

ENERGIZED OXYGEN SYSTEMS



- ✓ **WHAT IS ECODOX EMPR ?**
- ✓ **WHAT IS THE TASK OF DIOXYGENYL MOLECULE IN OUR ATMOSPHERE?**
- ✓ **HOW DIOXYGENYL MOLECULES ARE PRODUCED WITH EKODOX GAS GENERATORS?**
- ✓ **HOW DIOXYGENYL MOLEKULES WORKS**
- ✓ **ADVANTAGES OF ECODOX SYSTEM**
- ✓ **WHERE ARE THE FIELDS OF USAGES ECODOX SYSTEMS**

ECODOX EMPR

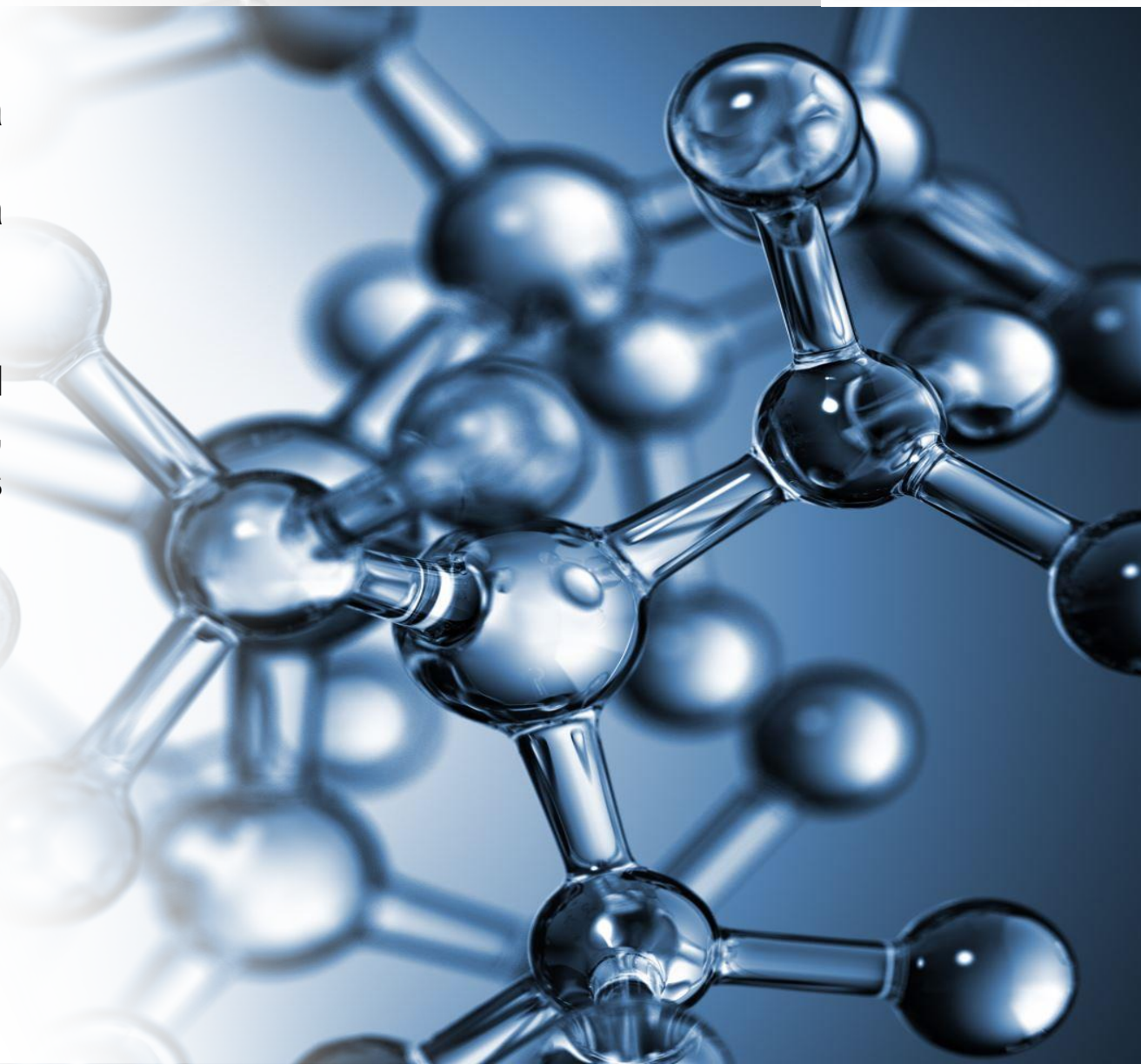
ECODOX EMPR is the technology of obtaining Tetra (O₂⁺/O₄⁺) oxygen from oxygen molecules energized in a new generation cold atmospheric plasma reactor.

Dioxygenyl is used in advanced hazardous and domestic wastewater treatment, air disinfection, sterilization purposes in health and medical sectors with exceptionally successful results

What's Tetra (O₂/O₄) Oxygen?

Dioxygenyl is produced in plasmic EMPR reactors with high magnetic energy. Dioxygenyl is formed when one of the electrons of biradical oxygen gains energy and moves to another orbital opposite to its spin.

Dioxygenyl is a non-radical reactive oxygen molecule because it has no unpaired electrons.



What is Tetraoxygen's function?

- It stimulates the excitation energy by transferring it to organic-inorganic molecules. It returns to its original state after making the stimulation which otherwise cannot be done by the inactive oxygen.
- They are unstable compounds and after a certain half-life they lose their energy and turn into neutral oxygen molecules again.
- They are not free radicals. These properties distinguish them from triozone molecules.
- Although they have a disintegrating effect on organic and inorganic compounds, they do not show corrosive and abrasive properties on metal and plastic derivative surfaces.
- Tetra Oxygen is the primary agent of photooxidative stress in microorganisms.
- The damages that occur on the macromolecules of microorganisms due to Dioxygenyl effect disrupt the cellular functions and destroy them.
- Dioxygenyl is the primary agent of photooxidative stress microorganisms
- It breaks down polymer molecules in wastewater and air and renders them harmless.

APPLICATIONS

ECODOX has disinfection / carbon emission reduction effects in environments where applied.



AIR DISINFECTION

It reduces the microbiological load in the air and on the surfaces where the air comes into contact with, It prevents mold formation.



WATER AND WASTEWATER DISINFECTION

Full disinfection is achieved when applied on drinking water, environmental waters, septic tanks, garbage leachate and bloody (slaughter house etc)water.



RECOVERY OF WATER / WASTE WATER

According to the characteristics of water and wastewater, 82-95% recovery is achieved.



OTHERS

Elimination of odour and H₂S gas in flue gas is achieved at 80-95% rate.

ECODOX GENERATOR

- ▶ Ecodox EMPR is the disinfectant with the most effective oxidation value in the world.

So it is very suitable for fast and effective sterilization. Since Ecodox EMPR gas turns into oxygen after destroying harmful microorganisms, it leaves no residue. For these reasons, it is suitable for use in air purification. The air cleaner uses the air in its environment as a raw material. By producing EcodoxEMPR with high voltage current, it destroys germs and bacteria in the air and eliminates odors.

- ▶ The Ecodox EMPR device energizes only the oxygen it receives from the environment and gives it back to the environment. It does not contain any allergenic ingredients. Since it does not contain chemicals, it can be applied safely and does not need any chemicals.
- ▶ Ecodox EMPR Generators do not create or contain Ozone gas or Nitrous Oxide.



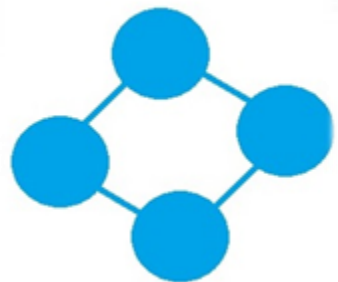
ECODOX AIR DISINFECTION

- ▶ It reduces the microbiological load in the air and on the surfaces it comes into contact with, and prevents mold and fungus formation.
- ▶ Where people live collectively; shopping malls, schools, plazas, smart buildings, business centers, hotels, etc. It is possible to remove odor, stop the total microbiological activity in the air, and thus increase the air quality, with EMPR technology in all indoor living spaces. The ECODOX EMPR device energizes only the oxygen it receives from the environment and gives it back to the environment. It does not contain any allergenic ingredients. Since it does not contain chemicals, it can be applied safely and does not need consumable chemicals.



Energized oxygen is not Ozone.

It can be defined as the «advanced oxidation» purification technology.



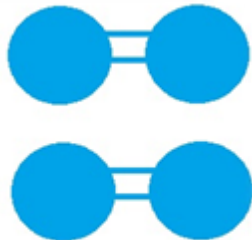
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WATER/ WASTEWATER RECOVERY & RECYCLE

Ecodox wastewater / water treatment systems are powerful and proven alternative to both chemical and biological treatment systems.

It destroys the microorganisms with an efficiency of 100% in the wastewaters where Ecodox gas is applied. Ecodox gas neutralizes the harmful chemicals, reduces the Total Suspended Solids to zero value.

This is made possible with the Ecodox System as a result of separating the solid parts in the wastewater without need for any chemicals. Ecodox System reduces the COD (Chemical Oxygen Demand), BOD (Biological Oxygen Demand) ratios below limit values through enrichment of the energized oxygen levels in the water.

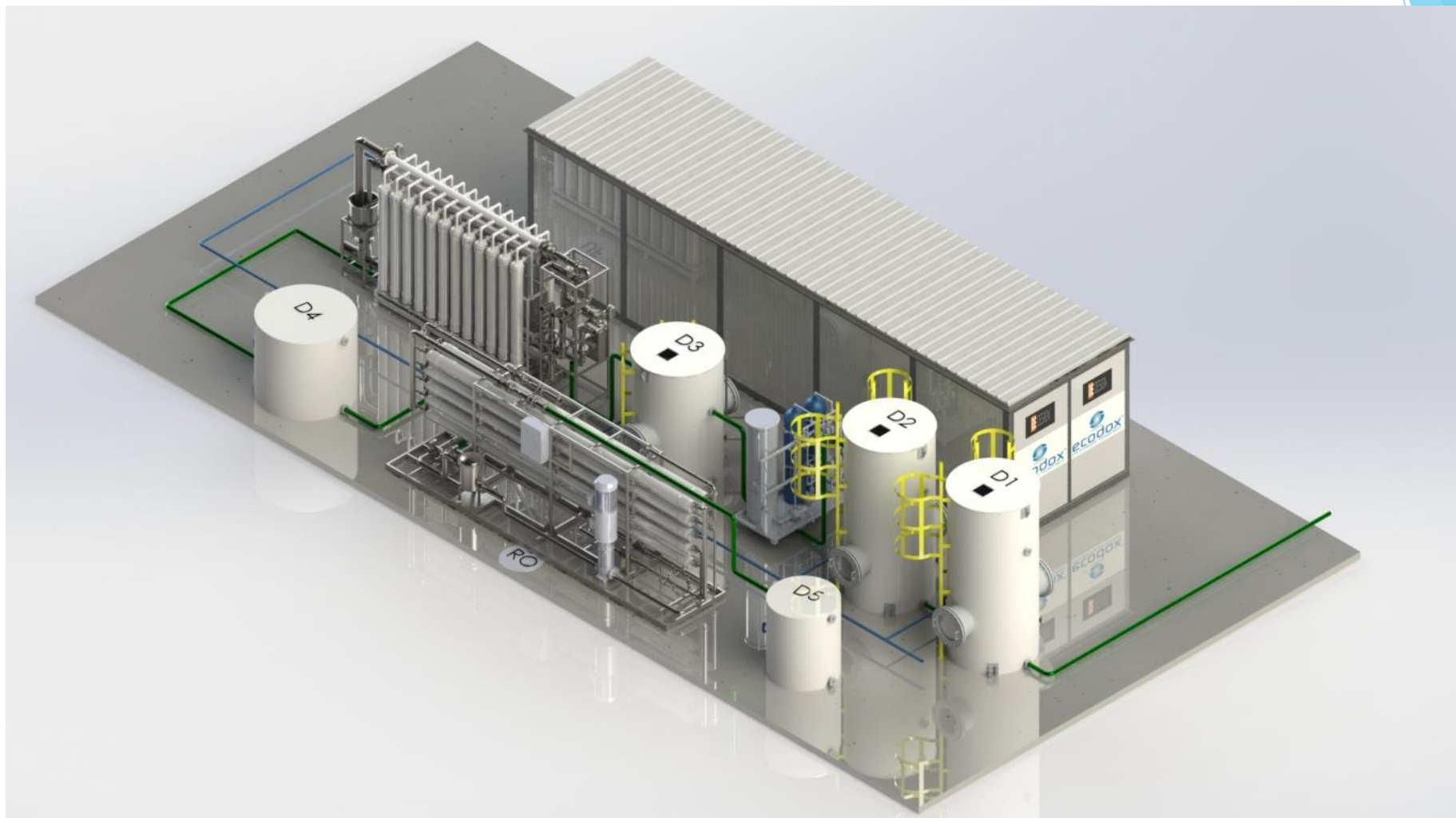
Ecodox also removes the pollutants affecting the clarity of the water and the bad odour.

Ecodox System is easy to install. It requires less space than other systems. The system has full back up for all the components and supported with generator. Sytem continues to operate in case of power failures or component failures.

Ecodox system purifies the effluent water and returns it to the factory for reuse.

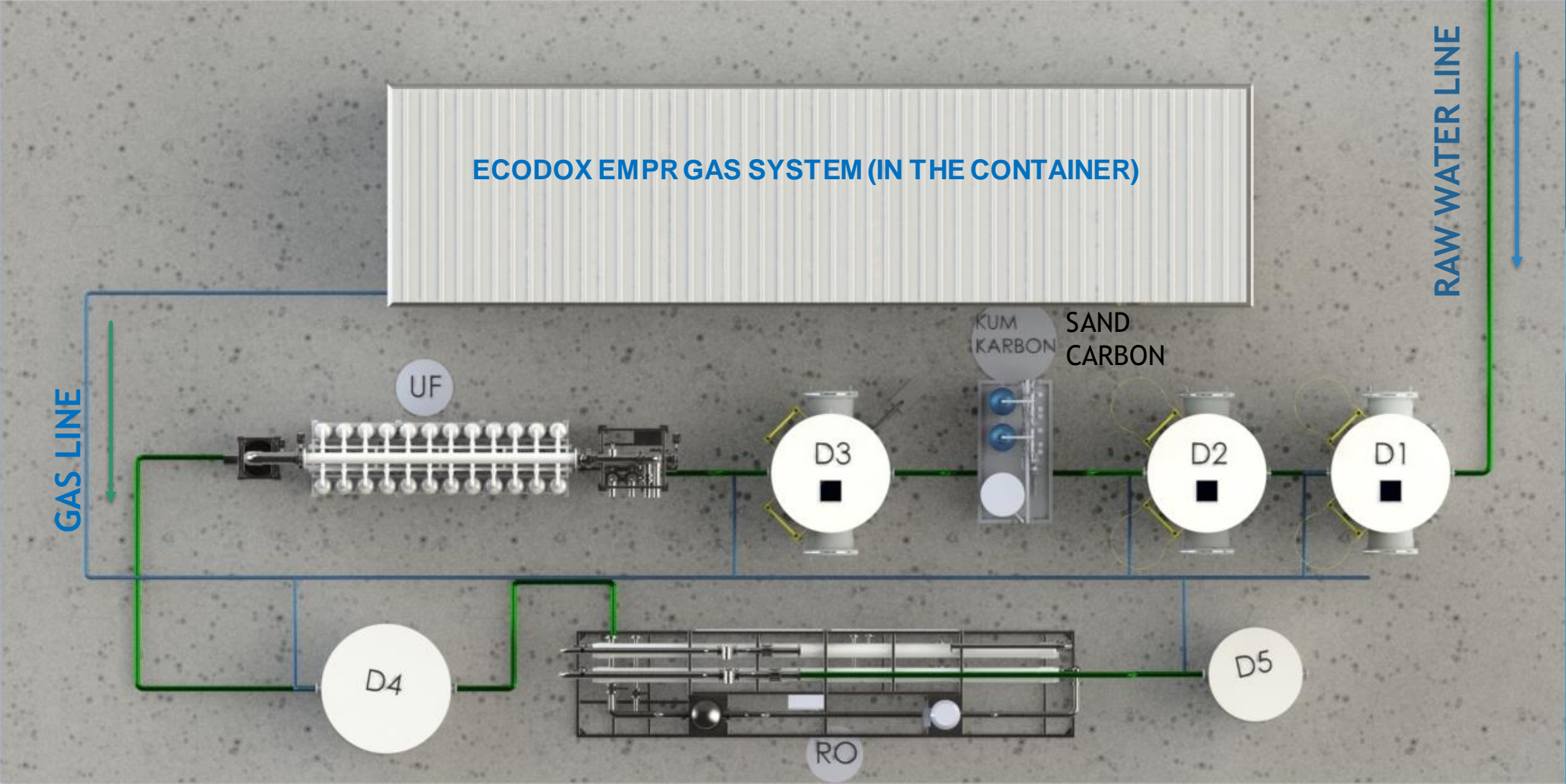
Ecodox industrial Wastewater treatment systems can be used for the recovery of the water at the food processing and production factories, pharmaceutical factories, paper mills, paint, textile factories as well as garbage leachate waters for both odor removal and their treatment.

TYPICAL SET UP



- System can be completely containerised.

PROCESS FLOW



PROCESS FLOW

D1 – D2: Wastewater is taken into these tanks and Ecodox gas is applied. The aim is to saturate the waste water with gas in order to start the floculation and breaking down the polymer molecules.

D3: Wastewater, which passes through the sand and carbon filters and free from coarse residues, is poured here. Ecodox gas continues to be given at this stage, too.

D4: Wastewater which is passed through the UF (Ultra Filtration Process) meets the discharge criteria. Ecodox gas interaction continues at this stage

D5: At this final stage, after passing through the RO (Reverse Osmosis) the water is brought to drinking water and / or irrigation water grades.

Important Note: It must be noted that ECODOX SYSTEMS can produce any grade of water depending on user requirements. System may vary subject to type of water wanted by the user – drinking grade, irrigation grade – discharge grade.

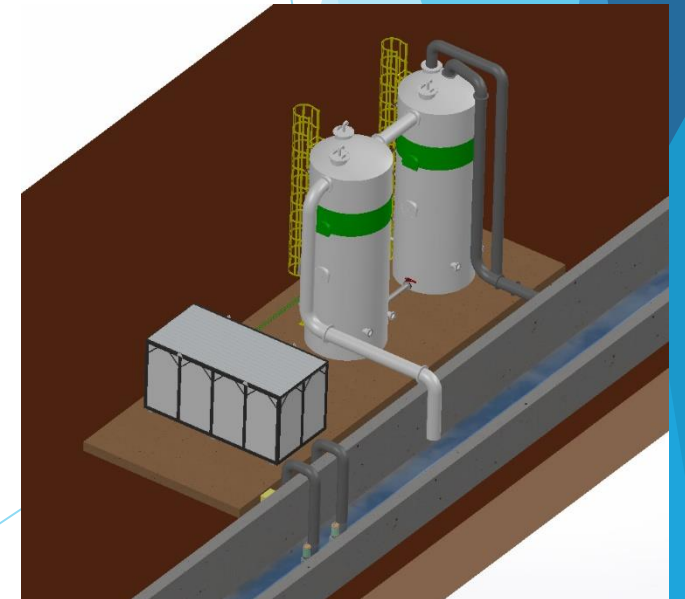
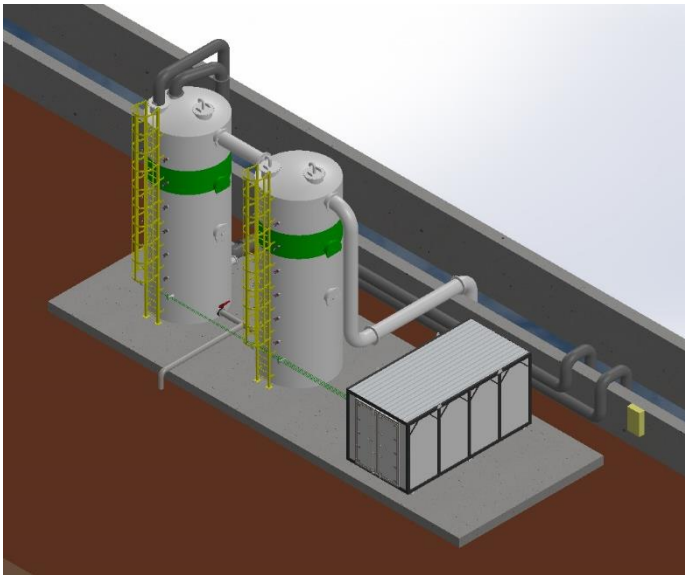


WATER / WASTEWATER DISINFECTION

Total disinfection is achieved when applied on drinking water, environmental waters, septic tanks, garbage leachate and bloody (slaughter house etc)water.

Ecodox Gas is more effective than all other known existing disinfection methods. Its operating cost is quite low and it can be customized to size, capacity to suit user requirements.

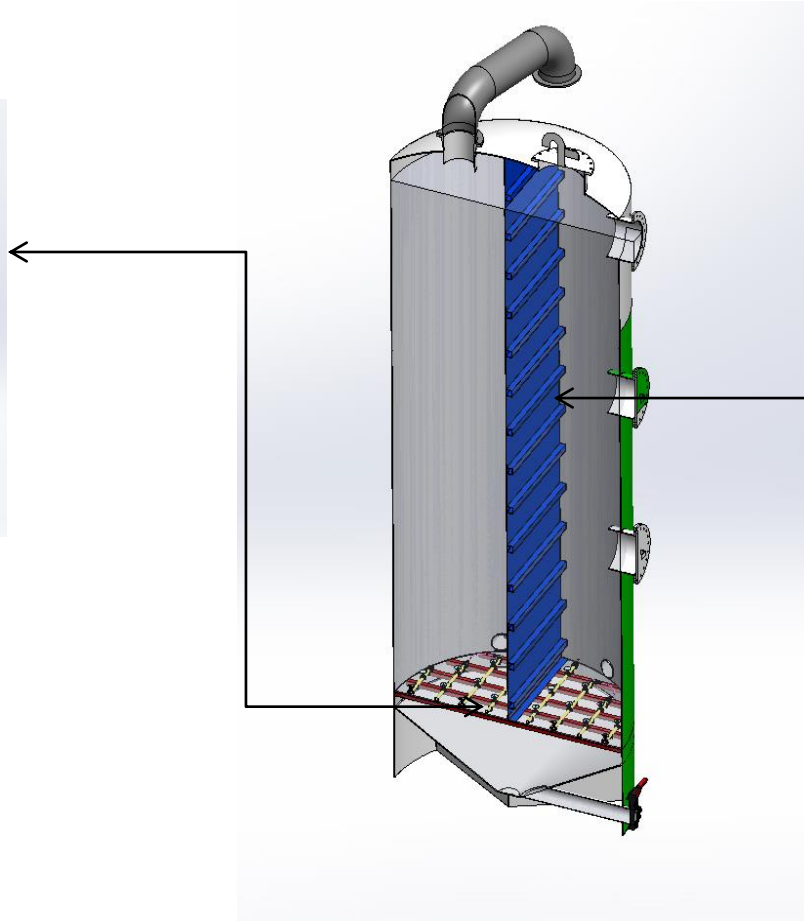
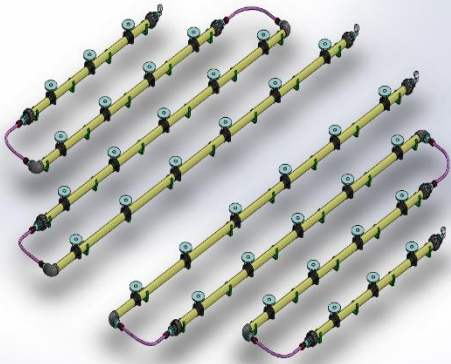
It has been proven that the bacterial density in the waste waters / water is reduced to zero where Ecodox gas is applied.



ECODOX CONTACT TANK

(DETAILED SECTIONS)

DIFFUSER PLAN



SEPARATION SCREEN

Facility wastewater is pumped into the contact tank and is sectioned with a separation screen. Then, the disinfection is achieved upon injection of the gas through the diffuser fogging system which is placed at the bottom section of the tank.

LAB ANALYSIS (WASTE WATER)

Heavy Metal Analysis Results Ağır Metal Analiz Sonuçları		Al	Cd	Co	Cr	Cu	Fe	Hg	Ni	Pb	Sn	Zn
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Susuz Filtrat Numunesi	Inlet Water Value Reaktör Giriş	251,7	0,057	0,094	5,699	5,942	234,6	1,875	3,238	0,23	<0,001	12,3
	After Filtration + Filtrasyon Sonrası	0,547	<0,001	0,005	0,049	0,043	0,769	0,057	0,392	0,004	<0,001	0,221

Numune Adı Sample ID	KOİ (mg/L) COD	Toplam Azot (mg/L) Total Nitrogen	pH
Ham Su Raw Water	13.350	2.050	8,20
UF Çıkışı UF Exit	2,625	410	8,41
NF Çıkışı NF Exit	52	<10	8,06

WASTEWATER RECOVERY APPLICATION AT BIOGAS PLANTS

RAW WATER RESULTS

Parametre	Birim	Ölçülen Değer
pH	-	8,31 (24,4°C)
AKM TSS	mg/L	8440,0
BOİ BOD	mg/L	1394,0
Toplam Azot Total Nitrogen	mg/L	605,0
Renk Colour	Pt-Co	107.792,5
KOİ COD	mg/L	8678,25
Bulanıklık CLARITY	NTU	6175,0
Toplam Fosfor Toal Phosphorus	mg/L	58,05
İletkenlik Conductivity	Us/cm	31.900,0
Sülfat Sulphate	mg/L	6928,5
Fosfat Fosforu Sulphate Phosphorus	mg/L	6,59
Yağ ve Gres Oil & Greaswe	mg/L	18,0
Balık Biyodeneyi(ZSF)	-	<10

(*) Result...

WASTEWATER RECOVERY APPLICATION AT BIOGAS PLANTS

PRODUCT WATER RESULT

Parametre	Birim	Ölçülen Değer	Kullanılan Analiz/Ö Metodu
	Total Nitrogen		
pH	-	9,87 (24,0°C)	TS EN ISO 1052
AKM TSS	mg/L	0,8	TS EN 872
BOİ BOD	mg/L	1,32	SM 5210 B
Toplam Azot	mg/L	0,41	SM 3500 N C
Renk COLOUR	Pt-Co	2,57	SM 2120 C
KOİ COD	mg/L	26,06	SM 5220 D
Bulanıklık CLARITY	NTU	0,31	SM 2130 B
Toplam Fosfor Total Phosphorus	mg/L	0,07	SM 4500 P B,C
İletkenlik Conductivity	Us/cm	961,0	SM 2510 B
Sülfat Sulphate	mg/L	77,36	SM 4500 SO ₄ ⁻² D
Fosfat Fosforu Sulphate Phosphorus	mg/L	0,01	SM 4500 P C
Yağ ve Gres Oil & Grease	mg/L	0,68	TS 7887

TEXTILE WATER RECOVERY PROJECT

With Ecodox EMPR recovery system 150 m³ waste water per day is recovered.
The system works with an efficiency of % 92.

ANALYSIS REPORT	Wastewater Treatment Plant Entrance - COLORED	Wastewater Treatment Plant Outlet - PRODUCT		
Parameter	Analysis result	Analysis result	Unit	Analysis Method
pH	9,93	8,98		TS EN ISO 10523
Conductivity	7280,00	6,40	µs/cm	TS 9748 EN 27888
Phenol	<0.1	<0.1	mg/L	SM 5530 B&SM 5530 D
alkalinity	830,00	10,90	mg CaCO ₃	SM 2320 B
Chemical Oxygen Demand (COD)	1019,80	15,00	mgO ₂ /L	SM 5220 B
Biological Oxygen Demand (BOD)	356,00	5,20	mg/L	SM 5210 B
Suspended Solids	18,00	<10	mg/L	SM 2540 B
Ammonium Nitrogen	<5	<5	mg/L	SM 4500 NH ₃ B&SM 4500 NH ₃ C
chloride	1702,40	<10	mg/L	TS 4164 ISO 9297
Sulfur	1,25	<0.1	mg/L	SM 4500 -S-2 D
Sulphite	<1	<1	mg/L	SM 4500 -SO ₃ -2 D
Colour	3566,80	<5	Pt-Co	SM 2120 C
Oil and Grease	64,00	<10	mg/L	SM 5520 D
Free Chlorine	<0.02	<0.02	mg/L	SM 4500-Cl G
Zinc	0,127	<0.003	mg/L	EPA 200.7
Total Hardness	----	<10	mg CaCO ₃	SM 2340C



LAB ANALYSIS REPORTS FOR NO2, NO, and Ozone

Tablo 2.2. Noktasal Azot Monoksit ve Azot Dioksit Ölçümüne Ait Bilgiler ve Ölçüm Sonuçları
Nitrogen Monoxide and Nitrogen Dioxide Measurement Results

No	1	Ölçüm Bilgileri			
Numune Alınan Bölüm	23. Kat	Çalışılan Bölüm	23. Kat		
Çalışan Adı-Soyadı	-	Unvanı	-		
T.C. Kimlik No	-	Yapılan İş Faaliyeti	Ofiste Çalışma		
Mesai Saatleri	-	Maruziyet Kaynakları ve Cinsi	NO-NO ₂		
Mola Saatleri	-	Ölçüm Başlangıç-Bitiş Saati	10:02-10:18		
Sıcaklık (°C)	26,8	İşin Süresi	-		
Nem (%)	47	Sigara/ Alkol Kullanımı	-		
Basınç (mbar)	1009,0	KKD Kullanımı	-		
Ölçüm Stratejisi	Yukarıda verilen bilgiler ışığında ölçümlerin noktasal olarak yapılmasına karar verilmiştir.				
Ölçüm Sonuçları					
Parametre	Sonuç (ppb) Result	KMSGHY Sınır Değer	KMMSGÖHY Sınır Değer	NIOSH Referans Değer)	OSHA Referans Değer
NO ₂	<0,3	-	-	-	-
NO	<19,8	-	-	-	-

Tablo A 2. İş Yeri Ortamı Ozon Gazı (O3) Ölçüm Sonuçları
Ozone Gas (O3) measurement result

Ölçüm Bilgileri ve Bölümde Çalışanın Bilgileri					Çevre Şartları			Ölçüm Sonucu (ppm) Result ppm
No / Saat	Adı Soyadı / T.C. No.	Bölüm / Yapılan İş	Mesai / Maruziyet / Ölçüm Süresi (dk)	Seri No / Cihaz Artek Kodu	Sıcaklık (°C)	Basınç (mmHg)	Nem (%)	
1 / 10:30 10:35	-	24. Kat Sunrise Açık Ofisi	480/420/5	00839 / 869	24,4	758	49,2	<0,025*

*Tayin limitinin altında tespit edilmiştir.

GALVANIZATION AND ACID BATH APPLICATION

The purification and recovery of acid bath water with high conductivity and containing dissolved metal salts is possible only ECODOX systems without using any chemicals.

PARAMETERS	VALUE	RAW	PRODUCT
COD	mg/Lt	2.700	20
Chloride	mg/Lt	20.100	<10
Ph	-	1	5
Color	Pt-Co	430	<1
Conductivity	uS/cm	100.000	<1.000
Fe	mg/Lt	500	<10
Cr	mg/Lt	2.500	<10

GALVANIZATION AND ACID BATH APPLICATION



Tablo 3. Laboratuvar Çalışması Giriş ve Çıkış Sızıntı Suyu Karakterizasyonu
 LAB TRIALS - ENTRY and EXITY GARBAGE DUMP LEACH WATER CHARACTERISATION

Parametre	Birim UNIT	Giriş Sızıntı Suyu Karakterizasyonu Entry Water Values	Çıkış Sızıntı Suyu Exit Water Values Karakterizasyonu
KOİ COD	mg/L	4083	18
Yağ ve Gres OIL & GREASE	mg/L	11	-
Askıda Katı Madde (AKM) SS	mg/L	54	<10
Toplam Kjeldahl Azotu (TKN)	mg/L	1627,1	18.9
Fosfor (Toplam) PHOSPHORUS	mg/L	12,5	<0,2
Florür FLUORIDE	mg/L	2,8	0,3
Siyanür (Toplam) CYANIDE	mg/L	0,027	<0,02
Krom (Cr ⁺⁶) CHROMIUM +6	mg/L	<0,01	<0,01
Bakır COPPER	mg/L	<0,05	<0,05
Çinko ZINC	mg/L	0,08	0,06
Demir IRON	mg/L	1,49	<0,05
Kadmiyum CADMIUM	mg/L	<0,002	<0,002
Krom (Toplam) CHROMIUM TOTAL	mg/L	2,34	<0,01
Kurşun LEAD	mg/L	<0,005	<0,005
Toplam Koliform Bakteri Sayısı TOTAL COLIFORM BACTERIA	Kob/100ml	2.8x10 ³	NOT DETECTED Tespit Edilemedi
Escherichia coli	Kob/100ml	Tespit Edilemedi	NOT DETECTED Tespit Edilemedi



ECODOX APPLICATION OF DOMESTIC WASTEWATER

In the trial carried out in the domestic water treatment plant and in the environmental water with mixed septic tank, the wastewater successfully reduced below the desired table values with only Ecodox and filtration systems without using any chemical or biological process.

Analysis	TSS	ESS	COD	TN	NH ₄ -N	NO ₃ -N	TP	Temp	Conductivity	pH
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	°C	μS/cm	
Raw water	700	560	822	310	247	1,6	29,9	15,6	2890	7,9
After using ecodox and Ultrafiltration	2	1	74	17	13,5	1	0,4	15,1	2628	7,8

ECODOX APPLICATION OF DOMESTIC WASTE WATER

In this trial, only energized oxygen and ultrafiltration were used instead of chemicals and no other biological additives were used.



OTHER APPLICATIONS

- ▶ Caustic recovery and water purification in petroleum waste waters,
- ▶ In the purification and deodorization (odour removal) of industrial / factory chimneys,
- ▶ In the purification and deodorization (odour removal) of textile RAM chimneys,
- ▶ In the removal of H₂S in geothermal energy facilities and in preventing the formation of calcium carbonate in pipelines,
- ▶ Refinement and more efficient-healthier production of fish and animal farms,
- ▶ Air disinfection and air quality improvement in shopping malls, schools, public areas
- ▶ In health and medical fields.

ECODOX SYSTEM ADVANTAGES

- ▶ The installation cost is at least 10% more advantageous than ordinary treatment systems.
- ▶ Operating costs are between 50% and 80% more advantageous than ordinary treatment systems.
- ▶ No chemicals are used during treatment. Consequently reduces operating costs.
- ▶ In terms of the area it covers, it occupies a minimum of 50-70% less space compared to ordinary treatment systems.
- ▶ It provides at least 30% energy saving compared to ordinary systems.
- ▶ It does not emit bad odors. It does not increase the microbiological load in the air.
- ▶ Compared to ordinary systems, the need for personnel is much lower.
- ▶ There is no risk of the system stopping. Even if there is a fault, the system continues to work without stopping because it is redundant. With our remote monitoring systems, it is quickly intervened against malfunctions.
- ▶ Due to its modular structure, it can be easily transported and its capacity can be increased.
- ▶ It is the treatment system that contains the least risk in terms of occupational health and safety.

ECODOX APPLICATION

CRUDE OIL SEPARATION AND REFINERY WASTE WATER RECYCLING

Crude oil from oil wells undergoes a separation process and the water in the oil is separated.

Since the separated water contains petroleum oil, heavy metals, organic loads, salts, chemicals and hydrogen sulfide in emulsion and dissolved form, it needs to be purified.

With the ECODOX Waste Water treatment system, oil separation water can be treated at a very low cost without using any chemicals.



ECODOX APPLICATION – ODOR AND CHEMICAL REMOVAL ON INDUSTRIAL CHIMNEYS

ECODOX offers definite results in chemicals and odor removal on the industrial chimneys. In industrial kitchen chimneys, in the chimneys of cesspool collection pits, in fish feed factories, in coal burning chimneys in cement factories and many more, the flue gas washing system both breaks down chemicals and completely prevents odor.



ECODOX APPLICATION TO THE HYDROGEN SULFIDE EMITTED FROM THE GEOTHERMAL POWER PLANT CHIMNEY

Geothermal power plant with 20,000 M3/Hour NCG gas discharge capacity operates in Turkey

Reducing approximately 350 ppm Hydrogen Sulfide emission in the NCG gas discharged from the chimney to the atmosphere below the limit values allowed by the Ministry of Environment, is achieved without using any chemicals with ECODOX technology.

PARAMETRE	UNIT	ENTRY VALUE	EXIT VALUE
Hydrogen Sulfide	ppm	350	<50

GARBAGE LEACHATE WATER ECODOX APPLICATION RESULTS

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DESALINATION PLANT

ROCKS HOTEL - CYPRUS

In this Project 400 cubic meter drinking water produced from the sea water. The system Works with 60% efficiency without using any chemicals. The operating cost is lower than other ordinary systems.

DESCRIPTION	ECODOKS	OTHER
CAPACITY	400 M ³ /day	400 M ³ /day
POWER CONSUMPTION	30 KWh	40 KWh
TOTAL COST FOR PER CUBIC METER	0,25 \$	0,50 \$
STAFF	2	2
SPACE NEED	40 M ²	50 M ²
EFFICIENCY	%60	%50

PRODUCE DRINKING WATER FROM SEAWATER SYSTEM





Certificate of Registration



This is to certify that
Quality Management System
of

**DEDİZAYN ELEKTRONİK YAZILIM
SAVUNMA SANAYİ VE MEDİKAL TİCARET ANONİM ŞİRKETİ**
YENİŞEHİR MAH. OSMANLI BLV. VOLUME İSTANBUL NO: 9/11
PENDİK - İSTANBUL / TÜRKİYE

complies with requirements of

ISO 9001:2015

This certificate is valid concerning all activities related to;

DESIGN, PRODUCTION, SALE AND AFTER SALE SERVICES OF AIR AND ENVIRONMENT CLEANING SYSTEMS
HAVA VE ORTAM TEMİZLEME SİSTEMLERİ TASARIMI, ÜRETİMİ, SATIŞI VE SATIŞ SONRASI HİZMETLERİ

ISO 01 1204 1409
Certificate No.

May. 7, 2021
Date of Audit

Jun. 25, 2021
Date of this Certificate

Jun. 25, 2021
Date of Registration

Jun. 24, 2022
Certification Expiry Date


Managing Director / Director



Medicert Uluslararası Ürün Ve Sistem Belgelendirme Ltd. Şti.
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Tel: 0232 327 33 44 www.medicert.com.tr info@medicert.com.tr

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YENİŞEHİR OSMANLI BLV. VOLUME PLAZA NO:9 D:11 PENDİK İSTANBUL/TÜRKİYE

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