FREE COOLING BUSINESS CASE STUDY

Zdenko Marincic, CEO, X-LOGIC

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1. Introduction

Over the last decade global warming has become an increasingly important item on the global political agenda. In this regard, information and communication technologies have been identified to be a major future contributor to overall green house gas emissions, having a share of more than 2% already in 2007 with a strong trend to increase. In order to reduce the environmental impact of telecoms, efforts to increase energy efficiency of these technologies have significantly gained momentum. As one branch of the sector, mobile radio networks account for about 0.2% of global emissions, contributing a rather small portion to the overall carbon footprint of ICT today. However, with rising demand for communication services in developing countries, serious challenges with respect to energy needs of mobile radio networks are expected in the future.

In addition to minimizing the environmental impact of the industry, cellular network operators are as well interested in reducing the energy consumption of their networks for economical reasons. The costs for running a network are largely affected by the energy bill and significant savings in CAPEX and OPEX can be realized through reduced energy needs.

Currently over 80% of the power in mobile telecommunications is consumed in the radio access network, more specifically the base stations. Taking this into account, there is only one way to lower the energy consumption of these networks and that is to increase energy efficiency of the components inside the base station. With the rapid development of mobile communication services and the promotion of global energy-saving and emission-reducing tasks, the energy consumption of base stations has become the focus of all operators, of which the temperature control equipment accounts for around 45%.

2. Why do you need Free Cooling in your telecom network?

2.1 Traditional temperature control solution for mobile base stations

Currently, air conditioning and refrigeration as a traditional temperature control solution is applied in communication indoor sites, and the reference temperature is set as 22-25 ℃. The solution can ensure the normal, reliable operation of the equipment. But there are still some problems:

- The air conditioner works too long in succession, the failure rate is high, and the maintenance costs too much;
- Energy consumption is extremely huge, each base station consumes up to 20,000kWh each year on average;
- The differentiated needs for equipments working in optimum temperature can't be satisfied;

2.2 Introduction to Free Cooling

Free air cooling means utilizing ambient air to cool. The system is therefore far more economical in use than active cooling. Free air cooling is controlled ventilation where savings up to 80% energy

consumption for mobile base stations can be achieved (strictly depending on the climate surrounding of the base station).

Fig. 1 – Telecommunication base station

Reasons to go for Free Cooling:

- Price of electrical energy will rise
- Fuel price will rise
- CO2 emission will be reduced
- Investment companies will support green, clean and energy efficient projects

Benefits from Free Cooling:

- Significant reduce of energy cost (cca. 20-50%) per base station on yearly basis (measured on site in Croatia)
- Less running time on A/C unit – longer operational life of A/C unit
- Environment friendly

For all equipments in base station, battery is the bottleneck of temperature control because of its optimum working temperature 20-25℃, which is much lower than the temperature other communication equipments can bear. In allusion to above features, **X-LOGIC** proposes the intelligent ventilation system (XFrCool1 + ventilator + grills + dampers + filter). This solution has the following advantages:

- Control temperature in different region, reducing the site energy consumption by 20-90%;
- Air conditioner is replaced by intelligent ventilation, saving CAPEX of temperature control system minimally by 25%;
- The battery works within the optimum environmental temperatures, ensuring its service life

3. Business case study

Business case study was performed on 3G/4G base stations in T-mobile Croatia on locations in Zagreb.

3.1 Business case study for 3G/4G base station

Parameters of 3G/4G base station:

- Volume of BTS: 12 m3
- Heat dissipation of 3G/4G equipment: 2 kW
- Air-condition unit: 7.5 kW Toshiba
- Air fan used for free cooling: 75 W
- Air flow of air-fan: 2000 m3/h

Type	Payback period
A/C unit Toshiba 7.5 kW	- (*)
XFrCool1 + vent + dampers + grills + filetr	1-3 years (**)

(*) *Stand-by air condition is a must.*

(**)*The calculation is based on approximate price of 0.1 EUR/kWh. In countries where this rate is higher the savings are far bigger.*

4. Photos from free cooling installation

Fig. 2 – Free cooling controller XFrCool

Fig. 3 – Controller XFrCool in operation

Fig. 4 – Outdoor free cooling unit

5. Conclusion

Choose you free cooling solution supplier in **smart**, **simple** and **effective** way!