

Environment

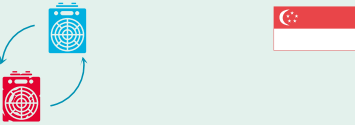
CLIMATE CHANGE AND CARBON

We continue to address the threat of climate change through mitigation and adaptation efforts, focusing on improving our energy performance and efficiency measures, as well as building resilience across our operations.

Energy performance and efficiency

The Singtel Group has been working on a number of programmes targeting energy reduction across key energy intensive touchpoints of our operations, such as network infrastructure, data centres, satellite earth stations and office buildings.

For more details on our approach, please refer to our [website](#).



Replacing and overhauling chillers and related equipment

Over the years, we have been regularly replacing and overhauling chiller units and related Mechanical and Engineering (M&E) equipment at our exchanges and office buildings in Singapore, targeting those that have been in operation for 15 years or more.

In FY2018, we replaced the older and less efficient chillers from NCS Hub with new chillers, cooling towers and pumps of high energy efficiency. Alongside the chiller replacement, old Computer Room Air Handling Units (CRAH) and Air Handling Units (AHUs) were replaced with newer and more energy efficient Electronically Commutated (EC) fan driven AHUs.

Our energy roadmap has been updated and extended until FY2021, and to replace 22 units of older chillers and related M&E equipment located at our exchanges and office buildings.

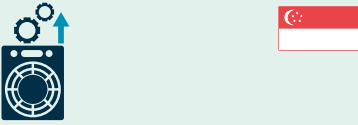
Progress in FY2018

Estimated energy savings and emissions avoidance:

4,401 MWh/year (15,842 GJ/year) or 1,898 tCO₂e/year in Singapore.

Potential reduction of a total of 6,141 MWh (22,108 GJ) annually when fully completed for all 22 chillers.

This will reduce our carbon footprint by 2,649 tCO₂e per year in Singapore.



Retrofitting M&E equipment

We have made concerted efforts to retrofit our M&E equipment such as installation of Variable Speed Drive (VSD) for air cooled chiller, AHU and CRAH at our Data Centres in Singapore.

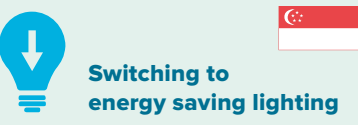
Progress in FY2018

Estimated energy savings and emissions avoidance:

(a) Retrofit of air cooled chiller with 1 VSD, NCS Bedok: 300 MWh/year (1,080 GJ/year) or 129 tCO₂e/year.

(b) Retrofit of AHUs with 50 VSDs, Kim Chuan 1 Data Centre: 1,282 MWh/year (4,615 GJ/year) or 553 tCO₂e/year.

(c) Retrofit of CRAH units with 47 VSDs, Kim Chuan 1 Data Centre: 1,131 MWh/year (4,072 GJ/year) or 488 tCO₂e/year.




Switching to energy saving lighting

Concerted efforts made to retrofit to LED lightings in Singapore.

Progress in FY2018

Estimated energy savings and emissions avoidance:

164 MWh/year (591 GJ/year) or 71 tCO₂e/year at Kim Chuan 2 Data Centre in Singapore.



Implementing operational improvements

We created energy savings through operational improvements without the need for capital investments in Singapore.

We increased the temperature of common areas to 25 degrees Celsius and optimised the operating hours of the air conditioning units at our data centres.

We also looked into the operation methodology of the CRAH units at our telephone exchange and changed from running three units at an average of 80% fan speed to running four units at around 60% fan speed.

Progress in FY2018

Estimated energy savings and emissions avoidance:

(a) Kim Chuan 1 Data Centre: 949 MWh/year (3,415 GJ/year) or 409 tCO₂e/year.

(b) DC West Data Centre: 5,909 MWh/year (21,271 GJ/year) or 2,548 tCO₂e/year.

(c) Yio Chu Kang telephone exchange: 66 MWh/year (239 GJ/year) or 29 tCO₂e/year.



Upgrading fresh air cooling

Replacing current fresh air fans with modern DC variable speed fans and larger intake units with the capability of doubling the air intake and reducing the need to rely on air conditioners in Australia.

Progress in FY2018

Installation completed at 260 sites.

Estimated energy savings and emissions avoidance:

1,170 MWh/year (4,212 GJ/year) or 936 tCO₂e/year in Australia.



Replacing Uninterruptible Power Supply (UPS)

We replaced six units of UPS and improved efficiency from 84% to 92.5%.

Progress in FY2018

Estimated energy savings and emissions avoidance:

365 MWh/year (1,314 GJ/year) or 157 tCO₂e/year at Kim Chuan 1 Data Centre in Singapore.

Climate change resilience

In response to the potential effects of climate change in Singapore, we have reviewed targeted critical infrastructure and identified those that may need enhancement to protect against floods. We are currently exploring measures to mitigate this risk.

We continue to participate actively at the Australian Business Roundtable for Disaster Resilience and Safer Communities (ABR), of which Optus is a founding member, and have published our [fifth Report](#) on Building Resilience to natural disasters in our states and territories. We are pleased that our efforts and research through ABR have contributed towards the Australian Government's recent announcement of establishing a National Resilience Taskforce to reduce the impact of natural disasters on the Australian community.

We have identified an additional 260 critical facilities across Australia for the next three years where we will upgrade energy standby generation and storage capacity from three to seven days, so that we will have extended uptime during times when the public energy grid is affected by natural disasters.

Two additional SATCATs (mobile cell on wheels with built-in generator power) were commissioned during the year to support mobile communications at disaster areas.

As part of our support for SDG 11 on Sustainable Cities and Communities, Singtel and Optus have been involved with the [100 Resilient Cities](#) (100RC) projects in Singapore and Sydney, Australia, to provide input into the key long-term resilience issues and roadmap. We see significant interdependencies between different stakeholders and key infrastructures in ensuring overall resilience of cities to long-term 'systems shocks', such as climate change and climate action (SDG 13).

We engage the Centre for Liveable Cities, the Secretariat to the Singapore 100RC project, for such input at the national level and to mobilise broader corporate engagement with the 100RC initiative, which supports SDG 17 on Partnership for the Goals. Since 2016, we have been actively involved in the Sydney 100 Resilient Cities workshops and contributed to the strategy development, and we remain an advocate.



Decommissioning obsolete mobile equipment

Shutting down and decommissioning obsolete mobile equipment as a result of the discontinuation of 2G technology in Australia.

Progress in FY2018

Radio frequency shutdown on 5,100 sites and equipment decommissioning on 1,750 sites.

Estimated energy savings and emissions avoidance:

11,424 MWh/year (41,126 GJ/year) or 9,139 tCO₂e/year in Australia.



Converting to energy efficient mobile base stations

We continue to upgrade our mobile networks in Singapore and convert to energy efficient mobile base stations.

Progress in FY2018

Energy efficient mobile base stations:

99.12% in Singapore.
Electricity use per cell carrier:
Improved to 3,238 kWh from 3,594 kWh last year.



Promoting sustainable transport options

We continue to make sustainable transport attractive to employees by running one of Australia's largest fleets of employee shuttle service with over 100 buses each day.

Progress in FY2018

Reduction of cars off the roads:
~1,400 cars daily



Switching to cleaner energy

Switching the power supply source from diesel generators to the national power grid for cleaner energy at our offshore Pulau Tekong Microwave Station.

Progress in FY2018

Estimated emissions avoidance:
223 tCO₂e/year in Singapore.