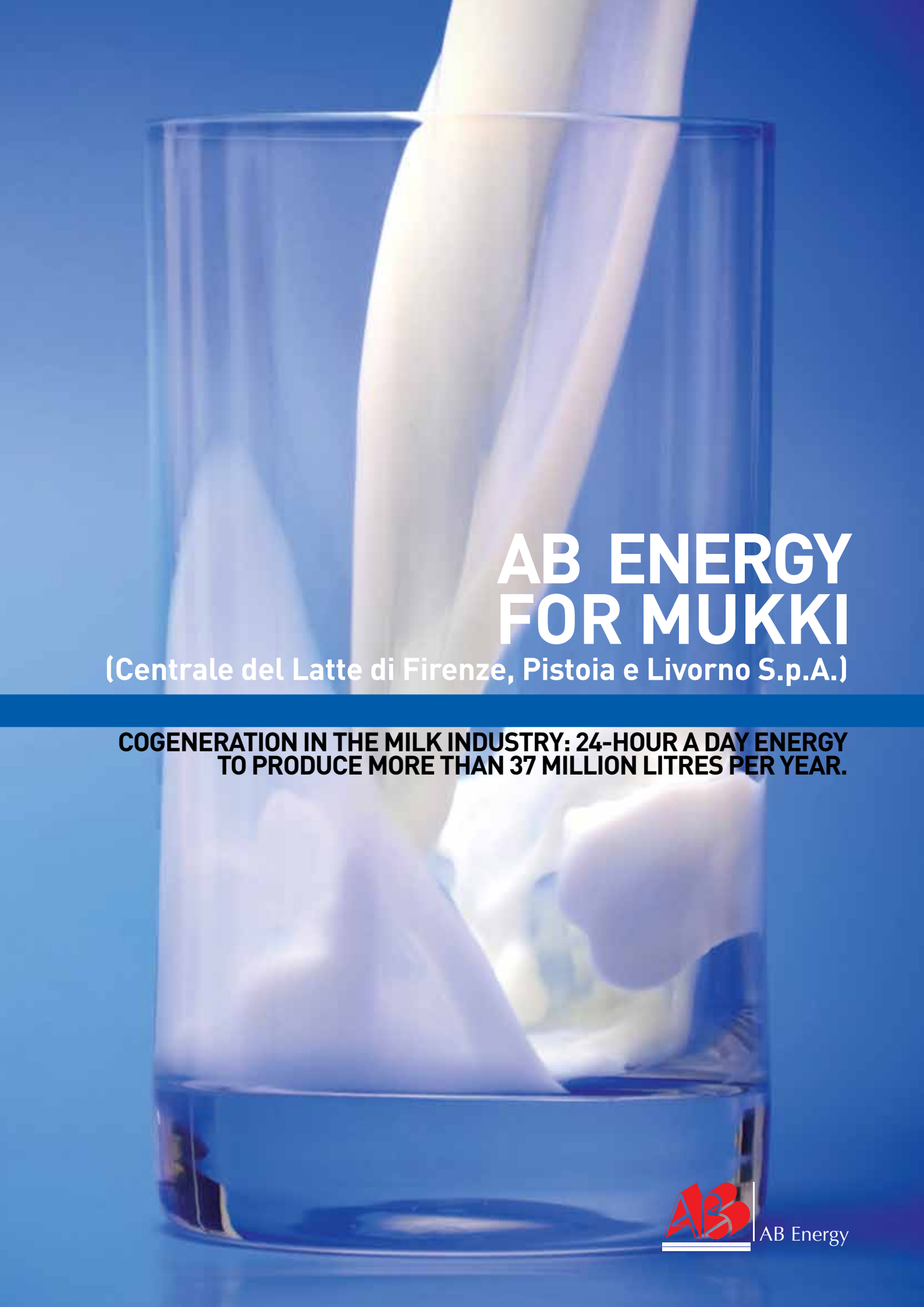
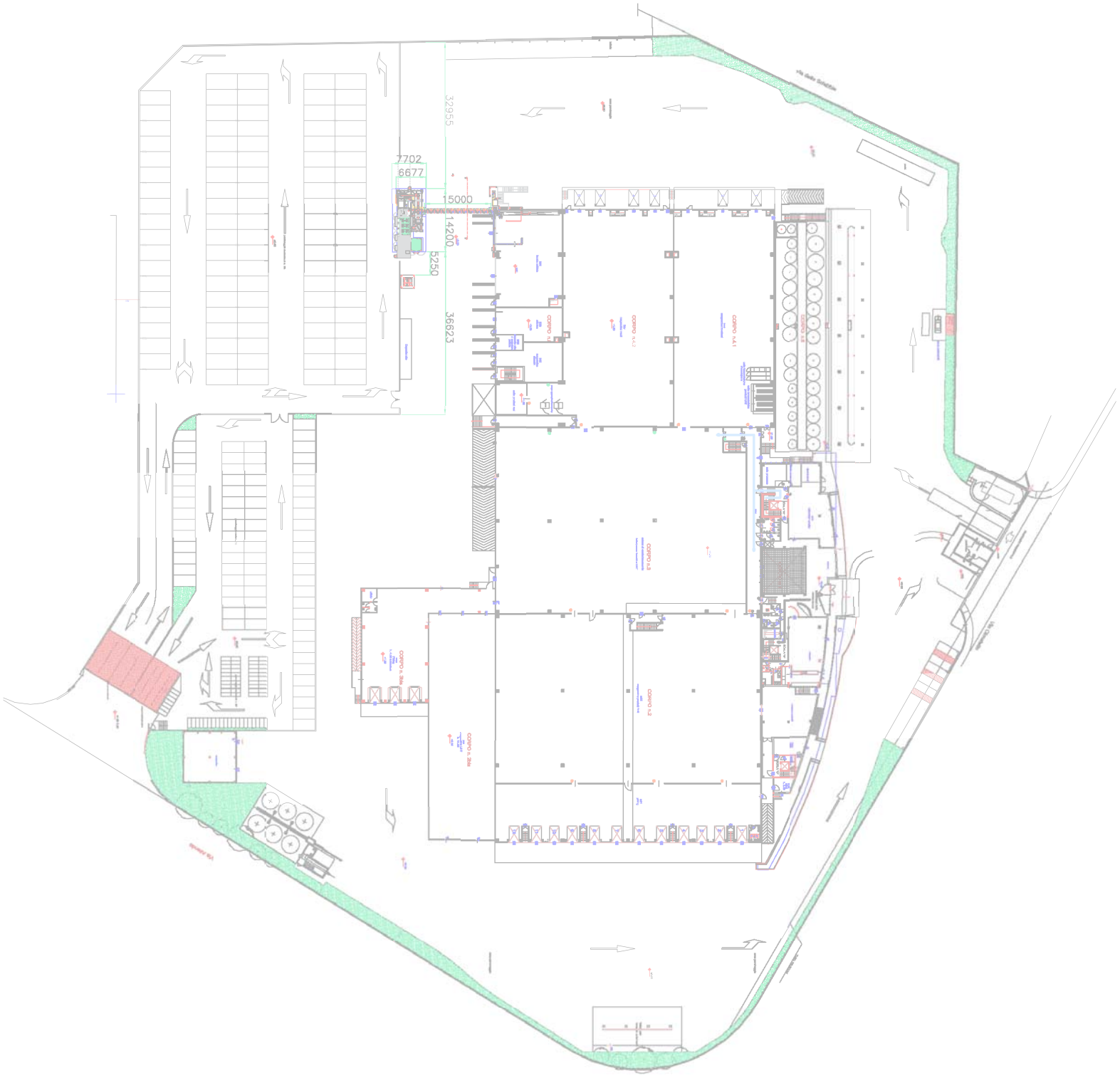


AB ENERGY FOR MUKKI

(Centrale del Latte di Firenze, Pistoia e Livorno S.p.A.)

COGENERATION IN THE MILK INDUSTRY: 24-HOUR A DAY ENERGY TO PRODUCE MORE THAN 37 MILLION LITRES PER YEAR.

AB Energy


32955
7702
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36623

FEWER EMISSIONS, FEWER COSTS AND HIGHER EFFICENCY IN A PRODUCTION CHAIN WITH TRADITIONALLY HIGH THERMAL AND ELECTRICAL CONSUMPTION.

The milk chain involves very specific production cycles requiring large quantities of energy that are used particularly by the thermal treatments of products and plant operation.
These plants run 24 hours a day, requiring a flexible, constant energy supply for production of potentially thousands of litres a day.
The need to optimise consumption in the costs-benefits ratio in order to exploit the best possible energy efficency with substantial savings in terms of both costs and emissions is all too clear. Results would also ideally be measurable in the short-term.
And the choice for cogeneration heads precisely in this direction. By using cogeneration technology, such as that supplied by AB Energy grants availability of an energy solution that runs 24 hours a day, 365 days a year, also allowing for the use of part of the energy that is normally dispersed by traditional systems (approximately 55%). A significant decrease in costs and emissions, whilst maintaining the same high level of productivity, both in terms of quality and quantity.
The experience of Centrale del Latte di Firenze, Pistoia e Livorno S.p.A. (Mukki) shows the importance of cogeneration for a chain such as the dairy - cheese-making chain, which requires plant management aimed at maximum use of energy, both in electrical and thermal application.

THE MUKKI OBJECTIVE: TO CONFIRM ITS OWN TERRITORIAL FOCUS AND MAINTAIN A LEADING ROLE IN COMPETITIVENESS ON THE REGIONAL MARKET.

Centrale del Latte Mukki annually collects 37 million litres of milk from approximately 140 Tuscan stalls, distributing it to more than 12.000 sales outlets throughout a territory that extends from Liguria to Lazio. In addition to fresh and long-life milk, the company also supplies fresh cream, yoghurt, butter and various fresh cheese specialities.

With more than 1.200 employees and 200 vehicles for product collection and distribution, Mukki leads the region with a market share of more than 60% and an economic return on the territory of 45 million euros per year.

A point of reference for the attention to high quality too, as summarised very accurately by the 'Distinctiveness Charter': a sort of company statute that codifies commitment, safety and conduct at work.

A reality that focuses on workers and consumers as well as on the environment, energy saving and territorial protection.

In 2005, Mukki invested 43 million euros in opening the new plant in Novoli. The new structure took 24 months to develop and extends over a surface area of 37 thousand square metres comprising offices, laboratories and production, and a further 35 thousand square metres used as refrigeration cells on the ground floor. The entire chain is carried out using automatic systems: from collection to production and packing. The new plant further strengthens Mukki's role in Tuscan agricultural food excellence, guaranteeing a genuine product, an ethical system

and significant energy savings, to the full benefit of the environment and the company's profits. The choice for cogeneration was therefore a decision that fitted in well with the business strategies and philosophy, where innovation is at the service of the 'Competitive quality' concept. The whole process of transformation is constantly monitored by specific software and a control centre.

THE KEY ELEMENTS AND EFFICENCY OF THE AB COGENERATION PLANT.

Mukki,
plant characteristics:

ECOMAX14 NGS		
Fuel consumption	363	Nm^3/h
Power input	3446	kW
Electrical power cophi 1	1416	kW
Electrical efficency	41	%
Temperature of boiler water supply	60	°C
Team production	880 13,5 196,69	Kg/h barg °C
Thermal power recovered in steam	621	kW
Cold water	20	°C
Hot water	75	°C
Thermal power recovered in water	831	kW
Total thermal efficency in steam and hot water	42	%
Total efficency	83	%

THE AB ENERGY PROBLEM-SOLVING ABILITY AS A RESPONSE TO THE MOST DEMANDING PRODUCTION AND STRUCTURAL REQUIREMENTS.

AB Energy's answer to the request presented by Mukki for a solution for the supply of electricity, but above all of steam and hot water with the took the form of the ECOMAX 14 plant (1.400 kWh). A highly-efficient choice designed to guarantee all the energy necessary to produce more than 37 million litres of milk a year. The ECOMAX model is a 'fully-integrated container module' solution that comes highly recommended in the logistical-industrial situations typical of this type of business, where there is little passive space.
As this is a new plant, but one which is already equipped with traditional energy conveying plants, AB Energy has had to integrate the ECOMAX system with the pre-existing provisions, through a careful feasibility study carried out by the in-house team.
The project translated into the complete development of the electrical equipment, from the control centre to the plant. It was demanding and articulated, particularly with regards to the flows of steam with exchanger for the recovery of hot water. Pipes were built according to the highest safety criteria, through the development of a 'pipe rack' (grouping in a single belt) for the independent, but integrated transport of hot water, heat and electricity.
On an executive level, the entire plant has been developed within the timeframes established and with extremely reduced plant stop-time, thereby minimising the impact on the production cycle, which operates regularly 365 days a year. Mukki production requirements also needed every single aspect to be perfect and immediately operative right from start-up.


AB
AE Energy

AB ENERGY DEVELOPED THE COMPLETE INTERVENTION SCHEDULE IN COMPLIANCE WITH THE CUSTOMER'S TIME CONSTRAINTS.

Plant delivery timing by AB Energy, which was duly respected, entailed delivery at the Mukki plant with installation to be started in March and completed in June, and subsequently immediately tested. No critical issues were encountered in either phase.
The plant effectively started up in July. A 'full service' maintenance agreement followed with AB Service, a company belonging to the AB Group and dealing with plants maintenance.

CO_2 EMISSIONS REDUCED PER YEAR (1.280 tonnes)

OIL CONSUMPTION AVOIDED PER YEAR (550 tep)

WORKS SCHEDULE

	2008									2009																													
Month	November					December				January					February				March				April				May					June				July					
Week	44	45	46	47	48	49	50	51	52	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Design																																								
Pre-manufacture in the workshop																																								
Construction works																																								
Assembly																																								
Start-up																																								
Continuous operation																																								

PLANT EFFICENCY IN THE WORDS OF THOSE USING IT.

(Eng. Leonardo Moretti, Technical Director Mukki).

Why did you choose cogeneration?
"Our company made the most of the opportunity presented by the construction of the new production plant in 2005 to renew the systems in a focus on design and development choices that would consider the energy aspect, both in terms of savings to be made and a lesser environmental impact. Of the various alternatives available, the cogeneration plant looked to be the best option from all viewpoints: not only did it offer significant savings in costs, but also because its impact in terms of emissions presented great benefits if we take a look at the general energy context. This was the start of the choice to install a cogeneration plant, which would allow us to develop the other plants with all due provisions".

What are the real benefits of a cogeneration plant in the dairy – cheese-making industry?
"The dairy – cheese-making industry features very specific production cycles, using a great deal of heat in various forms (steam, hot water etc.). This is particularly true for the thermal treatments of products and consequent plant washing. Clearly, there is also a high consumption of electricity. The natural consequence of these factors, observed in the spirit of energy integration to optimise consumptions, leads us to evaluate cogeneration as that family of systems that fit perfectly in with this type of productive reality. This is, however, only true where it can allow for a plant size and management that is able to fully exploit the thermal component. Another important aspect is that in the dairy – cheese-making industries, working activities generally take place within a 24-hour timeframe. This too helps manage plants with a certain level of flexibility. In other words, cogeneration is simply perfect for installation in a dairy – cheese-making industry".

How was the decision to entrust AB Energy with plant development, reached?
"In the past, Centrale del Latte has always tried to establish partnership relations with its suppliers that are not therefore limited to the supply of the moment, but which last over time, also involving the aspects of service and capacity to respond to customer needs. At the time of evaluating possible suppliers, after having contacted a great many, AB Energy showed itself to be the only one able to offer us a complete design project from start to finish, in addition to a capillary assistance service that was well-structured and long-term. We have enjoyed great attention to customer needs and a truly professional approach by staff both during plant design and its subsequent development".

How has the cogeneration plant developed by AB Energy integrated into your existing energy dynamics and systems?
"The fact of having to build a new plant has doubtless had its advantages, allowing us to envisage the possibility of a future cogeneration plant installation right from the start. Integration had therefore been considered from the very beginning. As of today, the plant is run according to the methods established during the design stage, without the production context perceiving any difference whatsoever in terms of function. On the contrary, the impact on consumption and energy costs is such as to guarantee a payback compatible with our production scenario. As a company, we have always paid a great deal of attention to the energy market and its developments, and we have therefore also envisaged contracted energy purchase agreements that complement the management of a cogeneration plant, annually holding tenders for the purchase of energy. We pay a great deal of attention to this business cost item".

The plant has only been up and running for a few months, have you already been able to note its efficiency with regards the expected benefits?
"Despite the fact that the plant has only been running for a few months, we have to acknowledge that it complies in full with the declared and expected efficency. And this is true of all aspects: environmental first and foremost where, also following measurements we have taken, we have been able to see that the values of emissions and sound impact fall well below the values declared. In operative and efficency terms too, the first few months of plant use have given extremely positive results that are fully in-line with expectations: we successfully re-use all the thermal energy produced as a by-product, and clearly the electrical energy too, thereby obtaining significant benefits that translated into a reduction of consumptions, emissions and business costs".

What are your expectations for the maintenance service in such a complex plant?
"Given the complex nature of the plant and the professionalism required for its maintenance, we needed a maintenance service that did not significantly impact our workforce. We needed an all-inclusive service that would oblige the supplier to guarantee the declared efficency and to provide territorial representation in order to ensure a rapid response where required. All these criteria have been guaranteed contractually and we have to say that up until now, the assistance supplied has always been well up to standard".

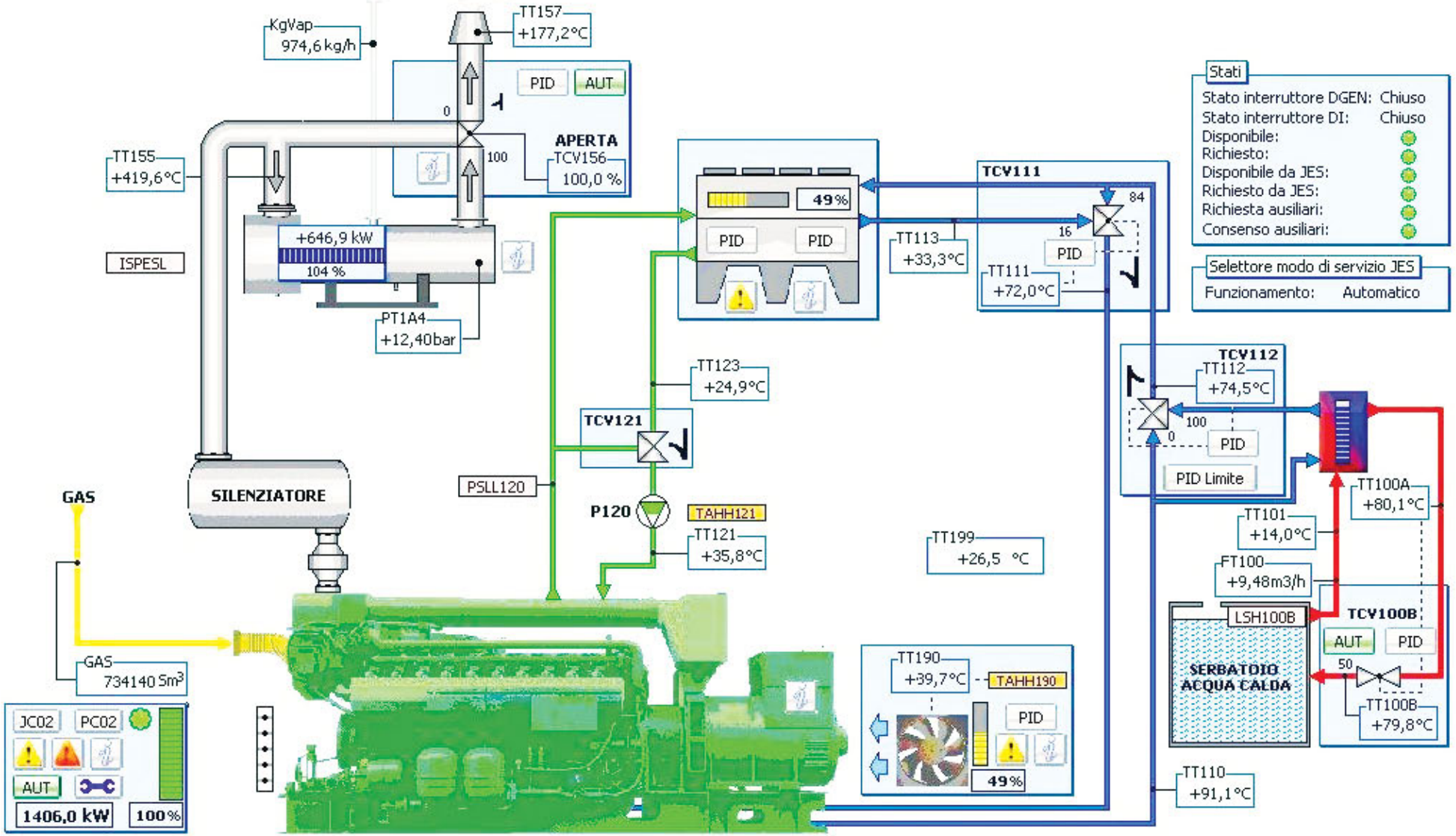
AB GROUP PROFILE.

Founded and run by Angelo Baronchelli, the AB Industrial Group has been operating for more than 30 years in the cogeneration and in the energy valorisation of renewable sources sector.
Today, AB Group has 8 operational companies and over 250 staff.
The leadership position in the Italian market has favoured the growth, at international level also.
The Group has designed and realised over 250 "keys in hand" cogeneration systems. The AB systems are characterised by the high efficencys, the modularity, the compactness and the easy transport: peculiarities that fully satisfy the energy requirements of the different companies.
AB has also widened the range of products with the BIO line, studied to add value to biogas energy.
AB Group turns to its customers like the only interlocutor responsible of the realisation of the entire system.
Through its companies, the Group makes all the necessary technical know-how available for the designing, the realisation, the installation and the management of the systems, developing the entire project, the construction, the start-up and completing the offer with a service able to guarantee maintenance of the systems for their entire life-span.
AB installed the first branches in Spain at the beginning of 2007 and in Romania in February 2009. This strategy now sees the widening of its horizons with specific focus on the European nations, distinguished by the excellence of the MADE IN ITALY.

Cogeneration has resulted a winning choice in other sectors also, industrial and not:
food, chemical-pharmaceutical, textile, plastic, paper, bricks, etc.

Those who have chosen AB Energy:
Amadori, Assolac, Buitoni, Cooperativa La Speranza, Cotonificio Albini, Fatro, Felli Color, Gruppo Cremonini, Lafarge, Martini & Rossi, Nestlè, Olimpias Benetton, Pastificio Ferrara, Pastificio Rummo, Pfizer, Polynt, Wienerberger, etc.

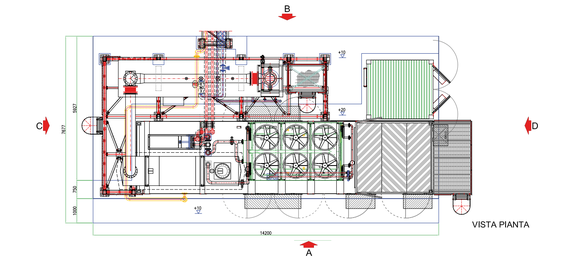
MONITORING SYSTEM

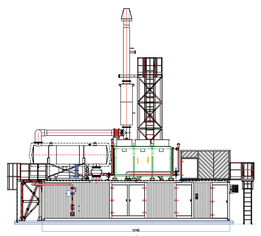


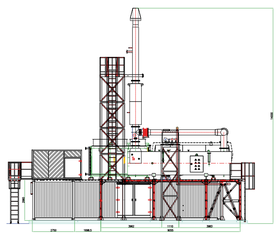
AB ENERGY, LEADING ENERGY

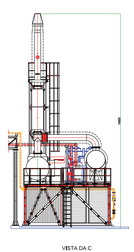
AB Energy

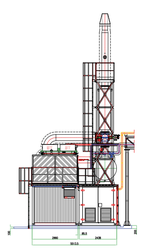
www.gruppoab.it - tel. +39 0309945011



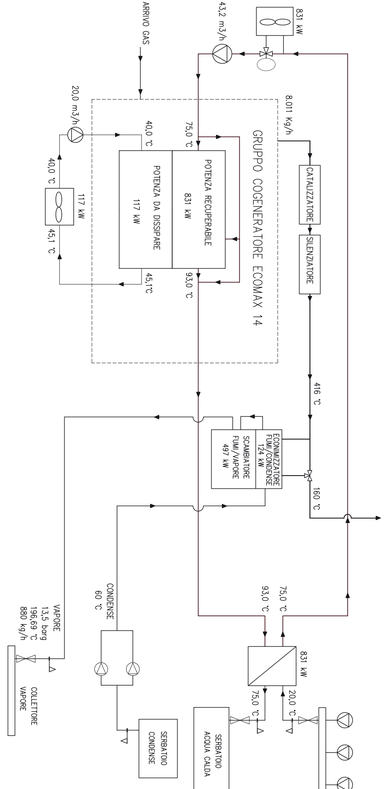




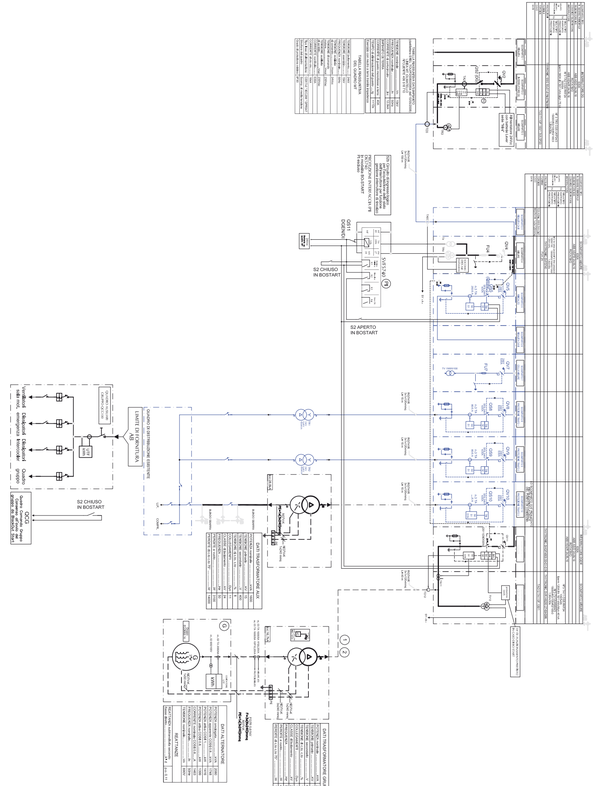




ECOMAX 14 NGS SYSTEM LAYOUT



ECOMAX 14 NGS FUNCTIONAL SCHEME



ECOMAX 14 NGS SINGLE LINE DIAGRAM