managed to achieve at least 2,464,061 kWh energy savings as of 2021 and reduced 1,005,337 kg CO2 emission. The energy savings achieved is equivalent to the supply to 554 units of 4-Room HDB Flats for a year (SP Group Average kWh in May-22: 370 kWh). The total CO2 reduction is equivalent to support GreenGov.SG effort in planting 16,623 trees grown for 10 years to be sequestered.



Establish Baseline Measures

- Prior to 2021, NTFGH and JCH consumed more than 48,000,000 kWh annually and emitted approximately 20,000,000 kg CO2. The energy consumed is equivalent to electricity supply to 11,000 units of 4-Room HDB flats (SP Group Average kWh in May-22: 370 kWh). The CO2 emitted annually is equivalent to carbon to be sequestered by 329,533 trees grown for 10 years.
- With the sustainability initiatives taken, we have improved the energy efficiency by 2.25%, reducing the CO2 emission by 446,401kg CO₂. The reduction in CO2 resulted lesser trees require by 7,381 to sequester the carbon emitted.



Analyse Problem

Probable Root Cause

- Legacy Practices**
 - Old practices and resistant to change, including the need to keep air conditioner running non-stop in offices or support services areas
 - Attitude and behaviour - Having an open door with an air conditioner running, not switching off air-condition, non-essential lights and electronic devices when not in use
- Environment Issue**
 - Hospitals are significant contributors to natural resource depletion and environmental change. In general, the electricity consumption in hospitals consists of air conditioning systems, lightings, IT, kitchen and medical equipment. Aside from CO₂ emission, Hospital is also a significant emitter of short-lived yet potent climate pollutants such as, methane, and anaesthetic gases.
- Lack of awareness, clear guidance and visibility on how to embrace and drive workplace sustainability**
 - Healthcare workers have to change their practices and behaviours to make sustainability work.
 - Lack of quantitative results and visibility on the energy efficiency level and reduction in CO2 reduction in both hospitals and key service areas such as Operating Theatres, Intensive Care Units before, during and post research

Select Changes

Probably Solutions:

To address the issues, the following solutions were identified:

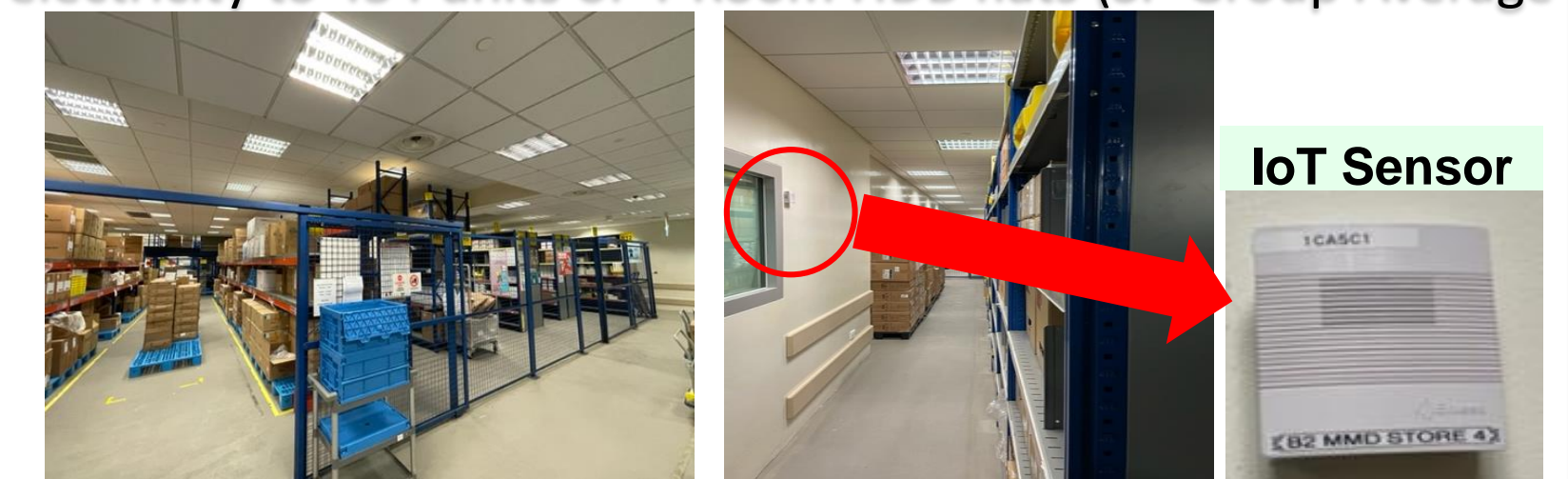
- Innovation and transformation** - Process reengineering, operational changes and technological advances across the system to reduce energy consumption, waste and pollution.
- Sustainable & Resilient Facilities** - We continue to work to reduce our energy use in facilities and offices through retrofitting and installing energy-saving fixtures and updating heating and cooling systems.
- Environmental Stewardship** - Ongoing education and efforts to raise sustainability awareness and engaging employees and inspire them toward greater organizational and personal responsibility.

Test & Implement Changes

1. Process reengineering and disrupting old practices at departments such as Clinics, Kitchen, Logistics Hub, Linen Store, Medical Record Office(MRO) and etc.

a. Energy Efficiency

Since the start of hospital operations in 2014, it is inevitable that legacy practices built up over the years and some were necessary in the past to keep hospital running smoothly and ensure zero disruption to hospital operations. However, with the help from technology and medical advancement, the team explored the potential of breaking out of legacy practices at their departments. Air-conditioning, equipment and lightings were used to turn on 24/7/365 which incur high energy consumption and CO2 emission. Through the intervention to break the legacy practices, FM team has worked with the users from clinics, kitchen, logistics hub and linen store, Medical Record Office (MRO) and other departments to adjust the operating hours of the air-conditioning, equipment and lightings based on operation needs whilst not disrupting hospital operations. This initiative has help to improve energy savings of at least 1,930,781 kWh annually and reduced CO2 emission by 787,759 kg CO2. The energy savings achieved is equivalent to supply of electricity to 434 units of 4-Room HDB flats (SP Group Average kWh in May-22: 370 kWh).

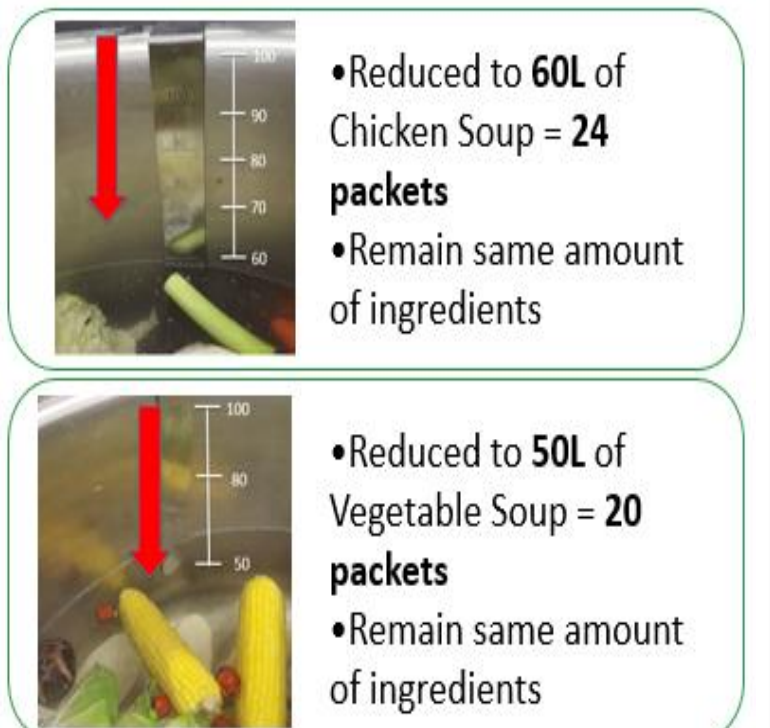


b. Water Conservation

In the past, Kitchen produced 100 litres of chicken stocks and 100 litres of vegetable stocks on daily basis. Total 200 litres stock is cooked daily for patient meals.

Since 2021, Kitchen reduced the amount of water used to cook chicken and vegetable stock while remain the same amount of ingredients. Total 110 litres were saved daily which resulted in 32,850 litres of water saved in a year. The total saving of water can supply to one unit of 4-Room HDB flat for 2 months.

This innovative initiative has not only helped in reducing the water consumption, but also reduce food wastages

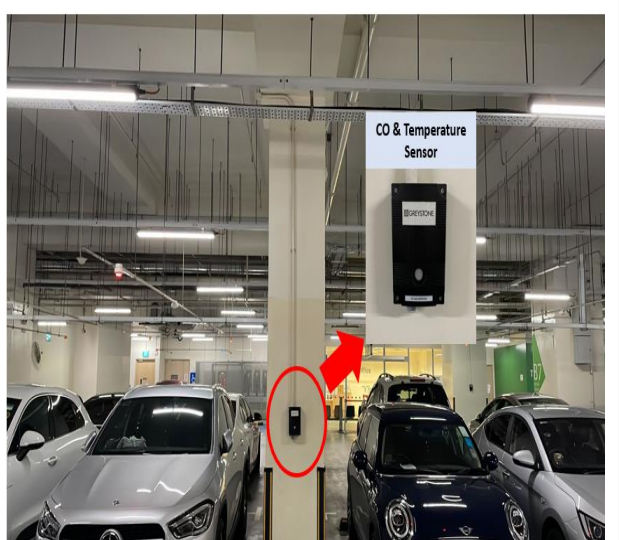


2. Implementation of Economical Mode (OT Setback) at Operating Theatre (OT) when not in use.

Operating theatres (OT) are very strictly-controlled environments and there is a need to maintain the temperature and humidity and room pressure 24/7 to meet the stringent OT requirements for patient safety during surgeries. The energy consumption is high and is attributed to the amount of supplied air, energy used for fans and the time that surgery rooms are in operation. The users from Major Operating Theatre worked together with Facilities Management team to implement Economical Mode at operating theatre when not in use by increasing the temperature and humidity and reducing air-change. This implementation not only helps to improve energy savings of at least 40,734 kWh annually, infection control and patient safety are also not compromised. The energy savings of this initiatives is equivalent to supply of electricity to 9 units of 4-Room HDB flats for a year (SP Group Average kWh in May-22: 370 kWh).

3. Installation of Carbon Oxide (CO) and temperature sensor readings at carparks to improve energy efficiency.

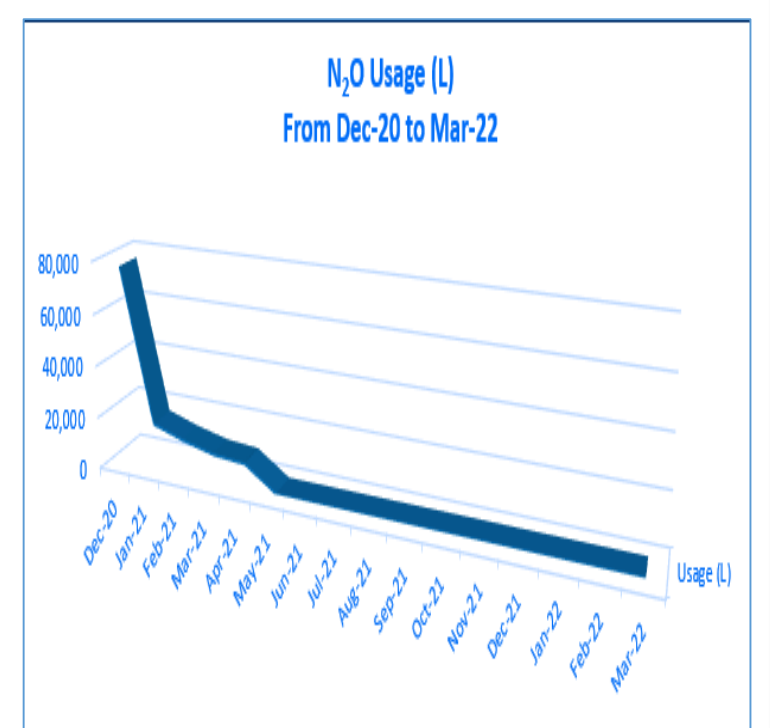
In the past, the exhaust fans at carparks are running 24/7/365. Facilities Management team installed Carbon Monoxide (CO) and temperature sensor at the carparks areas and the exhaust fans operate based on the multi-variant sensor readings. This initiative has help to improve energy savings of at least 492,645 kWh annually and reduced Carbon Dioxide (CO2) emission by 200,999 kg CO2. The energy savings of this implementation is equivalent to supply of electricity to 110 units of 4-Room HDB flats for a year (SP Group Average kWh in May-22: 370 kWh).



4. Reducing Nitrous Dioxide (N₂O) usage in MOT, Endoscopy, Radiology and HPV

N₂O commonly known as laughing gas has significant medical uses, especially in surgery for its anaesthetic and pain reducing effects. N₂O is about 300 times as potent as carbon dioxide (CO₂) at heating the atmosphere. And like CO₂, it is long-lived, spending an average of 114 years in the sky before disintegrating. It also depletes the ozone layer.

There are 70 cylinders (7,400L each) pipe-in and supplying to MOT, Endoscopy, Radiology and HPV. Throughout the years, JHC has been reducing the usage of N₂O to almost zero usage by switching to the use of Total Intravenous Anaesthesia (TIVA) which is much less harmful to the environment resulted in the reduction of Greenhouse gases emission.



Key Outcomes and Results

- Energy Efficiency:**
 - 2,464,061 kWh Saved per Year
 - 1,005,337 kg CO₂ reduced per Year
 - The total savings can supply electricity for about **554** units of 4-Room HDB flat for one year!
 - The CO₂ reduction is equivalent to support GreenGov.SG effort in planting **16,623** tree grown for 10 years to be sequestered!
- Water Efficiency:**
 - 32,850 litres of Water Saved per Year
 - The total savings can supply water for about 2 months for a unit of 4-Room HDB flat!

Environmental Stewardship

JHC Green Committee launched Earth Day campaign in April 2022 in conjunction with Earth Day. NTFGH & JCH colleagues embracing sustainability by providing suggestions on optimizing energy & water efficiency. Total 90 submissions received from our colleagues on their Green ideas and Green Habits.

Spread Changes, Learning Points

Sustainability is everyone’s responsibility.

It goes beyond a team’s effort to make it happen. By placing sustainability at the core of what we do in hospital, we are not only saving lives but also saving the planet.

For decades, healthcare services mainly focus on sustaining and improving human wellbeing. To advocate for environmentally sustainable initiatives on top of our day-to-day hospital operations bring about a paradigm shift in our understanding of hospital roles and responsibilities. The awareness and education of environmental sustainability can help in re-framing our understanding of hospital as facilities that not only aim to improve patient health outcomes, but as facilities that simultaneously aspire to enhance the natural environment, to foster healthy communities with equitable access to care.

