Clean Air Solutions

For a better Health, Life, Environment and Energy efficiency

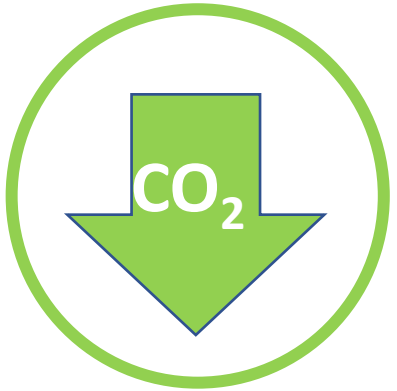


VOC abatement systems

VOC abatement systems with catalytic oxidation reaction

- Reduced energy consumption
- Very limited CO_2 emissions
- No harmful by-products such as NOx and CO





genano

Genano VOC abatement systems

- Fully automatic operation
  - Automatically adapts to varying flow rates and VOC concentration
  - Remote control

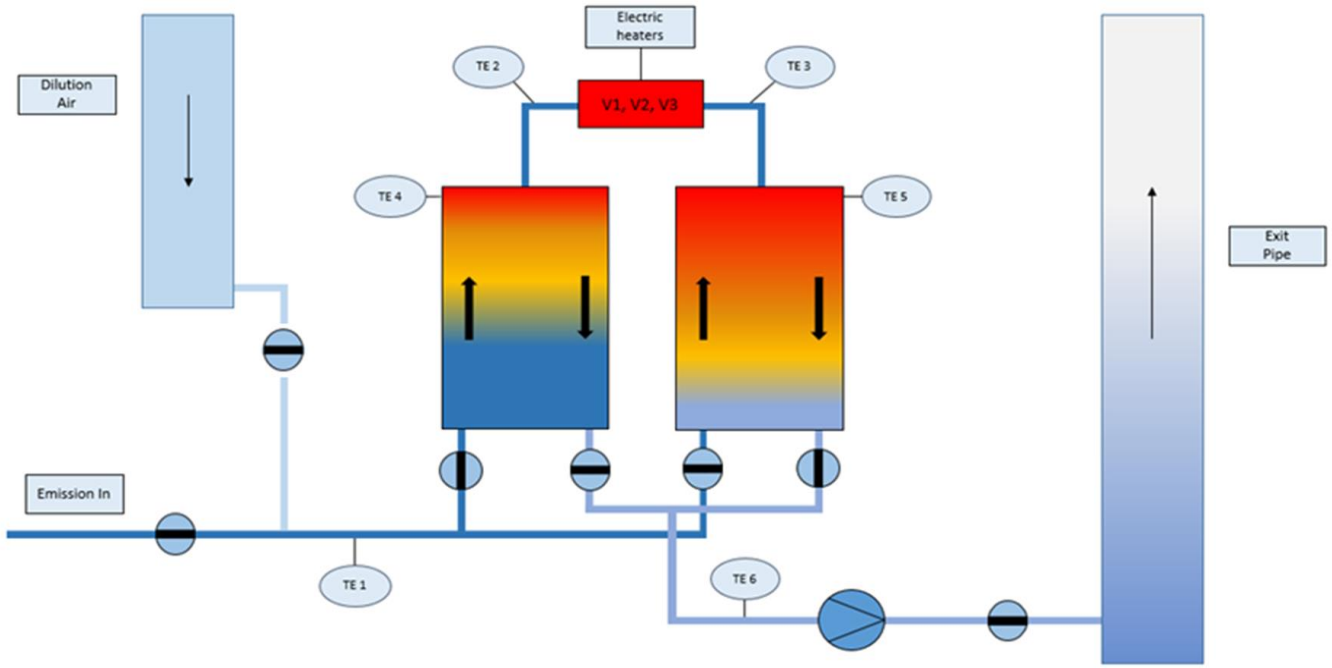
- Low operation cost
  - Very small need for extra heating energy due to highly efficient regenerative heat exchangers (up to 95%)
  - Minor need for maintenance

- Compact size
  - Easy transportation
  - Easy installation
  - Easy maintenance

genano

Genano VOC abatement systems

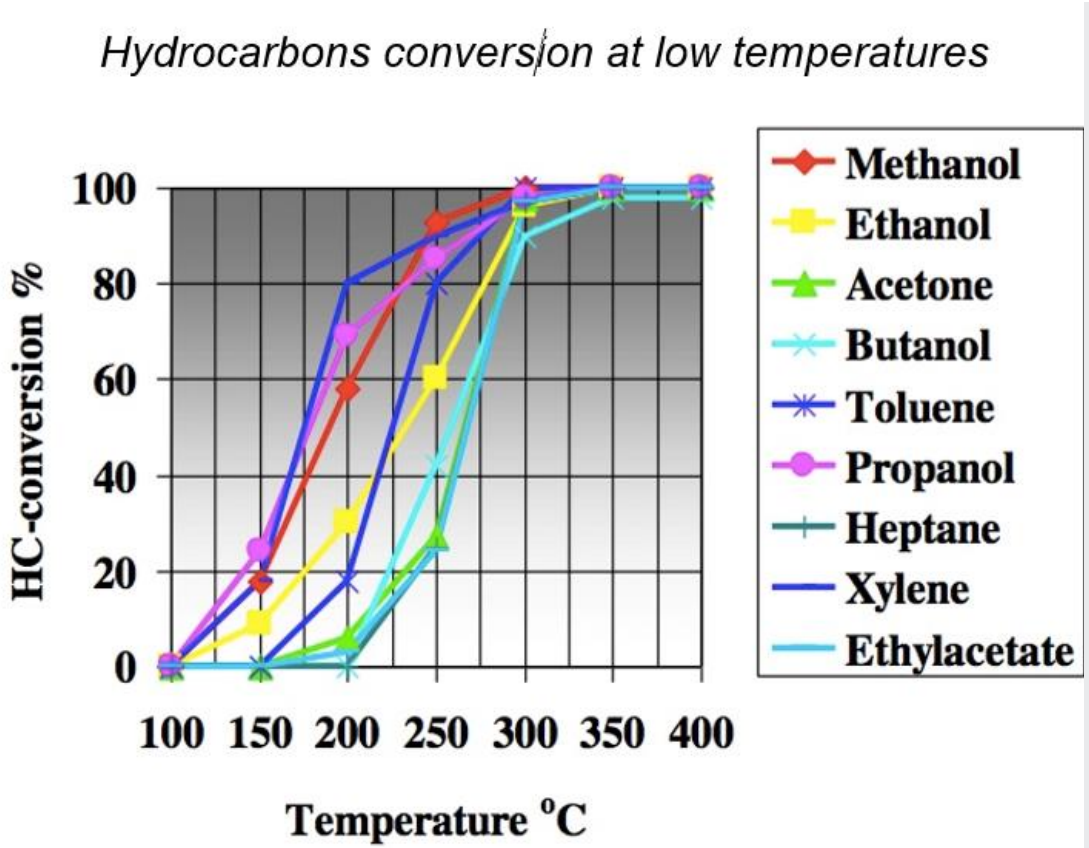
- VOC emission reduction from:
  - Painting lines
  - Printing processes
  - Plastic and rubber manufacturing process
  - Iron casting
  - Chemical industry
  - And many more…

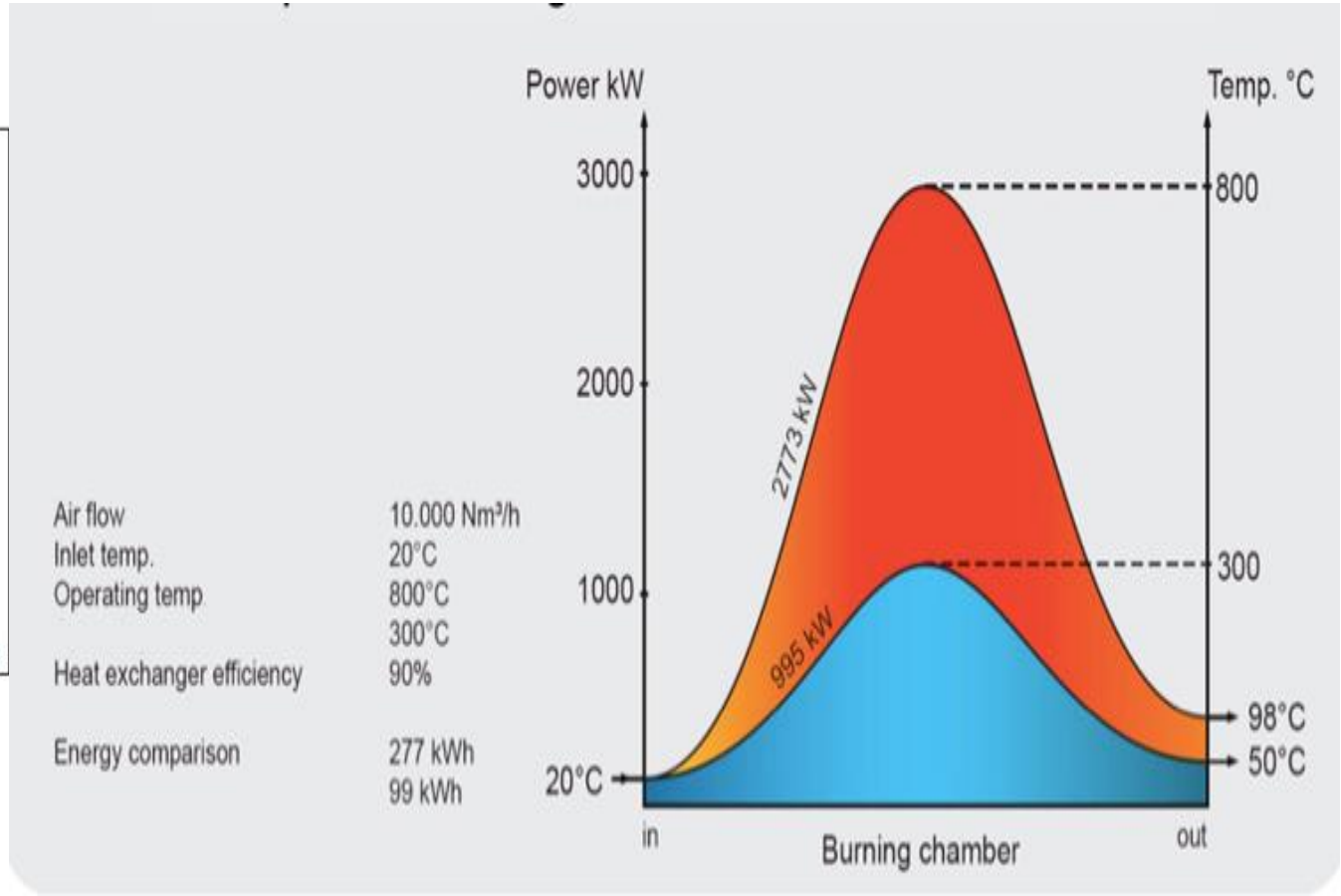


- Highly efficient with low VOC concentrations
  - 0,3 – 3 g/Nm^3
  - Can cope also higher VOC peaks

genano

Regenerative catalytic combustion method, which is called "regenerative catalytic oxidation"





Catalytic oxidation

- ✓ Saving energy
- ✓ Minimizing CO_2 emission
- ✓ No secondary pollutants such as NOx and CO
- ✓ Quick start up time
- ✓ Generally more compact plant design
- ✓ Lighter plant
- ✓ Longer lifetime due to lower operation T
- ✓ Can be controlled with low excess 0_2
- ✓ Much lower auto thermal point (> 0,6 g/Nm^3)

- ✓ Catalyst can be poisoned
- ✓ Pressure drop over the catalyst bed

Thermal oxidation

- ✓ High energy consumption
- ✓ Higher CO_2 emission
- ✓ High thermal stress to construction due to high operation temperature
- ✓ Production of NOx and CO due to high operating T
- ✓ Longer start-up time due to T and heat capacity
- ✓ Much bigger and heavier unit
- ✓ Higher maintenance cost due to higher thermal load. E.g. cracking of ceramic heat exchangers
- ✓ Needs min 8 % surplus O_2 in the gas
- ✓ Higher auto thermal operation (>1,2 g/Nm^3)

- ✓ No risk of poisoning

genano

All amounts of catalytic poisons has to checked from Genano Solutions

Catalytic poisons ***) mg/Nm³

Silicone (Si)
Sulphur (S)
Chlorine (Cl)
Phosphor (P)
Halogenated compounds

Some poisons can be oxidated in small portions or occational emissions

genano

Energy consumption calculation (example)

Air flow rate	25 000		Nm^3/h
Inlet temperature	25,0		°C
Operation time	6000		h/a
VOC concentration	0,80		g/Nm^3
VOC net heating value	30,0		kJ/g
Abatament technology	RCO	RTO	
Thermal efficiency	94,0 %	95,0 %	
Incineration temperature	320	800	°C
Autothermal point	0,76	1,67	g/Nm^3
Outlet temperature	43,6	63,8	°C
Heating power		181	kW
Heating energy		1 088	MWh/a

Energy saving: **98 000€/year**
(0,09€/kWh)

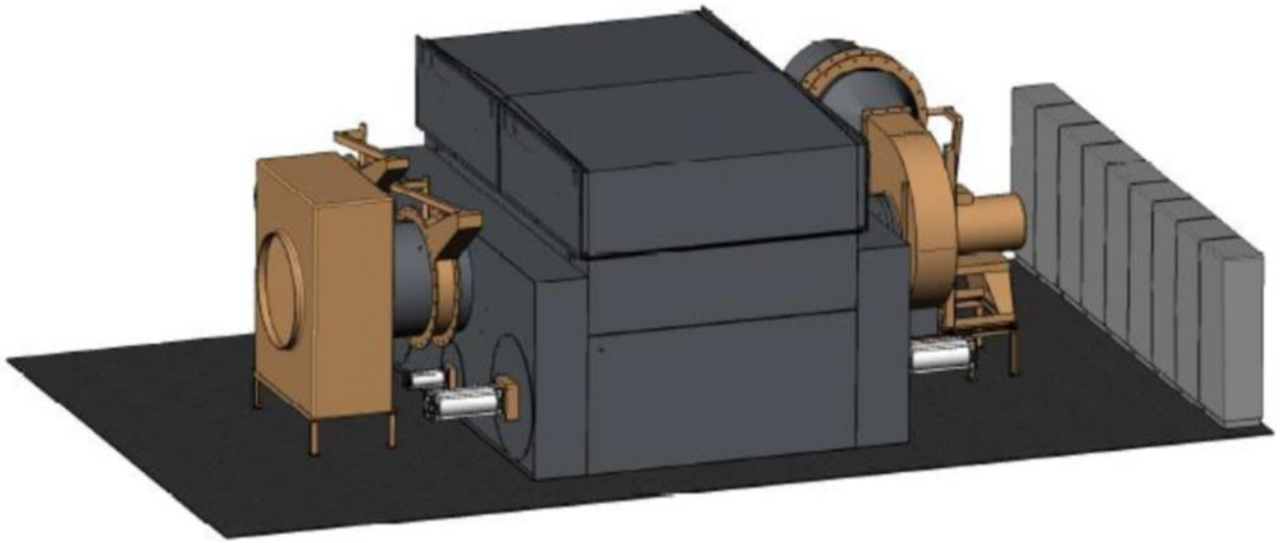
genano

CASE Poland

- VOC-emissions from the veneer dryer in Poland (pine):
  - VOC concentration 0,8 – 4 g/Nm^3/h
    - Type of VOC
      - Turpentine
      - Toluene
      - Hydrocarbon C5 – C13
      - Etylobenzene
  - VOC gas heating value 30 kJ/g
  - Inlet temperature 130 – 150 ^oC
  - Air Flow: 35 000 Nm^3/h
  - Calculated autothermal point 0,8 g/Nm
    - No need for extra heating energy
    - Low operation cost
  - Purification efficiency >95%

CASE Poland

- The size of RCO: 5 x 11 x 4 meters (W x L x H)
- Weight: ~40 000kg



Case study: Printing



Case:

Flexoprinting solvents abatement

Process data:

Air flow: max 15000 Nm3/h

Type of VOC compounds: Ethyl Acetate, Ethanol, Acetone and others

Concentration: 1 - 4 g/Nm3

Emission limit: 100 mgC/Nm3

Solution:

2 bed catalytic oxidizer

Auto thermal operation (no extra heating energy)

Outlet emission: <100 mgC/Nm3

genano

Case study: Pipe manufacturing



Case:

Abatement of Carbon Monoxide

Process data:

Air flow: max 6000 Nm3/h

Type of compound: Carbon monoxide

Concentration: 1 – 2 g/Nm3

Solution:

2 bed catalytic oxidiser

Auto thermal operation (no extra heating energy)

Outlet emission: <20 mgC/Nm3

genano

Case study: Tyre manufacturing



Case:

Tyre manufacturing process

Process data:

Air Flow: 5500 Nm^3/h

Type of compound: heptane

Concentration: 1-3 g/Nm^3

Solution:

2 bed catalytic oxidizer

Outlet emission: <50 mgC/Nm^3