



CASE STUDY

by Termogamma

ENERGY EFFICIENCY UPGRADE: TRIGENERATION AND FREE COOLING PLASTIC INDUSTRY, ITALY

ITP SPA

ITP - Industria Termoplastica Pavese (Thermoplastics Factory) is one of those family businesses that form the backbone of Italian industry. Established in 1972, it operates in the plastics sector, producing **polyolefin films for food and industrial packaging**, and for surface protection.

As a company, ITP's strategic goal is to create increasingly efficient packaging products that contribute substantially to the reduction of food waste and environmental pollution.

The processing technology adopted is blown extrusion, a process that employs granules of polyolefin material





compounds to produce films made of 3 to 7 layers, depending on the characteristics required for their use.

Along with its continuous technological innovation, ITP does not forget to pay attention to the resources that are needed for its industrial process. Talking about energy, large amounts of electricity are needed for the extrusion machines, while chilled water is also needed to cool them down.

ITP decided to improve its energy systems in order to keep growing as a company while reducing energy costs and environmental footprint. Trigeneration was chosen as one of the best available solutions to reach this ambitious goal.

Short Technical Description of the Solution

The installed trigeneration system consists of a natural gas engine which, coupled with a generator, produces electricity. While this process is taking place, a large amount of heat is generated inside the engine. This heat (available for free) is completely recovered through a series of heat exchangers placed in the engine's cooling circuit. Also, heat contained in the exhaust gases is recovered through an exhaust gases/water heat exchanger. Therefore, final global efficiency of the process is above 85%.

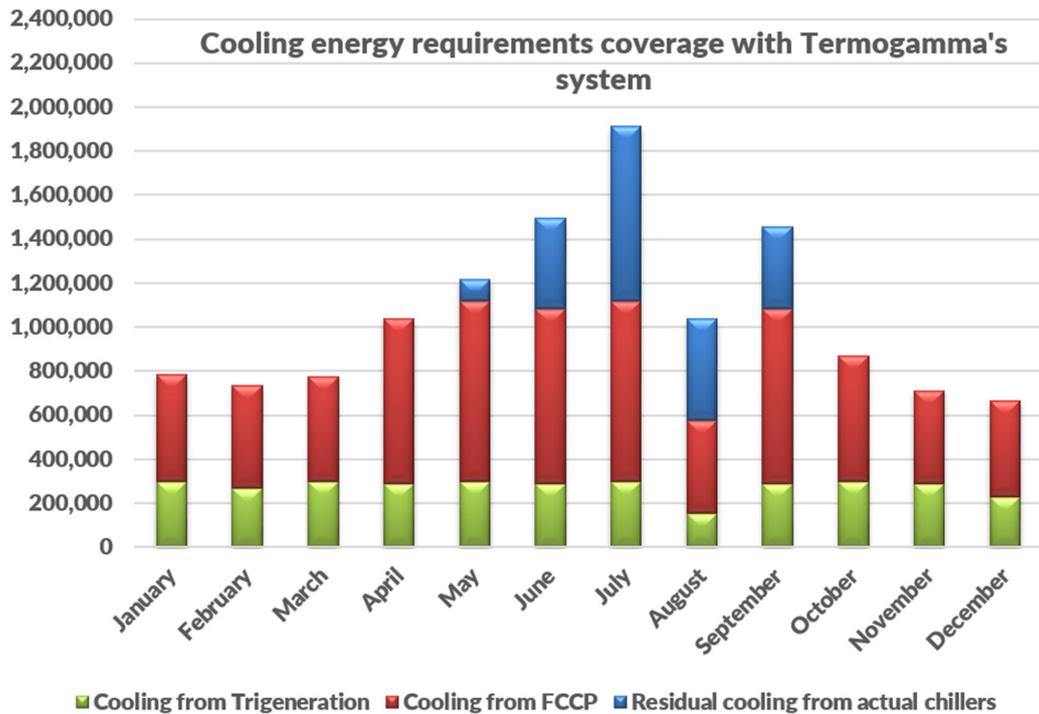
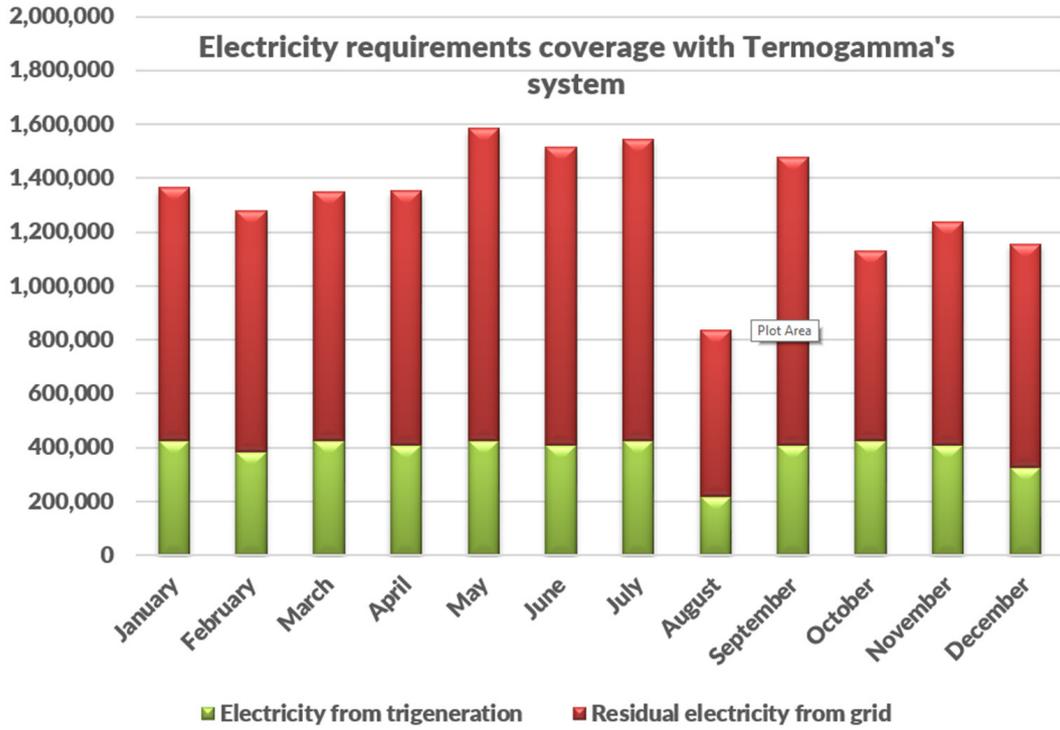
The second component of the trigeneration system is a sin-



gle stage absorption chiller. Absorption chillers use hot water as input energy (at about 90°C) to produce chilled water (at about 7°C), thus saving the electricity that would be used by a traditional electric chiller. The heat recovered from the engine is therefore used to feed the absorption chiller.

Before installing the trigeneration system, ITP was using old traditional electric chillers that were almost reaching the end of their useful life. Efficiency was quite low at that moment and ITP was aiming for an important energy efficiency jump. Thus, apart from the chilled water produced by the absorption chiller, ITP added 1,2 MW of cooling capacity through a new Free Cooling Chiller Plant (FCCP), which was completely integrated with the trigeneration system. The purpose of the FCCP system is to serve as background cooling plant for the trigeneration system, while covering peak cooling demands of the industrial process.

The new cooling system has massively contributed to increased efficiency rates as while working in Free Cooling mode (winter time, plus partially autumn and spring) it may reach an energy efficiency rate (EER) of above 25. During summer, its efficiency stays above 4 thanks to the water-cooled chiller integrated inside the system.



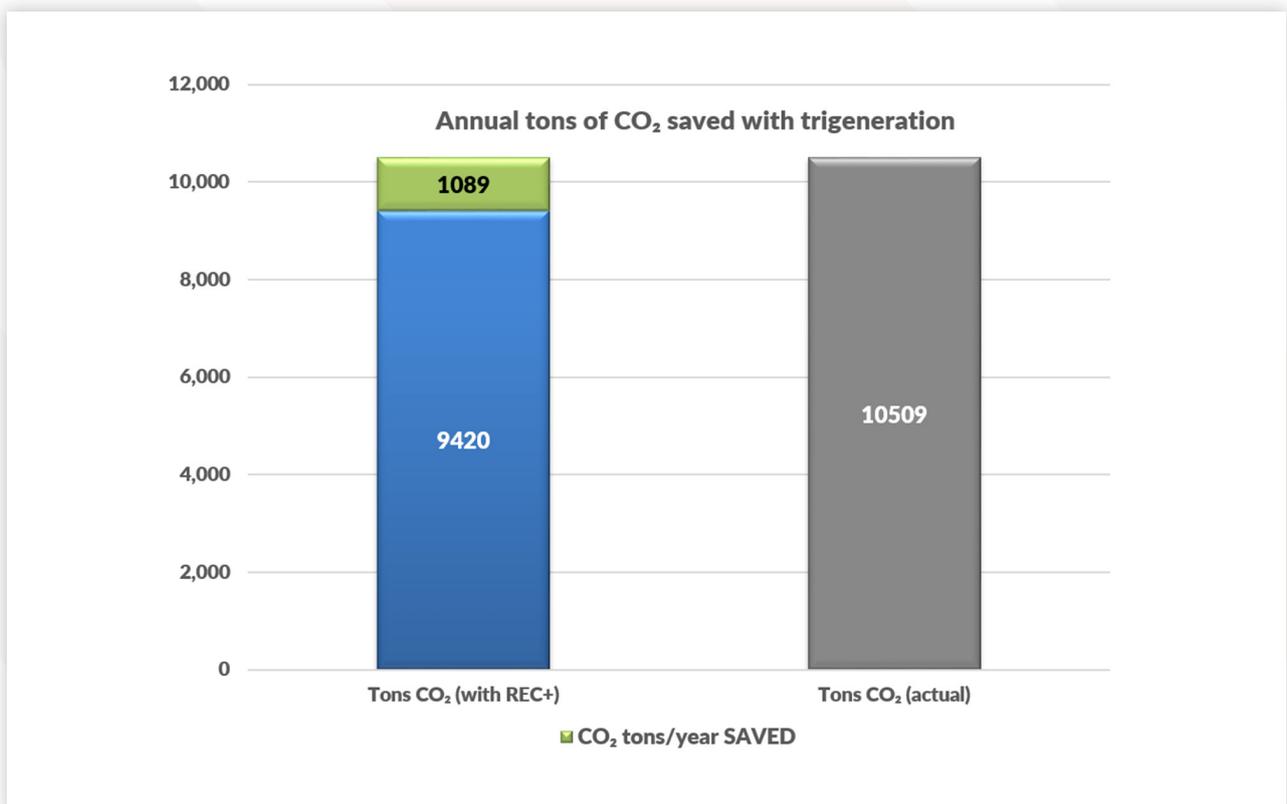


The Results

As at September 2018, the trigeneration system REC+600TCC has been operating for more than 35.000 hours and has delivered more than 21.000 MWh of electricity and more than 16.000 MWh of cooling energy. The cooling system FCCP-1200 has already produced more than 20.000 MWh of cooling energy.

The plastic factory already enjoys net cost savings from the plant, as it has already fully repaid the initial investment, in less than 3 years.

The CO₂ emissions saved to the environment up to date amount to 4.900 tons.





Second Plant

ITP, due to its non-stop growth and the development of new markets, has recently enlarged its production facilities. The entire energy solution for the new areas was engineered and constructed by Termogamma, installing another tri-generation system of 400 kW of electric power and 360 kW of cooling capacity. The new system has already cumulated more than 10.000 hours of operation.

Conclusions

Trigeneration technology, when well implemented and integrated into the industrial context, has clearly demonstrated its benefits for plastic industry companies. This kind of industrial process is highly energy intensive, with the energy bill representing one of its most important production costs.

Trigeneration systems combined with efficient cooling energy systems have a triple advantage for this kind of industries: improved energy efficiency and reduced energy bill, plus reduced environmental footprint.

Comment from the CEO

"We knew that the savings envisaged during the initial stages of the project were to be interpreted as mere numbers on paper. However, the reality is that today those hypothesized savings have been fully achieved." ■