Welcome to SET ENERGY SERVICES

Green energy and 100% clean mobility integrated within an unique high potential system



**Smart Energy Technologies** 



Discover the potential and possibilities of an Anaerobic Installation to dispose organic waste High yield , zero emissions integrated systems through new technologies

# SET ENERGY SERVICES FOR THE SMART CITY

Reduce the environmental emissions, use local resources available in the territory, offer flexible energy services , programmable on demand and zero emissions vehicles is our objective for a Smart City

Thanks to the implementation and the integration of high efficiency renewable technologies, we eliminate the concept of landfill and incineration valorizing waste, solid and liquid biomass in clean energy, through ecological systems of pyrogasificazion and biogas



High yield , zero emissions integrated systems through new technologies

#### The types of waste treated are:

- Solid urban waste.
- Polluting special waste, expired medicinal, hospital waste
- Industrial and communal sludges and water waste.
- Wood, plastics, tires.
- Waste from production discards of agri-food and other industries, animal manures.



High yield , zero emissions integrated systems through new technologies

The electrical energy locally produced, from disposal systems or from other plants using renewal energy, thanks to a storage system on compressed air, can be used " on Demand" to supply important urban services such as conditioning systems, land and maritime transport, without any carbon emissions, or it can be converted into green electric energy, through an eco-friendly air compressed engine.

Our integrated system is based on eco-friendly plants; they are compact, modular and easy to install; indeed with minimal civil works, as we have adopted also transportable plant solutions in containers.

Polluted lands, can be revalorized through our decontaminating system, and then to be used for the installation of the plant itself.

The flexibility and the optimal integration between the various systems will be the key to interpret the future of the different green technologies and their applications such as air compressed vehicles, thermal systems and the energy system, to have smart grids (micro grids) for a real Ecological Smart City with a general vision and a complete and virtuous management of the global energy system.



### PYRO-GASIFICATION SYSTEM FOR WASTE DISPOSAL

# **Pyro-Gasificator**

Our objective is to produce thermal and electrical energy with eco-sustainable technologies , through the disposal of urban, industrial, agricultural and animal waste, allowing the elimination of landfills.



Our systems are modular, compact, easy to install and engineered according to the production site .They meet precisely the waste disposal needs of small, medium and large waste collection centers, whether private or public.

Thermal and Electrical energy production using sustainable technologies, by disposing urban and industrial waste

### **PYRO-GASIFICATION TECHNOLOGY**

Through a **patented system** which uses a process that transfers heat directly in the heart of the raw materials (biomass or waste), in an anaerobic environment, through steel balls that are heated at a temperature between 450° and 1050°. Within an unique process of a few minutes we can transform 93 to 95% of the organic materials into SYNGAS.

The steel balls are heated inside micro- ovens and 50% of the energy used during the heating process is recuperated.

#### **PYRO-GASIFICATION PRINCIPLE SCHEME**





#### **PYRO-GASIFICATOR**

The pyro-gasification technology used by SET ENERGY SERVI-CES allows transforming up to 95% of the carbon through a single process cycle, thus allowing a high production of SYNGAS. The consumption of energy to produce syngas is between 10% to 20% of the production of the all process.

This system can also produce oil (diesel type) from products such as tires or other polluting products with zero emissions

### PYROLYSIS AND ENVIRONMENT

The tests done with highly polluted products revealed very positive results for the environment. In particular the CO2 emissions remained below 300 Kg/T, which means 70% lesser compared to modern incineration technologies.

# **BIODIGESTION AND BIOGAS**

BIODIGESTION : technology for the agro-industrial waste.

The use of another type of reactor operating without oxygen, in the treatment of agro industry water waste purification, permits to eliminate their pollution and to produce biogas.

The principle is based on a patented technology UASB that implements a bed of granular sludge in an ascending flow.

This type of compact reactor, powers up quickly, and accepts important soluble organic charges.

Its small size and the energy savings it generates, makes this technology particularly suitable for the treatment of liquid waste produced by the food industry.

The residues of bio-digestion process become the raw material for the pyrolysis process.

This process allows industries (as cheese factories) to become autonomous in its own energy supply.









# INTEGRATED TECHNOLOGIES FOR A SMART CITY



# LOCAL RESOURCES...



...for local energy and clean mobility in the city

Airpower high efficiency compressed air engine

Air Power developed the first efficient air compressed engine with an international patent that permits to increase over four times the actual performances known.

The use of compressed air as a means of propulsion, allows great flexibility and various applications in different fields, all highly ecological.

Via a conversion kit, the air propulsion can be applied to existing engines and plants.

# **COMPRESSED AIR ENGINE APPLICATIONS**



# ENERGY STORAGE

Taking advantage of the fluid dynamic air properties and the efficiency of the compressed air engine, it is possible to store electrical energy in the form of compressed air and use it again when it is requested to power utilities, cold chain or to produce energy by turning on an alternator. The production of electricity can be predictable in its feeding and dispatchable, contributing to an higher quality and safety of the electrical system.

These systems lend themselves to be used for both performances "in power" or "in energy".

#### **AIR POWER SUPER COOL PANEL**

Photovoltaic panels connected to the exhaust system of the engine Air Power, in the static version, receive cold air which increases their yield by +/-20%.

This technology permits through a conversion kit to retrofit existing solar parks.



With this Air Power technology, we are able to optimize both plants and energy consumption of utilities.

#### AUTOMOTIVE APPLICATIONS

It will be possible to develop conversion kits for buses destined for urban public transport: in this way , at a very competitive cost, we can get a complete revamping of the fleet of vehicles available, thanks both



to the Power Station for the production of renewable energy, and the lower cost of current management, it will generate a positive cash flow effects for the private and public companies, with zero emissions vehicles and the possibility of purifying the atmospheric air we breathe : each bus can "purify "the air for 500 persons.

It will also be possible to develop conversion kits for vehicles of freight transport. It may be applied to the tank for compressed air and to the turbo alternator to supply auxiliary services; This will turn them into negative emission vehicles: we have calculated that 4000 commercial vehicles can purify the air breathed by a million people.



Full tank pressure [ATM] = 400.00

- Full tank temperature [C] = 25.00
- Tank volume [L] = 1000.00
- Outside air temperature [C] = 25.00
- Wheel circumferences [M] = 1.76
- Running valve (expansion A) [MM] = 5.00
- Maximum running valve[MM] = 80.00
- Diameter of cylinder [MM] = 84.00
- Number of cylinders = 0:00
- Axle Ratio = 4:11
- Gear Ratio = 3.4200 1.9000 1.2800 0.9700 0.8200



## **RESIDENTIAL SERVICES**

SET ENERGY has selected a partner to develop a new concept of residential civil Engineering using compressed air for the production of A-class energy, anti-seismic ecological housing, totally powered by renewable sources : it will be possible to place an Air Power engine in its static version, to obtain electricity, heating, cooling and indoor air purification.

For these houses, an innovative system of photovoltaic panels has been selected ,that can be installed as a hedge or as part of the facade , to increase the efficiency of the panels themselves thanks to an higher ventilation and bigger surface radiation during the year .The heat flux envelope of the house will be increased.





ventilation inlets





Tower "Super Montparnasse" Facade integration project in Paris ( France )

Trapezoidal modules On roof installation project in Switzerland (Sion, 2012)





#### WITH THE INTEGRATED TECHNOLOGIES DEVELOPED BY SET ENERGY SERVICES WE PUT A SMART HOUSE IN A SMART CITY



#### **CONTROL SYSTEM**

An overall control of the entire system will be installed to supervise all the activities during the start-up, operation, and maintenance period. All technical data from the different systems will be received and processed by our system **GEVY** (global energy vision integrator).

Our integration of the various "subsystems" allows us to monitor 24 hours a day all services and applications, optimizing the management, the services, the maintenance and allocating the potential according to needs with an information service for the users in real time.



# **CONNECTION TO THE GRID**

# **POWER ACCUMULATION**

Producing programmable renewal energy, using flexible modules and storage systems that allows to have a Virtual Power Plant, which is a cluster of facilities that are globally managed by a single control center **GEVY**.

By integrating generation, services and storage of the energy for an utilization "on demand", we offer an intelligent energy network as a basis for the development of a smart city. This feature makes that the production of electrical energy can be predictable in its grid input, therefore dispatchable and contributing to the quality and safety of the electrical system. A system to be effective must be integrated and safe.

# **SMART GRID ASPECTS**

Grid characteristics of the SET systems :

- Belonging to RES Distributed Generation
- · Connection interface to the network with defined functions
- Allocation of network services
- Accumulation possibilities

Through the connection, the interaction with the network will be an active type, what creates the bases for the implementation of the Smart Grid philosophy.

# SMART CITY INTEGRATION APPROACH

"Smart Grid" is an intelligent network that can receive bidirectional power flows, that

allows interaction between the producer and consumer,

and determine in advance the

demands of consumption, therefore adapts with flexibility the production and consumption of electrical energy.

A network that communicates exchanging information about the energy flows, managing efficiently peak demands, avoiding power cuts and reducing the loads where it is needed.



### SET ENERGY SERVICES KNOW HOW

#### The main components which allowed us to develop our project :

- The presence of Expert Teams whom are highly experienced both in the field of Renewable Energy New Technologies (Solar / PV [cool panel], Wind, Geothermal and High-speed Self-Generated Biomass), as well as in the Automotive Industry.
- A strong expertise in Engineering and Manufacturing of last generation solar products
- A revolutionary AIRPOWER Engine with negative emissions, whose Patented principles have resulted to be essential in the problem solving of Energy storage.
- An AIRPOWER highly innovative concept of car manufacturing; profitable for the low and
- medium volume, capable of producing a wide range of vehicles with the same platform.
- The ability to design, develop and operate the integration of all the components, above mentioned.

#### The Technology used in our system allows:

- **SIMPLICITY**: in its installation, use and maintenance.
- **YEILD**: the performance of every single process has been the basis of our development, and this means that whole system has a return superior to at least 80%.
- **INTEGRATION**: a supervision and control system that handles the integration of various processes, with an "on-line monitoring and warnings" by assigning the different settings to the system.
- **FLEXIBILITY**: Its compact size allows installations even in containers, and then can be transferred where it is needed.
- **COST-EFFECTIVENESS**: the system provides a solution to various problems such as the problem of WASTE DISPOSAL, it also produces Renewable Energy with high returns.

# SET ENERGY NEWS

The overall project was presented at the international conference about environment in Venice (Italy) which was attended by:

Dr Zanonato, Minister of Italian Economic Development

Dr. Amalia Sartori, President of the Committee on Industry, Research and Energy at the European Parliament.

On this occasion the engine was presented in world premiere.

The project was also presented during a conference at the TIS of Bolzano (Italy) in the presence of Dr Bizzo - innovation commissioner of the province of Bolzano- and of a Tunisian government delegation and to European parliament





www.setenergy.ch info@setenergy.ch