SUSTAINABLE CIRCULAR ECONOMY SOLUTIONS

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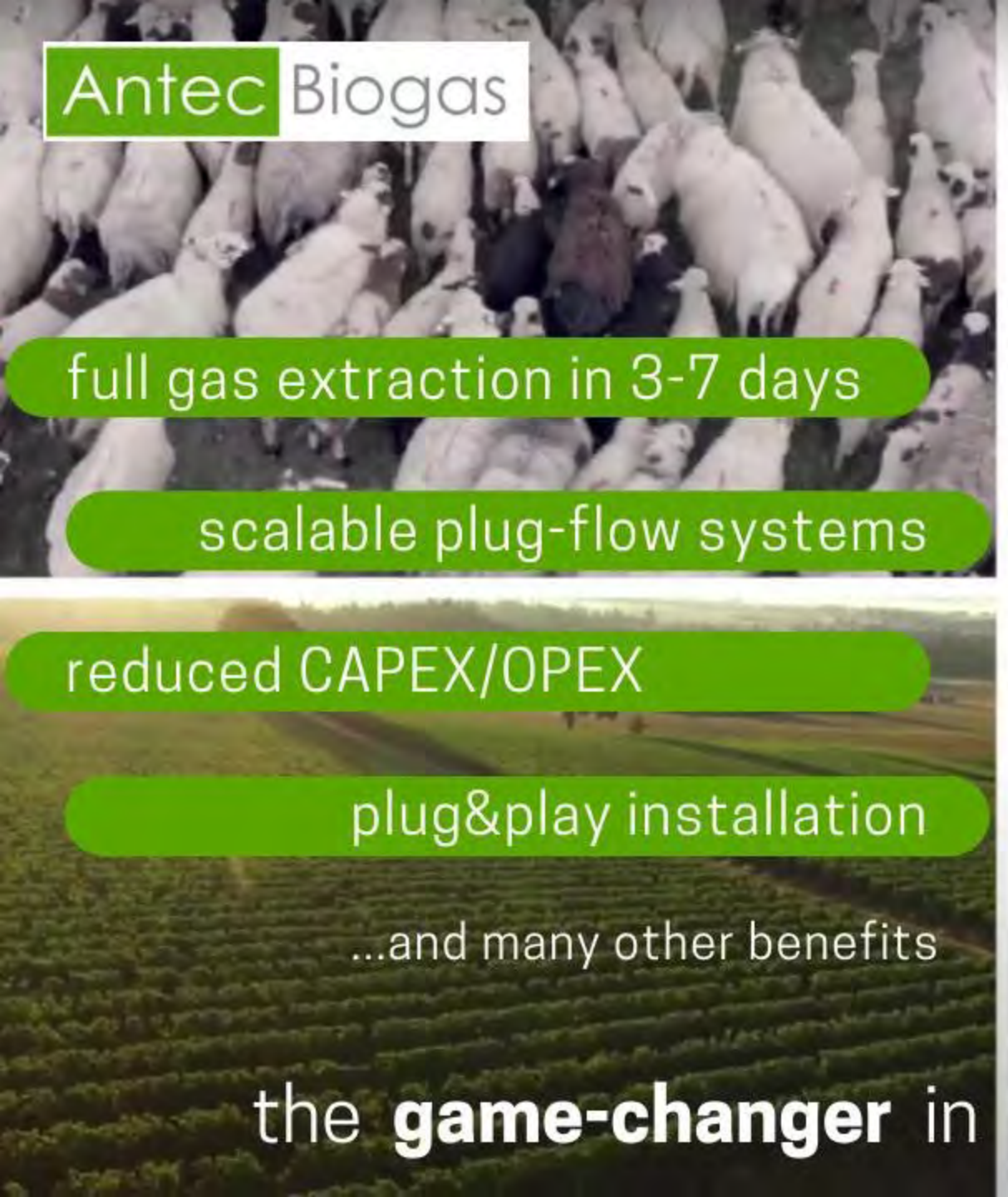
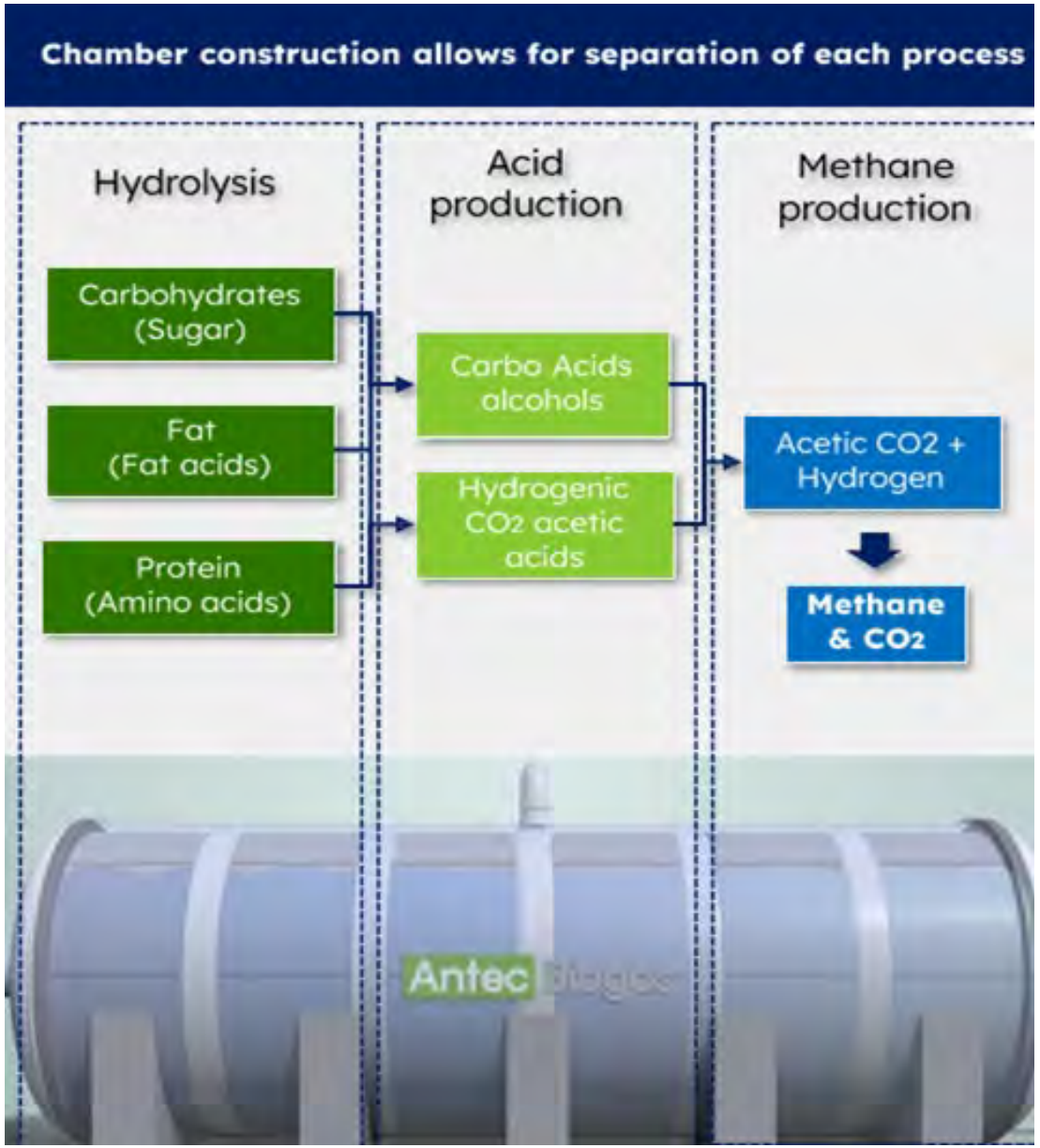
Contents

ANTEC BIOGAS
PATENTED TECHNOLOGY



SPEED UP YOUR BIOGAS PRODUCTION UP TO 5 TIMES



ANTEC BIOGAS PATENTED TECHNOLOGY

PRODUCTION TIME: ANTEC VS BIOGAS UNIT TRADITIONAL BIOGAS INSTALLATION

7 DAYS INSTEAD OF 60 DAYS

https://www.youtube.com/watch?v=Qmm4kQjGIdE

EFFECTIVENESS

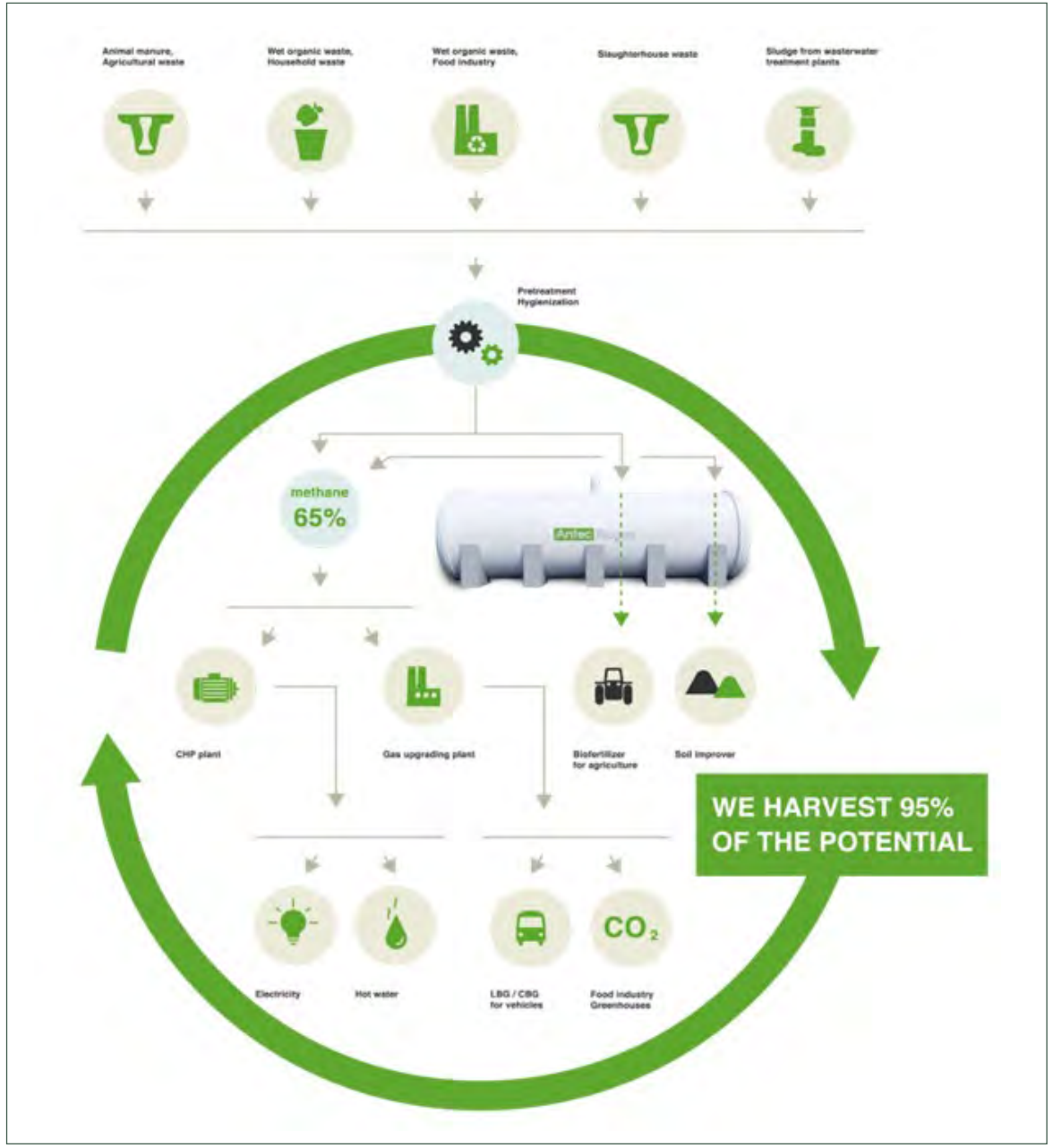
3-5 times faster production than traditional biogas plants, except for the use of a larger share of waste - up to 95% gas efficiency compared to the traditional gas efficiency of 60-80%.

REQUIRED SPACE

Only 1/5 of the space of traditional systems and simple installation buildings are required.

MODULAR MODEL MAKES EASY TO EXTEND

Antec bioreactors are available in 3 sizes and are manufactured in the factory. They are delivered by trucks, which facilitates the start-up and expansion of the installation with minimal costs. Many reactors are built together in powerful complexes that can handle large volumes. This can also be done gradually.



A NEW VERSION OF CIRCULAR ECONOMY

During the digestion, methane is removed from the organic biomass. The biogas is taken out of the reactor and is dried and cleaned of impurities, before it is upgraded to green energy. Biogas for the production of electricity and heat goes via a gas engine, where its' cooling water is warmed up and can be used for heating. In larger plants, biogas is upgraded to fuel. Compressed (CBG) or liquid (LBG) biogas is the fuel of the future for heavy transport, construction machinery and boats.

During biogas production, CO2 can be harvested and become green CO2, which can be used for greenhouses and food production. Sales of upgraded biogas and CO2 are important sources of income to achieve profitable biogas production.

EFFICIENT HIGH SPEED COMPOSTING AND RECYCLING OF ORGANIC WASTE

HIGH SPEED BIOWASTE COMPOSTERS - ORGANIC WASTE RECYCLING AT SOURCE

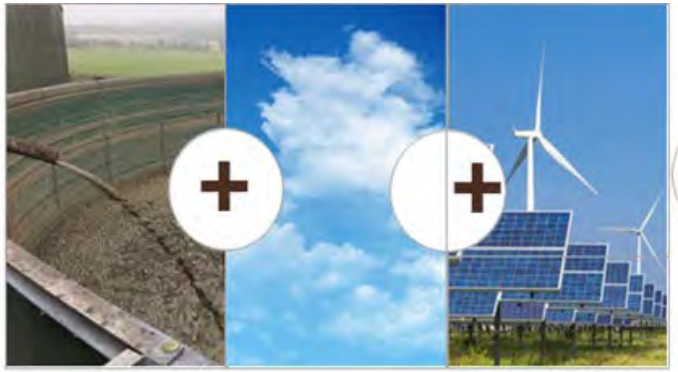
Eliminate biowaste at source with high speed, closed composters with unattended, odorless operations and creation of valuable compost.

Makes Compost in just 1 day

N2 Applied has developed a technology that enables local production of fertiliser from liquid organic substrates such as slurry or digestate with air and electricity. The technology adds nitrogen from the air into the liquid substrate and increases the nitrogen content. The reaction stops the loss of ammonia and reduces emissions, making it an efficient and sustainable fertiliser, and creating a more circular farm system. N2's scalable process enables fertiliser production to be re-distributed to the end-user, the farmer – cutting long and expensive value chains, and reducing the need for chemical fertiliser production based on fossil gas or coal. The solution also provides on-farm emission reductions of methane and ammonia, as well as odour.

ENRICHED ORGANIC FERTILIZER

N2 Applied



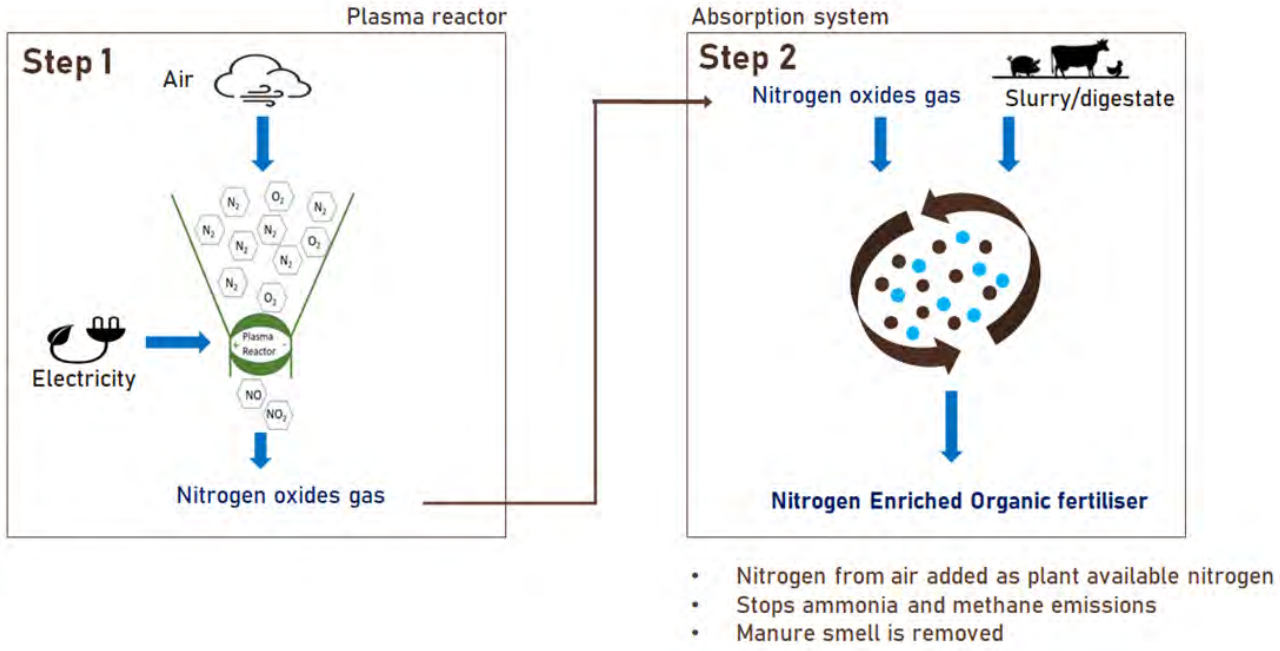
Slurry / Digestate

Air

Electricity

N2 Unit

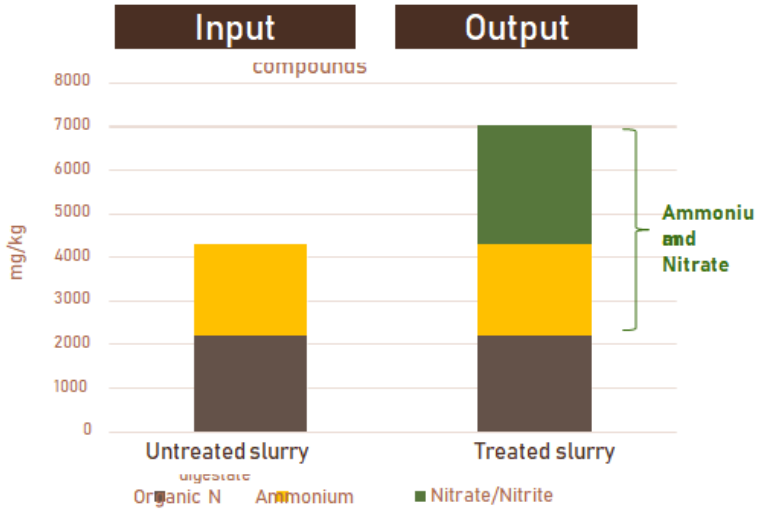
Nitrogen Enriched Organic fertiliser

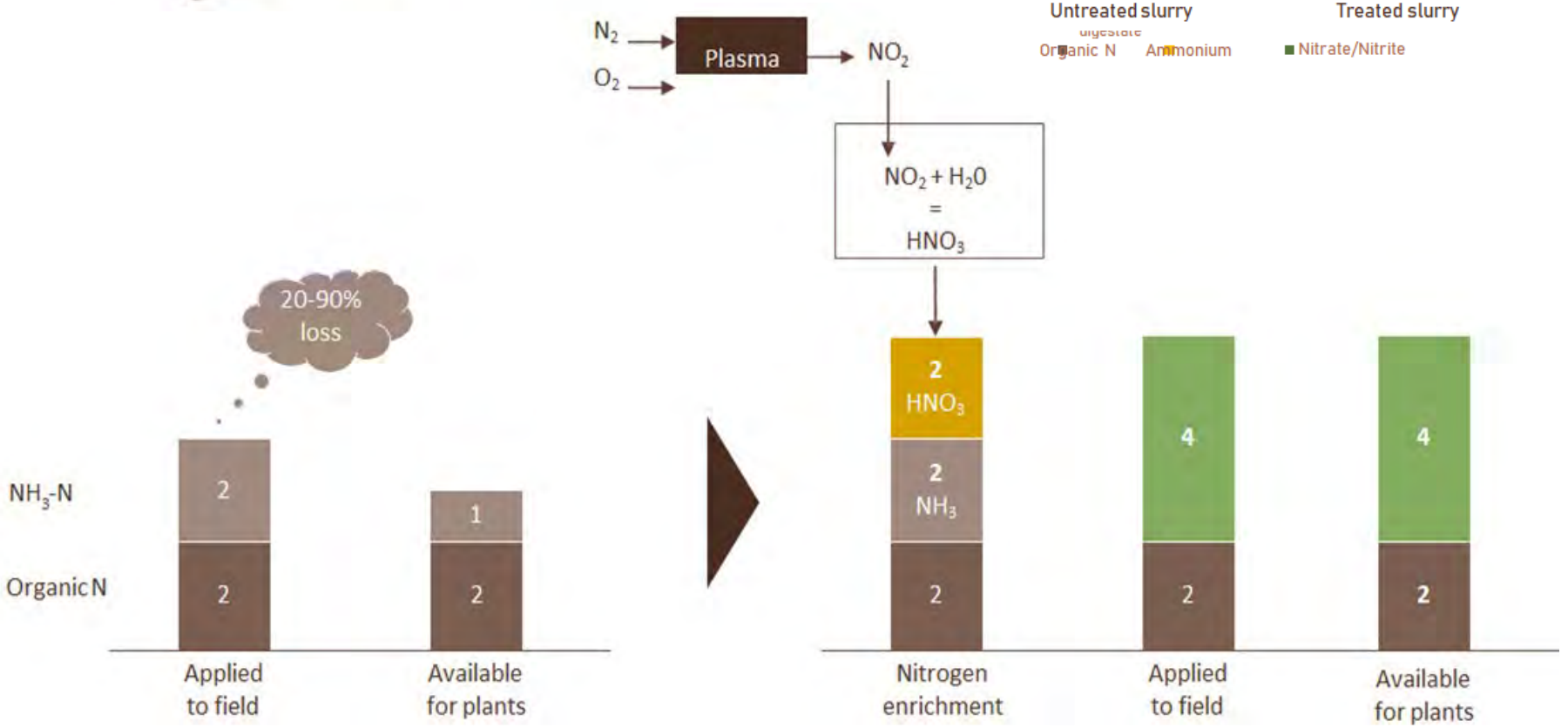


- Nitrogen from air added as plant available nitrogen
- Stops ammonia and methane emissions
- Manure smell is removed

SLURRY & DIGESTATE TREATMENT FOR ENRICHED ORGANIC FERTILIZER PRODUCTION

Produce Nitrate and bind ammonia-N *Doubling the ammonia-N content*

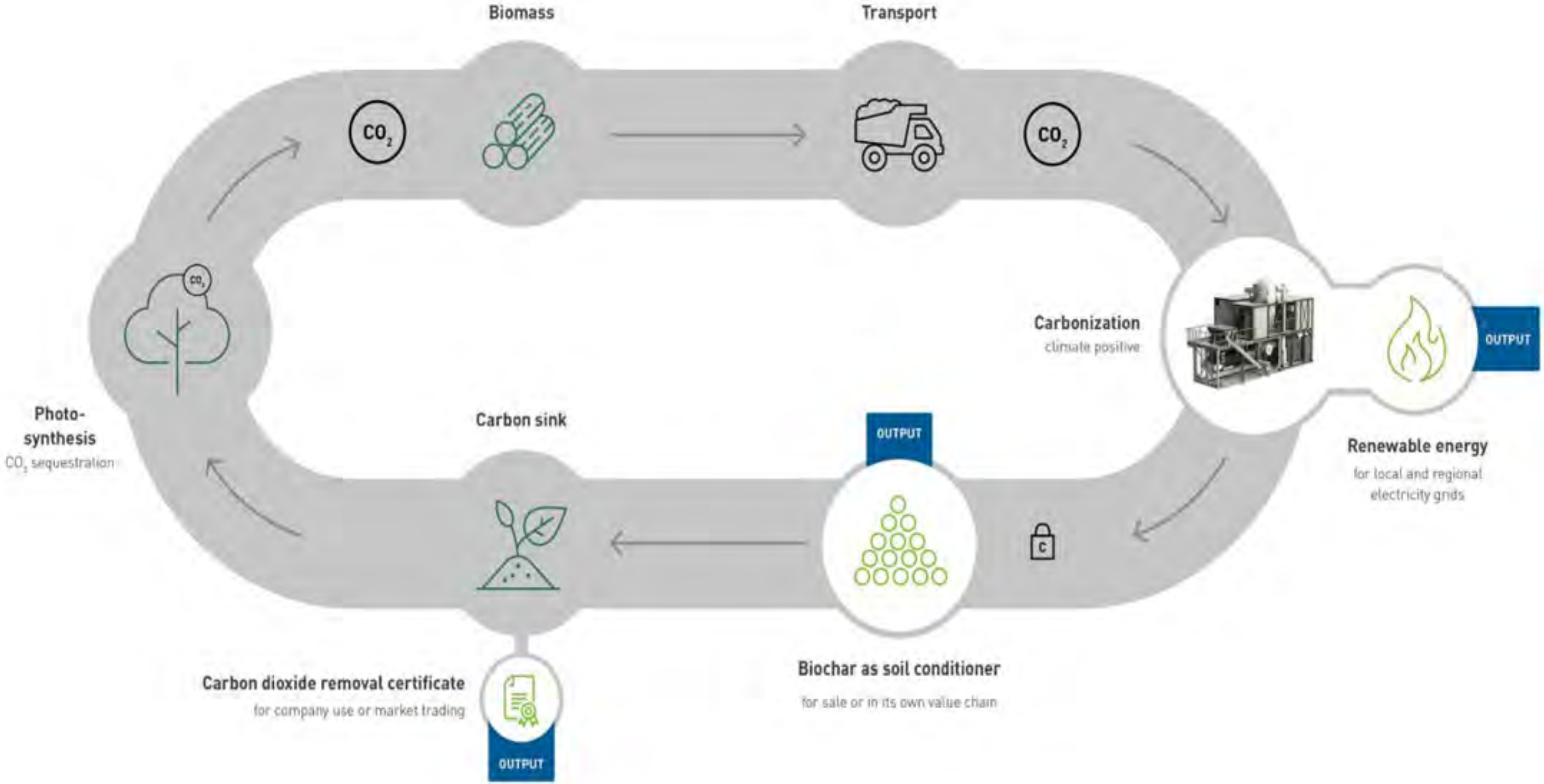


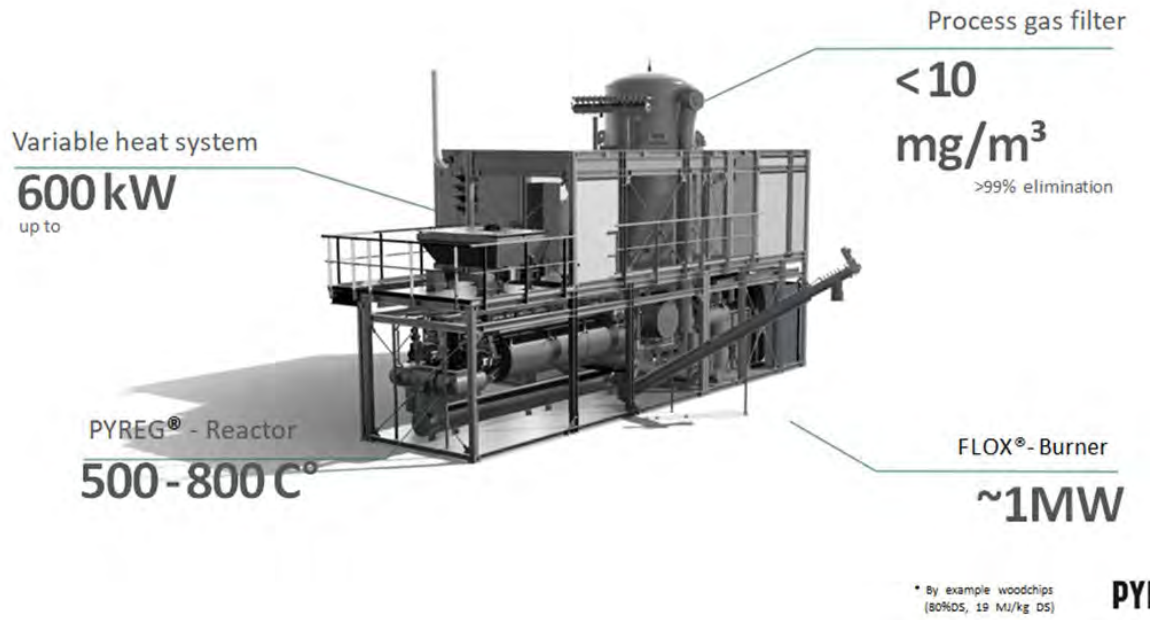


SLURRY & DIGESTATE TREATMENT FOR ENRICHED ORGANIC FERTILIZER PRODUCTION

Produce Nitrate and bind ammonia-N *Doubling the ammonia-N content*

CARBON REMOVAL & BIOCHAR TECHNOLOGY

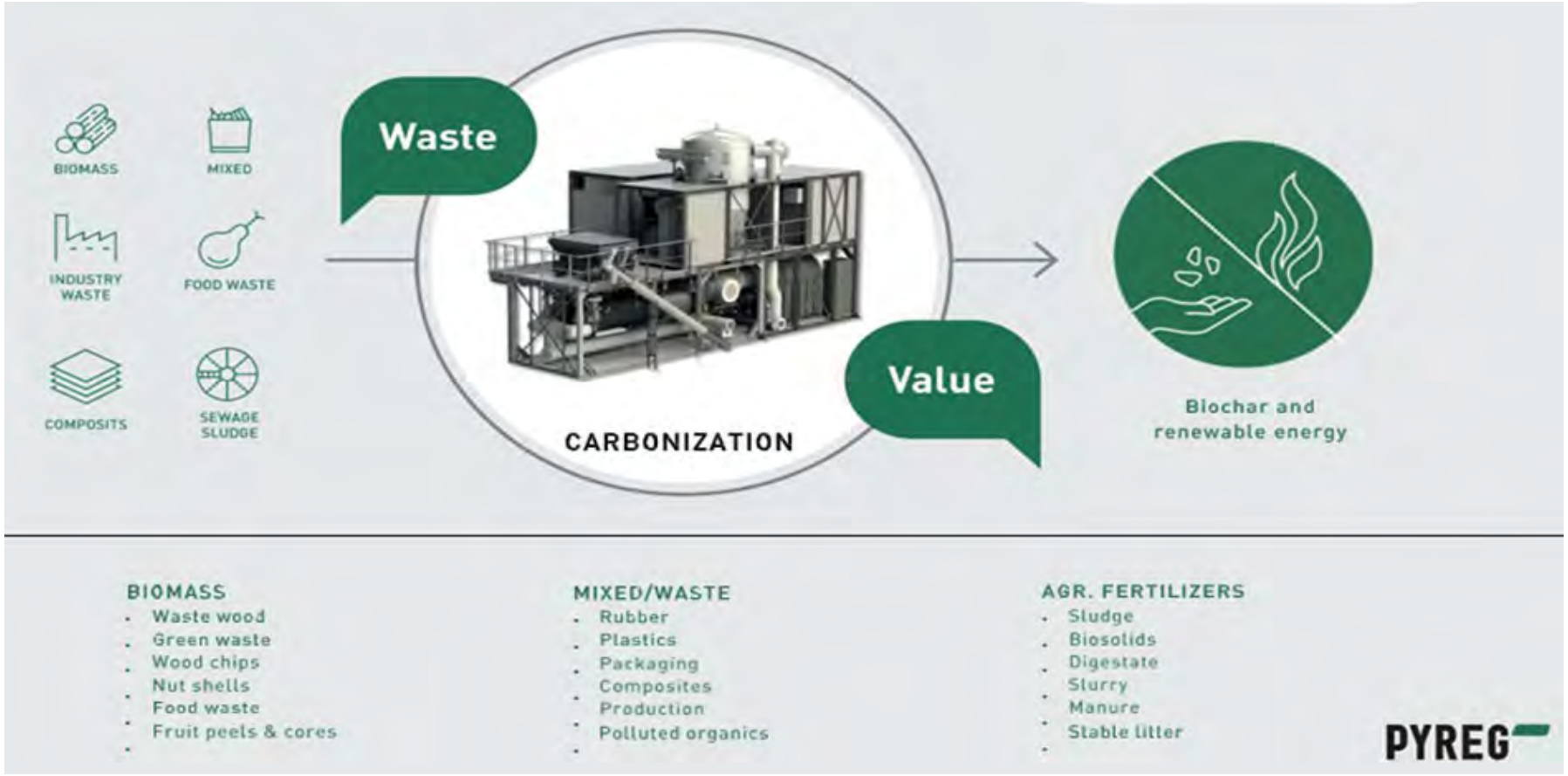

Biomass
Transport
CO_2
CO_2
Carbonization
climate positive
OUTPUT
Renewable energy
for local and regional electricity grids
Photo-synthesis
CO_2 sequestration
Carbon sink
OUTPUT
C
Biochar as soil conditioner
for sale or in its own value chain
Carbon dioxide removal certificate
for company use or market trading
OUTPUT

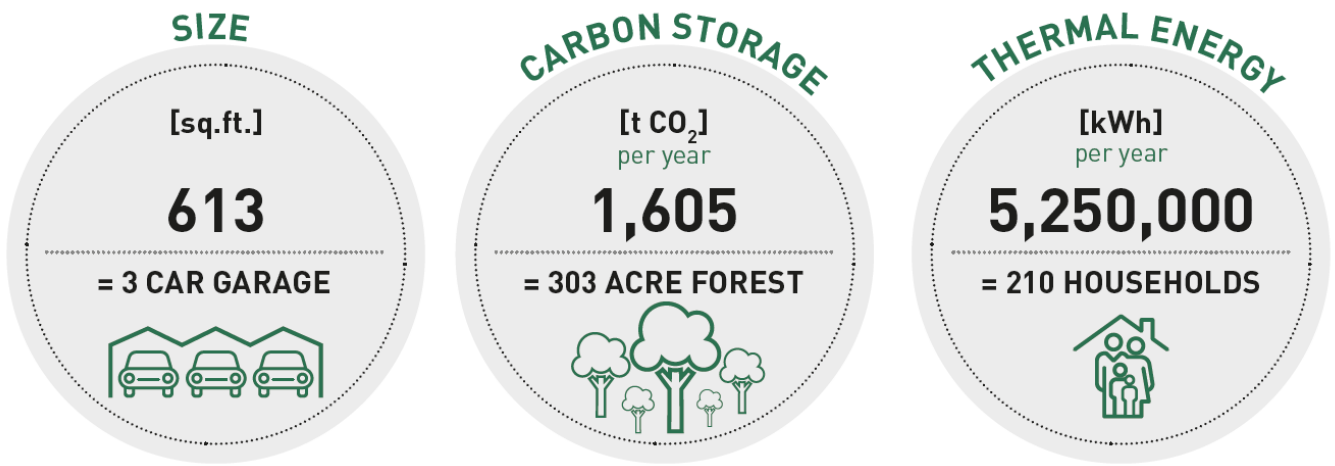


WHY BIOCHAR

The PYREG PX1500

PYREG BIOCHAR MULTI-MATERIAL CAPABILITY





EFFICIENT LIGHTING

3 optic options

Aisle
Wide Diffuse
Wide Clear

lightelligence enabled

2 mounting options

Aircraft Cable
Fixed Mount/Pendant

Lumen output

9,274 to 46,894 lm

Dimming option

0% — 100%

Wiring

Direct wiring with 0.5 inch (Pg-7) trade size knockout

Surge protection

Per IEC 61547
1.5 KV line-line / 3 KV line-earth

Onboard intelligence

Built-in sensing with data logging, energy and fault monitoring, and protective temperature monitoring and control

Wireless networking

IEEE 802.15.4 Wireless Mesh

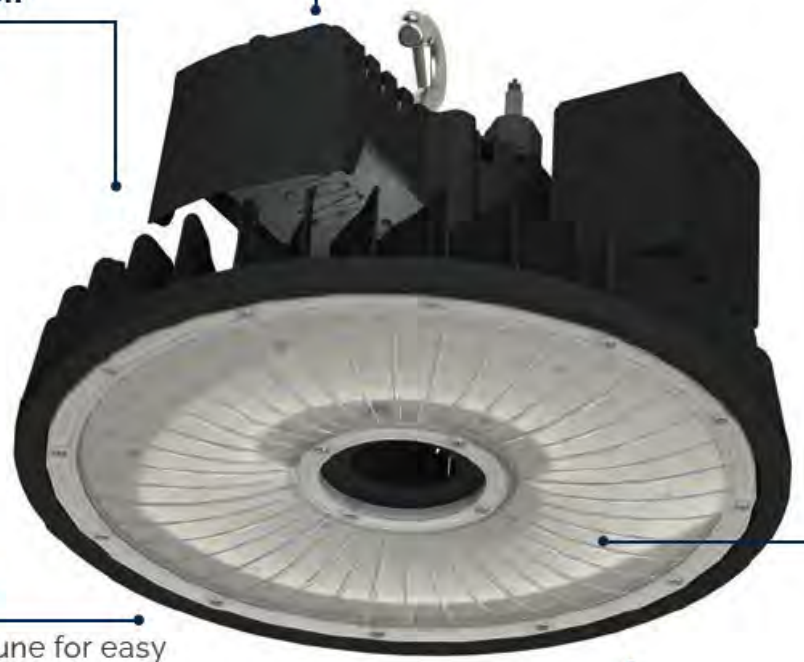
Input voltage

UL
CLE-B1, CLE-D1, CLE-F1, CLE-H1, CLE-N1
120 — 277 VAC, 50/60 Hz Standard Voltage (ST)

EFFICIENT INTELLIGENT INDUSTRIAL LIGHTING

The CLE luminaire series from Digital Lumens offers unparalleled performance and reliability across a broad range of industrial and commercial applications.

Featuring a value-optimized chassis design, CLE intelligent LED luminaire family is an energy-efficient, cost-effective alternative to uncontrolled LED, fluorescent, and HID luminaires.



2 reflector options

Aluminum
Polycarbonate

Mounting option

Open Hook
with locking
security screw

Wireless connectivity

Connects to SiteWorx Tune for easy reporting and fine tuning of lighting settings anytime, anywhere

Wireless networking

IEEE 802.15.4 Wireless Mesh

Lumen output

14,824 to 35,687 lm

3 optic options

Narrow (60°)
Wide (90°)
Diffuse (120°)

EFFICIENT INTELLIGENT INDUSTRIAL LIGHTING

The Digital Lumens ULX luminaire family offers high-performance intelligent high-bay luminaires for a broad range of industrial and commercial applications. Available in a wide operating temperature range and a watertight IP65 housing makes the ULX ideal for challenging environments.

EFFICIENT INTELLIGENT INDUSTRIAL LIGHTING

SiteWorx Keeps You Ready for the Future

SiteWorx builds on whatever systems and equipment you have in place and leverages new value from them — taking you further, faster. The cloud-based SiteWorx suite is updated automatically, so you can take advantage of new capabilities and enhancements as soon as they are released. So when you make SiteWorx part of your facility, you can be confident that it will provide great results and an impressive ROI right from the start and year after year. It's a future-proof solution that grows and evolves along with your facility, delivering ongoing value to your business.

OUTDOOR LIGHTING

CUT-8 LED

The original design of the set gives character to the illuminated location.
CUT-8 LED is made of aluminum profile protected with anodic coating.
The use of high-quality LEDs ensures even and efficient lighting.

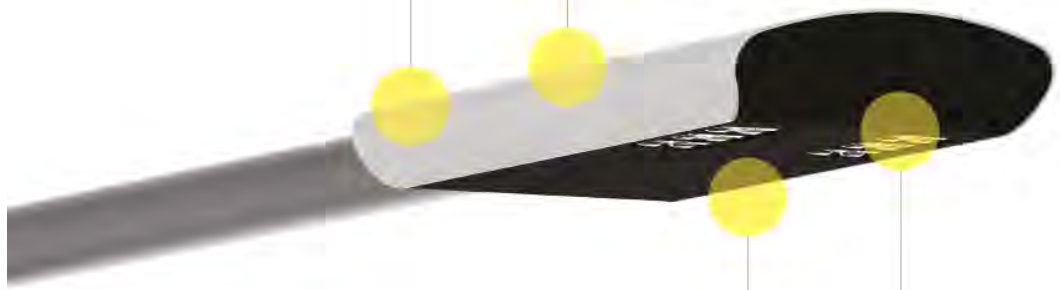
CE AC 10V Al DALI

Environmentally friendly production and operation

Manufacturing process of CUT-8 LED is carried out with the use of energy efficient and sustainable methods. Aluminium housing is 100% recyclable. LEDs used do not emit UV infrared radiation and consume less energy compared to traditional light sources, resulting in reduction of CO_2 emission. Luminous efficacy at the luminaire level up to 118lm/W.

Anodized aluminium body
Inox / black color, corrosion resistance and decorative features

Overvoltage protection
Increases luminaire resistance against electrical discharges up to 15 surges with 10 kV voltage



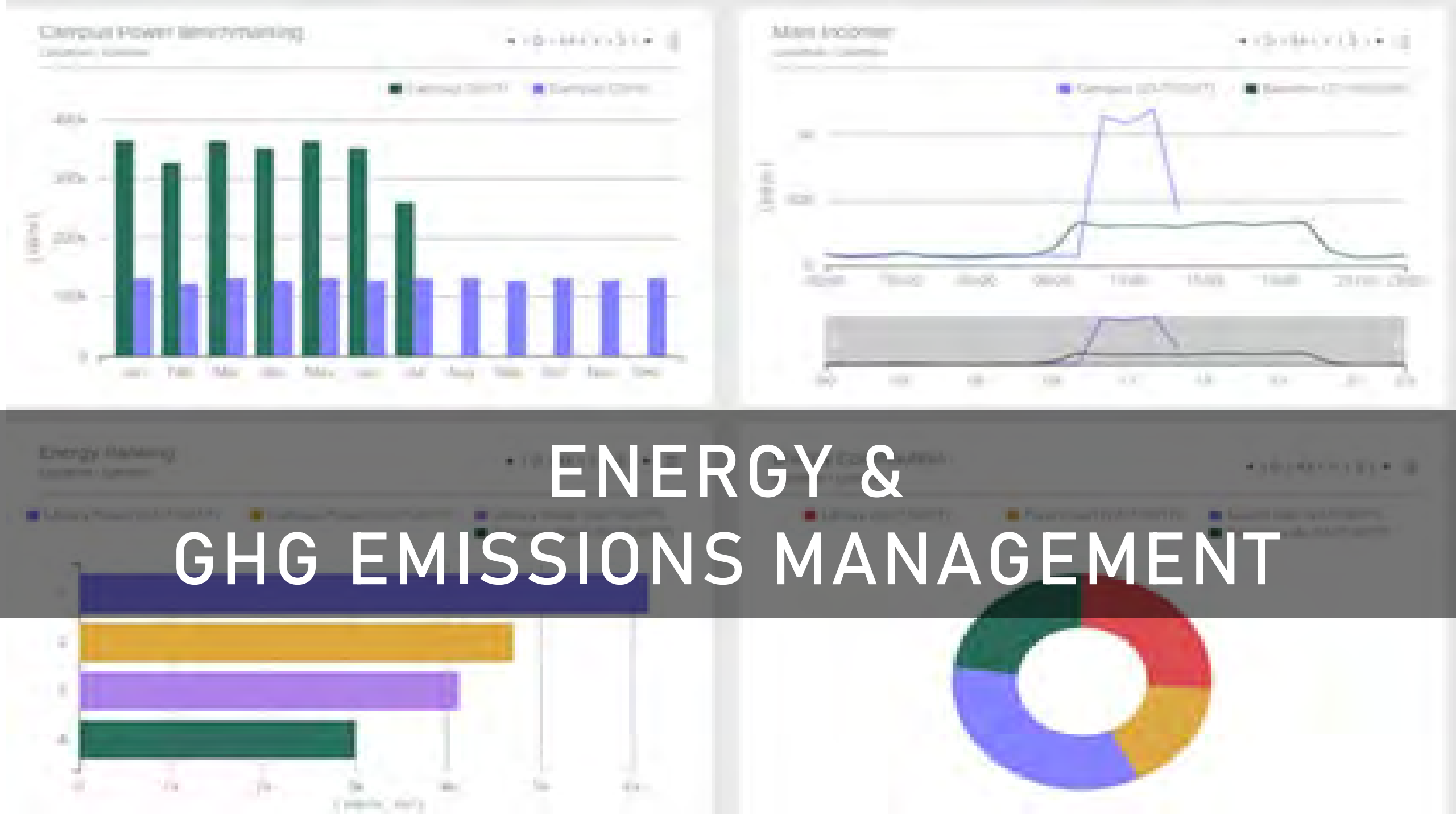
Philips Xitanium Driver
Highly efficient and programmable power supply with 7 programmable functions according to customer requirements

Available functions
- adjustable output current
- DALI interface or 1-10V (OPTION)
- programmable time profiles
- temperature control on the module
- power control of the luminaire using variable input voltage
- maintaining a constant luminous flux in time
- power reduction by connecting additional power line

EV MOBILITY HUBS

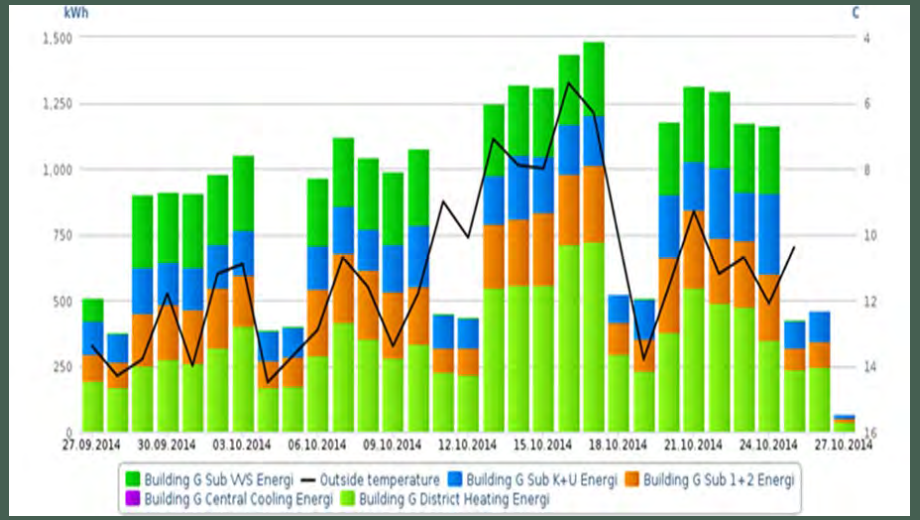
EV MOBILITY HUBS

EV MOBILITY HUBS & CARS



ENERGY & GHG EMISSIONS MANAGEMENT

ENERGY & GHG EMISSIONS MANAGEMENT



ENERGY & GHG EMISSIONS MANAGEMENT

EVO's IPMVP protocol: Real-time savings verification

Certify achieved energy savings according to IPMVP protocol by comparing your current consumption vs your baseline.

- Certify and validate savings in a objective way
- Monitor your Energy Efficiency Measure portfolio in real-time, quantifying achieved savings
- Easily detect when your consumption exceed what was expected

Basic and advanced reports: Report energy savings to entire community

Set up automated reports to receive, weekly or monthly, advanced data analysis in your e-mail, ready to make decisions.

- EXCEL or pdf reports
- Weekly, monthly, quarterly or on-demand automations
- Custom figures
- Comments insertion
- Send to e-mail only to indicated users
- Electricity, gas, water, cost, EnPI's, trends, benchmarking, etc.

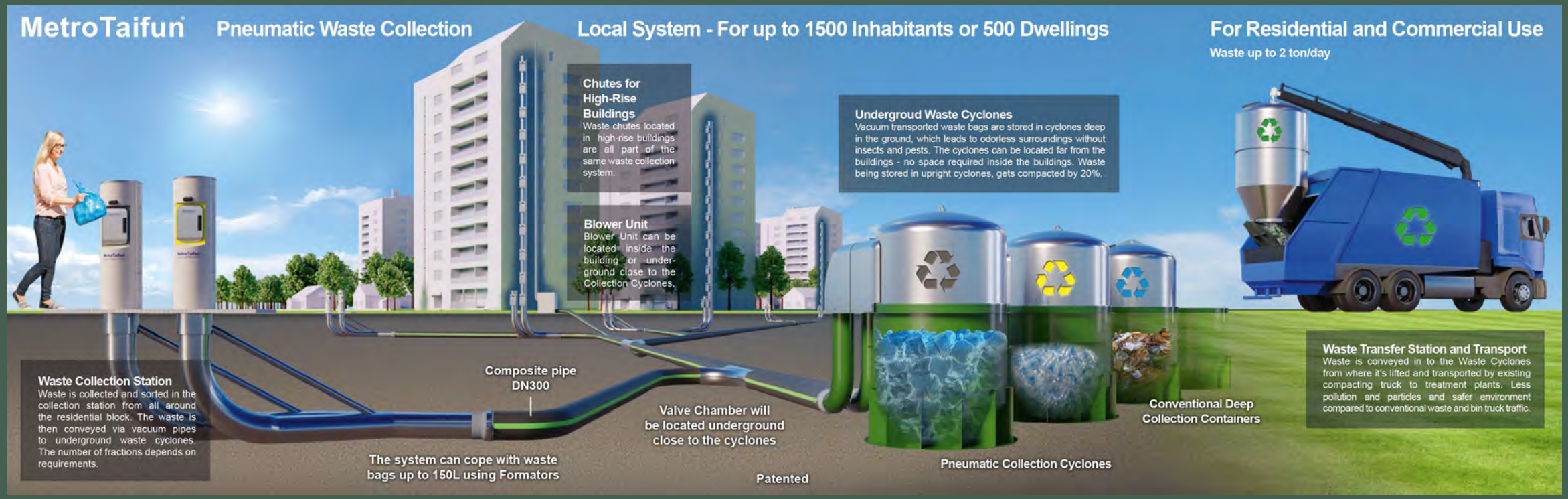
Energy App Market®: Energy Management has no limit

Third-party developed apps market to get the most of your data, covering all project requirements.

- Apps developed
- Differentiate from other partners developing your own apps.
- Develop your own apps if Energy Manager doesn't covers all your project needs
- Get revenue from selling your apps into Energy App Market®
- Analysis, reports, widgets, alerts, data backups apps.
- Goals, targets, budgeting, renewables energy, forecast…

AUTOMATIC WASTE COLLECTION SYSTEMS

AUTOMATIC WASTE COLLECTION SYSTEMS



AUTOMATIC WASTE COLLECTION SYSTEMS

BIOFABRIK

The WASTX Plastic P2.5

NEXT GENERATION CHEMICAL RECYCLING PLANT

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THE KEY FACTS

BIOFABRIK | The White Refinery®

The WASTX Plastic converts post-consumer plastic waste into synthetic crude oil (Syncrude) and energy-rich gas. It is characterized by a modular, decentralized and scalable design.

Converts 1 kg of Plastic to 1 l of Syncrude

The plant processes post-consumer waste materials such as HDPE, LDPE and PP into a high-quality energy source with a fuel value of 11 kWh.

Fully Automated Reactor

The input substrate is disintegrated in a single process, distilled and converted into Syncrude and gas.

Only 0.5 kWh per Litre

For the treatment of one litre of plastic waste, the plant requires only about 0.5 kWh. The product contains about ten times the amount of energy.

Decentralized Container Design

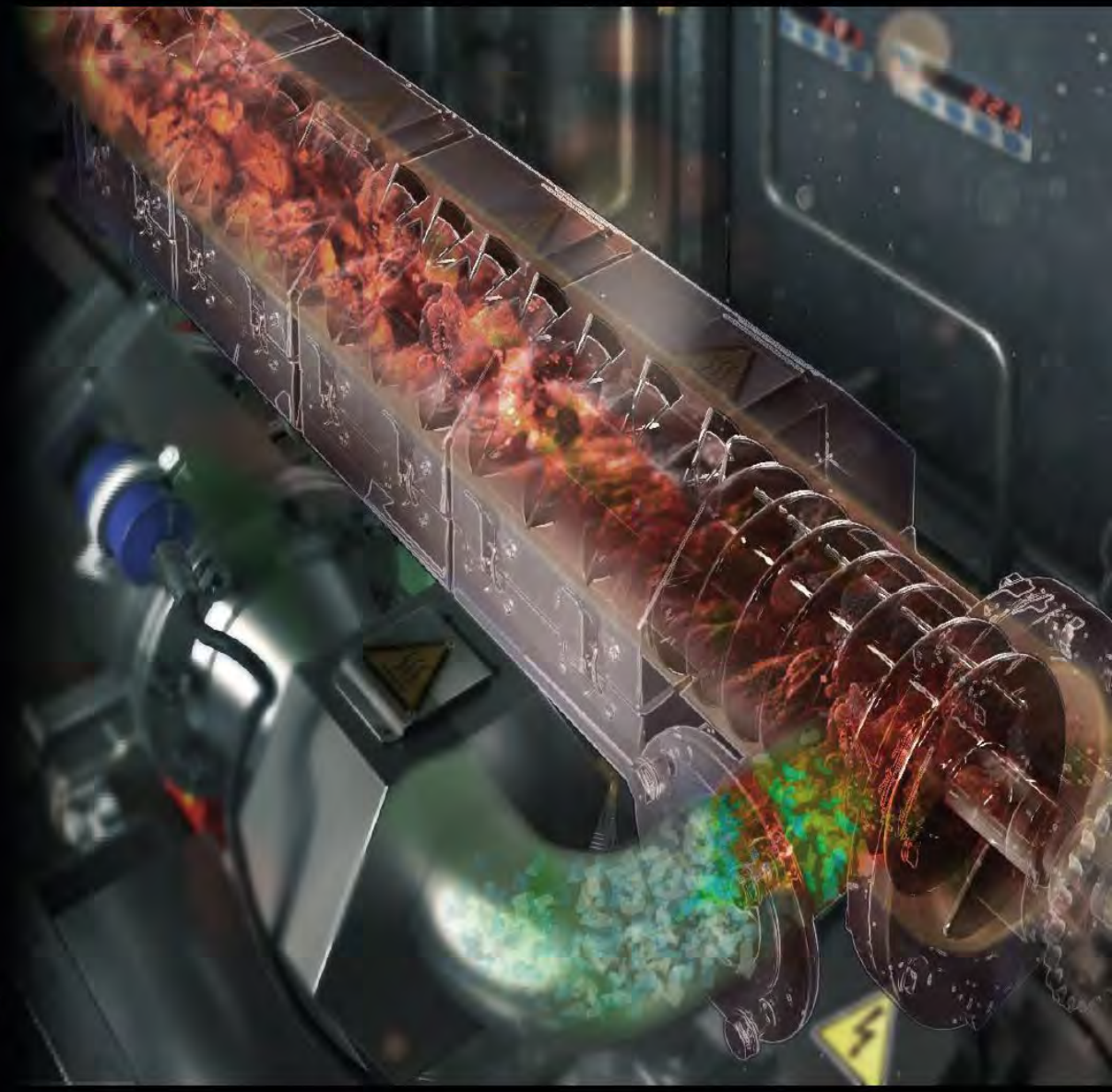
All systems are installed in 20 ft or 40 ft machine containers with integrated oil collecting tray.

Shredder and Substrate Silo

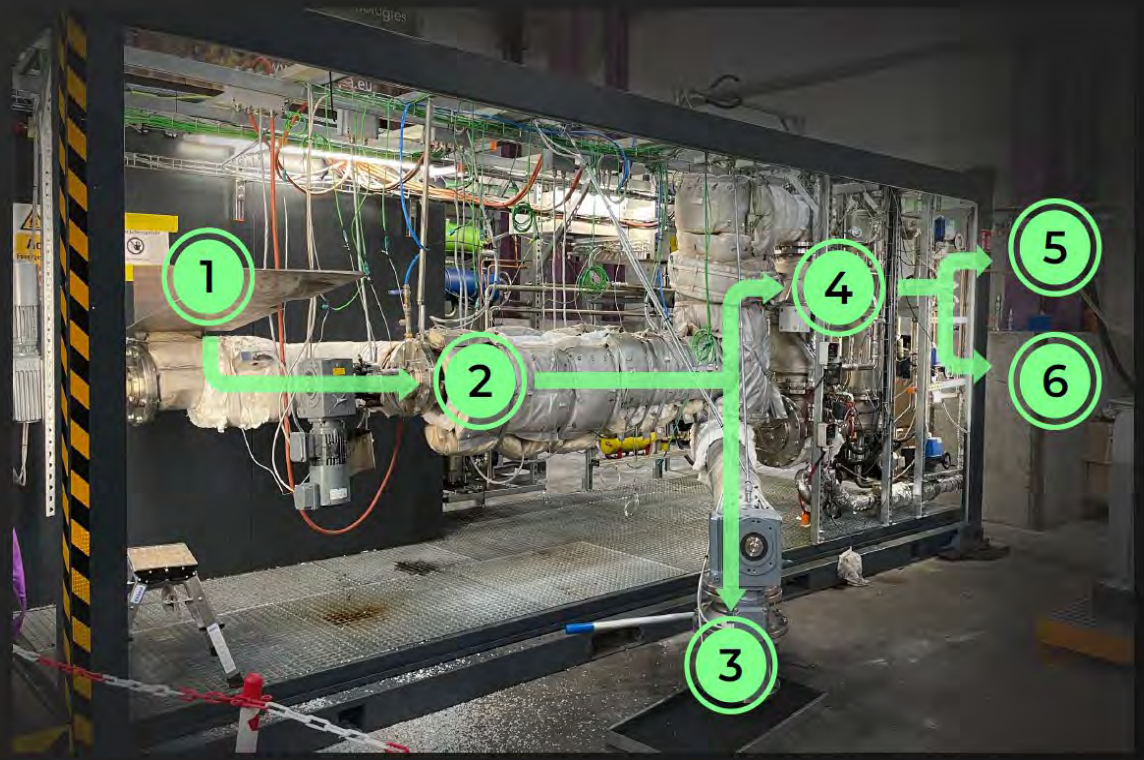
After grinding, the substrate is stored in the silo and automatically dosed in order to achieve the best possible processability in the reactor.

Use of Electricity and Heat

The optional generator is a genset specially optimized for the processing of pyrolysis distillates for island operation. It is characterized by high robustness, simple construction, and good efficiency. The thermal power can also be used by means of an optional CHP module.



PROCESS AND TECH DATA



1	**Substrate entry:** By means of a stuffing screw, the material is introduced into the pyrolysis reactor in an airtight, demand-driven manner and melted.
2	**Pyrolysis reactor:** The material is heated with constant movement. At temperatures of up to 500 °C, depolymerisation occurs, cracking of the long hydrocarbon chains into liquid and gaseous products.
3	**Residue discharge:** The residues are separated from the pyrolysis gas in the separator and continuously discharged by means of a tamping screw.
4	**Stepped condensation:** In several temperature stages, the condensable components of the pyrolysis vapors are recovered as oil or waxy products.
5	**Pyrolysis gas:** The gas is processed using an integrated gas washer before being used in a generator to power the plant. Thus, the plant supplies itself with electricity.
6	**Pyrolysis oil:** The extracted oil can be profitably sold to the petrochemical industry as the main ingredient of production or converted into energy by a special and optionally available generator.

The plant is expandable by means of various modules. Among them, there is a pre-treatment plant for preparing the waste for the pyrolysis process, tank systems for the final products, generators and silos of various sizes. More information can be found in separate handouts.

THE PROCESS STEPS

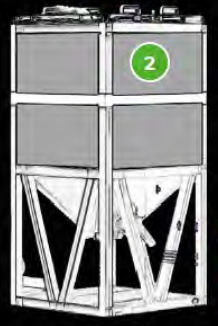
BIOFABRIK The White® Refinery

Input material (HDPE, LDPE, PP)

Plastic
1000kg/day

1 Cutting mill (optional)

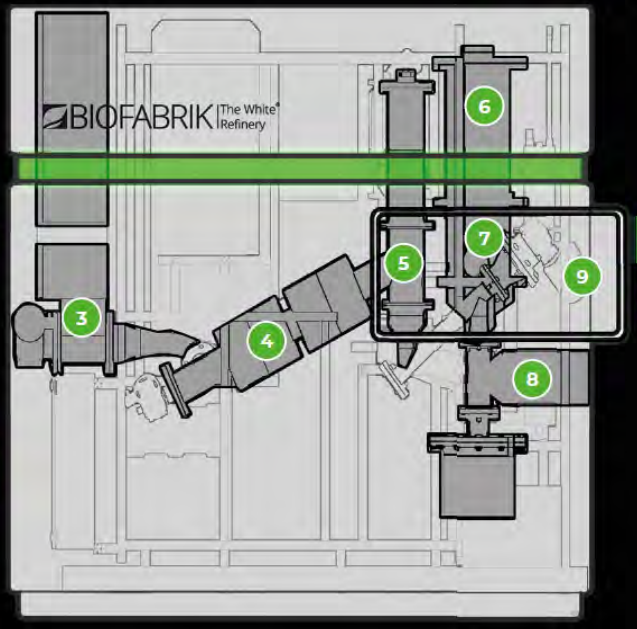
If the input material is too coarse, it can be crushed to a suitable grain size in a cutting mill.



2 Buffer (optional)

In a silo the small-sized substrate is buffered e.g. for a daily requirement. From there a blower conveys the material to the intermediate storage above the feed hopper.

INPUT



WASTX **Plastic**

RESIDUE

Coke
30kg/day

3 Substrate entry

By means of a stuffing screw, the material is introduced into the pyrolysis reactor in an airtight, demand-driven manner and melted.

4 Pyrolysis reactor

In the reactor, the material is heated with constant movement. At temperatures of up to 500 °C, depolymerisation occurs, i.e. cracking of the long hydrocarbon chains of the solid plastics into shorter chains of the liquid and gaseous products. Excess carbon atoms are split off and, together with mineral impurities, form the solid residue.

5 Separator and residue discharge

In the separator, the residues fall downwards, while the oil and gas vapours rise upwards and are conducted to condensation. The residues are conveyed via a cooling section into the gas-tight sealable residue container.

6 Stepped condensation

In several temperature stages, the condensable components of the pyrolysis vapours are obtained as oil or waxy products.

7 Cooling system

By means of an active cooling system (compression chiller), low cooling water flow temperatures can be reliably provided even at higher ambient temperatures in order to also separate low-boiling components.

12% PYROLYSIS GAS

OR

10

Energy
3300kWh/day

Refinery

85% PYROLYSIS OIL / WAX

10

OR

Base oil
1000l/day

8 Filter and discharge

By means of pumps, the condensate mixture is passed through filters and then discharged from the system. The products can optionally be converted to electricity on site or supplied for external material or energetic use.

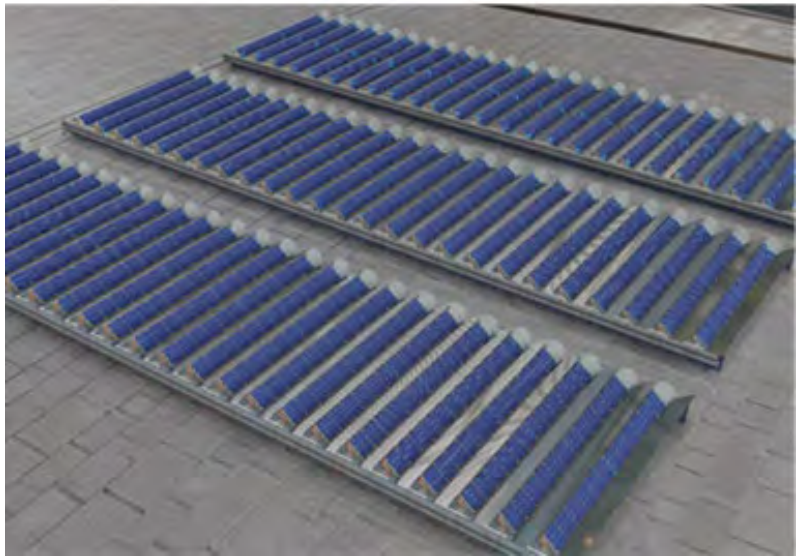
9 Control

The entire system is controlled in a highly automated manner. The system can be monitored by the operator on site or remotely via appropriate interfaces and, if necessary, controlled.

10 Output and possible uses

The output of the machine contains 85% base oil, 12% pyrolysis gas and small amount of residuals. The oil can be sold to the petrochemical industry as the main component of the output or it can be converted into energy by a special generator. The gas may be used to supply energy to the plant or be sold bottled.


RENEWABLES



LOW HEIGHT SOLAR THERMAL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CLEAN ENVIRONMENT!
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