Managing our environmental impacts

We operate in countries that are particularly environmentally vulnerable and strive to improve our own resilience and mitigate our impact on the environment. The ICT industry is categorised as a low environmental impact sector. We have identified the most significant environmental impact of our operations as being energy use and the related carbon emissions in our network. Our focus is on minimising the energy intensity and carbon footprint of our operations by improving the energy efficiency of our network. Furthermore, communications technology can play a significant role in enabling a low carbon economy by powering innovations that can reduce carbon footprints while bringing wider social and economic benefits.

Accountability and management

We have robust management systems in place to help us minimise our impact on the environment and continually improve our performance. Our environmental management system (EMS) at the head office of Vodacom Group Ltd is ISO 14001 certified by TUV Rheinland.

The Group Health, Safety and Environment (HSE) Executive Head is accountable for our EMS and compliance. Environmental performance indicators are the responsibility of each Chief Officer within Vodacom and are managed on a project-by-project basis. Accountability for our environmental performance at operational level rests with the senior management at each of our operations.

During the year, we established a cross-functional workgroup to review, redefine and monitor our EMS, environmental projects and focus areas. All environmental initiatives are tracked by the workgroup. The focus this year was on addressing legal compliance issues and waste management.

PG 11
Our approach to responsible sourcing

The quality of reporting across the Group varies and we seek to improve standards where needed.

Compliance and regulatory developments

Our operations comply with applicable environmental legislation. We monitor environmental compliance through site inspections. During the year, we conducted environmental compliance audits in five of the seven regions in South Africa. The level of compliance, averages at 75% and the areas for improvement are: alignment to construction regulations and authorisation of diesel tanks. During the year, there were no environmental incidents recorded or prosecutions for environmental offences or fines for breaches in environmental regulations.

We have actively followed developments on the impending carbon tax legislation in South Africa. As a low impact company, our carbon tax liability will be relatively low. We will, however, be impacted by increases in fuel and electricity levies should the cost implication of the carbon tax be passed on to the consumer by fuel suppliers and the national power utility Eskom.

Key environmental performance indicators

Group indicators	2016	2015
Reduction in carbon values per site (%)	**7**	5
CO_2 emissions[1] (tonnes)	**576 872**†	561 515†
Solar operated sites	**955**	n/a
South Africa indicators		
Number of sites	**11 621**	10 673
Access network electricity (GWh)	**282.0**	255.0
Core network electricity (GWh)	**81.0**	62.0
Data centres electricity (GWh)	**33.0**	48.0
Building electricity (GWh)	**50.0**	59.0
Diesel generator fuel (million litres)	**3.3**	2.8
Vehicle fuel (diesel and petrol) (million litres)	**1.3**	1.6
Network equipment and handsets reused or recycled (tonnes)	**1 006**	160

1. Total scope 1,2 and 3 emissions (Greenhouse Gas Protocol).
† Restated to exclude Tanzania base stations.

Energy and climate change

As we grow our business and extend voice and data services to our customers, we are expanding our network and handling more data. To minimise the resulting increases in energy use and carbon emissions, we continue to rollout energy efficiency measures and new technologies across our network.

Across the Group we measure diesel and electricity consumption at over 15 000 base stations and implement initiatives aimed at operating more efficiently and adopting renewable and alternate sources of energy where feasible.

This year, we defined our strategy for managing our internal energy and carbon performance and established the following set of principles that guide how we will work efficiently and dedicate resources to effectively track, manage and report our performance.

- **Principle 1**: Take a full life-cycle view when assessing energy and carbon performance.
- **Principle 2:** Incorporate energy and carbon performance considerations into business and procurement decisions, design specifications and operational functioning.
- **Principle 3:** Strive to improve energy efficiency of our organisation by choosing energy efficient technology solutions as far as possible and eliminating waste.
- **Principle 4:** Manage the carbon intensity of our company by optimising energy choices where possible, driving awareness, reducing waste and growing sustainably.
- **Principle 5:** Ensure business continuity at all levels of Vodacom, by addressing energy shortages and pursuing alternative and independent energy solutions where the business case supports this.
- **Principle 6:** Engender and enable behavioural change in our organisation, along our value chain, in our customers and in our communities, to minimise our environmental impact, carbon intensity and energy intensity.
- **Principle 7:** Employ the latest technology and advanced ICT solutions, integrate smart measurement and control capability to facilitate energy and carbon performance measurement and management.
- **Principle 8:** Streamline and integrate governance and physical systems for a unified and optimal approach for Vodacom.
- **Principle 9:** Set ambitious targets for energy performance and carbon intensity, while driving operational expenditure reductions and ensuring network resilience.

In South Africa, as we rollout more smart energy meters at base stations, the quality of reliable energy data improves. In Tanzania, we no longer own the network towers and have therefore not included the towers' energy consumption in our Group performance assessment.

We participate annually in the CDP's South Africa Climate Change Report. In 2015, we retained our lead in the telecommunications sector in South Africa. Our scores increased from 96% in 2014 to 99% in 2015. Our CDP submission is available at **www.cdproject.net.**

Energy security

We continue to invest in back-up equipment and generators at our sites and have emergency plans in place to deploy additional mobile generators should the need arise. All core elements and important hub sites have permanent generators as additional power back-up.

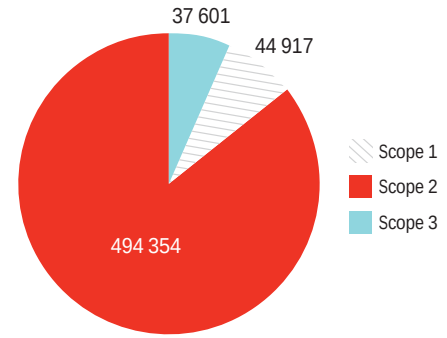
Our performance

We measure our carbon footprint annually. Our direct (scope 1) emissions account for about 8% of our carbon footprint and are generated primarily by diesel generators used to power up base stations as well as the use of petrol and diesel cars in our vehicle fleet. Our scope 2 emissions are indirect emissions as a result of using electricity from the national grid and account for approximately 85% of the total carbon footprint. Reducing our electricity usage is consequently a major focus. Scope 3 activities include indirect emissions as a result of business travel, employee commuting and downstream distribution.

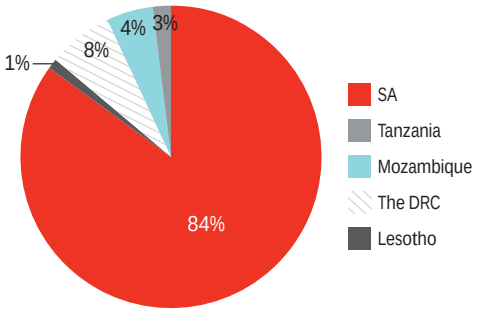
With the growth in our networks across the Group our carbon emissions increased by 2.7% to 576 872mtCO_2. Our number of base stations increased to 15 577†. This has resulted in a 7% reduction in carbon emissions per base station.

† Excluding Tanzania base stations.

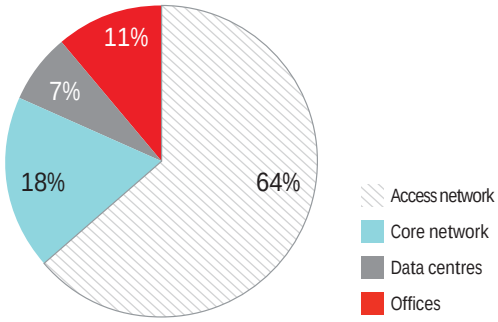
Total emissions in metric tonnes $mtCO_2$



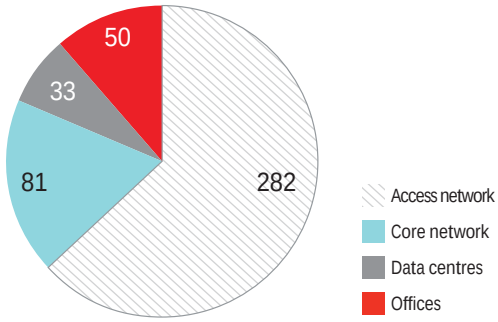
Our operations' contribution to Group carbon footprint



Energy use per category as % (South Africa)



Energy use per category in GWh (South Africa)



Improving energy efficiency

The access layer of our network – the component of our network that customers connect to, whether it's a base station or a physical fibre-optic connection – accounts for just over 60% of Vodacom's energy consumption and continues to increase due to network growth and the expansion of 3G and LTE/4G services. Energy efficiency initiatives range from alternative power generation, high temperature batteries to the rollout of smart energy meters. During the year, we installed 331 smart meters.

We are also exploring innovative energy solutions such as fuel cells, flow batteries, DC power cooling and energy data management solutions. The Vodafone Site Solution Innovation Centre in Midrand, South Africa provides a base for the Vodafone Group network innovation teams to collaborate with external parties and suppliers to develop and test new technologies that will help reduce our energy use and carbon footprint.

Vodacom is continuously renewing its core network – where calls and data requests are directed and connected – to support future technologies and services. Core network energy efficiency initiatives include heating, ventilation, air conditioning (HVAC) system optimisation, humidity control set-point changes and lighting optimisation. Projects have achieved energy savings of between 5% and 34% at the respective facility.

In the office environment, energy reduction initiatives include retrofitting of LED lighting, HVAC optimisation and redesigning offices to incorporate the New Way of Working plan which aims to move all employees to open plan working. Energy saving projects completed at our buildings accounted for estimated energy savings of 1.3GWh which translates to R1.8 million, during the year. We reduce the need for business travel – and associated greenhouse gas emissions – by equipping our offices with technology to enable our people to communicate and work together with colleagues around the world.

Operational optimisation is an ongoing process. In the coming year we will rollout smart metering and sub-metering to monitor electricity and water consumption to assist in identifying opportunities for improvements.

Our office in Century City in Cape Town, South Africa has one of the largest single-roof photovoltaic solar array installations in Africa. It generates more electricity than the building requires. To ensure that there is no wastage of green electricity, our engineers have designed an ice plant which will produce ice which will be used for cooling the building's HVAC system. This will ensure the effective utilisation of the excess energy generated by the solar panels.

Energy and climate change continued

Alternative energy solutions

To reduce our reliance on carbon intensive energy sources, we promote the use of small-scale renewable energy to power our network. In the DRC, we continue to establish ultra-low cost sites in rural areas with no coverage and now provide 2G services with GPRS and EDGE. The sites are totally off-grid and operate on battery and solar power only, providing a 'greener' solution when compared to a site powered by a diesel generator. The concept has been expanded into Vodafone as a global best practice.

We now have 955 solar sites across the Group. In the DRC, the number of ultra-low cost sites now stands at 788 and the solution has significantly reduced the carbon emissions per base station. Vodacom Lesotho has also implemented the ultra-low cost site, with a deployment time of only four days and at a cost of almost half of what it would cost for a normal base station.

Our Community Power initiative, implemented since 2011, entails using solar energy to power a Vodacom base station and provide the excess energy to neighbouring communities where grid supplies may be unavailable or unreliable. The flagship site in Emfihlweni in northern KwaZulu-Natal, South Africa is working well and an additional site in the Vuvu district, Eastern Cape, is also showing positive results (as per the case study). As the Community Power model is specific to rural areas where there is no electrification or plans for further electrification, base stations need to be close enough to existing infrastructure (such as a school or health clinic) to be able to share the excess energy produced by solar panels. These conditions are few and far between in South Africa.

Technology to support impact management

Our IoT solutions enable objects or devices such as cars, traffic or streetlights and buildings to send and receive real-time information via our network. This information enables our enterprise and business customers to gain insight into how their resources are being used. This in turn can help them to cut costs and carbon emissions, for example, by reducing their energy and fuel use and thus improving the efficiency of their operations.

In the South African market we have introduced solutions for monitoring water and energy consumption, which highlight wastage through excessive or abnormal usage combined with intervention indicators. Our diesel tank monitoring solution provides early warning of possible leaks enabling enterprises to act timeously to limit the loss and avoid the environmental impact of diesel flow into the ecosystem. Vodacom has implemented these solutions at several internal sites and will continue the rollout across further key sites. We have implemented solutions with large manufacturing customers and have a strong pipeline of customer interest. Several new initiatives are to be launched next year to further address key areas of energy management for local government.

Vodacom provides renewable energy to rural school

Vodacom is supplying renewable energy to the Vuvu Junior Secondary School in Mount Fletcher, Eastern Cape, and its local community, with excess power generated at its solar-powered base station in the area. The school now has access to electricity for the first time since it opened in 2004. The project follows a successful pilot initiative launched in Emfihlweni in Northern KwaZulu-Natal in 2012, as well as a second project in Kisarawe, Tanzania, in 2013.

Access to electricity is a key enabler of social and economic development. The project in Emfihlweni has already seen the matric pass rate improve year-on-year to 75% at the end of 2015. Vodacom is committed to using technology and its relationship with government departments, particularly the Department of Basic Education in this case, to help learners and teachers gain access to quality education and instruction. As part of the Mount Fletcher project, we have established a computer centre at the Vuvu school. This includes 20 computers for learners, a laptop for a teacher, a server, a white-board and projector and access to Vodacom's zero rated educational content.

The base station's 7.5kW solar array has led to a 60% saving on fuel normally consumed at the base station and a reduction in generator run time to three to four hours per day.

Vuvu Junior Secondary School in Mount Fletcher, Eastern Cape.

Waste and water

Our aim is to reduce waste sent to landfill by identifying waste streams that can be reused and recycled. Initiatives under development include an integrated waste management procedure, a battery rejuvenation project and waste separation at source as part of Vodacom's New Ways of Working.

As technology advances, we replace our network equipment with new, more energy efficient equipment that improves the network service for our customers and makes our operations more efficient. This generates electronic waste (e-waste). During the year, 1 006 tonnes of network equipment and handsets were reused or recycled. The large increase since the previous year can be attributed to our battery swop-out project on our network. Some e-waste is potentially hazardous and must be handled separately and disposed of responsibly. We conduct formal audits of our e-waste suppliers to ensure that our e-waste is being disposed of in accordance with good practice and compliance with legislation. Through audits and a collaborative approach between Vodacom and suppliers we ensure that there is legislative compliance, as well as improved reporting and management of e-waste disposals.

This year, we increased the level of recycling of general waste generated at Midrand campus from 26% to 32%. In our stores in South Africa we introduced plastic bags made from recycled material with a message to customers to reuse the bags.

Our operations use relatively little water compared with other industries and we do not consider this to be material to our environmental impact. However, we recognise that water is becoming an increasingly important issue, especially in the water-stressed regions in which we operate. We only consume water in the office environment. Each operation takes measures to increase environmental awareness in their market, including campaigns with water saving tips for the office and home environment.

At our retail operations we have undertaken campaigns to promote reduced electricity, water and paper usage, and waste generation.

Ozone depletion

Some of our network cooling systems and air conditioning systems in our offices and shops use refrigerants. We have phased out the use of chlorofluorocarbons (CFCs) in most buildings. There is a plan to phase out the use of R22 gas. Free cooling, which substantially reduces the energy consumed by air conditioners, has been implemented at 331 further sites during the year.

Providing clean biomass stoves

Vodacom Lesotho has partnered with Africa Clean Energy, an environmental organisation focused on providing affordable and clean energy to communities, to invest in ultra-clean biomass stoves.

The stove burns any type of biomass and results in complete combustion of the fuel, minimising CO_2 emissions. The virtually smoke-free burning avoids the negative health and environmental impacts of smoke. The stove requires 70% less fuel and converts the energy from heat to electricity to power LED lights and charge phones. To date,100 stoves have been distributed and Vodacom Lesotho has committed to provide more stoves for distribution in all the communities where ultra-low cost base stations are proposed.

Biomass stove