

**The world
is changing.
Let's change
it for the
better.**



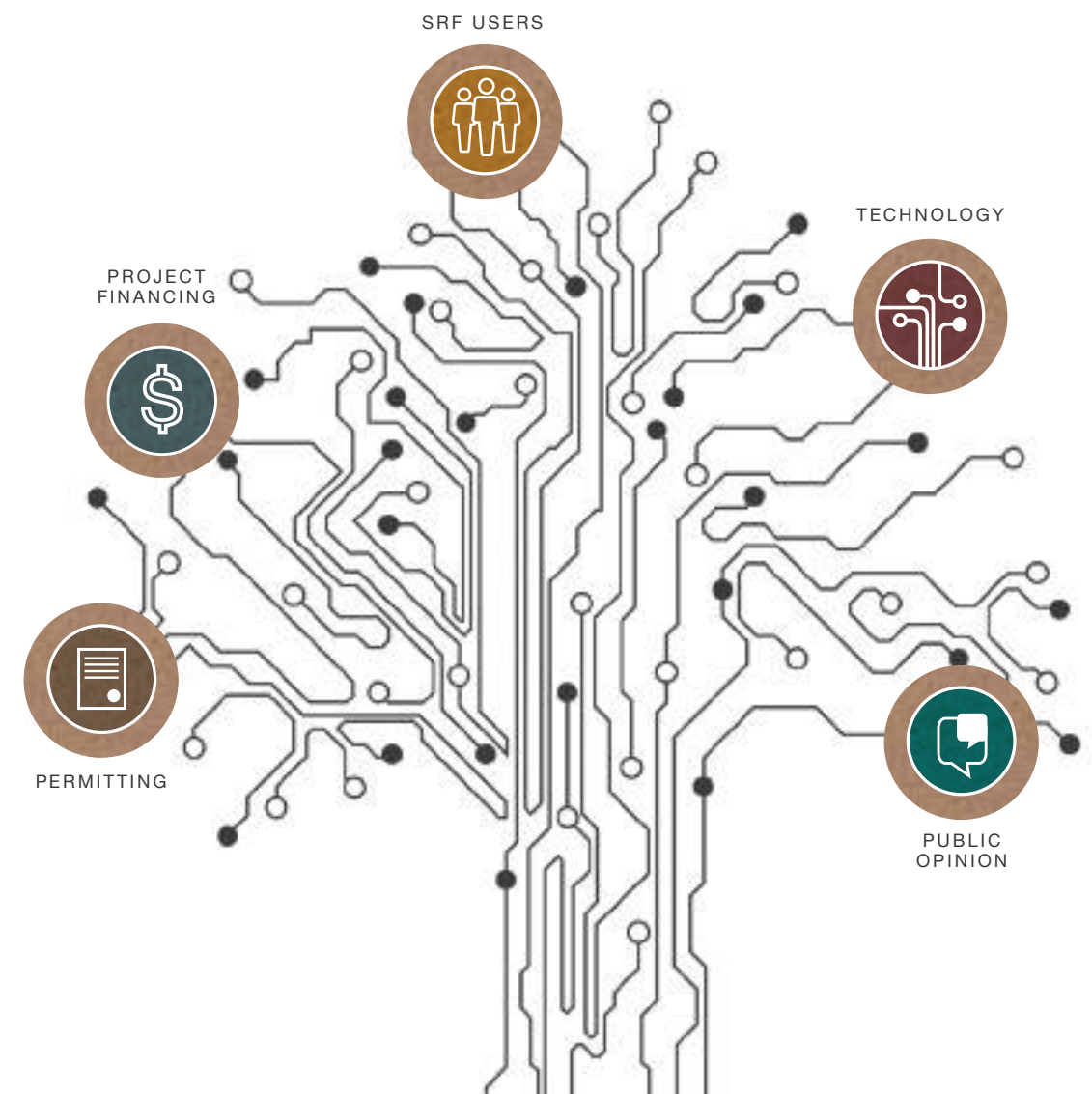


**Welcome
to the Green
Technology
Revolution**





THE OUTSTANDING SOLUTION TO SHAPE A NEW CLEAN BUSINESS





// ENTSORGA: THE ANSWER TO EVERY RECYCLING NEED

In 1997 a small but bold and driven group of young entrepreneurs took a hard look at the current requirements for protecting the planetary environment and came to the conclusion that any effective strategy needed to implement only the best and most reliable among available technologies.

AND SO THEY DECIDED TO FOUND AN ENGINEERING COMPANY WHICH INCLUDED AN INDUSTRIAL PRODUCTION CHAIN DEEPLY INVOLVED IN EACH SINGLE STAGE OF THE WASTE DISPOSAL AND RECYCLING PROCESSES, **AS A POWERFUL STEP TOWARDS ATTEMPTING TO SOLVE THE EFFECTS OF WIDESPREAD, EVER-GROWING POLLUTION AND CLIMATE CHANGE.**

Over almost two decades that same company, which was christened ENTSORGA, has developed a remarkable number of solutions in the fields of both waste management and energy production.

Such a process of continuous improvement in research and design has led ENTSORGA to grow into a key player worldwide in providing proprietary technologies for:

- COMPOSTING
- BIOSTABILIZATION
- BIODRYING
- ANAEROBIC DIGESTION
- ALTERNATIVE FUEL FOR THE CEMENT INDUSTRY
- CELLULOSIC BIOETHANOL

In addition, over the course of its life Entsorga has diversified its activities by building and managing waste treatment plants as well as creating several subsidiaries abroad, in order to better offer its technological achievements to a truly worldwide clientele. The company currently operates over four continents:

Europe, Africa, North and South America.

Entsorga is able to provide a vast range of services relating to the project process of waste treatment plants, from the initial steps of conception, planning, design and advising to every stage of the final implementation.

Today the company can rightfully boast considerable experience in the construction of waste treatment plants, together with an ample choice of technological offers: such a know-how and product range allow Entsorga to fulfill every potential need, from facilities conceived for small communities to large-sized, fully automated plants.

ENTSORGA IS ROUTINELY ABLE TO DEFINE AND ACTUALIZE SPECIFIC SOLUTIONS, INCLUDING LANDFILL DIVERSION AND RECYCLING TARGETS, THAT ARE TAILOR-MADE TO MEET ALL CUSTOMER REQUIREMENTS.





TRANSFORMATION IS THE ENGINE OF OUR REVOLUTION

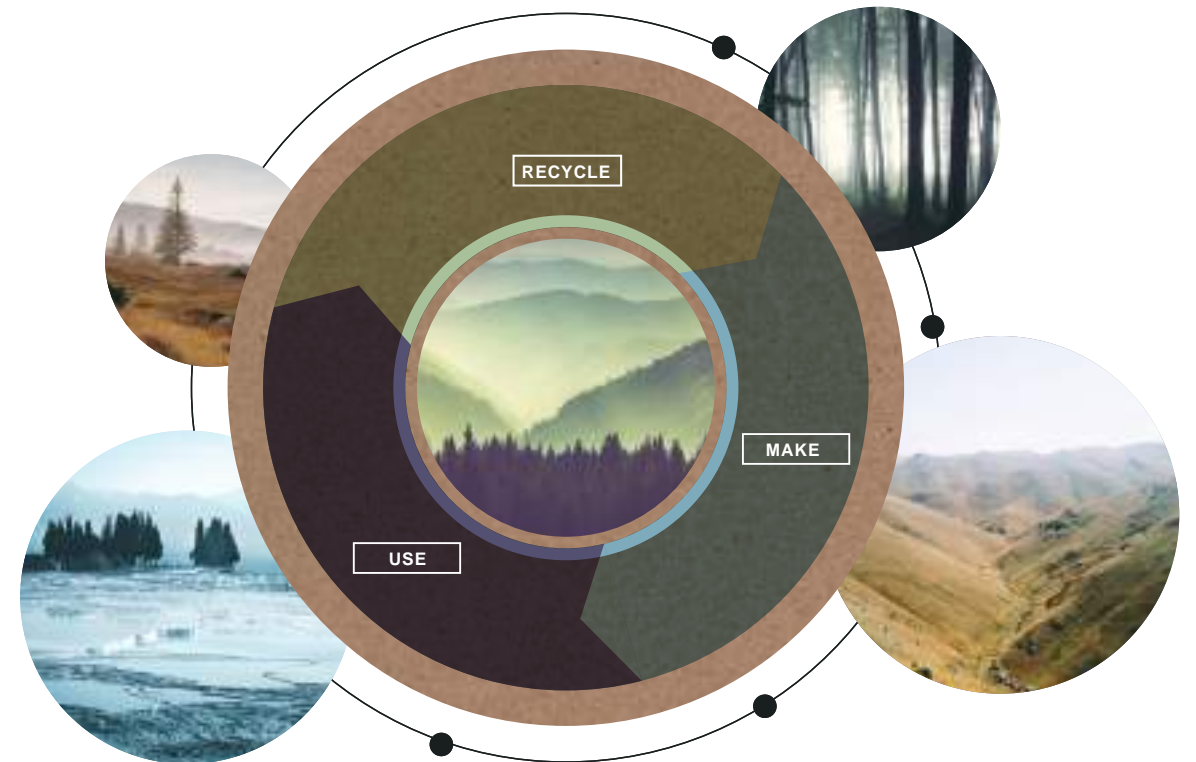
ENTSORGA'S FOREMOST DRIVER IS THE PRINCIPLE OF SUSTAINABLE DEVELOPMENT:

a revolutionary concept of the highest importance in our current historical environment and which has been accepted as a central policy objective of the European Union while gaining widespread traction worldwide.

The contemporary regulations for recycling, recovery and landfill diversion have created a significant market for new technologies devoted to waste treatment.

ENTSORGA PROVIDES PROVEN AND BANKABLE PROPRIETARY TECHNOLOGIES FOR RECOVERING AND VALORIZING WASTE THAT CAN BE THEREFORE REPO- SITIONED IN THE PRODUCTIVE CYCLE.

This way today's waste, if carefully treated, does not end up in landfills but can be granted a second life - thus becoming tomorrow's resource.



It is not the strongest
that survives, nor the most
intelligent, but the one
that is most adaptable to change

Charles Darwin

THESE ARE THE VALUES THAT MOTIVATE ENTSORGA:

- ☐ INTERNATIONAL SCOPE
- ☐ RELIABILITY
- ☐ “GREEN” APPROACH
- ☐ GROUNDBREAKING
ATTITUDE
- ☐ TEAMWORK

WE REACH OUR OBJECTIVES THROUGH TECHNOLOGY WHICH IS:

- ☐ PROVEN
- ☐ BANKABLE
- ☐ INNOVATIVE
- ☐ PROPRIETARY





A BOLD ROADMAP FOR TACKLING CLIMATE CHANGE

ENTSORGA has devoted considerable time and resources to studying the issue of environmental effects of human activities and the solutions, both existing and possible, for its alleviation.

The human impact on the environment is the result of the product of world population by individual average consumption, divided by the product between recycling/mitigating technologies and environmental education.

Because the numerator is constantly increasing, as population grows along with use of resources, we must increase the denominator accordingly.

ENTSORGA'S MISSION IS TO FOCUS ON STUDYING, DEVELOPING AND IMPLEMENTING NEW PROPRIETARY TECHNOLOGIES TO REBALANCE THE EQUATION AND MITIGATE HUMAN IMPACT ON OUR PLANET.

ALL OF THIS CAN BE SUMMARIZED BY
THE SUSTAINABILITY EQUATION BELOW:

Human impact on environment

HI

=

Population

P

x

Consumption

G

T

Technology



PROPRIETARY TECHNOLOGIES WITH ENDLESS R&D IMPROVEMENT

Entsorga is able to offer a full set of proven and bankable proprietary technologies to turn unsorted waste into suitable, high quality resources such as compost or fuels. Our solutions include every aspect of productions to meet the broadest range of customer necessities, with the constant aim of mitigating human impact on our environment.

COMPOSTING

WHY GO FOR COMPOSTING? THE PUTRESCIBLE WASTE THAT GOES TO LANDFILLS GENERATES MASSIVE METHANE EMISSIONS, THUS INCREASING THE GREENHOUSE EFFECT AND ACCELERATING CLIMATE CHANGE.

COMPOSTING is one mean to avoid such emissions, at the same time providing the recovery of organic matter by producing improved soil that can be used in a wide range of fields, from gardening to agriculture. From waste to resource for a responsible management of the future.

FEATURES

The keystone for a good composting is the separate collection of organic waste (i.e. kitchen waste, catering waste, industrial scraps etc.) from which it is possible to produce a high quality compost, suitable for agriculture and floriculture.

Entsorga has developed a number of fully proven and bankable proprietary technologies (see box aside) to make it possible to implement composting treatment in a variety of situations: from small and medium plants to large automated plants.

ALL TECHNOLOGIES ARE FOUNDED ON THE FOLLOWING PRINCIPLES:

- Speed up the process by means of computer controlled forced aeration.
- Carry out the treatment in enclosed areas kept in negative pressure to avoid odor release.
- Very efficient odor control on emissions by means of proprietary biofilters.
- Limited footprint, modularity and upgradeability.
- Use process automation in order to have a 24/7 continuous process control.
- Limit labor cost by using automated equipment.
- Limit operators' exposure to foul air, dust and possible pollutants.
- Improve working conditions wherever possible, increase H&S standards.
- Increase as much as possible the reliability of the equipment with continuous improvements.

Composting is accessible, easy to implement and generates many benefits: it avoids methane emission from waste, contributing in a tangible manner to limiting climate change; it is one fundamental solution to reach zero landfills; it contributes towards agriculture sustainability, making it possible to reduce the use of chemical fertilizers, to improve soil quality, to reduce the energy required for cultivations, improving water retention and soil structure.

COMPOSTING PLANT, Territorio e Risorse, Santhià, Italy

COMPOSTING PLANT, La Città Verde, Crevalcore, Italy

COMPOSTING PLANT, Consorzio Industriale Provinciale di Nuoro, Pratosardo, Italy

RELATED TECHNOLOGIES

Bat Q-Ring®

Coccinelle

Q-Ring®

Turtle Q-Ring®

Bee

Scarabeo®

Automated Overhead Cranes

Biofilter



BIOSTABILIZATION

THE MECHANICAL BIOLOGICAL TREATMENT (MBT) FOR BIOSTABILIZATION AIMS TO REDUCE THE IMPACT ON THE ENVIRONMENT OF THE PUTRESCIBLE FRACTION OF UNSORTED WASTE WHEN LANDFILLED. IT DELIVERS REDUCTION IN GREENHOUSE GASES EMISSION AND IN LEACHATE PRODUCTION.

FEATURES

Two kinds of approach to the MBT process can be distinguished, according to the plant used in the mechanical and biological phases:

- the traditional two flow treatment system - where the input waste is shredded and screened, the underscreen is sent for biostabilization and the overscreen is sent for recycling or recovery
- the single flow treatment system - where all the material is shredded and then sent for bio-oxidation

Biostabilization is an aerobic oxidation that mineralizes the putrescible fraction of the unsorted MSW (Municipal solid waste).

THE PROCESS INCLUDES TWO STAGES:

- a first stage of mechanical selection, executed according to each of the two methods above
- a second of aerobic digestion of the putrescibles.

Entsorga provides a full range of proprietary, proven technology to adapt the plant design to the needs of the users: from entry level and emergency plants up to large automated plants ranging up to 300.000 tpa of MSW.

RELATED TECHNOLOGIES

Bat Q-Ring®

Coccinelle

Q-Ring®

Turtle Q-Ring®

Bee

Scarabeo®

Automated Overhead Cranes

BIOSTABILIZATION PLANT, Belvedere Spa, Peccioli, Italy

STABILIZATION PLANT, Deco Spa, Chieti, Italy

STABILIZATION PLANT, Alba County Council, Galda de Jos, Romania



BIODRYING

BIODRYING IS AN AEROBIC BIOLOGICAL DIGESTION TREATMENT FOR REMOVING MOISTURE FROM A WASTE STREAM.
THE DRIED WASTE CAN BE USED TO PRODUCE SRF (SOLID RECOVERED FUEL) AND PEF (PROCESSED ENGINEERED FUEL).
THE ENTSORGA PROPRIETARY TECHNOLOGIES MAKE THE TREATMENT EASY, QUICK AND EFFICIENT.

FEATURES

Why go for bio-drying? Biodrying is usually a step to produce SRF (Solid Recovered Fuel) and PEF (Processed Engineered Fuel). It dries out the waste and makes cleaner mechanical refinement possible.

We decided to present the biodrying solution also in a stand-alone form, as in the past it was believed possible to produce a suitable SRF from just mechanically sorting and shredding the waste; a number of plants have been designed and built on this assumption.

From the scientific literature is now clear that this assumption was wrong and that the moisture within every waste stream is heavily compromising the final quality of the alternative fuel, keeping the heating value low.

Entsorga offers a full set of solutions for upgrading existing SRF production plants by adding a biodrying section and dramatically improving the final quality of the alternative fuel.

RELATED TECHNOLOGIES
Bat Q-Ring®
Coccinelle
Q-Ring®
Turtle Q-Ring®
Bee
Automated Overhead Cranes



BIODRYING PLANT,
Alte Madonie Ambiente Spa,
Castellana Sicula, Italy



MBT PLANT, Hills Group,
Westbury, UK



MBT PLANT, Hills Group,
Westbury, UK



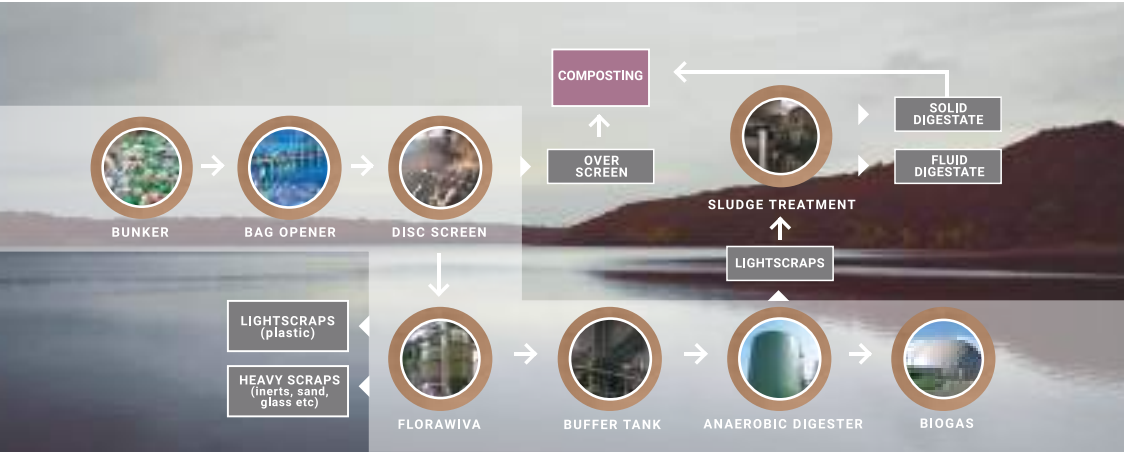
ANAEROBIC DIGESTION

ANAEROBIC DIGESTION IS A BIOLOGICAL PROCESS TO GENERATE BIOGAS FROM PUTRESCIBLE WASTE TO BE USED FOR POWER PRODUCTION OR REFINED INTO METHANE AS VEHICLE FUEL.

FEATURES

In the AD process the putrescible waste is converted, in total absence of oxygen, into biogas which is mainly made up of methane and CO₂ and is eligible as renewable energy.

The anaerobic phase



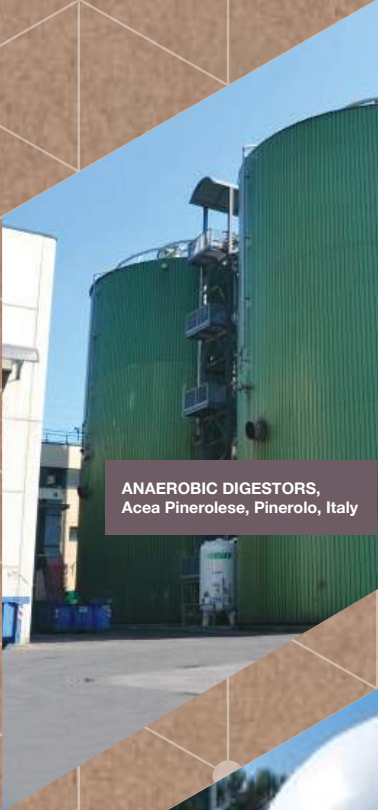
THE AD PROCESS HAS CONSIDERABLE ADVANTAGES:

- It makes it possible to produce valuable renewable energy (electric power or vehicle fuel)
- Allows for efficient odor control
- Improves the energy balance of the plant
- Requires a very limited footprint

The AD is the natural complement of a composting plant as composting is the best way to recycle the solid part of the digestate. In truth AD can replace the active phase of composting. AD really produces Green Energy and it is ultimately an industrial plant in itself. In cooperation with Acea Pinerolese, Entsorga offers to the market a proprietary and referenced technology for anaerobic digestion: the patented Florawiva and Cow system.

RELATED TECHNOLOGIES

Cow e Florawiva



ANAEROBIC DIGESTORS, Acea Pinerolese, Pinerolo, Italy



GASOMETER, Acea Pinerolese, Pinerolo, Italy



ANAEROBIC DIGESTION PLANT, Acea Pinerolese, Pinerolo, Italy



ALTERNATIVE FUEL FOR THE CEMENT INDUSTRY

THE WHOLE CEMENT INDUSTRY HAS SET AS A STRATEGIC GOAL TO GO FOR MORE BIOGENIC ALTERNATIVE FUELS IN ORDER TO REDUCE CO₂ EMISSIONS, IMPROVE THE ENVIRONMENTAL FOOTPRINT OF THE PROCESS AND REDUCE THE DEPENDENCY FROM FOSSIL FUELS. ENTSORGA HAS MADE AVAILABLE A FULL SET OF PROVEN AND BANKABLE TECHNOLOGIES TO TURN UNSORTED MSW (MUNICIPAL SOLID WASTE) INTO A SUITABLE PROCESSED ENGINEERED FUEL (PEF). OUR SOLUTIONS COVER ALL ASPECTS OF PRODUCTION INCLUDING TRANSPORT, DELIVERY AT SITE AND FEEDING THE FUEL INTO THE KILN.

FEATURES

With the exception of water, cement is the most used matter in the world and the cement industry is strongly committed to make the production process more sustainable and more energy efficient. One of the keystones of its policies is to replace fossil fuels (sometimes dirty fuels due to the sulfur content) with alternative fuels, better if renewable.

In Europe some plants have already achieved a substitution ratio of more than 80%. The SRF (Solid Recovered Fuel) produced out of the MSW is strictly standardized and regulated. In the US the Non-Hazardous-Secondary-Material (NHSM) rules have opened the possibility to produce a fuel with the characteristics of a commodity. The Entsorga PEF Prometheus has obtained by the US EPA the status of non-waste and therefore can be transported and traded as a commodity.

The Entsorga proprietary technologies make it possible to produce a processed engineered fuel out of MSW by treating the waste mechanically and biologically in order to obtain a dry and homogeneous fluff with a heating value of 16-18 MJ/kg, suitable to be fed to the kilns pneumatically or mechanically. The technologies are fully proven and bankable and have been approved by countless due diligences by independent certifiers.

In order to supply a full service to the users, Entsorga is now capable of delivering to the cement kilns complete feeding systems made up of docking stations, storage and handling equipment, dosing system and pneumatic or mechanic feeding to the kilns. All systems are fully referenced and proven.

OUTGOING SRF, MBT PLANT, Hills Group, Westbury, UK

ALTERNATIVE FUEL DOSING AND FEEDING SYSTEM, Essroc, Nazareth, USA

RELATED TECHNOLOGIES

Turtle Q-Ring®

Bee

Prometheus

Pelican

Falcon

Automated Overhead Cranes

ALTERNATIVE FUEL DOSING AND FEEDING SYSTEM, Essroc, Nazareth, USA



CELLULOSIC BIOETHANOL

SECOND GENERATION PROCESSES TO PRODUCE BIOETHANOL OUT OF CELLULOSE ARE THE GREAT INNOVATION FOR RENEWABLE FUELS AND SUSTAINABLE CHEMISTRY.

ENTSORGA HAS DEVELOPED A PROPRIETARY TECHNOLOGY FOR HANDLING AND PRE-CONDITIONING BULK BIOMASSES TO BE FED TO THE CELLULOSE-BIOETHANOL CONVERSION PLANT.

FEATURES

Cellulosic ethanol is ethanol (ethyl alcohol) produced from cellulose (the stringy fiber of a plant) rather than from the plant's seeds or fruit. It is a biofuel produced from grasses, wood, algae, or other plants. The fibrous parts of the plants are mostly inedible to animals, including humans, except for ruminants. At present nearly all of bioethanol is produced out of starches or sugar-based dedicated crops such as sugar cane, corn or sugar beet. These crops compete with food crops and many countries are now limiting the amount of bioethanol produced from starch/sugar-based crops.

Cellulosic feedstocks are non-food-based feedstocks that include crop residues, wood residues, dedicated energy crops, and industrial and other wastes. All methods require a homogeneous and preconditioned feedstock and this is of paramount importance when the feedstock is made up of mixed residues from agriculture.

The considerable amount of masses and volumes of bulk materials to be handled in industrial plants requires special solutions to contain costs and achieve the required reliability.

Entsorga has developed **a proprietary, referenced and proven technology** to pretreat the material by opening the biomass bales, removing unwanted elements (stones, earth, steel), shredding the biomass to the desired dimension, eventually wash it and then store and dose the feedstock.

The Entsorga automated cranes developed for waste handling are also a very powerful tool to deal with large amounts of bulk materials, delivering low handling cost due to automation and making it possible to considerably reduce the storage footprint.



CELLULOSIC BIOETHANOL PLANT, Crescentino, Italy



CELLULOSIC BIOETHANOL PLANT, Crescentino, Italy



CELLULOSIC BIOETHANOL PLANT, Crescentino, Italy

RELATED TECHNOLOGIES

Automated Overhead Cranes





TECHNOLOGIES

ENTSORGA'S TECHNOLOGIES ARE PROPRIETARY, PROVEN AND BANKABLE. THE PRINCIPLES ON WHICH THEY ARE BASED ARE: ENVIRONMENTAL PROTECTION, USER FRIENDLY APPROACH, PROCESS AUTOMATION IN ORDER TO INCREASE EFFICIENCY AND RELIABILITY, LOW ENERGY CONSUMPTION, CONTINUOUS IMPROVEMENT.



ENTSORGA'S PROPRIETARY TECHNOLOGIES



REACTORS

Bee

Automated plants with single reactor and high capacity

Coccinelle

Container reactors for medium-small capacity plants

Turtle Q-Ring®

Biocelles with breathable fabric roof

Bat Q-Ring®

Mobile plant with breathable covers

Q-Ring®

Breathable covers

Scarabeo®

Biotunnels with biofilter

Cow & Floraviva

Anaerobic digestion



MECHANICAL TREATMENTS

Automated Overhead Cranes

Automated handling of bulk materials

Prometheus

Alternative fuel mechanical refining for cement industry

Pelican

Alternative fuel feeding system for cement industry

Falcon

NIR (Near Infra Red) optical sorter for removing PVC from alternative fuel



EMISSION

GeCo₂®

Methane abatement in landfill gas

Biofilter

Odor control





THE CIRCULAR ECONOMY GOES GLOBAL

Thanks to its comprehensive network of main facilities and representative offices, which are spread over three continents, ENTSORGA is able to meet the necessities of its customers on a multinational scale.

- MAIN OFFICES AND PLANTS
- REPRESENTATIVE OFFICES

ENTSORGA USA

ENTSORGA
WEST VIRGINIAENTSORGA
BRAZILTERRITORIO
E RISORSEENTSORGA
ITALIA SPA

ENTSORGA UK

ENTSORGA
POLANDENTSORGA
ROMANIAENTSORGA
GREECE



Revolution is not a matter of merit, but of efficacy

Jean-Paul Sartre

CORPORATE SOCIAL RESPONSIBILITY (CSR)

ENTSORGA UNDERSTANDS CSR AS THE ABILITY TO MANAGE THE COMPANY WITH A RESPONSIBLE AND SUSTAINABLE APPROACH WHICH GUARANTEES THE CONTINUITY IN TIME OF THE COMPANY'S LIFE.

THAT IS WHY ENTSORGA HAS ALIGNS ITS CORPORATE POLICIES WITH ECONOMIC, SOCIAL AND ENVIRONMENTAL OBJECTIVES IN ORDER TO ENSURE THE COMPANY'S SUCCESS OVER TIME.

SUPPLIERS

The supplier is an integral part of our supply chain and for this reason we ask him to adopt the ISO 9000 and ISO 14000 certifications. At the same time we are committed to sharing our strategic projections, guarantee back to back payments, make advance payments or cover our obligations with financial contracts, conduct training courses/briefings.

HUMAN RESOURCES

Patents, trademarks and know-how shall ensure Entsorga's success and this wealth is produced basically from intellectual work of women and men who work in Entsorga. Our team is the corner stone underpinning our future.

CUSTOMERS

Entsorga wishes to guarantee a continuous improvement of its technologies and solutions, realization, after sale service, research and development in order to obtain maximum customer satisfaction.

ENVIRONMENT

Entsorga defines its objectives in terms of environmental certifications, analysis and output of its annual emissions balance, energy efficiency improvement.

COMMUNITY

Entsorga supports sport associations for "open air" sports, activities for the local communities, initiatives for the dissemination of Corporate Culture and initiatives for the increase of the territory attractiveness for young graduates.



ENTSORGAFIN S.P.A
ENTSORGA ITALIA S.P.A.
Strada Provinciale per
Castelnuovo Scrivia, 7/9
15057 Tortona (AL) - Italy
PH +39 0131 811383
E-mail: info@entsorga.it

ENTSORGA USA
1904 Eastwood Road, S.te 201
Wilmington NC, 28403
PH +1 910 679 4944

