

Average annual emissions year 2022

ZEVO PRAHA MALEŠICE

WASTE TO ENERGY PLANT

Discontinuous emission measurement [$\text{mg}\cdot\text{m}^{-3}$]

	measured	limit	% of limit
HF	0,4800	1	48
PCDD/F	0,0018	0,1	2
Cd	0,0001	0,05	0
Tl	0,0001	0,05	0
Hg	0,0010	0,05	2
Sb	0,0001	0,5	1
As	0,0001		
Pb	0,0005		
Cr	0,0006		
Co	0,0001		
Cu	0,0006		
Mn	0,0035		
Ni	0,0005		
V	0,0001		

PCDD/F = $\text{ng}\cdot\text{Nm}^{-3}$

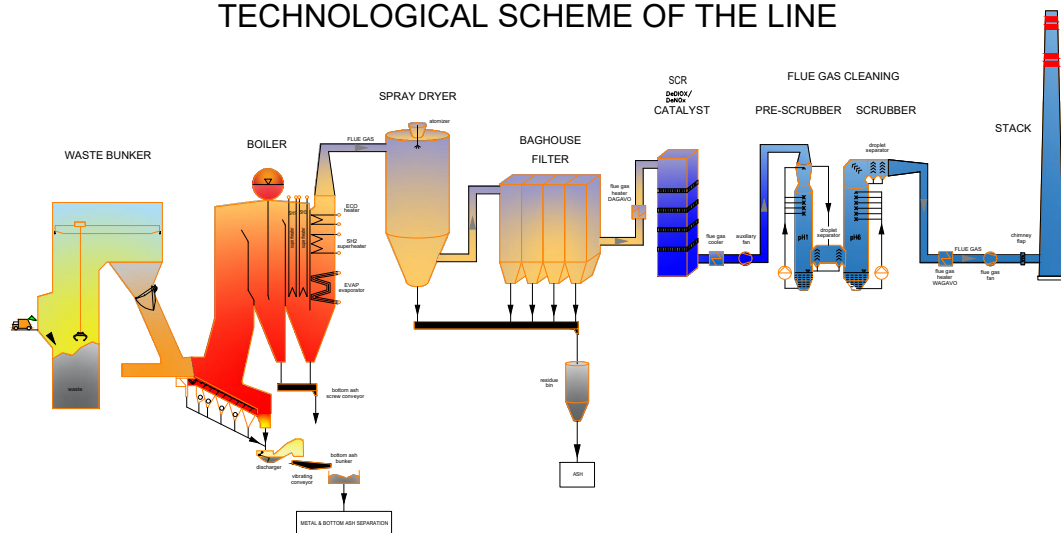
Continuous emission measurement [$\text{mg}\cdot\text{m}^{-3}$]

	measured	limit	% of limit
Dust	0,07	10	1
SO ₂	0,62	50	1
NO _x	97,8	200	49
CO	2,1	50	4
HCl	0,07	10	1
TOC	0,34	10	6

Continuous measurement system

Dust	front scattering of infra-red light
SO ₂	NDIR s cross flow modulation for SO ₂ ,NO _x a CO
NO _x	NDIR s cross flow modulation for SO ₂ ,NO _x a CO
CO	NDIR s cross flow modulation for SO ₂ ,NO _x a CO
HCl	absorption spectroscopy in IR zone
TOC	flame ionization detection
NH ₃	Multicomponent IR spectrometry

TECHNOLOGICAL SCHEME OF THE LINE



CZECH REPUBLIC

General information

Technology

Four boilers, each with independent purification line. Combined production of heat and electricity with heat recuperation from flue gases. Flue gases are purified by spray dryer and baghouse filter to remove the dust. Next step is destruction of PCDD/F and NOx by catalyst. Final step is removal of HCl, HF, SOx and heavy metals by wet lime scrubbers.

Historical events

Start of construction	1988
Trial operation	1997
Continuous operation	1998
SNCR DeNOx technology	2000
Activated carbon to flue gas purification	2000
New control system Delta V	2006
SCR DeDiox technology	2007
Cogeneration	2011
SCR DeNOx technology	2011
GOLEM - general reconstruction and ecologization	2023

Boiler

Manufacturer	MARTIN GmbH.
Nominal capacity	15 t waste.hr ⁻¹
Nominal steam production	40 t steam.hr ⁻¹
Nominal steam temperature	250 °C
Nominal steam pressure	1,37 MPa
Type of boiler	membrane, underpressure, vertical draughts
Number of draughts	5
Height	32,5 m
Length	12 m
Type of grate	reverse feed
Number of zones	10
Incline of grate	27°
Incineration time	cca 90 min
Temperature of incineration	900 - 1200 °C

Turbogenerator

Manufacturer	Siemens
Type	condensing bleeder steam
Max. electric output	17,44 MW
Specified pressure	1,15 MPa
Specified temperature	250 °C
Rotation speed	5292 rot.min ⁻¹
Unregulated steam bleed	56 t.h ⁻¹
Maximum usable flow	119 t.h ⁻¹

Cogeneration unit

Max. electric output	17,44 MW
Max. heat output - hot water	35 MW
Max. heat output - steam	18 MW
Heat to public network	850 TJ
Heat - own consumption	60 TJ
Electricity production	85 000 MWh
Electr. to public network	60 000 MWh
Electricity - own consumption	25 000 MWh
Energy Efficiency - R1	0,68

Annual waste balance

Projected capacity	480 000 t
Allowed capacity	394 200 t
Volume bunker capacity	11 000 m ³
Eqv. inhabitants (Prague)	1 373 403
Heat capacity	10,5 MJ.kg ⁻¹
Bottom ash production	100 000 t
Fly ash production	10 000 t
Iron scrap production	8 200 t

Personnel

Number of shifts	4
Shift operation	58
Engineers	16
Administration	12
Laboratory	5
Maintenance	22
Total	113

Flue gas purification

Spray dryer

Technology	GEA Niro
Producer	GEA / ZAUNER GmbH
Type	centrifugal cyclone
Removed substances	dust, water from wet cleaning
Speed of spray jet	12 000 rot.min ⁻¹
Height	18,5 m
Length	4,5 m
Temperature of FG	270 °C

Baghouse filter

Producer	ZVZ Milevsko, a.s.
Type	bag filter
Removed substances	dust
Number of sections	3
Temperature of FG	220 °C
Separation efficiency	99,99%

DeNOx

Technology	Flowtech Industries AG
Producer	ZAUNER GmbH
Type	SCR
SCR	25% NH ₃
Dosing of NH ₃	before catalyst
Temperature of SCR	280 °C

Dediox/DeNOx catalyst

Technology	CERAM Catalysts GmbH
Producer	CERAM Catalysts GmbH / ZAUNER GmbH
Type	SCR DeDiox/DeNOx CombiCat
Removed substances	PCDD/F, NOx
Catalyst	V ₂ O ₅ +WO ₃
Material of catalyst	ceramics + TiO ₂
Temperature of FG	280 °C
Effective area	41 268,5 m ²
Height	24 m
Efficiency	> 99%

Pre-scrubber

Technology	Lentjes Bischoff Ltd
Producer	Plasticon
Separator type	wet lime cleaning
Removed substances	HX, heavy metals, PCDD/F
Slurry suspension	Ca(OH) ₂ + 10% active coal
pH of medium	at 15 - 20% hydrouse solution
Height	< 1
Diameter	26 m
Temperature of FG	3,2 m
Separation efficiency of HCl	65 - 75 °C
	>99%

Scrubber

Technology	Lentjes Bischoff Ltd
Producer	CKD Dukla Praha / Plasticon
Separator type	wet lime cleaning
Removed substances	SOx, heavy metals, PCDD/F
Slurry suspension	Ca(OH) ₂ + 10% active coal
pH of medium	at 15 - 20% hydrouse solution
Height	6
Diameter	26 m
Temperature of FG	3,2 m
Separation efficiency of SOx	60 - 70 °C
	>99%

Stack

Type	monolithic with ceramic insertion (cerpack)
Height	177,5 m
Diameter of monolith bottom	12,99 m
Diameter of monolith crown	6,36 m
Diameter of cerpack bottom	2,8 m
Diameter of cerpack crown	2,8 m
Temperature of output FG	110 °C
Flue gas flow rate	10 m.s ⁻¹