



# The Turin waste-to-energy plant

# A sustainable plant serving the local communities

The TRM Iren Group waste-to-energy plant treats non-recyclable waste, transforming it into electricity and heat, contributing to the reduction of fossil fuels and therefore to environmental protection.

The plant uses proven technologies: it consists of three independent lines, equipped with advanced technological systems and continuous emission monitoring, remotely supervised by ARPA Piemonte.

Built between 2010 and 2013 and operational since 2014, it is located in Turin, in the Gerbido area, bordering with the municipalities of Beinasco, Grugliasco, Orbassano, Rivalta and Rivoli.

Managed according to environmental sustainability criteria and with ongoing improvement of environmental performance, it is certified to EMAS, ISO 14001, ISO 9001 and ISO 45001 standards, guaranteeing quality, safety and sustainability.

Since 2013, the Metropolitan City of Turin has launched the SPoTT Project, a health surveillance plan on the health of the population living near the Waste-to-Energy Plant (<https://www.spott.dors.it/>).

## Production data \*

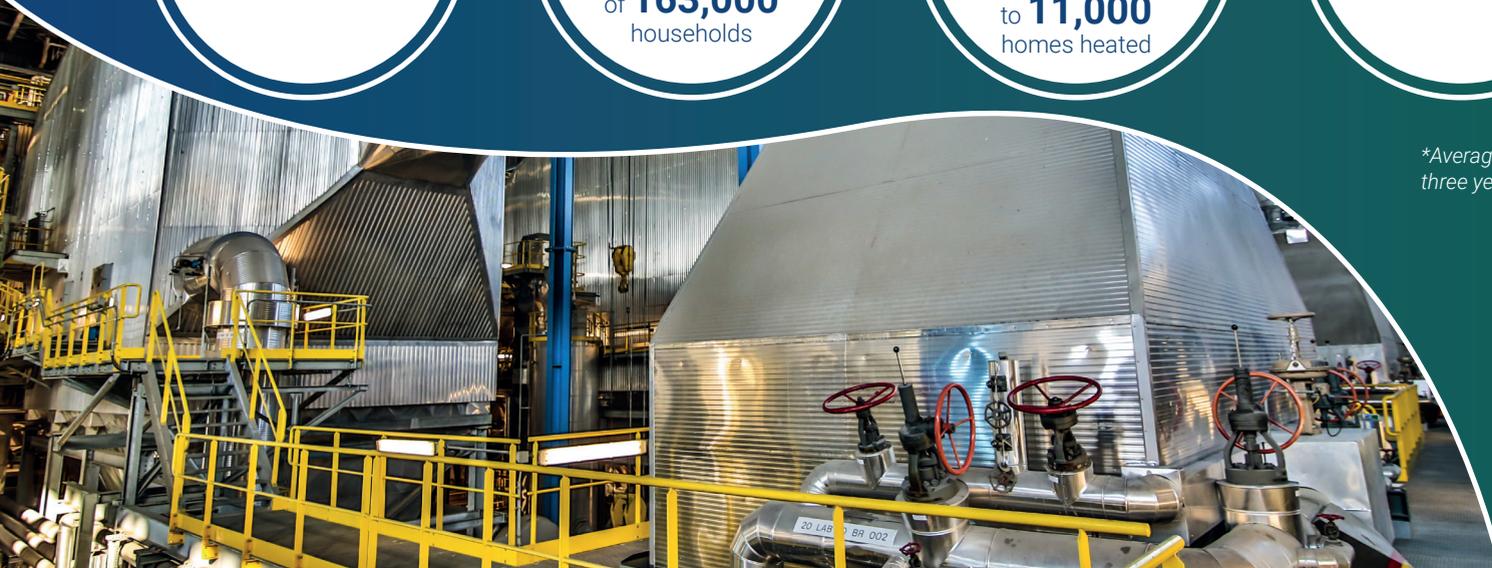
**584,000 tonnes**  
of waste treated

**325,000 MWh**  
of electric energy  
distributed over the grid.  
Equivalent to the needs  
of **163,000**  
households

**150,000 MWh**  
of heat for district  
heating.  
Equivalent  
to **11,000**  
homes heated

**74,000 TOE**  
of fossil  
fuel saved

*\*Average over the last three years*



# The waste-to-energy process

## CONTROL AND DELIVERY:

the vehicles transporting waste first pass through the radioactivity monitoring portal; then, they are weighed before entering the pre-bunker area where the waste is discharged into the bunker.

## COMBUSTION:

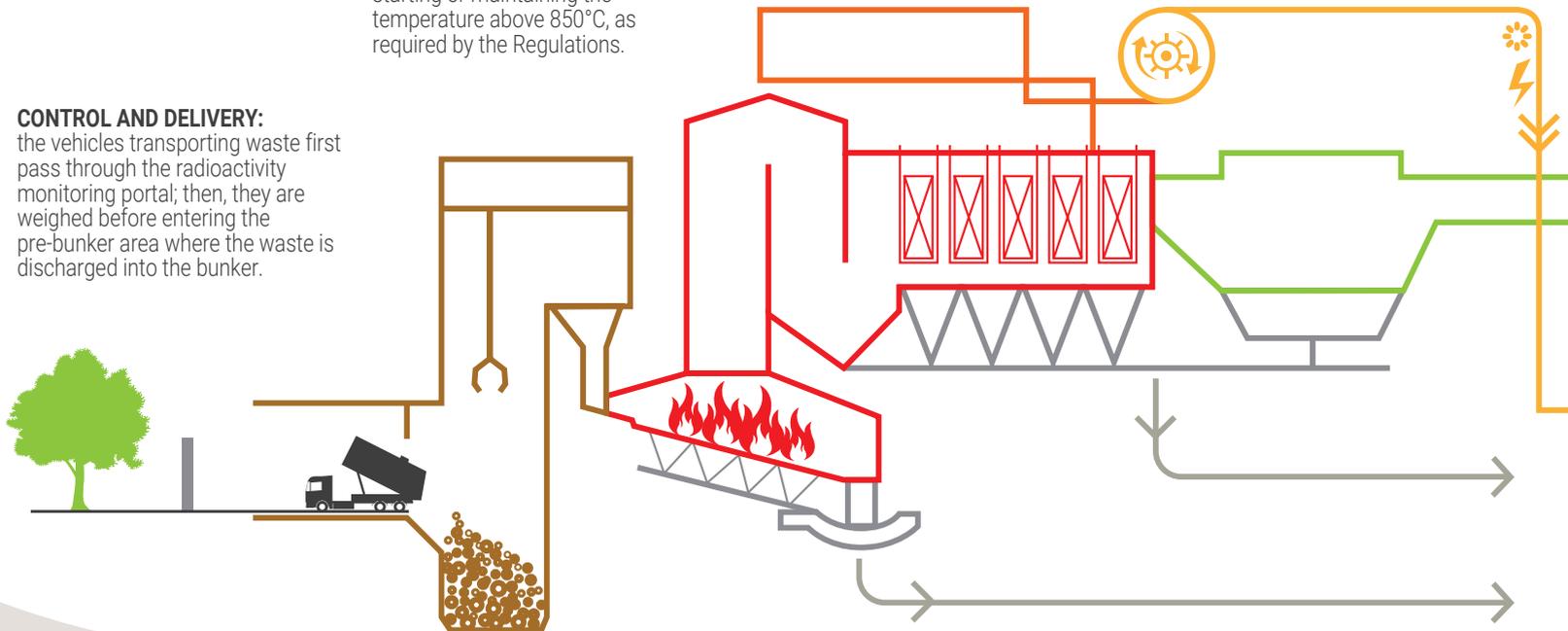
on the grates, the waste burns by spontaneous combustion at about 1,000°C; natural gas is only used for starting or maintaining the temperature above 850°C, as required by the Regulations.

## STEAM PRODUCTION:

the flue gas, generated by combustion, pass through the boiler located above each grate. The water circulating in the boiler's heat exchanger coils is heated by the flue gas and turns into steam.

## ENERGY RECOVERY:

the steam, produced in the boilers, powers the turbine that generates electricity; a portion of the steam heats the water that goes into the district heating network.



## FLUE GAS TREATMENT:

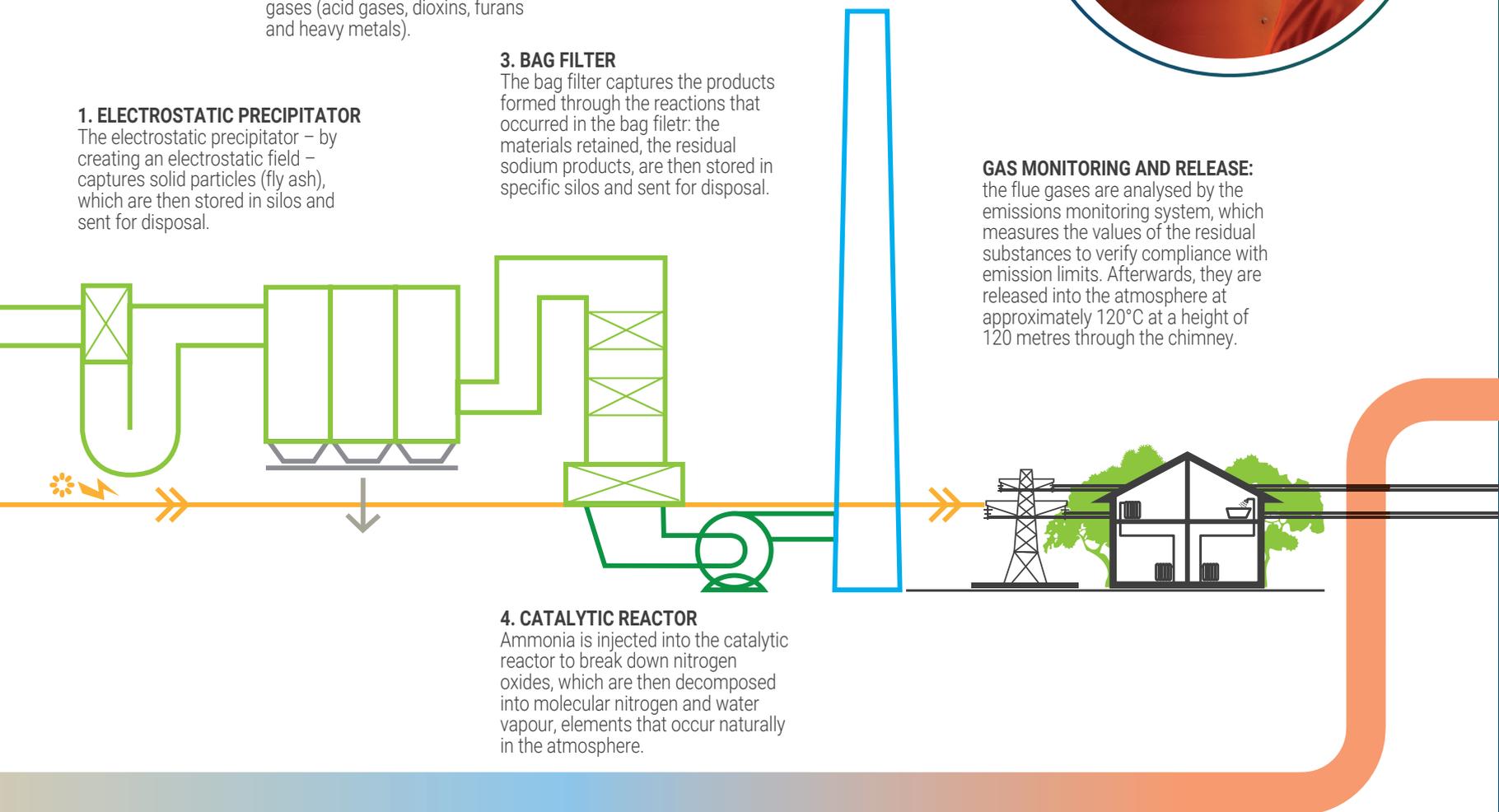
The combustion flue gas, exiting the boiler at about 200°C, are purified following a four-stage process:

- 1. ELECTROSTATIC PRECIPITATOR**  
The electrostatic precipitator – by creating an electrostatic field – captures solid particles (fly ash), which are then stored in silos and sent for disposal.
- 2. DRY REACTOR**  
Sodium bicarbonate and activated carbon are introduced into the dry reactor, where they react with the substances still remaining in the flue gases (acid gases, dioxins, furans and heavy metals).

- 3. BAG FILTER**  
The bag filter captures the products formed through the reactions that occurred in the bag filter: the materials retained, the residual sodium products, are then stored in specific silos and sent for disposal.

- 4. CATALYTIC REACTOR**  
Ammonia is injected into the catalytic reactor to break down nitrogen oxides, which are then decomposed into molecular nitrogen and water vapour, elements that occur naturally in the atmosphere.

**GAS MONITORING AND RELEASE:**  
the flue gases are analysed by the emissions monitoring system, which measures the values of the residual substances to verify compliance with emission limits. Afterwards, they are released into the atmosphere at approximately 120°C at a height of 120 metres through the chimney.



## RESIDUAL WASTE MANAGEMENT: THE WASTE-TO-ENERGY PROCESS GENERATES RESIDUAL WASTE.

**Bottom ash** (or slag) is the non-combustible part of the waste. After falling from the grate, it is cooled and deposited in a bunker via conveyor belts, after separating any ferrous materials, which are also recycled. Bottom ash accounts for about 20% of the incoming waste and is not hazardous. It is treated by specialised companies that process it to be re-used as building material.

**The fly ash** – approximately 2% by weight of the initial waste – comes from the selection of the electrostatic precipitator while the residual sodium products (about 1.5%) is retained by the bag filter: both are hazardous and – once stored in silos – are transported to authorised plants for treatment, inerted and then sent for recovery or disposal.

# A total and constant control

Emissions are checked at all stages of the process: in the boiler, during the purification phase, as well as in the chimney, where compliance with emission limits is verified. Most of the parameters imposed by the Integrated Environmental Authorisation (IEA) are stricter than those provided by national regulation (Legislative Decree 152/06). As established by the Regulation, some parameters are monitored continuously, while others are subject to periodic sampling. ARPA Piemonte has real-time access to the data, ensuring maximum protection for the environment and the health of local communities.

The limits set by the IEA and average values in the last three-year period for each parameter monitored are reported in the tables.

## Continuously monitored parameters *(average data for the last three years)*

Parameters	Unit of measurement	Values authorised by the IEA	Line 1	Line 2	Line 3
Particulates	mg/Nm <sup>3</sup>	5	0.06	0.01	0.01
Hydrochloric acid (HCL)	mg/Nm <sup>3</sup>	5	1.70	1.48	1.43
Hydrofluoric acid (HF)	mg/Nm <sup>3</sup>	0.5	0.05	0.05	0.06
Sulphur oxides (SO <sub>2</sub> )	mg/Nm <sup>3</sup>	10	1.81	1.91	1.33
Nitrogen oxides (NOx)	mg/Nm <sup>3</sup>	70	43.56	42.66	46.38
Total organic carbon (TOC)	mg/Nm <sup>3</sup>	10	0.54	0.23	0.20
Carbon Monoxide (CO)	mg/Nm <sup>3</sup>	50	6.47	5.82	6.96
Ammonia (NH <sub>3</sub> )	mg/Nm <sup>3</sup>	5	1.37	1.12	1.56
Mercury (Hg)	mg/Nm <sup>3</sup>	0.02	0.0002	0.0002	0.0004

## Parameters monitored with periodic samples *(average data for the last three years)*

Parameters	Unit of measurement	Values authorised by the IEA	Line 1	Line 2	Line 3
Polycyclic Aromatic Hydrocarbons (IPA)	mg/Nm <sup>3</sup>	0.005	0.00003	0.00003	0.00003
Dioxins and Furans (PCDD + PCDF)	ngTEQ/Nm <sup>3</sup>	0.05	0.0022	0.0035	0.0026
Polychlorinated biphenyls - Dioxin like (PCB - DL)	ngTEQ/Nm <sup>3</sup>	0.05	0.0010	0.0012	0.0010
Cadmium and Thallium (Cd+Tl)	mg/Nm <sup>3</sup>	0.02	0.0020	0.0020	0.0020
Zinc (Zn)	mg/Nm <sup>3</sup>	0.5	0.1430	0.0739	0.0793
Heavy metals (Sb+As+Pb+Cr+Co+Cu+Mn+Ni+V+Sn)	mg/Nm <sup>3</sup>	0.3	0.0456	0.0373	0.0372

# A plant integrated in the local area

Designed to fit harmoniously with its surroundings starting with its aesthetic features, the plant has a visitor path and spaces dedicated to the community. In recent years, it has hosted cultural events and public activities, transforming an industrial site into a place experienced by the local community, in the spirit of transparency and dialogue with stakeholders.



[www.trm.to.it/en.html](http://www.trm.to.it/en.html)