



Mobile Energy Efficiency



Telstra achieves A\$1.5 million in mobile network energy savings

Over the past two years Australian operator Telstra has implemented mobile energy efficiency initiatives across its network, resulting in annual cost savings of A\$1.5 million and carbon emission reductions of 6 700 TCO₂e. With its strong emphasis on sustainability, the company has been measuring and reporting its carbon emissions since 2000. In 2010 Telstra decided to implement significant measures to capture the benefits offered by mobile energy efficiency solutions. The impact of this successful energy reduction programme is noticeable in Telstra's results from the GSMA's Mobile Energy Efficiency Benchmarking with strong improvements in RAN energy per connection, per cell site and per unit traffic.

Background

Telstra is Australia's leading telecommunications and information services company. In addition to being Australia's largest provider of fixed line services, Telstra is Australia's largest mobile telephone service provider with more than 13 million mobile connections. In 1981, Telstra (then Telecom Australia) was the first company to provide mobile telephony services in Australia. Telstra's GSM network was the first digital mobile network in Australia, launched in April 1993 on the 900 MHz band. Telstra's

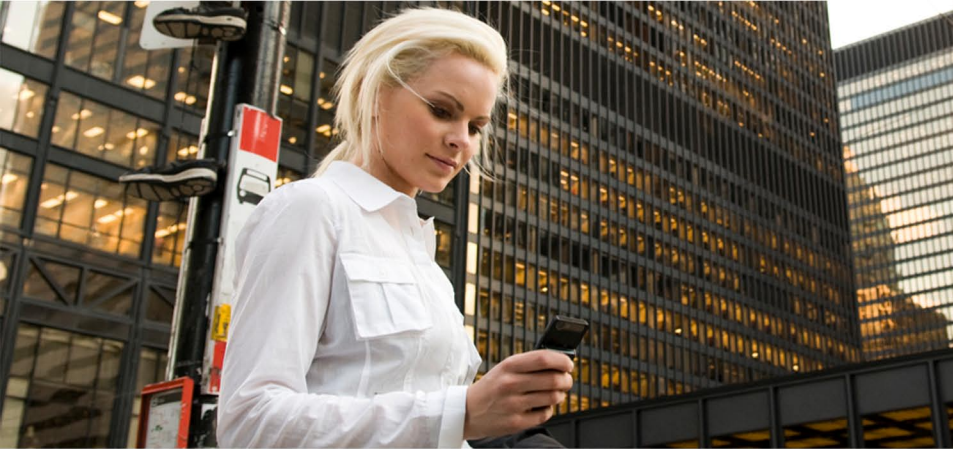
mobile network has continued to evolve, with widespread adoption of HSPA+ and, in 2011, the launch of its LTE network to service its data-hungry customers. As a mobile operator in Australia, Telstra faces some unique challenges, including a huge geographic area to cover, much of it with a low population density and high summer temperatures. In this context, the key energy management issues for Telstra are associated with providing site cooling.

Opportunity

Telstra has always had a strong emphasis on sustainability and has been measuring and reporting its carbon emissions since 2000. It has set aggressive targets to reduce energy consumption and carbon emissions and these targets have a strong influence on its energy management policy. Given Australia's climate and geography, energy costs are also significant on a per customer basis, and it is good business practice to manage these aggressively. The energy consumption associated with cooling five years ago was approaching 50% of network energy consumption and was a natural target for action.

Solution

Telstra has implemented several initiatives that have resulted in a reduction in running costs of approximately 60% at sites where the full solution has been applied.



Initiative 1: Mandatory installation of 'economy cycle cooling fans' in mobile equipment huts to provide fresh air cooling

An economy cycle fan that is installed and used in conjunction with existing room air conditioners (RACs) will typically provide an energy reduction of up to 57% in comparison to a site without an economy cycle fan. The economy cycle fan unit is physically the same size as the existing RAC, so it is able to be installed in the same opening or mounting frame as an existing RAC with minimal work. This results in reduced installation time and costs, and ensures a standardised installation is achieved across all sites. This economy fan has a power module for 240vAC operation with a 48vDC-240vAC inverter as an optional module that provides emergency operation and cooling during AC mains outages.

Initiative 2: Use of high temperature VRLA batteries

VRLA batteries are used to provide back-up power at Telstra mobile sites, and traditionally the installed batteries were designed to operate optimally at ~25°C. In order to sustain the elevated temperature set point strategy (refer to Initiative 3), Telstra has commenced the deployment of batteries that operate at higher long-term temperatures. These batteries are designed to operate optimally at 30°C without reducing battery performance and the expected operating life. Ensuring that equipment can function at higher temperatures means that cooling costs can be reduced.

Initiative 3: Modification of air-conditioning controls and increasing the mobile equipment operational temperatures from 25°C to 32°C

Telstra mobile base stations are cooled by fresh outside air when the internal temperature is between an upper limit of 32°C and a lower limit of 25°C. When the internal temperature increases beyond 32°C, the air-conditioners are staged to progressively come on line to provide mechanical cooling for the shelter. The system also incorporates fixed set point and control settings in order to avoid unauthorised tampering, thereby ensuring national standardisation and sustained energy savings. (Staff comfort buttons are also provided and when activated the set point temperature is lowered to a pre-set level for a defined period of time.) A one degree increase in temperature equates to an energy saving of approximately 3% in air conditioning costs.

Initiative 4: Install purpose-built 'Process Coolers' as a replacement to the traditional room air conditioners

Telstra has specified product selection criteria for the use of high

efficiency (improved coefficient of performance) 'Process Coolers'. These have been selected to ensure they are the same physical size and capacity as existing RACs to enable an easy changeover from model to model. The units have a fixed thermostat that eliminates unauthorised tampering. Comparative factory testing between the existing RAC and the new Process Cooler using a Power Quality Analyser determined that under the same conditions the RAC had a running current of 12.5 Amps and the current for the Process Cooler was over 35% lower with a running current of 8 Amps. This has provided an increase in mechanical air-conditioning efficiency during periods where economy cycle cooling was unavailable.

Results

In a typical mobile base station which has no economy cooling provisions, the average air-conditioning power consumption at 25°C is about 12 500 kWh per year. This can be compared with a mobile base station which is equipped with economy fans and high temperature VRLA batteries, where the internal temperature is maintained at an elevated temperature of 29°C. At these latter sites the average air-conditioning power consumption is typically 6 890 kWh per year. The mobile air-conditioning load reduction strategy, implementing Initiatives 1, 2 and 3 simultaneously, achieves typical energy savings of 5 610 kWh per year per mobile building.

The installation of Process Coolers at some of the Telstra mobile sites has further improved the overall efficiency of the cooling system at these sites, resulting in an additional 30% reduction in air-conditioning power consumption. After implementing Initiatives 1, 2, 3 and 4, the average air-conditioning power consumption is typically 5 190 kWh per year. Over the past two year period Telstra has implemented these initiatives in 1 200 mobile base stations across its network and saved 6 700 MWh, resulting in annual cost savings of A\$1.5 million and carbon emission reductions of 6 700 TCO_{2e}. These energy reduction initiatives apply to all new site builds and as an ongoing energy reduction retrofit program.

Telstra is one of 35 mobile operators participating in the GSMA Mobile Energy Efficiency Benchmarking initiative.

**For more information visit:
www.gsma.com/mee**