

Forum Iran-Italy: Investment opportunities in Iranian energy and environment sectors

UNIDO ITPO Italy – Rome
26th June



AN ITALIAN HISTORY



1979

GEL was founded in 1979 thanks to the founder, Mr Nazzareno Berto. At the beginning Company was producing chemicals for maintenance and washing of heating systems.

In late 80's

Gel began to design equipment and components for domestic and professional users.

In late 90's

Industrial Division was created and developed. Plants were built to treat contaminated groundwater for Medical use.



2008

The new factory in Castelfidardo: a covered area of 10,000 square metres

2017

GEL is listed in the AIM Alternative Investment Italian Market

1980

1990

2000

2010

2017

THE FIRST PATENT:
"Flow reverser for
descaling
equipment".

1982

Gel opens out
to international
markets.

1993

GEL
becomes SpA

2004

Since 1979, we have been taking care of Water



THE NUMBERS

>15	Millions of € is the turnover 2017
65	Employees
10	Patents
23	Sales Agencies in Italy
> 2.000	Dealers in Italy
26	Distributors in Europe
300	Technical Assistance Centres in Italy
5	Technical-sales
10	Technical support of CAT and Retailers

Since 1979, we have been taking care of Water



GEL TODAY

- An Italian company in the water treatment able to manage the complete water cycle through standard and custom plant designs
- Over 30 years of activity
- High-quality products, respecting to the severe safety standards for healthy, safety and efficiency
- Design, building, commissioning and maintenance of tailored solutions
- Respect of international rules and legislations

Since 1979, we have been taking care of Water



OPERATING FIELDS

Domestic



Municipal



Hotels



Industrial



Medical



**Leachate and
liquid waste**

Since 1979, we have been taking care of Water



INDUSTRIAL DIVISION

- **FILTRATION PLANT**
- **RO DRINKING WATER PLANT**
- **PLANT FOR DIALYSIS LIQUID PREPARATION**
- **MBR BIOLOGICAL PLANT**
- **WASTE WATER PLANT AND LEACHATE LANDFILL**
- **MOBILE UNIT**

WHAT WE DO

- Chemicals
- Design and manufacture of “turnkey” and “tailor made” solutions
- Global Service Management
- Supply of mobile systems “service on call”
- Revamping & retrofitting of existing systems

Since 1979, we have been taking care of Water



OUR SERVICES

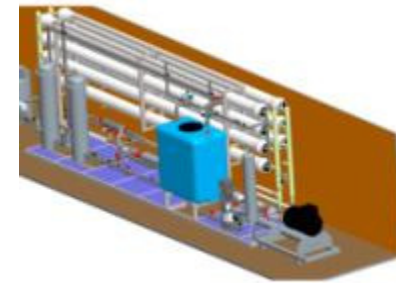
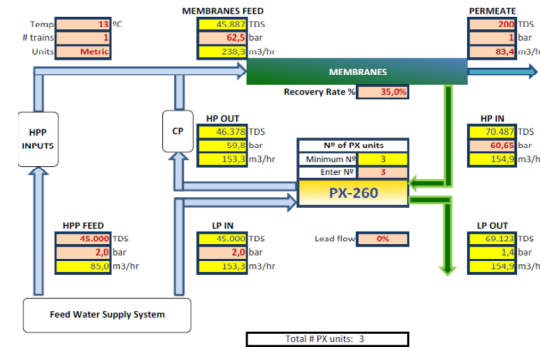
- Water Management
- Pre/post commissioning support
- Chemical, physical and microbiological water characterization
- Plants Automation and remote control
- Training Centre

Since 1979, we have been taking care of Water



OUR TOOLS

- Prediction software
- Modelling processes software
- Pilot plants simulation
- Run test and pilot plant on site
- Cooperation with universities and engineering companies



SAPIENZA
UNIVERSITÀ DI ROMA

Since 1979, we have been taking care of Water



OUR APPROACH

PLANT DESIGN STUDY



EVALUATION OF CRITICAL AREAS



IDENTIFICATION OF A TAILOR MADE SOLUTION



ROI and ROE EVALUATION

Since 1979, we have been taking care of Water



LANDFILL LEACHATE TREATMENT



OUR SOLUTION

Since 1979, we have been taking care of Water



LANDFILL LEACHATE TREATMENT

The landfill leachate is a liquid effluent which is generated as a result of:

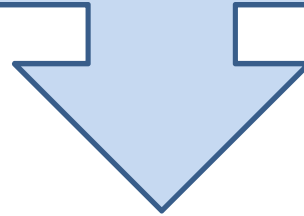
- Infiltration of rainwater into the waste mass
- Decomposition of waste

The production is a function of:

- Meteorology of the landfill site
- Characteristics of waste
- Degree of compaction
- Age and geometry of the landfill

LANDFILL LEACHATE TREATMENT

***THE LEACHATE CAN HAVE EXTREMELY
VARIABLE CHARACTERISTICS***



IMPACT ON THE CHOICE OF TREATMENT PROCESS

LANDFILL LEACHATE TREATMENT

The chemical parameters of interest are:

- Organic content (COD, BOD)
- Content of nitrogen (ammonia)
- Heavy metals
- Halogenated organic compounds

LANDFILL LEACHATE TREATMENT

Treatment philosophy:

- Treatment “Off Site”
- Treatment “On Site”

LANDFILL LEACHATE TREATMENT

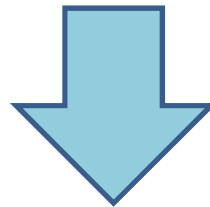
Disadvantages of the treatment "Off Site"

- High costs associated with the transportation and treatment
- Environmental risks and hazards associated with road transport
- Malfunction of the purification is not suitable for treatment of leachate
- Greater environmental impact

LANDFILL LEACHATE TREATMENT

Technology "On Site"

- Physic-chemical treatment
- Biological treatment
- Evaporation
- Reverse Osmosis membranes



OFTEN THE TREATMENTS ARE USED IN COMBINATION

LANDFILL LEACHATE TREATMENT

The selection of treatment depends on :

- Emission limit values to be respected
- Power Consumption
- Reduction of waste treatment
- Reduction of Environmental Impact
- Reliability and process safety
- Flexibility in respect of quality and quantity of leachate
- Cost management

LANDFILL LEACHATE TREATMENT

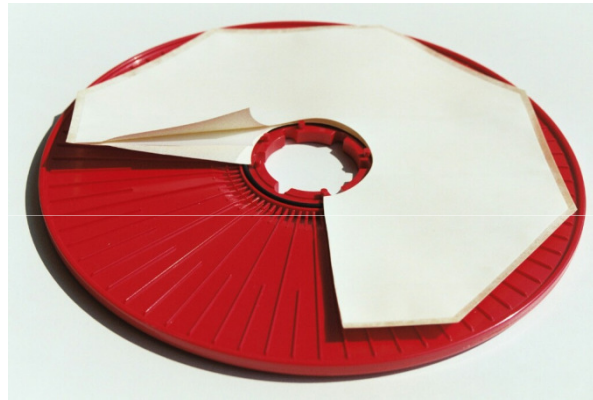
The key aspects of GEL solution :

- Separation technology is based on reverse osmosis
- Using High Pressure Low Fouling flat membranes GPT
- Mobile plant, housed in a container, "plug and play"
- Modular systems with extremely compact dimensions
- Systems are completely automated and remote controlled

LANDFILL LEACHATE TREATMENT

OUR MEMBRANE

GPT GEL Plate Tube Flat membranes with radial flow



Low fouling tendency

High operating pressure (up to 120 bar)

Since 1979, we have been taking care of Water



LANDFILL LEACHATE TREATMENT

TABLE D.2: COMPARATIVE PERFORMANCE OF VARIOUS TREATMENT PROCESSES FOR LEACHATE TREATMENT

Treatment Processes	Organics	Organics	Organics	Metals	VOCs	Nitrogen	Priority Pollutants	Solids	Comments
	Young (<5yr)	Middle (5-10yr)	Old (>12yr)						
Physical - Chemical									
Air Stripping	NA	NA	NA	NA	Good	Good	Fair	NA	Needs off gas treatment
Coagulation/precipitation	Poor	Fair	Poor	Good	NA	Poor	NA	Good	
Biological									
Aerobic suspended growth	Good	Fair	Poor	Good	Good	Fair	Fair	Fair	
Aerobic fixed film	Good	Fair	Poor	Good	Good	Fair	Fair	Fair	
Anaerobic (UASB)	Good	Fair	Poor	Good	Good	Poor	Fair	Fair	
Advanced/Tertiary									
Carbon adsorption	Poor	Fair	Good	NA	Good	NA	Good	NA	Needs pretreatment
Membrane processes	Good	Good	Good	Good	Fair	Good	Good	Good	Needs pretreatment
Chemical Oxidation	Poor	Fair	Fair	NA	Fair	NA	Good	NA	

Note 1. Modified from Qasim and Chian (1994).

Note 2. NA = not applicable

Source: Environment Protection Agency

Since 1979, we have been taking care of Water



LANDFILL LEACHATE TREATMENT

(TABLE D.2 CONT.)

Treatment Processes	Land Requirements	Ability to handle flow variations	Ability to handle influent quality variations	Reliability of the process	Ease of operation of the process	Ease of upgrading process change	Waste products
Physical - Chemical							
Air Stripping	Small	Fair	Fair	Good	Fair	Poor	Ammonia
Coagulation/precipitation	Medium	Good	Good	Good	Fair	Good	Sludge
Biological							
Aerobic suspended growth	Large	Good	Fair	Good	Good	Good	Sludge
Aerobic fixed film	Large	Fair	Good	Good	Good	Poor	Sludge
Anaerobic (UASB)	Medium	Good	Fair	Good	Fair	Fair	Sludge
Advanced/Tertiary							Spent
Carbon adsorption	Small	Poor	Poor	Good	Fair	Fair	Carbon
Membrane processes	Small	Poor	Good	Good	Fair	Fair	Brine
Chemical Oxidation	Small	Fair	Fair	Fair	Poor	Fair	Sludge

Note 1. Modified from Qasim and Chian (1994).
 Note 2. NA = not applicable

Source: Environment Protection Agency

LANDFILL LEACHATE TREATMENT

Physical/Chemicals treatments

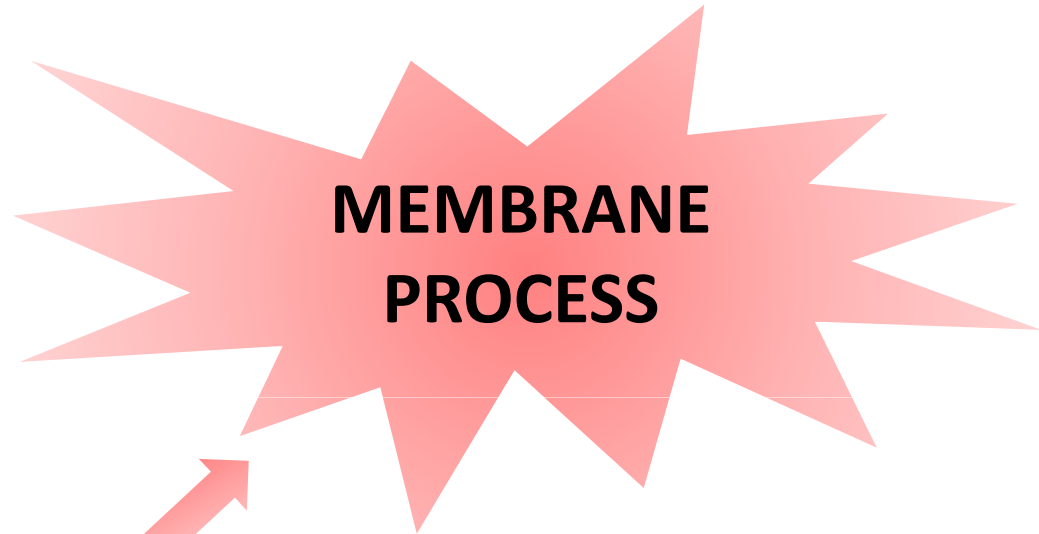
Stripping	18
Coagulation/precipitation	25

Biological treatments

Aerobic suspended growth	32
Aerobic fixed film	30
Anaerobic (UASB)	29

Advanced /Tertiary treatments

Carbon adsorption	21
Membrane processes	37
Chemical oxidation	19



And using GPT:

- *Minimul residual concentrate*
- *Minimum overall plant size*
- *No pretreatment before GPT RO stages*

Scores for the quoted assestaments in thwe previous tables:

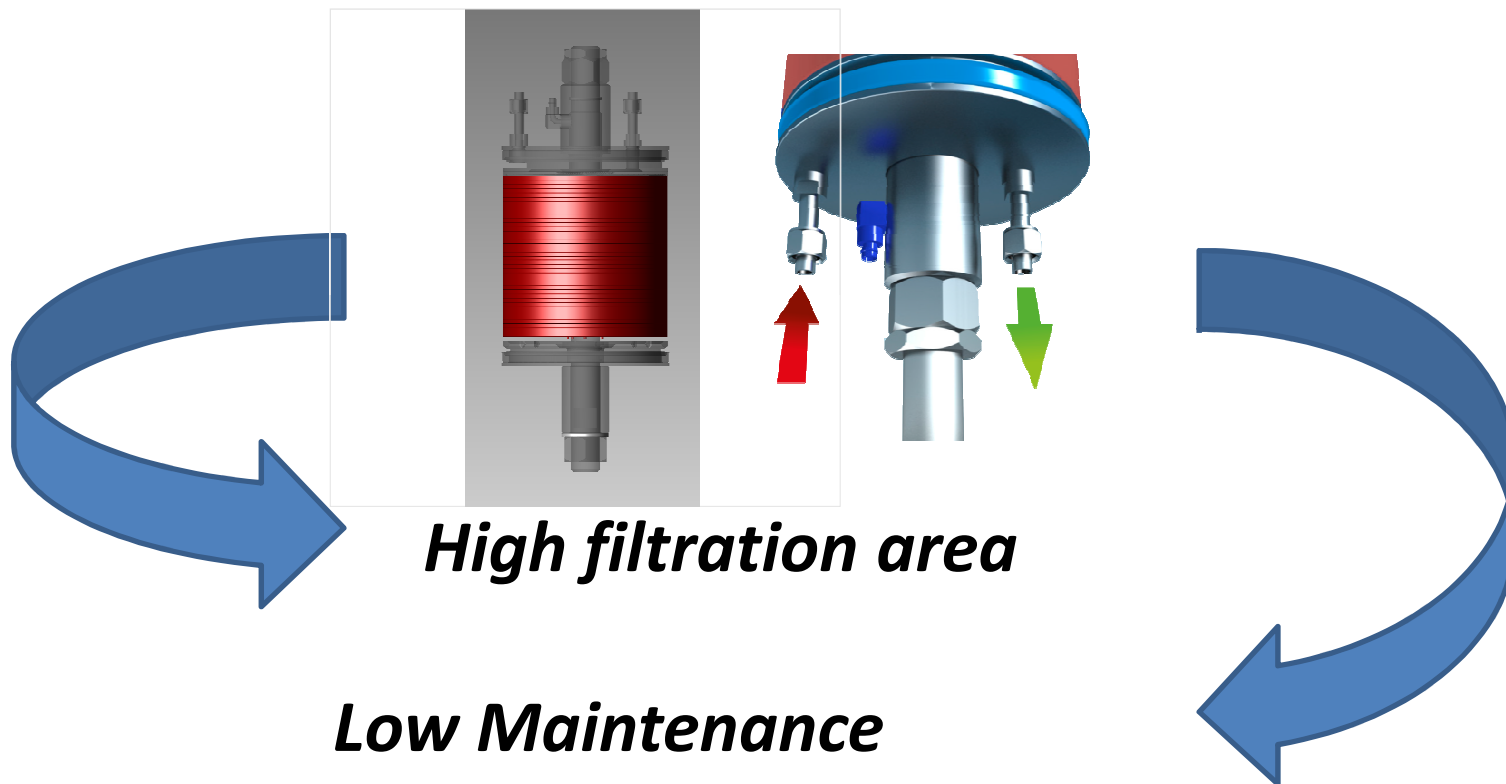
NA = 0 Poor= 1 Fair = 2 Good =3

since 1979, we have been taking care of Water



LANDFILL LEACHATE TREATMENT

GPT module with “quick exchange” system



Since 1979, we have been taking care of Water



LANDFILL LEACHATE TREATMENT

Advantages of GPT

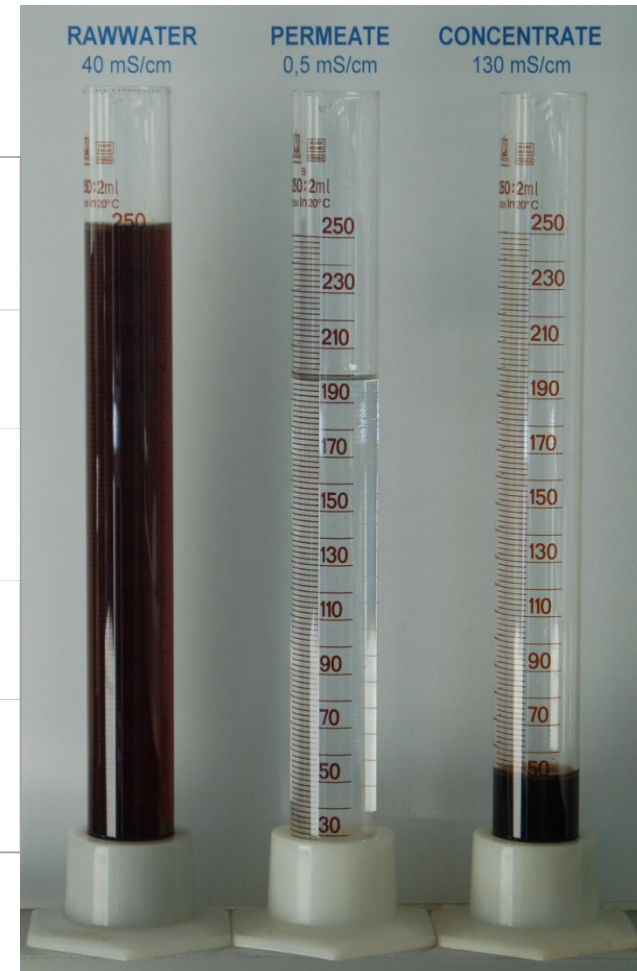
- Reduced fouling of the membranes
- Stage pre-filtration simplified
- Average life of membranes high
- High recovery rates
- Low Power Consumption
- Easy maintenance



LANDFILL LEACHATE TREATMENT

Achievable performances with GPT membranes

	Single stage RO	Double stage RO
Monovalent ion:	96 % to 98 %	> 99,5 %
Polyvalent ion:	98 % to 99,5%	> 99,9 %
Ammonia at pH 6.5:	95 %	> 99,5 %
Organic components at high molecular weight	99 % to 99,8%.	> 99,9 %



Since 1979, we have been taking care of Water



LANDFILL LEACHATE TREATMENT

Comparison of some treatment Technologies

Parametres	Input values				
COD	50.000 mg/l				
BOD	40.000 mg/l				
TN	3.000 mg/l				
NH ₃ -N	1.850 mg/l				
SS	1.500 mg/l				
pH	5.5 – 8.5				
Temperature	20°C				
Achievable standard for treated water					
Parameter	N/D	N+D+UF	N+D+UF+NF	N+D+UF+RO	GPT RO+RO
COD, mg/l	<4000	<1500	<500	<50	<50
BOD ₅ , mg/l	<800	<300	<100	<15	<15
SS, mg/l	<500	<15	<5	<1	<1
Total N, mg/l	<2000	<600	<400	<10	<10
pH	6,5-8,5	6,5-8,5	6,5-8,5	6-9	6-9

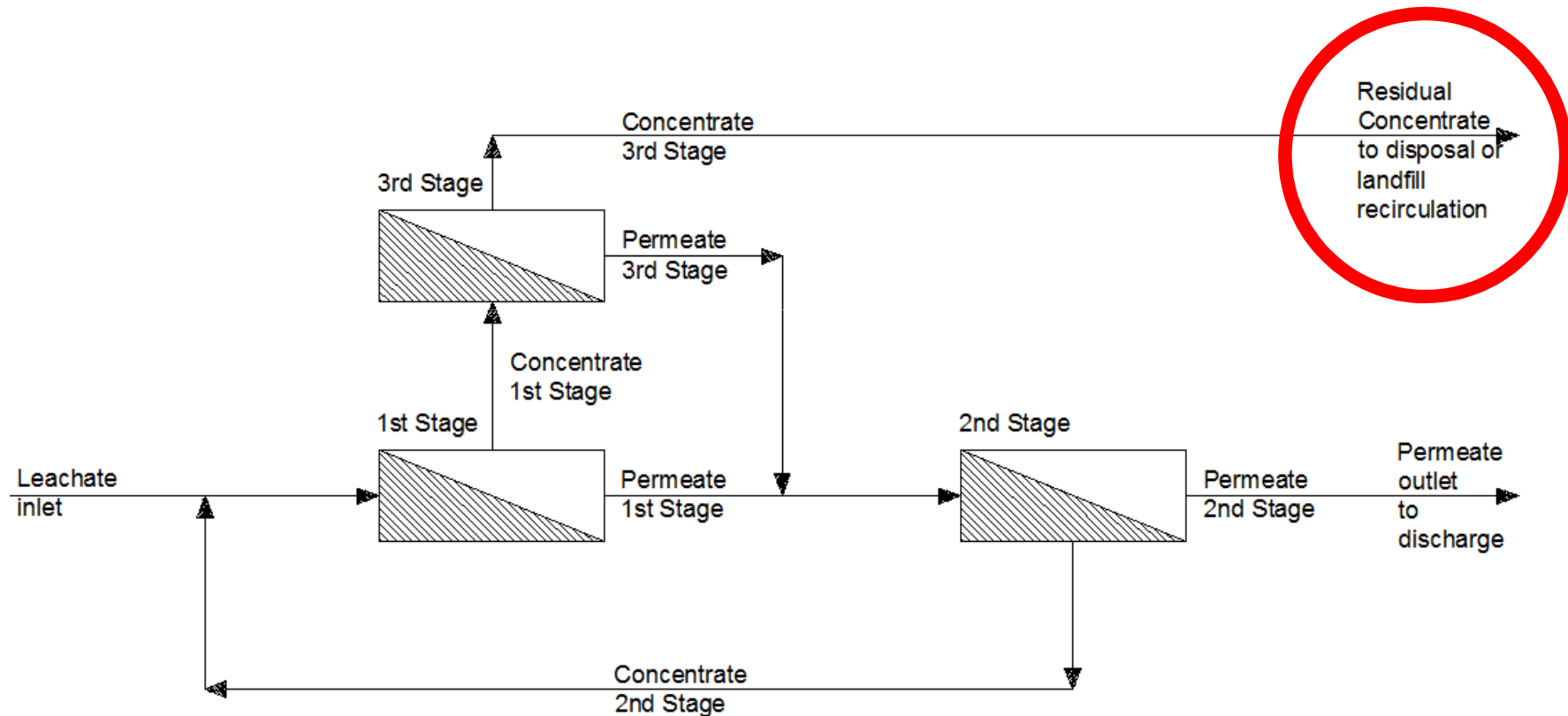
Legend : N/D = Biological nitro/denitro ; UF=ultra-filtration; NF= nano-filtraztion; RO= Reverse Osmosis spiral wound

Since 1979, we have been taking care of Water



LANDFILL LEACHATE TREATMENT

TYPICAL FLOW DIAGRAM



LANDFILL LEACHATE TREATMENT

Advantages of the GEL solution linked to the residual leachate concentrate recirculation

- Increasing of microbiological activity
- Increasing of biogas production
- Higher degree of compaction
- Increasing in accommodation capacity landfill
- Reduced environmental impact
- Degradation of refractory compounds
- Immobilization of heavy metals

LANDFILL LEACHATE TREATMENT

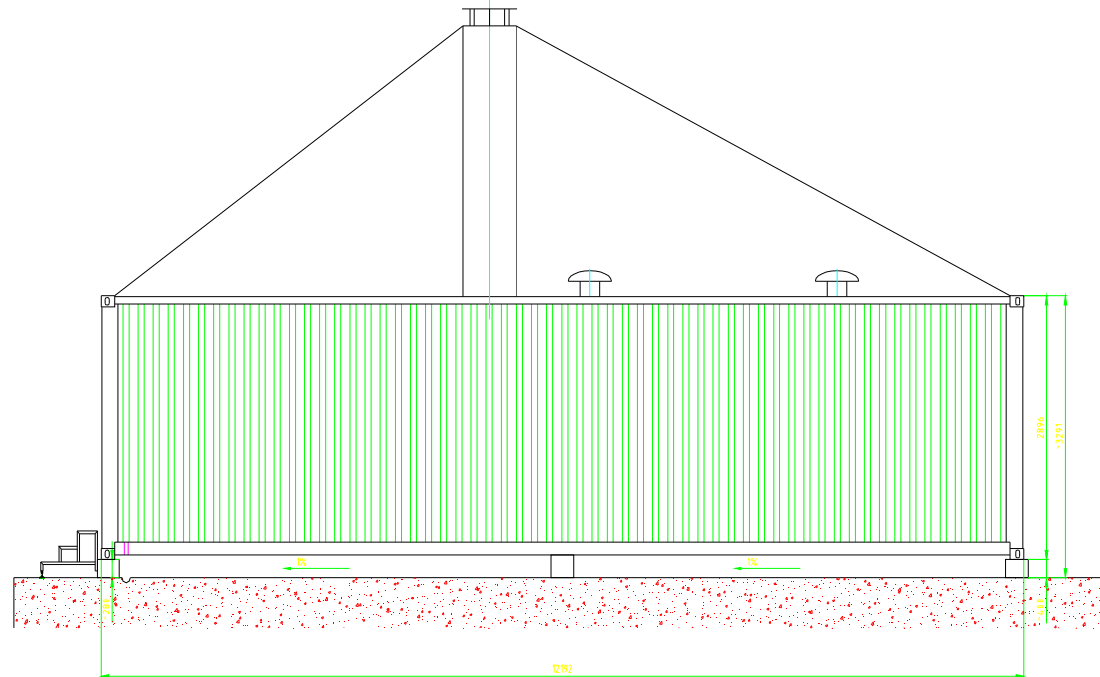
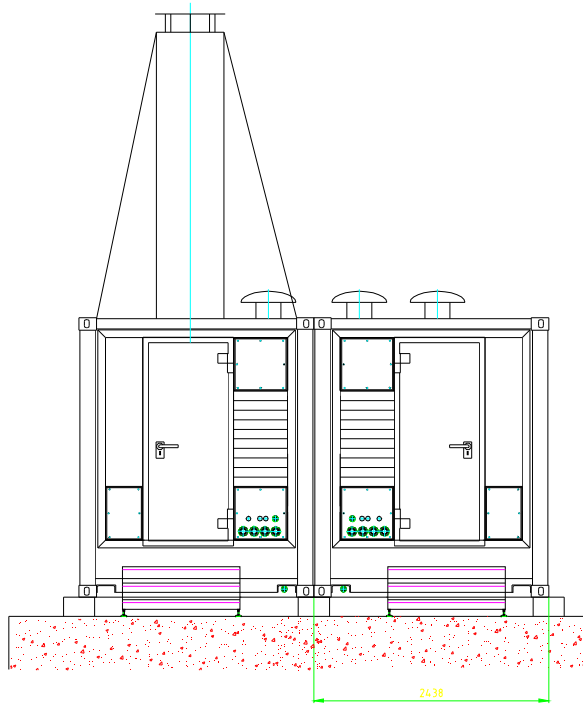
ALTERNATIVES :

- DISPOSAL OFF SITE
- Zero Liquid Discharge ZLD

***OUR R&D DEPARTMENT IS SETTING
AN INNOVATIVE SYSTEM FOR ZLD
READY ON 4TH QUARTER 2018***

LANDFILL LEACHATE TREATMENT

TYPICAL PLANT LAYOUT



Since 1979, we have been taking care of Water

LANDFILL LEACHATE TREATMENT

OUR OPERATION/SERVICES:



Landfill : Parapoti Italy
Q = 120 mc/d



Landfill Macchia Soprana Italy
Q = 50 mc/d



Landfill : Maruzzella Italy Q= 2x150 mc/d



***MANAGEMENT AND OPERATION OF ABOUT
500 MC/D OF LEACHATE TREATMENT***

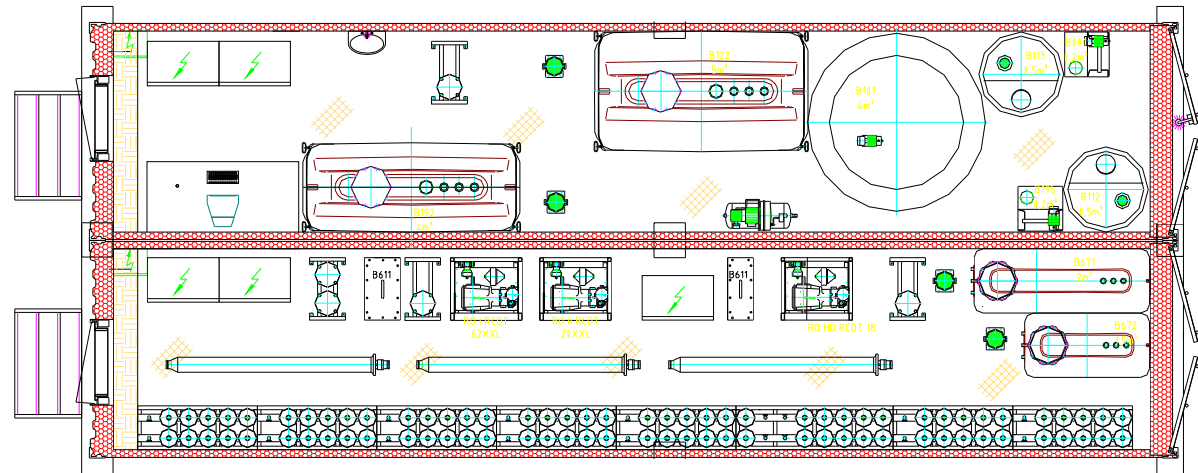
since 1979, we have been taking care of Water



LANDFILL LEACHATE TREATMENT

RENTAL SERVICE

3 stages unit Q= 150 mc/d



Since 1979, we have been taking care of Water



LANDFILL LEACHATE TREATMENT

SINCE 2010, OUR MAIN REFERENCES :

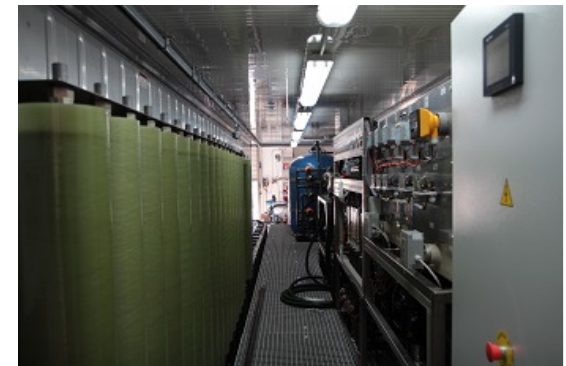
- MORE THAN 10 PLANT MANUFACTURED
- BIGGEST DAILY CAPACITY 600 MC/D
- INSTALLATION ON A SKID OR IN A CONTAINER

**TOTAL CAPACITY
> 1400 mc/d**

Since 1979, we have been taking care of Water

LANDFILL LEACHATE TREATMENT

INSTALLATION IN A CONTAINER

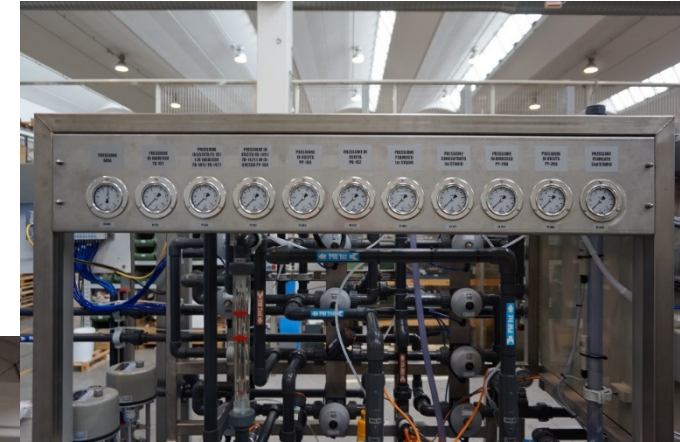


Since 1979, we have been taking care of Water



LANDFILL LEACHATE TREATMENT

INSTALLATION ON A SKID



Since 1979, we have been taking care of Water



LANDFILL LEACHATE TREATMENT



***OUR EXPERIENCE &
OUR TECHNOLOGY
TO REACH
YOUR AIM***

since 1979, we have been taking care of Water



LANDFILL LEACHATE TREATMENT



Thanks for your attention

Since 1979, we have been taking care of Water

