RENOVIS

RATIONAL ENERGY SOLUTIONS

Portfolio

CASE 1: glass industry

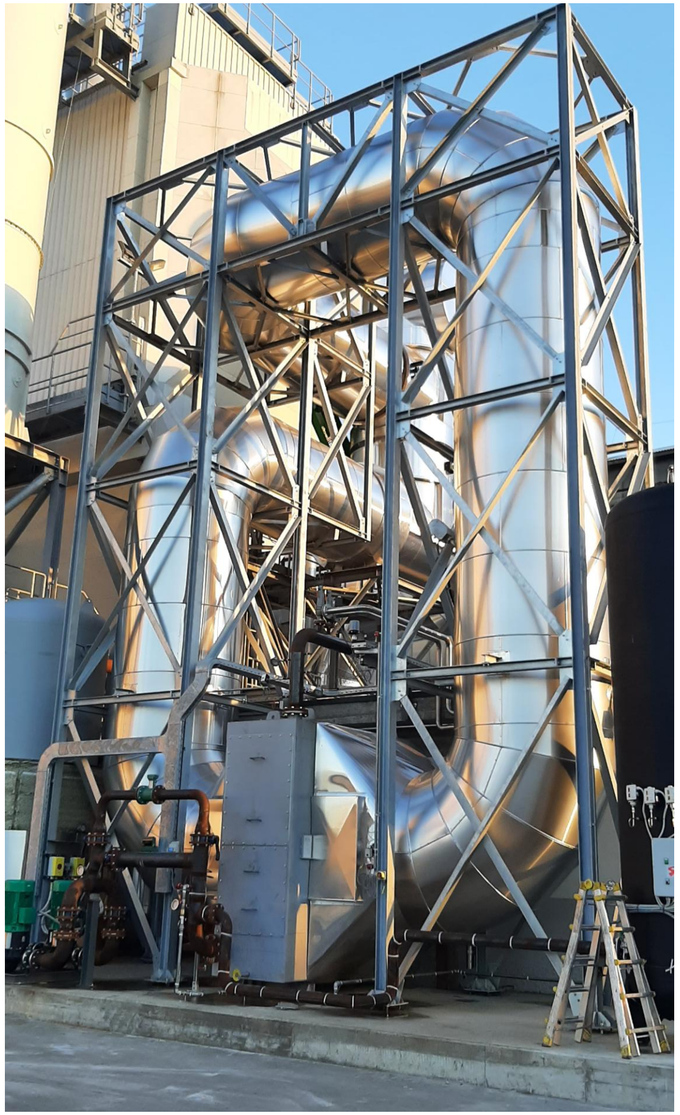
Challenge: A multinational leader in glass bottle production faced the challenge of reducing its environmental impact by finding a sustainable use for waste heat from its glass melting processes, which previously had no purpose.

Approach: Renovis designed and implemented a complete solution by connecting the customer's Corsico plant to the local district heating network. The project included installing a 3,500 kW heat recovery system to capture energy from flue gases, producing superheated water at 110°C, and linking it to the network managed by ATECC and ENGIE.

Outcomes:

- The new plant now meets almost the entire thermal energy demand of Corsico's district heating network, serving 30 buildings.
- Replaced natural gas combustion with recovered thermal energy, significantly reducing carbon emissions.
- Avoided approximately 2,870 tons of CO_2 emissions annually, contributing to a more sustainable and efficient heating system for the Corsico community.

CASE 1: glass industry



CASE 1: glass industry

CASE 2: paper industry

Challenge: A major tissue multinational aimed to significantly reduce energy costs and environmental impact at its Italian facility. The challenge was to find a sustainable way to repurpose the high-temperature flue gases from its 17 MWe gas turbine, which were previously wasted.

Approach: Renovis implemented a high-efficiency heat recovery system that:

- Hot water for seasonal microclimate: Supplies hot water at 90–95°C for facility heating during winter.
- Make-up water pre-heating: Preheats water used in the gas turbine's heat recovery steam generator (HRSG).
- Chiller water for turbine inlet air pre-cooling: Powers a 2,400 kWth absorption chiller (1,900 kW cooling) to cool the turbine intake air, boosting turbine efficiency during summer.

The system captures 5.5 MW of thermal energy from 170°C exhaust gases, producing 237,000 liters/hour of hot water and includes buffer tanks to optimize thermal storage and distribution.

CASE 2: paper industry

Outcomes:

Seasonal microclimate heating

- Natural gas savings: 1,960,800 Sm^3/year.CO_2
- Emissions avoided: 3,674 tons/year.

Make-up water pre-heating

- Natural gas savings: 404,000 Sm^3/year.CO_2
- Emissions avoided: 751 tons/year.

Chiller for turbine inlet air pre-cooling

- CO_2 emissions avoided: 1,095 tons/year.
- Additional electricity produced: 4,700,000 kWh/year due to improved turbine efficiency.

This intervention provides year-round benefits, including cost-free heating in winter, enhanced cooling efficiency in summer, increased electrical output, and a total CO_2 reduction of 5,520 tons/year. It stands as a model of sustainable energy use and industrial efficiency

CASE 2: paper industry

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CASE 3: bakery industry

Challenge: A leading multinational in the bakery sector aimed to reduce energy costs and environmental impact by recovering waste heat from its baking ovens, which previously dissipated through 40 individual chimneys.

Approach: Renovis designed and implemented a dual-stage heat recovery system:

- First stage: Recovers thermal energy to increase the temperature of superheated water from 115°C to 130°C. This water is then used for various process needs, including:
  - Heating oil silos.
  - Heating thermal oil.
  - Producing hot water for sanitation, washing, and heating.
- Second stage: Heats thermal water to 70°C to support the microclimate needs of production areas during winter.

The recovered heat is reintegrated into the facility's thermal circuit, replacing the need for natural gas-fired boilers. Additionally, a monitoring system was installed to track and verify energy savings over time.

CASE 3: bakery industry

Outcomes:

- Thermal energy savings: 5,044,000 kWh/year.
- Primary energy savings: 484 TOE/year.
- Natural gas savings: 578,560 Sm^3/year.
- CO_2 emissions avoided: 1,128 tons/year.
- Payback period: ~18 months.

This intervention delivers cost-free process heating and winter climate control while significantly reducing natural gas consumption and emissions. It highlights Renovis' ability to implement tailored, high-impact energy efficiency solutions for the food and beverage sector.

CASE 3: bakery industry

CASE 3: bakery industry

CASE 4: aluminum industry

Challenge: An aluminum foundry sought to improve energy efficiency and reduce natural gas consumption in its aluminum scrap treatment process. Previously, all thermal energy required for pre-treatment and melting was generated through natural gas combustion.

Approach: Renovis implemented a heat recovery system to optimize the foundry's thermal processes:

- Recovery of high-temperature flue gas energy from a post-combustor.
- Reuse of the recovered energy to:
  - **Preheat combustion air** for the burners serving the post-combustor, improving burner efficiency.
  - **Inject preheated air** into the drying drum, where aluminum scrap undergoes pyrolysis prior to melting.
- Installation of a monitoring system to track post-intervention energy savings and ensure ongoing optimization.

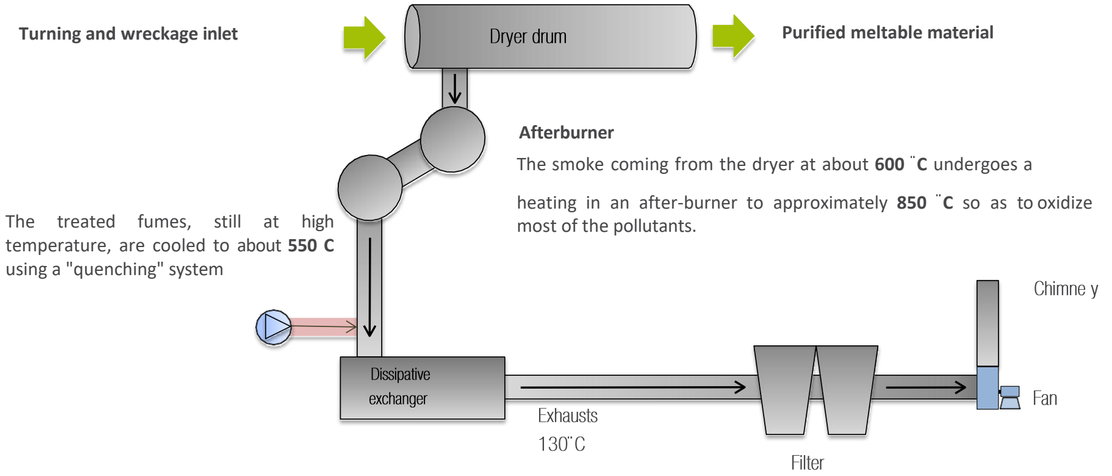
CASE 4: aluminum industry

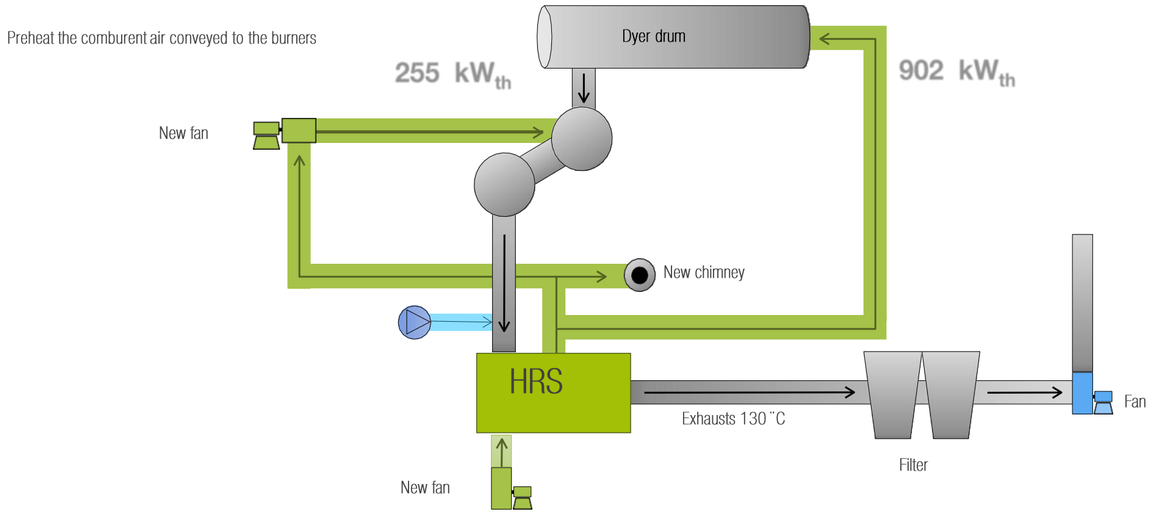
Outcomes:

- Thermal energy savings: 7,752,000 kWh/year.
- Primary energy savings: 795 TOE/year.
- Natural gas savings: 950,000 Sm^3/year.
- CO_2 emissions avoided: 1,852 tons/year.
- Payback period: ~12 months.

This solution significantly reduces energy costs and emissions while enhancing the efficiency of aluminum scrap processing, demonstrating Renovis' expertise in delivering tailored energy efficiency solutions for the industrial sector.

CASE 4: aluminum industry





CASE 5: textile industry

Challenge: The textile industry relies on electricity for machinery operation and steam and hot water at various temperatures for critical processes such as washing and dyeing. A leading Italian silk-textile manufacturer sought a solution to reduce energy costs and environmental impact while maintaining high process efficiency.

Approach: Renovis designed and implemented a 500 kW cogeneration system fueled by natural gas, producing electricity, steam, and hot water. Key features of the system include:

- Electricity production: A high-efficiency engine generates 500 kW of electrical power, meeting the facility's needs.
- Thermal recovery:
  - Steam production: 330 kg/h (226 kW), used for process requirements.
  - Hot water production: 475 kW from exhaust gases and engine cooling, used for washing and dyeing operations.
- Advanced environmental features, including:
  - A NOx reduction system to minimize emissions and comply with stringent regulations.
  - Continuous monitoring of physical and chemical parameters to optimize efficiency and emissions control.

CASE 5: textile industry

Outcomes:

- Electricity produced: 2,833,920 kWh/year.
- Thermal energy recovered: 701 kW (steam and hot water).
- CO_2 emissions avoided: 690 tons/year.
- High efficiency: Meets stringent CAR standards, maximizing resource utilization.

This solution exemplifies modern cogeneration technology, delivering cost and energy savings while reducing environmental impact, and highlights the potential for smaller-scale installations to achieve high efficiency and sustainability in industrial applications.

CASE 5: textile industry

CASE 5: textile industry

Renovis S.R.L.

Via Novara, 33

28010 Vaprio d’Agogna (NO), Italy T +39

0321 966707

info@renovis.net

www.renovisenergy.com