

Energy efficiency improvement work

In 2018, TIM proactively managed to avoid energy withdrawal increases linked to technological development through a continuous search for efficiency and optimisation in adopted solutions. In 2018 TIM has achieved a total net reduction in consumption is expected (net withdrawals and self-produced energy) of around 28 GWh compared to 2017.

This result was achieved through new cross-cutting (involving several areas) efficiency plans and with the implementation of specific efficiency projects launched in previous years, in detail:

- **Spaces Plan.** Provides for the release of 40 sites in the 2018-2020 period, of which 23 in 2018. The benefits in terms of saving will be mainly visible from 2019. The total saving linked to the release of the sites estimated for 2019 is between 40 and 50 GWh (includes offices, fixed network and DPC¹).
- **Analysis of high-consumption sites.** During 2018 special attention was given to the high-consumption sites (offices, fixed and DPC) with a 0.5 GWh threshold for network withdrawals (345 sites in total with a total withdrawal of around 1 TWh). The objective is to identify possible areas of efficiency and maximise achievable savings. In 2019 the plan is to mainly concentrate efficiency measures at these sites.
- **Management initiatives.** In 2019, savings are also expected from management type activities to improve the energy performance of high consuming sites: these initiatives should result in a saving of around 40 GWh.

Data Centres and IT area

Work continued in 2018 on hardware disposal (storage and server) and shutdowns (e.g. orphan servers) relating to the domestic market or 2017 projects about to be completed and so-called invisible shutdowns (only detected retrospectively) with estimated savings for 2018 of around 11 GWh. The following actions were completed:

- **Adaptive cooling of Data Centre rooms.** The use of a previously tested solution to manage cooling systems with adaptive algorithms, which control the operation of air conditioners based on the thermal mapping of server rooms, was put into practice, thus reducing consumption from air conditioning. The energy savings for 2018 are around 1.2 GWh.
- **Eco solution for IT infrastructure in the cloud.** An increase was made in the number of machines set up with real-time controlled and dynamic switch-off of “farms in the cloud” servers based on virtualisation mechanisms with optimisation of the use of physical resources (CPU and RAM). The solution, the efficiency of which has already been tested, improves the operation of IT farms in terms of performance and capacity planning information, enabling optimisation of the physical development of IT platforms even if the processing load required increases. The energy savings for 2018 (year fully operational) were around 0.6 GWh.
- **Cogeneration.** The production of energy from trigeneration plants in 2018 has been significantly increased, with efforts to limit machine stops and at the same time consistently optimise plant operation. Self-produced energy has increased around 27 GWh compared to 2017. In addition, in 2019, further trigeneration activities are being analysed for the Rozzano, Padua and Bologna sites relating to hydraulic circuit re-engineering and absorption chillers changes. Analysis has also begun to identify suitable sites for the installation of additional units between 1.5 and 2 MW of power. For 2019, self-production of around 150 GWh is expected (+20 GWh compared to 2018). In 2019 increased efficiency is planned in the main DPCs with the introduction of Building Energy Management Systems (BEMS).

In Brazil, in December 2018, a biogas plant using solid urban waste was put into operation with 5 MW of power for its own remote use. The facility supplies 864 antennas in the São Paulo area. With this initiative, TIM will become the first telephone company to use biogas to generate energy in an urban centre and supply its equipment. The objective is to reach 60% of the energy supply coming from renewable sources such as solar, wind, biogas and hydroelectric power plants by 2020. TIM Participações foresees a 22% saving on energy costs with a reduction plan for up to 2032. Currently, 18% of the company's energy supply comes from renewable sources.

Working locations/offices area

¹ DPC – Data Processing Centre

Mestre and Padua smart buildings were tested. The project involves the monitoring and control of power and air conditioning systems through the installation of probes to monitor temperatures and consumption, with the aim of reducing energy consumption and increasing system efficiency. The activity does not involve replacing air conditioning equipment, but only deals with its management logic. The project was carried out with "turnkey" logic. In 2019 increased efficiency is planned in the main office sites with the introduction of Building Energy Management Systems (BEMS).

In one of the São Paulo offices *in Brazil*, a water treatment plant and a rainwater collection system was set up with the aim to use water to clean the site's surrounding spaces and garden. The project involves implementing a rainwater from roofs and gutters retention system, with a physical-chemical system for the treatment and reuse of this water in sanitary facilities and with a total storage capacity of 680 m³. In another unit of São Paulo (Morumbi), part of the water used comes from an artesian well. In the Brazilian unit there is a gutter and air conditioning rainwater collection system with a 2.5 m³ capacity collection tank. The objective is to use this water to irrigate the plants and wash the unit's patio. In one of the operational units of Rio de Janeiro (TIM São Cristóvão) a similar project has been started.

Fixed Network area

- **Exchanges re-engineering project.** The plan was completed to adapt power supply and air conditioning infrastructure units of exchanges, with the aim of achieving energy efficiency. The actions, completed at the end of 2018, covered 110 of the most energy intensive exchanges (UGSs and POPs), out of a total of 10,500, indicatively representing 11% of the total consumption of Exchanges - around 156 GWh per year in total. The project saving objective of around 20 GWh has been achieved. Phase 2 of the project to be carried out in 2019 is planned to be extended to an additional 100 plants selected from the most energy-consuming sites (and not included in other saving plans).
- **Plans for business systems modernisation** continued in 2018 through a simplification of the architecture; energy efficiency can be improved by gradually decommissioning pre-existing systems and platforms which have reached the end of their support and maintenance cycle (end of support), and migrating data network services to platforms with better performance.
- **Integrated decommissioning and Network Simplification** – plans continue for compacting networks (PSTN, DSLAM ATM, DSLAM IP, SuperSGU) and the rationalisation and simplification of network platforms (Core Telephony Platforms, Transport Networks, Data Networks) with an added saving in 2018 of about 14 GWh. In 2019 an added saving of around 22 GWh is expected.

Mobile Network area

- **Radio Access Network Energy Saving:** the project started in 2018. The aim of the project is to reduce electricity consumption in 2G, 3G and 4G systems housed in radio base stations through the implementation/activation of specific features. The project will affect 13,000 RBS. The estimated saving when up and running (2019) is about 0.4 GWh (50% of which in 2018). A phase 2 of the project is being analysed, which involves the implementation of additional features.

- **Connection Power Reduction:** the project started in 2018. The aim of the project is to reduce the connection power of the electricity supply of RBSs, with criteria for mitigating possible disconnection risk, to make economic savings and optimise all approximately 15kW power supply connections with an increase in supply to 17kW and to eliminate the limiter, with consequent payment for the share of power consumption and not capacity. The expected saving is mainly linked to the reduction of fixed costs.

In Brazil the *business processes redesign* programme is being developed. It will examine various processes related to energy management. The programme aims to increase the focus on energy management by unifying end-to-end management activities. It includes energy efficiency measures and is part of the operational objectives for all areas directly involved. Free Cooling has also been implemented, a ventilation system with the installation of refrigeration equipment at sites which reduces the use of energy and refrigerant gases. The *container removal project* was also begun (removal of equipment from containers with air conditioning and installation of forced ventilation BTS reducing energy consumption used for air conditioning and HFC emissions). Finally, other projects launched in 2017 to adapt network equipment continue: virtualisation when possible and installation of more efficient equipment.