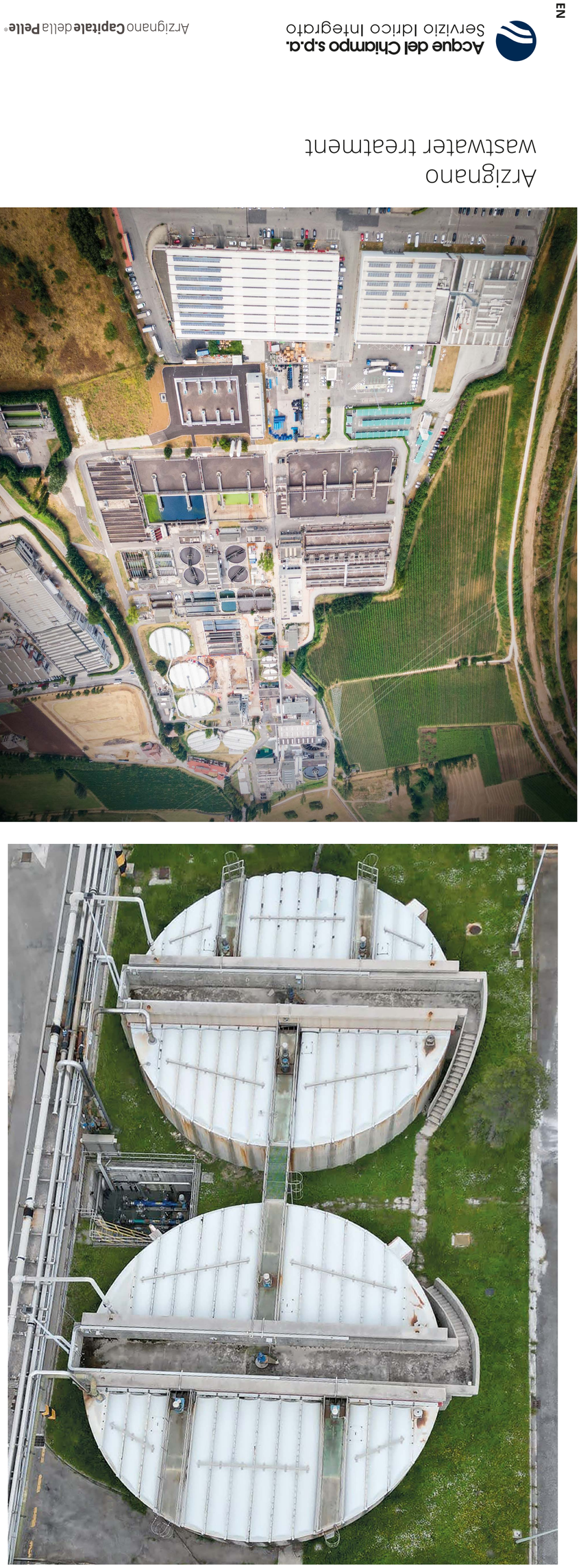
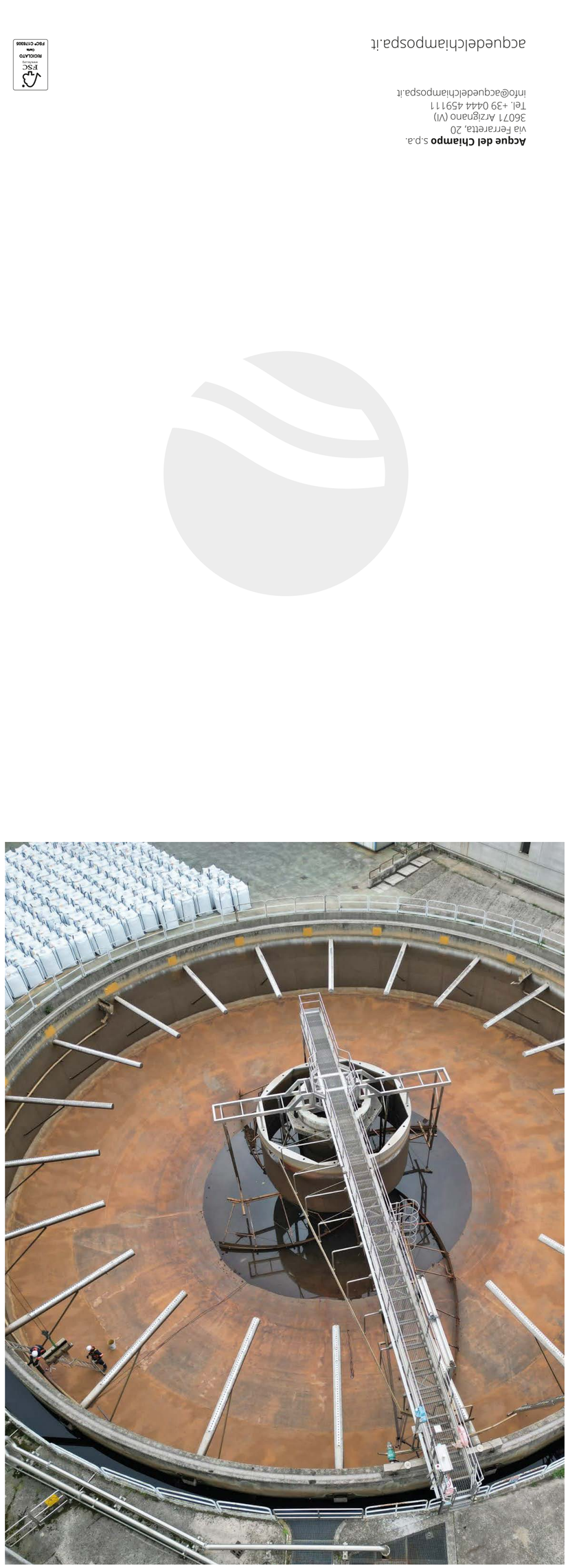




The industrial sewerage system connected to the Arzignano purification plant was built between 1976 and 1978; the collector network, approximately 40 kilometres long, is made of polyethylene, a material that is excellently resistant to the aggressive chemical substances contained in the industrial wastewater and guarantees a perfect hydraulic seal.
Tanneries are almost exclusively connected to the industrial sewage system: discharges are monitored continuously, detecting their quality and quantity. This network is subject to specific maintenance annually with the cleaning of the manifolds and discharged products.

Sewage from approximately 130 companies connected through the industrial sewer, and sewage from 7 of the 10 municipalities in the valley, come through two separate purification lines in the plant. The industrial line, with a 1.6 million population equivalent (PE) capacity, purifies sewage through treatment phases that include homogenisation, primary sedimentation, an intense biological treatment of oxidation-nitrification and denitrification, activated sludge separation by dissolved air flotation, and the final tertiary treatment and clariflocculation phase. The sludge resulting from the purification process undergoes a series of accumulation-thickening, mechanical dehydration, and thermal drying treatments, before being disposed of, once packaged into big-bags, in a controlled landfill.
Methane-fuelled cogeneration engines produce part of the electricity needed to power the machinery essential to operate the purification process. Over 50 people, including operators and technicians, run the plant on a continuous cycle every day of the year.

Acque del Chiampo has adopted far-sighted strategies over time: the industrial sewage system using materials resistant to the aggressiveness of the effluent, the odour treatment with reduced impact on the purified water leading to the formation of a by-product suitable for use in agriculture and industry, the separation of activated sludge by means of flotation, and the large biological plant.
The new tertiary ozone treatment section, improves the quality of purified water, the reuse of water discharged from the municipal line, to reduce groundwater withdrawal, and the construction of a new homogenisation tank, for further operational flexibility.
Future challenges focus on reducing the environmental impact of the tanning production cycle resulting in a positive impact also on the purification process, leading to a reduction in energy consumption and sludge produced.

1,600,000
population equivalent

130
industrial users served

30,000 m³/d industrial
15,000 m³/d municipal
flow rate treated per day

155,000 m²
plant surface area

4,800 kWh
generable energy

~ 9,000 kW
engaged power

Acque del Chiampo is the all-public operator for the integrated water service in the territories of its ten member municipalities: Arzignano, Montecchio Maggiore, Lonigo, Chiampo, Brendola, Montorso Vicentino, Altissimo, San Pietro Mussolino, Crespadoro and Nogarole Vicentino.

Headquartered in Arzignano, it serves, with 190 employees, a population of around 93,000 people over 230 km² of territory.

The industrial purification activity of the Arzignano plant is particularly important treating, with those of Montecchio Maggiore and Lonigo, 20 mln cubic metres of industrial and civil wastewater per year, which flows into the final collector managed by Arica Consortium for the Veneto Region.

Acque del Chiampo always dedicates growing attention to innovation, experimentation and issues related to environmental and health protection. Following the instructions of its member municipalities, and those of Arzignano and Chiampo, most affected by tanning activities, it has developed a plan for the ongoing improvement of the purification cycle aimed at achieving sustainable development objectives, through a continuous innovation based on research and on the implementation of the best technologies and experimentation.

Acque del Chiampo s.p.a.
via Ferraretta, 20
36071 Arzignano (VI)
Tel. +39 0444 459111
info@acquedelchiampospa.it

acquedelchiampospa.it

FSC
RICICLATO
Carta
FSC® C178006

Acque del Chiampo s.p.a.
Servizio Idrico Integrato

EN

Arzignano wastwater treatment

Arzignano **Capitale** della **Pelle**®

Acque del Chiampo s.p.a.
Servizio Idrico Integrato

Arzignano
wastewater treatment

1

Screening

Removal of coarse material using 2 automatic sub-vertical self-cleaning belt grids - width 2 m, spacing 6 mm - compaction of removed material.

2

Grit removal

Separation of grit in circular "track" type units with collection at the bottom and extraction via air-lift and then separation in grit classifiers.

3

Homogenisation

Wastewater equalisation before the next treatments. A total of 5 covered circular tanks with a diameter of 44 m and a volume of 7000 m^3 and 1 tank with a diameter of 40 m and a volume of 6000 m^3, all with rake arms on the bottom and odorous gas extraction.

4

Odour treatment

Malodorous gases containing sulphide acid extracted from homogenisation, screening, sewage treatment channel at primary sedimentation tanks, thickeners and liquid sludge reactors are treated in a section consisting of 2 fluidised bed columns where sulphur is obtained from the elimination of sulphide acid by means of LO-CAT©, a catalytic process. Gases are then further treated in a biofilter. Sulphur is separated from the solution by filtration.

5

Primary sedimentation

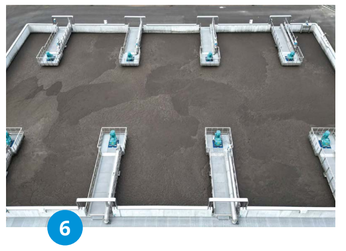
Separation of most of the sludge contained in the effluent takes place in 6 rectangular tanks with a total volume of 5760 m^3 equipped with rakes. The primary sludge extracted is then sent to the thickeners, and the clarified sludge proceeds to biological treatment.

Ozonisation

Advanced oxidation treatment using ozone for waste discoloration, disinfection, and water quality improvement.

8

Plant in operation 24 hours a day every day of the year



6

Pre-denitrification, biological oxidation/ nitrification

Biological treatment is carried out with the removal of carbon and nitrogen by means of aerobic microorganisms in the 2 separate biological lines totalling 130,000 m^3. The mixture, aerated at pre-denitrification, is circulated by augers in line 1 and submersible pumps in line 2. The concentration of dissolved oxygen, ammonia and nitric nitrogen are monitored continuously.

7

Flotation

Separation of the activated sludge from the purified liquid takes place in the subsequent pressurised dissolved air flotation phase subject to the addition of an organic flocculant agent (polyelectrolyte). There are 4 circular tanks, each with a diameter of 20.8 m and a total surface area of 1330 m^2, of a volume of approx. 3500 m^3, each tank is equipped with 2 sludge collection spoons and rakes.

Clariflocculation

A tertiary treatment that improves, with the addition of coagulants and flocculants, the quality of purified water at discharge by separating colloidal substances, further reducing chrome and residual phosphorous. Final treatment takes place in the two clariflocculation tanks with a diameter of 36 m, a surface area of 1000 m^2, and a volume of approximately 5000 m^3 each.

Sludge thickening

Accumulation and homogenisation of primary and biological sludge in two tanks of 1000 m^3 each equipped with mixers and rake arms.

9

10

11

Sludge dewatering

The process is carried out mechanically using four filter presses as required: Specifically, two lines with 90 1500 x 1500 mm plates, each with a nominal capacity of 20 solid tonnes/day, and two lines of filter presses each with 90 2000 x 2000 mm plates, each with a nominal capacity of 34 solid tonnes/day. There are also two lines equipped with centrifugal decanters, each having a nominal capacity of 24 solid tonnes/day.

Sludge storage silos

The semi-solid sludge obtained from the dewatering machines is sent, by means of screw conveyors, to two vertical storage silos with a volume of approximately 100 m^3 each, and then taken to feed the sludge thermal drying section.

Sludge drying

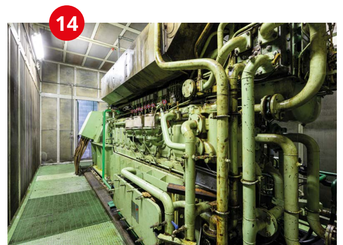
The section consists of four lines, two of the direct-heated hot-air type with an evaporating capacity of 4 tons of water/h each and two of the thin-film type with diathermic oil heated by methane boilers with an evaporating capacity of 2.6 tons of water/h each.

12

13

Cogeneration

The sludge drying plant is combined with a cogeneration plant, consisting of four gas engines with a capacity of 1305 kWe each that produce electricity through the combustion of methane gas. This electricity is used to operate the purification plant equipment, while the heat from the cooling water and combusted gases is recovered to pre-heat the air needed to dry the sludge



14

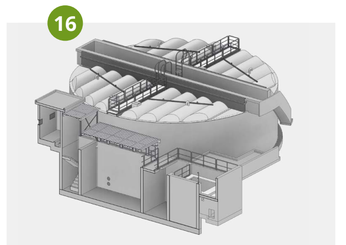
Municipal line

Consists of two identical screening/grit removal sections, capable of handling an inflow of 1300 m^3/h each. When raining heavily, the flow exceeding the first 5 mm of rainfall is collected in 3 rain tanks with a volume of 800 m^3 each. The pre-treated sewage is then sent to the biological oxidation/nitrification/denitrification section having a total volume of 5600 m^3 and, finally, to the sedimentation section that has two tanks of a volume of 1100 m^3 each to separate the activated sludge from the purified water by gravity.

15

Re-use of treated municipal water

Filtration and disinfection of water from the municipal line for industrial re-use by the plant.



16

Landfill

The sludge produced by the treatment plant is sent to the landfill. The dried sludge is placed in big polypropylene bags with a volume of about 1.5 m^3 to facilitate transport and dust and odour containment.
Acque del Chiampo has 9 landfills of which 2 operating.

17