

On-site energy reductions Methods & concerns

Energy consumption is a major portion of a telecom's OPEX, particularly in the developing world. Most of the energy that telcos consume is derived from fossil fuels, directly or indirectly, and is therefore unsustainable. Communication sites account for 45 to 70 percent of telcos' total energy consumption and are thus the primary foci for their green programs, which aim for energy efficiency and independence.

By Tang Chaoxi

Energy savings at two levels

On-site equipment, especially wireless and broadband access devices, represents the largest percentage of any operator's energy consumption and carbon footprint. Onsite reduction of both can be achieved through changes to network elements (NEs) or network topology.

A greener network topology generally means fewer sites; this can be accomplished through better network planning and/or increased coverage, though both methods are generally utilized together; 25 percent reductions in energy consumption can be attained through their employ, as well as reduced TCO.

Onsite network elements may include base stations, transmitters, air conditioners, power supplies, and other hardware. Among them, base stations and air conditioners are the big consumers, but advancements in power supply are easing the burden.

Key energy-saving techniques

Primary equipment

Energy consumption by primary onsite equipment (radio devices)



The FCS smart ventilation system is dustproof and highly tolerant of other stresses. It not only reduces energy consumption, but it also enhances maintenance efficiency. The FCS requires a visit every 3-6 months in difficult conditions, and every 6-12 months in fresh air.

is significantly greater than that for auxiliary devices. Statistics show that one watt saved from the primary equipment saves 2.5 to 3 watts of power for the entire site.

Power-consumption reducers can include broadband remote radio units (RRUs), which feature 40 percent fewer components, fail 60 percent less often, consume 20 percent less power, and offer 30 percent reductions in size and weight. They also feature multi-carrier power amplification (MCPA), which enables sharing of system resources such as radio frequency (RF) and carrier wave. Operators can adjust both flexibly, based on the number of users.

Huawei's green GSM base station uses multi-density carrier and RF broadband technology, with each module supporting four to six carrier waves. Its advanced power amplification chips and Doherty amplifier unit improve amplification efficiency by over 45 percent, while its energy control software reduces static energy consumption by over 60 percent.

Equipment room

Operators are under constant pressure to expand their infrastructure, but adding more sites is easier said than done. Labor and material costs are rising, while competitors and NIMBY (not in my back yard) outbreaks are making suitable locations scarce. In response, Huawei has launched a Mini-shelter solution that consumes 70 percent less space, 90 percent less manpower, and 40 to 70 percent less energy, which should enable operators to breathe a little easier.

Climate control

A site's climate control system consumes 45 to 55 percent of its total electricity, and will remain the key to energy saving over the next decade. Currently, energy saving is achieved through smart ventilation, heat exchange, temperature regulation for storage batteries, and heat piping.

Smart ventilation

Smart ventilation brings fresh air in and pumps hot air out, which reduces power consumption and eases the strain on air conditioners. Smart ventilation systems can achieve an energy efficiency ratio ranging from 15 to 30, which is ten times what an air conditioner would offer. Huawei's smart ventilation system can reduce energy consumption by 20 to 70 percent where smart ventilation is applicable, which is in areas where the annual average temperature is between 12 to 25°C, and areas that are not sandy, dusty, heavily polluted or humid (above 85 percent).

Heat exchange

Heat exchangers save energy through cooling with natural air. They are designed for efficient heat transfer from one medium to another. However, the media must be isolated, so a site must be insulated from outside air. Heat dissipation technology also depends on the heat exchange core. If a heat exchanger has long been in operation, dust, moisture, and corrosion may form at the core surface, which will reduce heat conduction efficiency.

Constant temperature

A thermotank can be used to isolate site batteries from equipment that is less heat-sensitive, which will reduce the workload for air conditioners considerably as cooling need no longer be maintained for the entire site.

Heat piping

Heat piping operates just like it sounds (insulated pipes transfer equipment heat outdoors, which lessens the need for air conditioning) and delivers benefits of a similar quality and caliber as heat exchange.

Power efficiency

Power efficiency can be maximized

through methods such as high-voltage power transmission, DC module dormancy, and power harmonic treatment. Huawei has increased the efficiency of its power modules to 96 percent, which is significantly higher than the telecom industry standard (80 to 85 percent). Huawei hybrid power supply solutions have been applied in numerous countries and regions, and have greatly reduced energy consumption and carbon emissions.

Green energy sources

Alternative energy sources include solar, geothermal, wind, water, biomass, and nuclear. Solar is the most promising, but its efficiency and cost will hold it back for the next ten to fifteen years.

A variety of other methods have been employed to reduce site-related energy consumption, including base station sharing, inverter air conditioning, refrigerant additives, glycolic acid, underground battery storage, accurate air supply, and geothermal water heat exchange.

Things to remember

A plethora of technologies are available to reduce site-related energy consumption, but not all are created equal; reliability and stability are paramount to such technology. If operation and/or control are unstable, onsite repair may be needed, which can

nullify the desired cost savings. Green technologies must also be suitable for the environment at hand. If they are not, modifications may have to be made that cancel out the lower energy bills. For example, air filters had better be robust if smart ventilation is to be effective in a dusty climate. If it isn't, maintenance personnel will have to visit frequently to change them out.

Huawei's FCS smart ventilation system is dustproof and highly tolerant of other stresses. It not only reduces energy consumption, but it also enhances maintenance efficiency. The FCS requires a visit every 3-6 months in difficult conditions, and every 6-12 months in fresh air.

Another issue with green technologies is monitoring. If it is not minimal and efficacious, the solution itself is useless. Huawei's energy management system helps operators monitor energy consumption status, and provides professional-grade service for equipment operation, maintenance and troubleshooting. In this context, operators can enhance their energy saving efficiency and extend their product life span.

More and more enterprises are researching and deploying energy-saving products to ensure sustainable development. Huawei is ready to work with operators in the promotion of ecofriendly solutions, and is ready to shoulder the burden of social responsibility for energy saving and emission reduction. 

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