

Transportation of biomass with **KOS & EKO** Piston Pumps





Pushing the limits of pumping

Tailings / Backfill
(underground & open cast mines)

Drill Cuttings
(offshore, oil & gas)

Sewage Sludge
(waste water treatment plants)

Fly Ash / Bottom Ash / Fly Ash-mix
(coal fired power plants)

Chemical Sludge
(paint, etc.)

Coal
(fines, mud, mix of fines with raw coal)

Screenings

Biomass

Paper Sludge

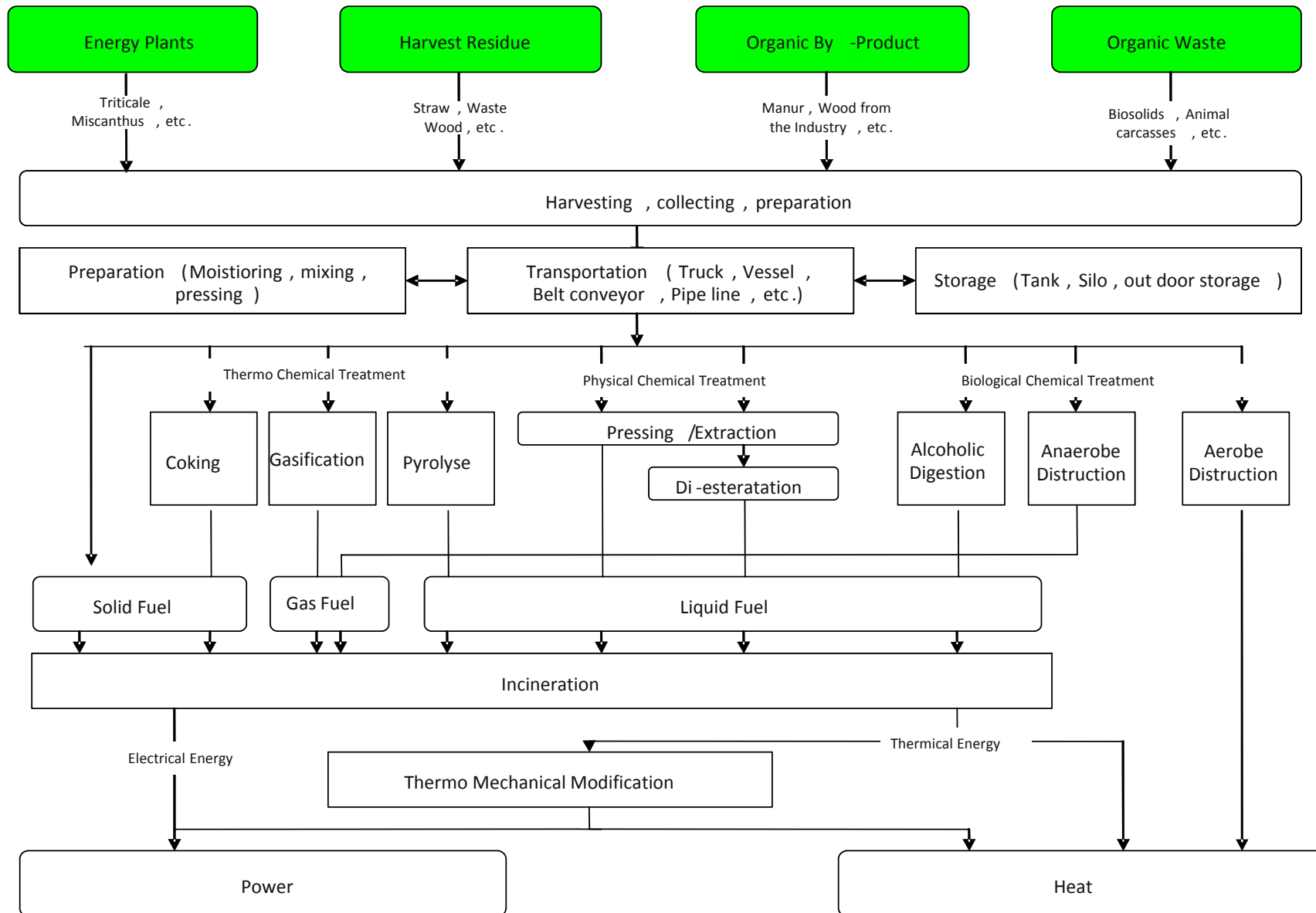
Titanium Dioxide

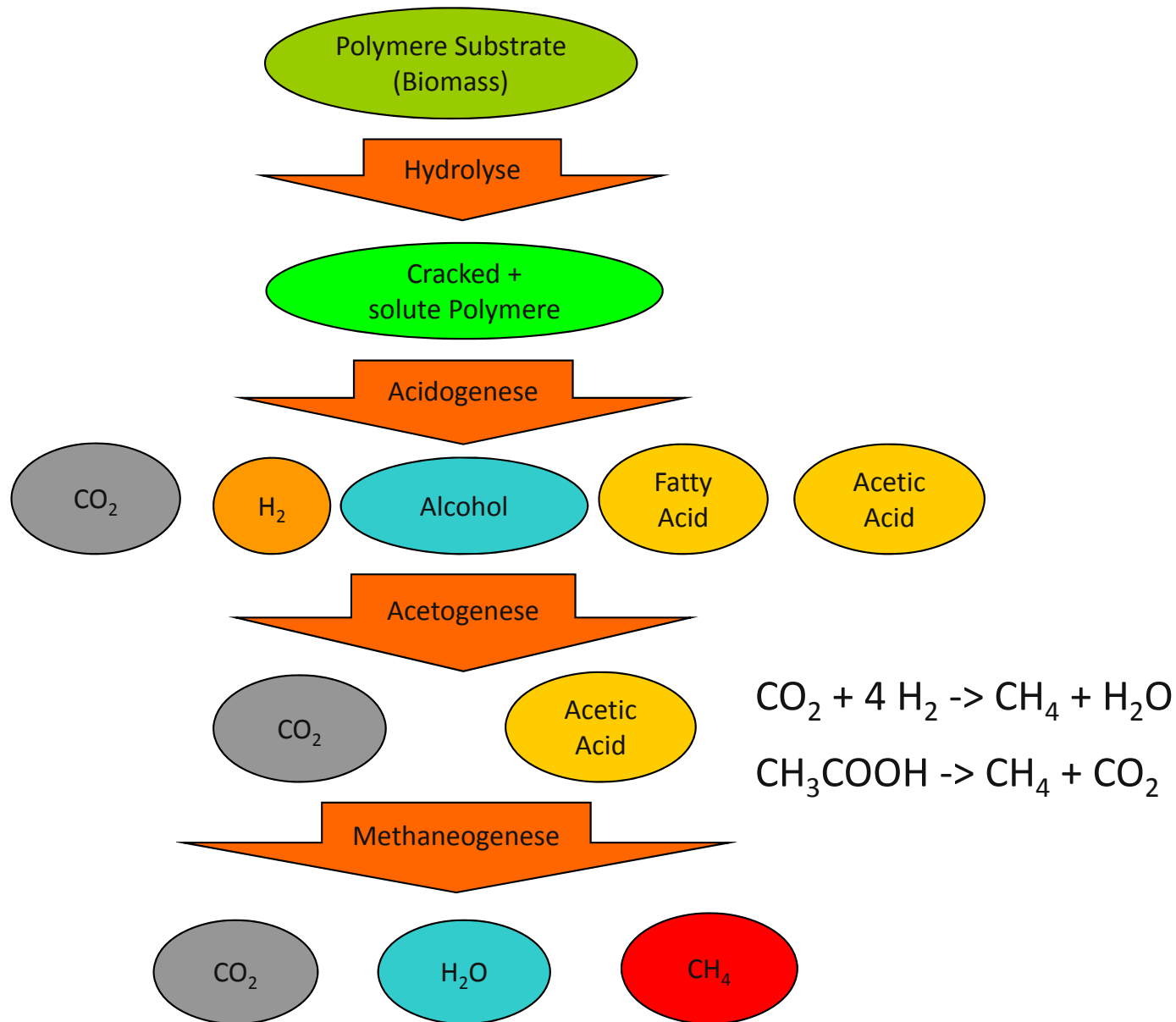




- Definition of Biomass
- Details and Benefits from using hydraulically driven Piston Pumps for Biomass-Transportation
- Case Studies of Existing Plants
- Conclusion





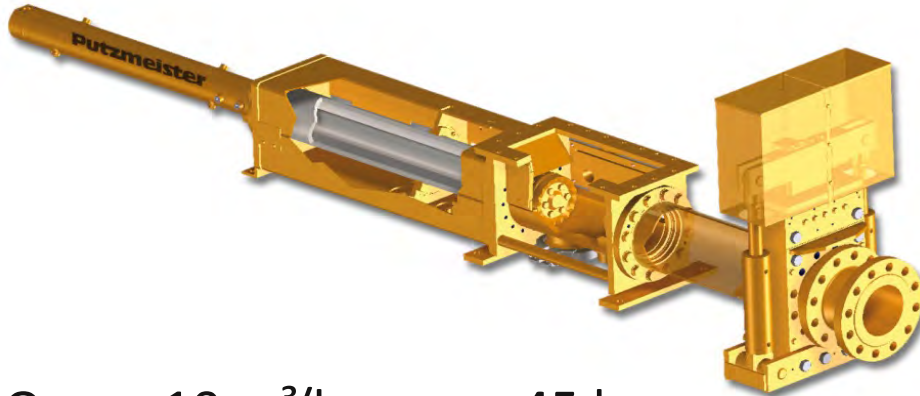


The Putzmeister Solutions for Biomass Treatment

Benefits of the KOS and EKO



EKO Single Cylinder Piston Pump

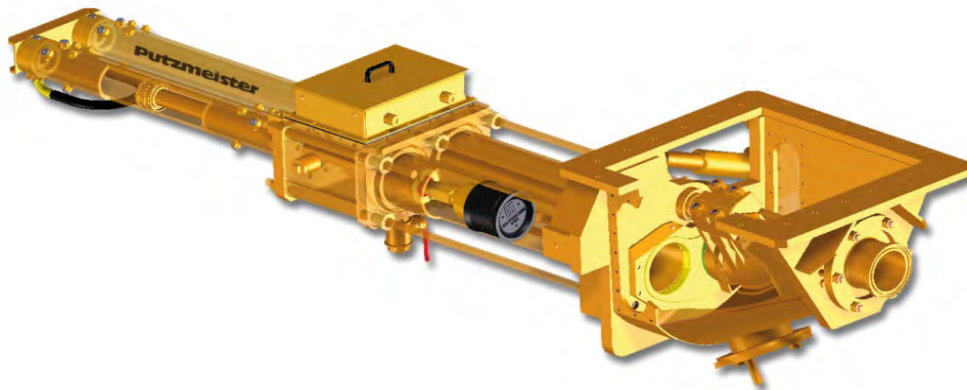


$$Q_{\max} = 10 \text{ m}^3/\text{h}; p_{\max} = 45 \text{ bar}$$



Corn Stover and straw are chopped and steamed

KOS Double Cylinder Piston Pump



$$Q_{\max} = 400 \text{ m}^3/\text{h}; p_{\max} = 150 \text{ bar}$$

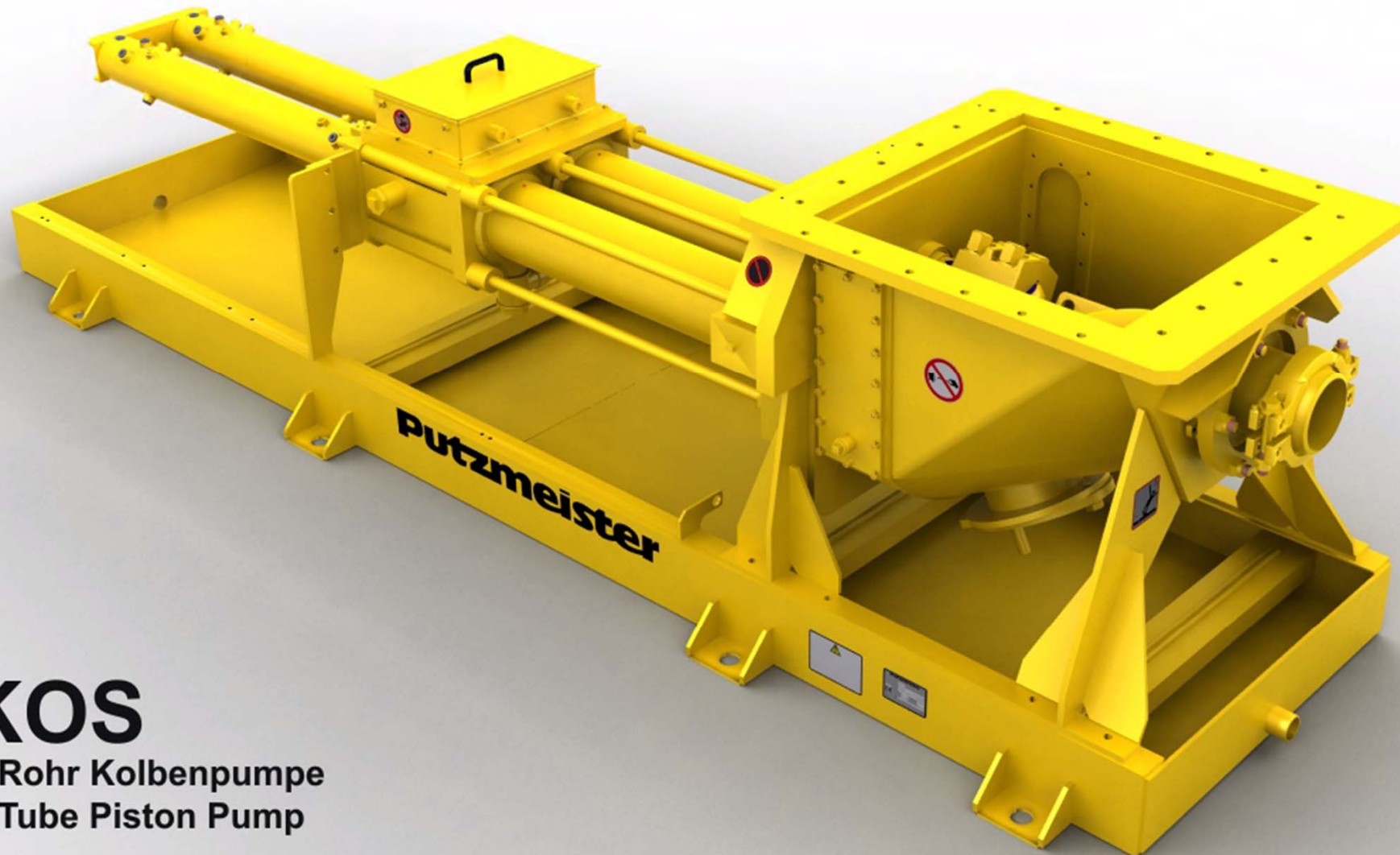


Kitchen Waste or Energy Plant mixed with manure





Putzmeister



KOS

S-Rohr Kolbenpumpe
S-Tube Piston Pump

Benefit from using Piston Pumps The KOS Piston Pump



No interference contours in the mass flow and therefore insensitive against foreign bodies (up to 75% of the Diameter of the Pressure outlet)

Low maintenance and wear, due to few moving parts

Insensitive against short-termed dry running

Minimal suction resistance due to high-volume and unrestricted inlet of material

Tungsten Carbide Wear Parts for highest possible life times

Fully Adjustable for wear to maintain optimum performance & Efficiency

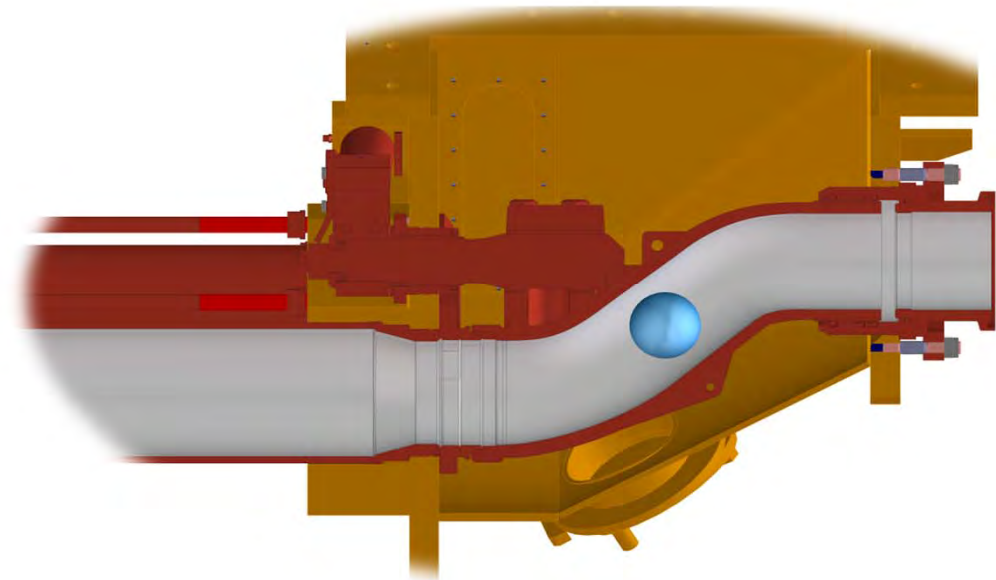
External Hydraulic cylinders eliminate the risk of oil contamination

For coarse material of high viscosity and a high percentage of coarse solids (> 5mm) as well as liquid materials

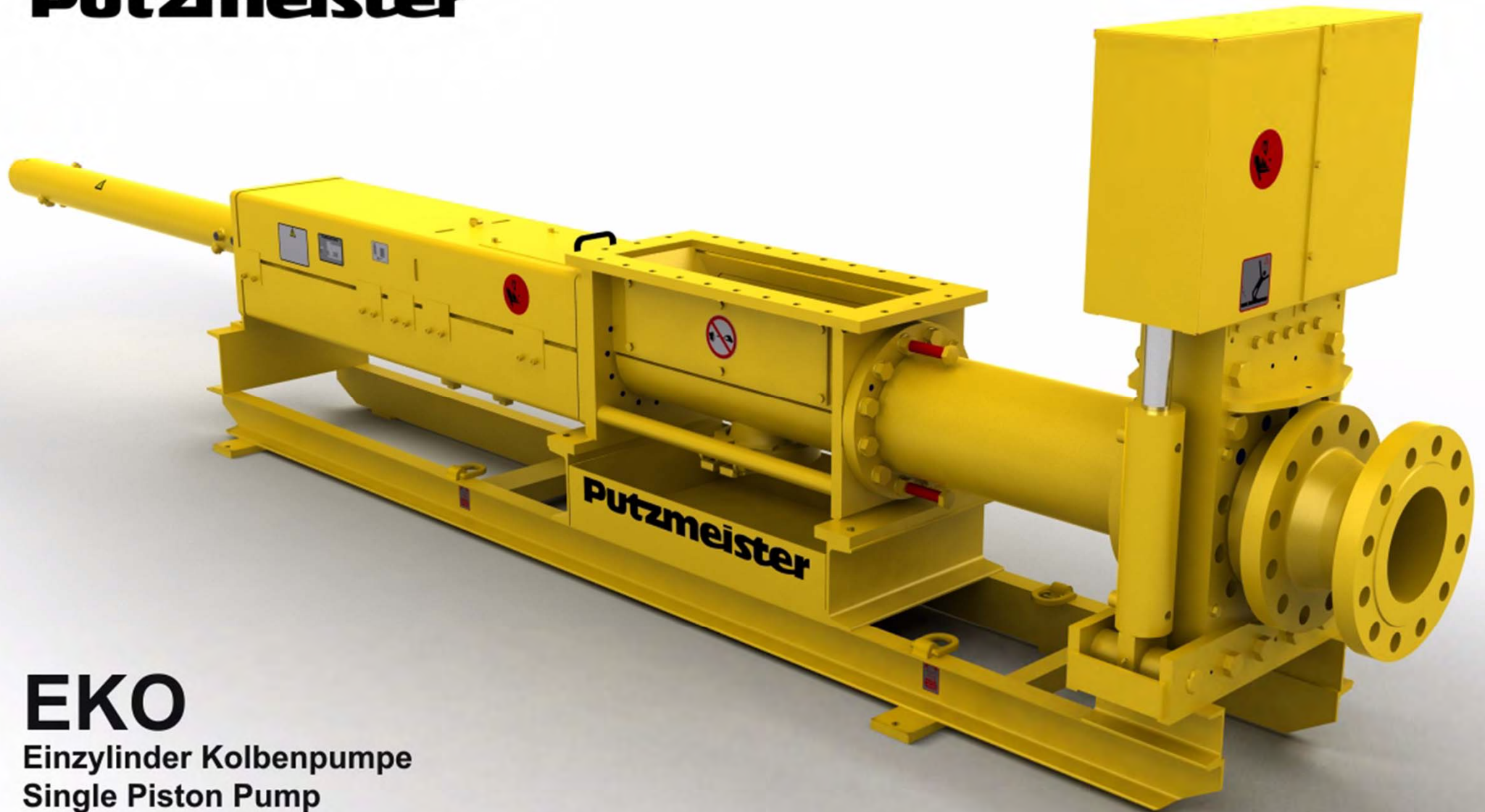
Delivery pressures up to **150 bar (2.175 p.s.i.)**

Delivery Output Volumes up to **400 m³/h (1.750 gpm)**

Designed for 24/7 Operation

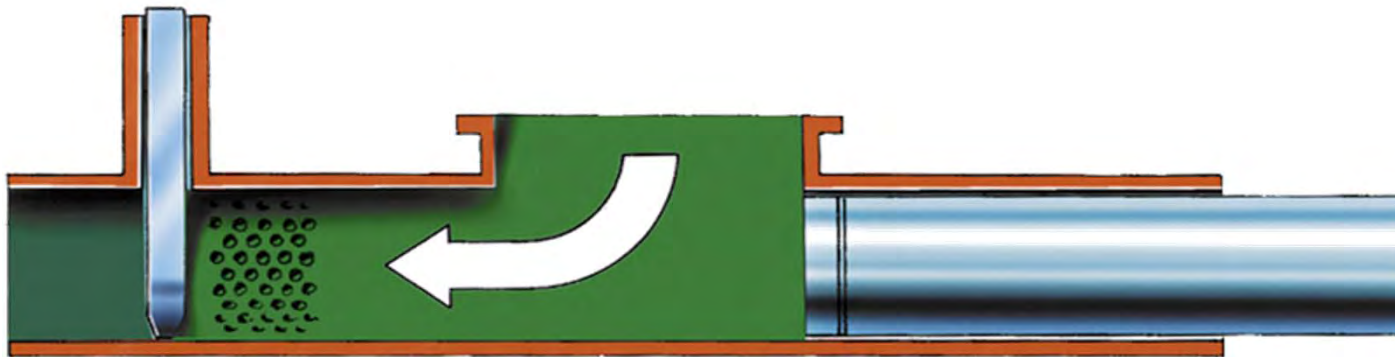


Putzmeister

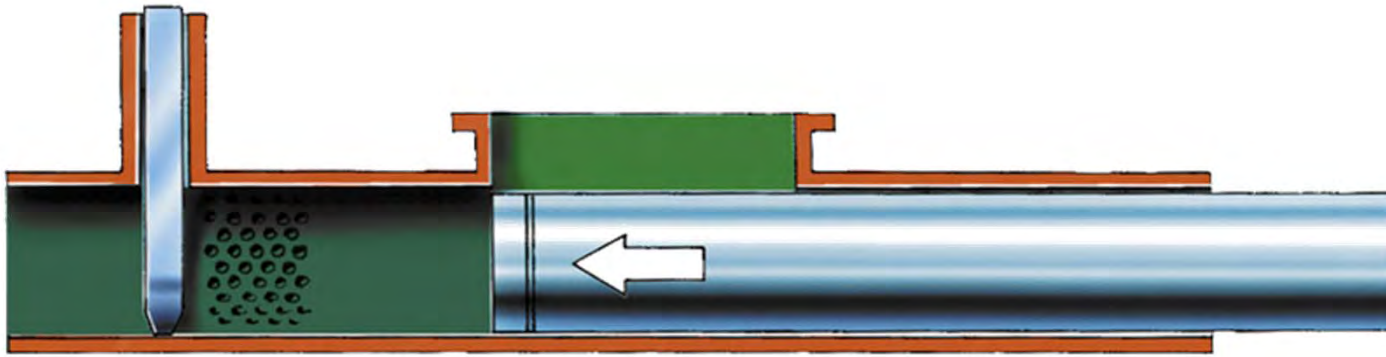


EKO

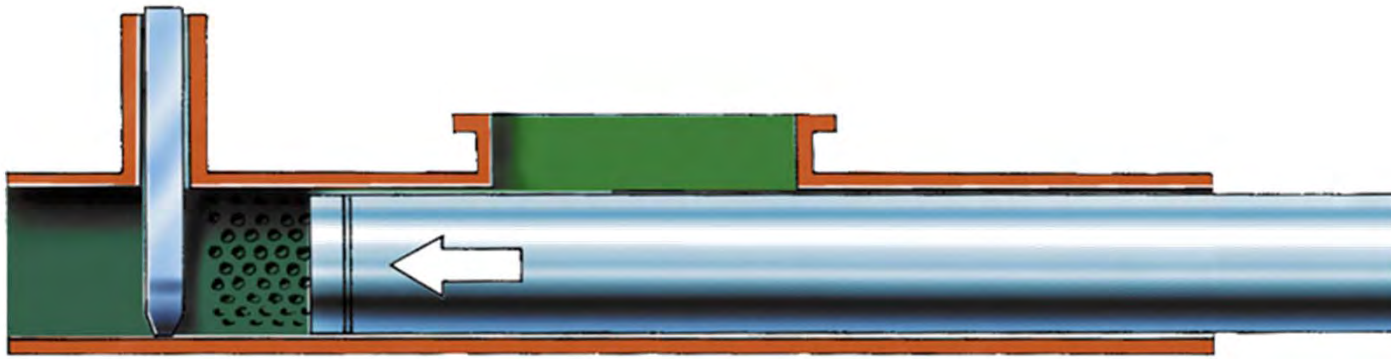
Einzylinder Kolbenpumpe
Single Piston Pump



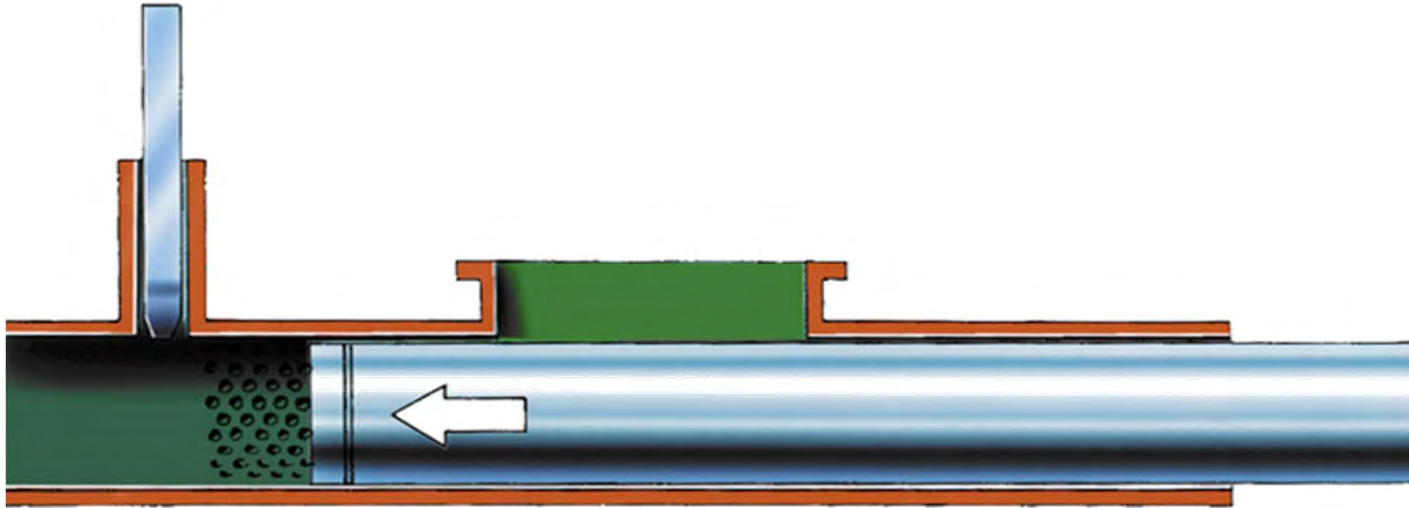
1. The pump will be fed with material



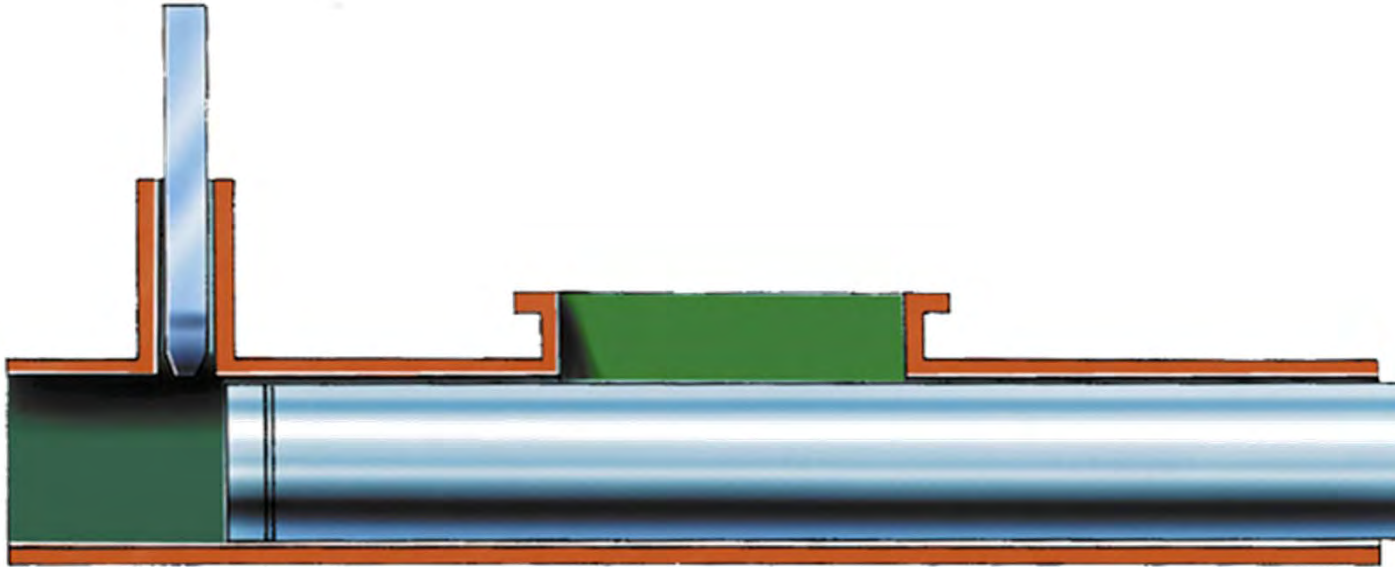
2. The delivery piston is moving forwards und will be dived into the perforated delivery cylinder



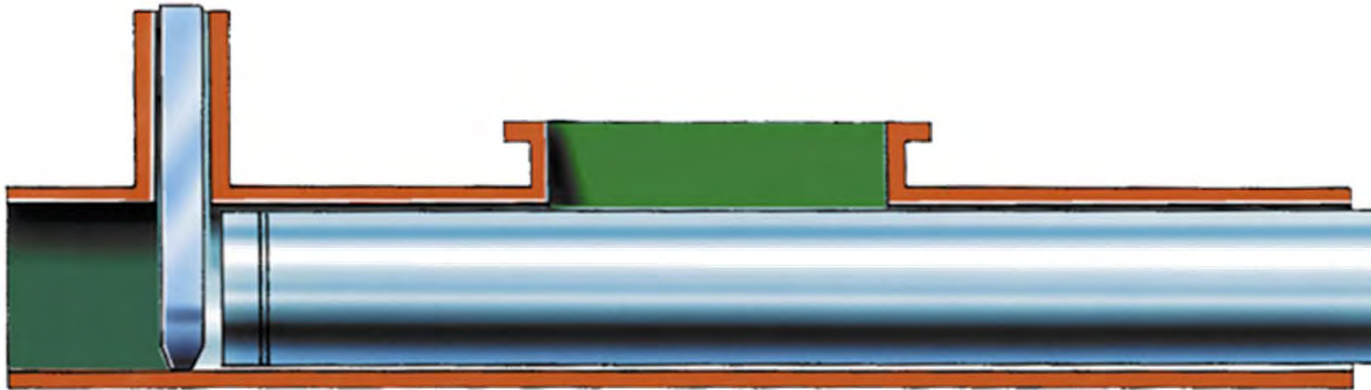
3. The delivery piston is compressing the material. Liquid material is squeezing out of the drilled holes. Foreign particles are remaining in the pump



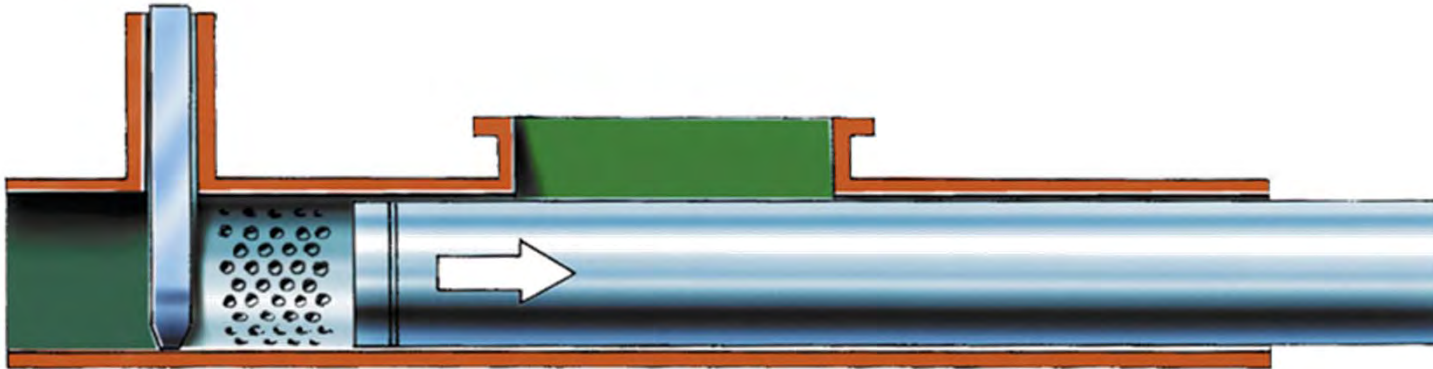
4. The gate valve will be opened



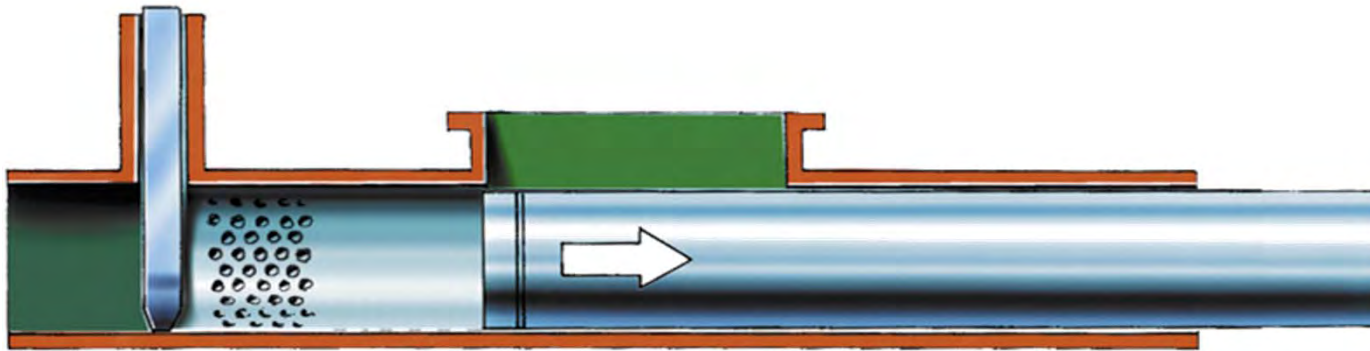
5. The delivery piston is pushing the foreign particles into the delivery line



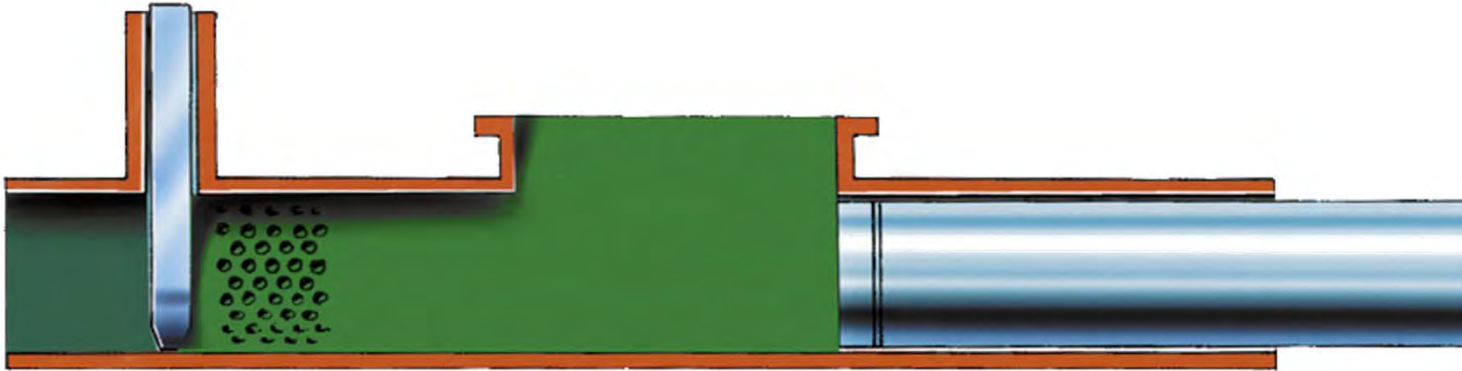
6. The gate valve will be closed



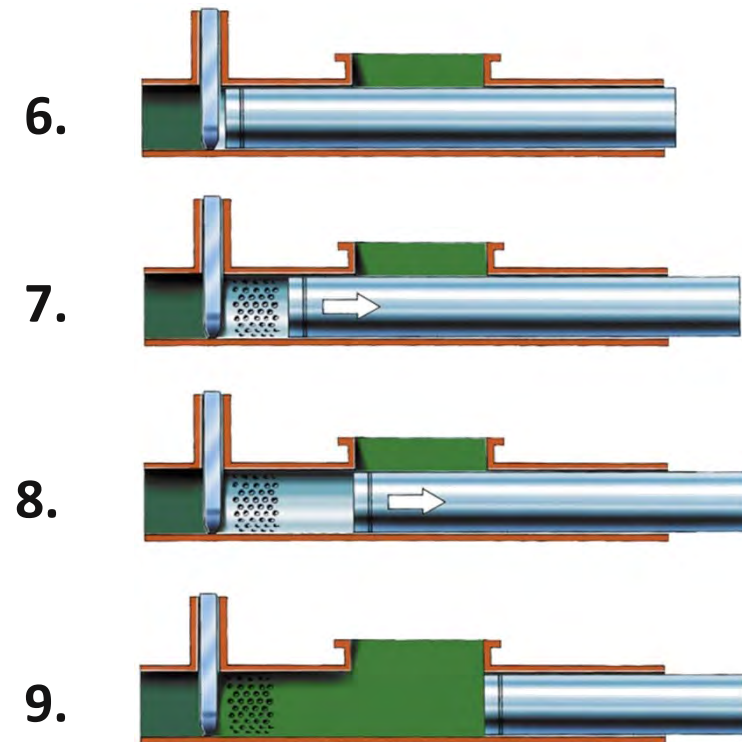
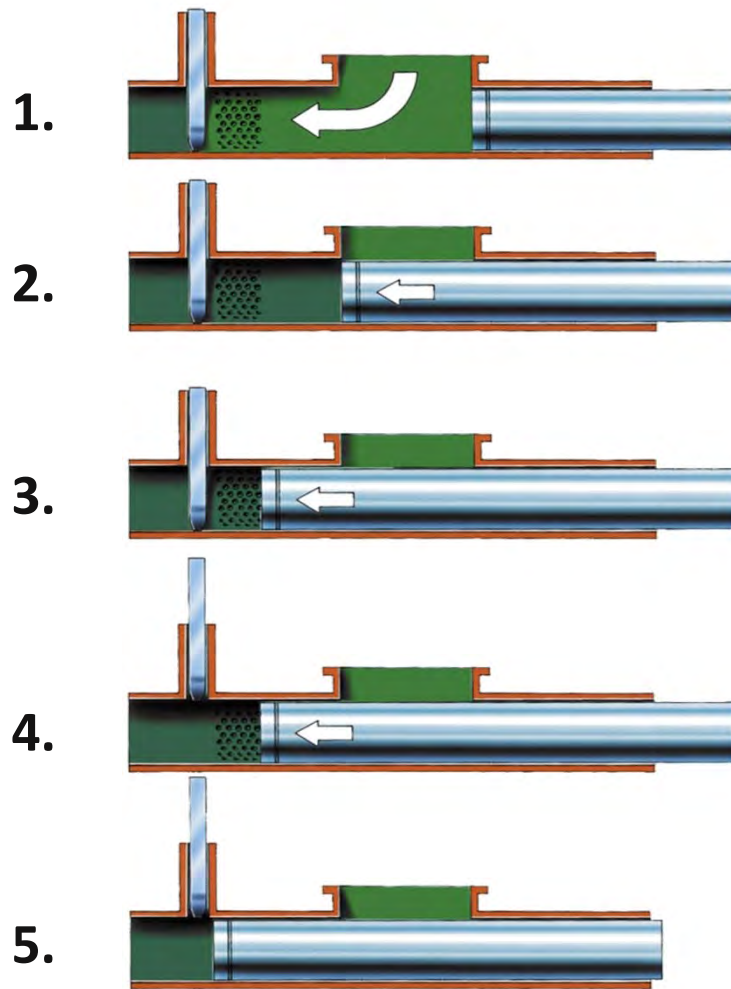
7. The delivery piston is moving backwards and is cleaning on the way back the holes from collect material



8. Retracting of the piston



9. Ready for the new load





- Bulky material (like straw) can be pumped by an EKO Pump
- With an EKO PP organic material can be separated from non organic material fully automated
- Almost all physically “free water” will be squeezed out the material
- Proven Technology as Biomass Treatment is done in Europe since almost 25 years
- For high volumes (>5m³/h) several pumps can be installed in parallel which increases the redundancy of the entire system.



- Biomass is containing lots of foreign particles
- KOS Double Cylinder Pumps as well as the Single Cylinder Pumps are suitable for Biomass
- Pumping Systems with Valves are **not Suitable**
- Piston Pumps are designed for 24 / 7 heavy duty use
- Piston Pumps are known for low Life Cycle Costs compared to other transportation systems due to few moving parts.
- Proven technology as Putzmeister has **more than 25 years** experience with transportation of Biomass
- The pipe line is hermetically sealed → no leakage or odor problem



Before EKO



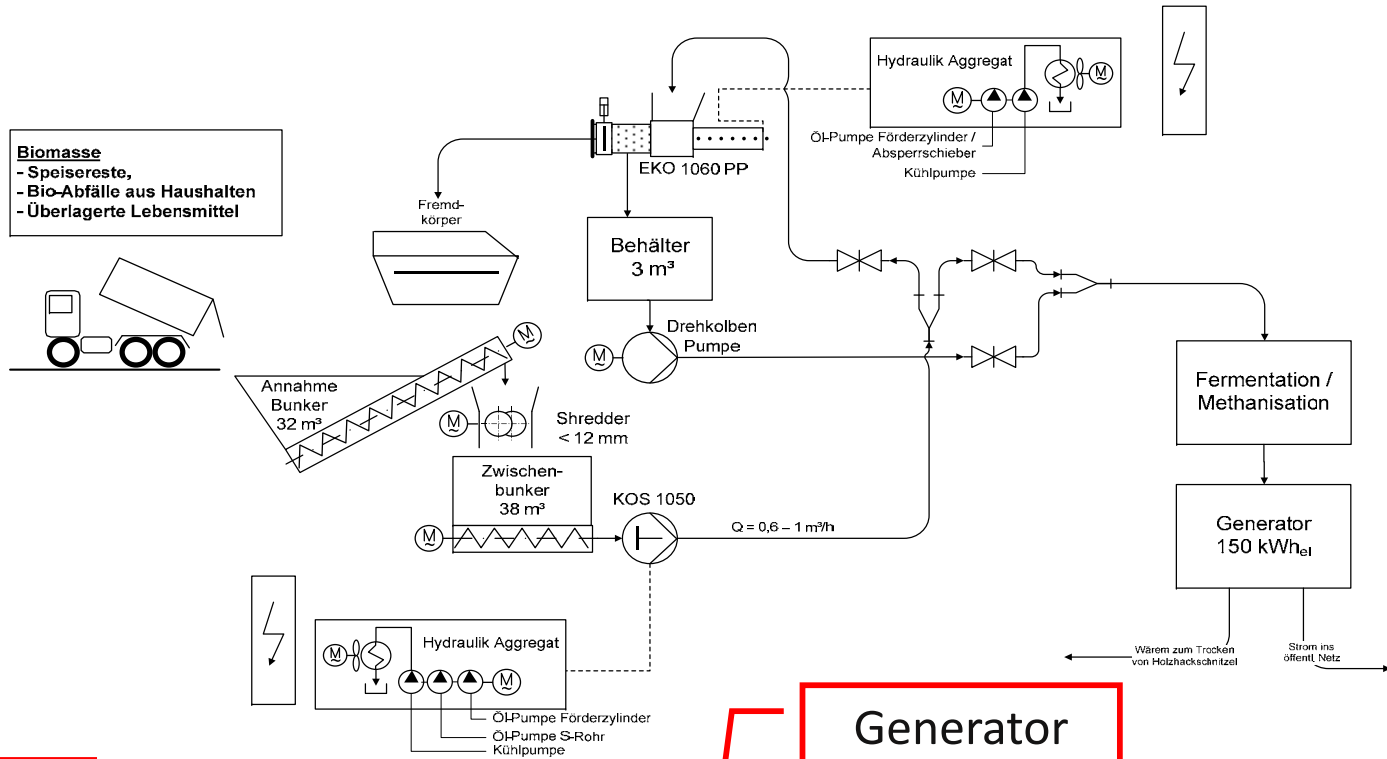
Discharge of EKO











Fermentations tank
730 m³

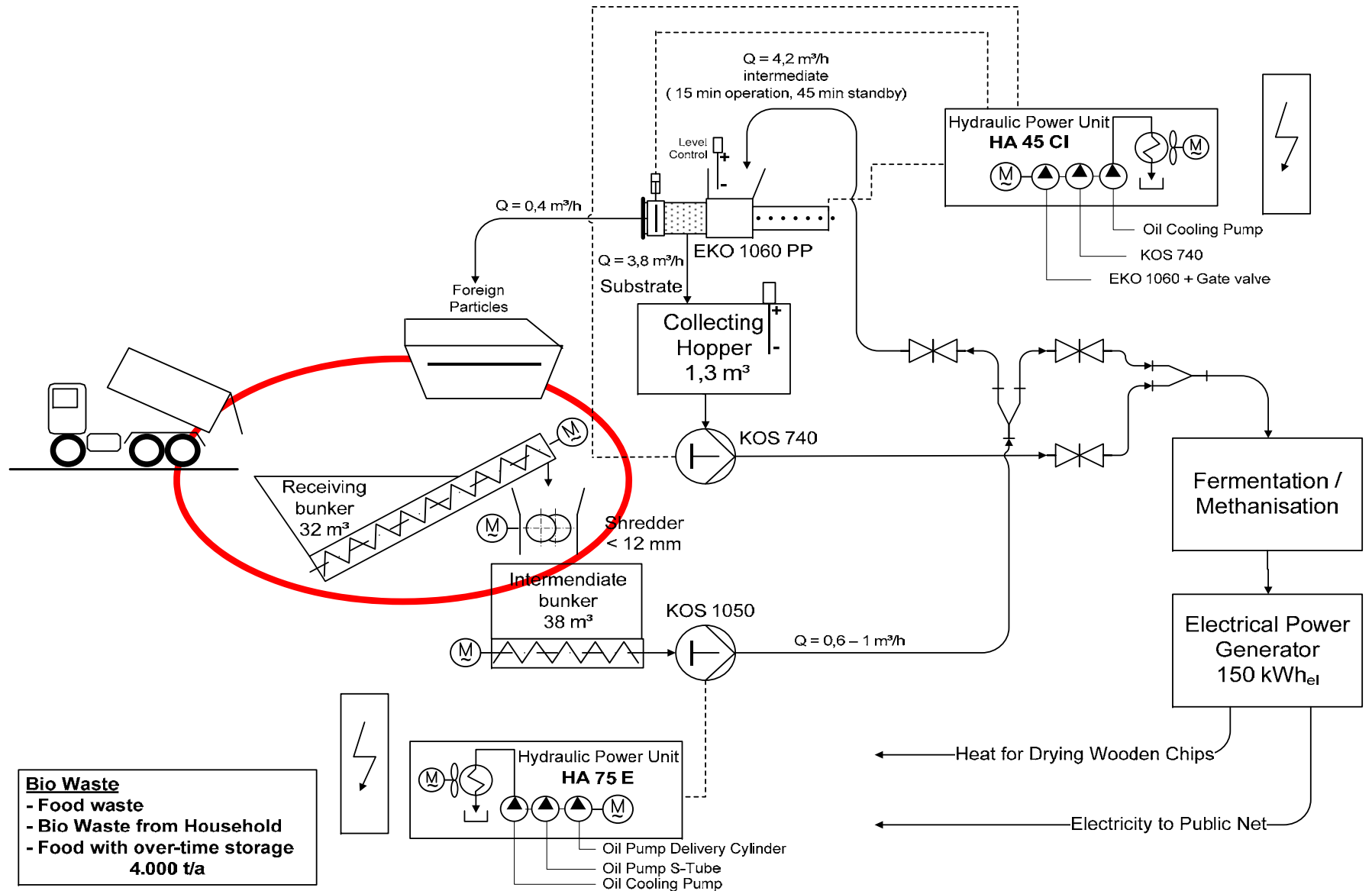
Generator
150 kWh

Receiving and
Treatment Area





Processing of the Food waste





Received Food waste with expired storage time.

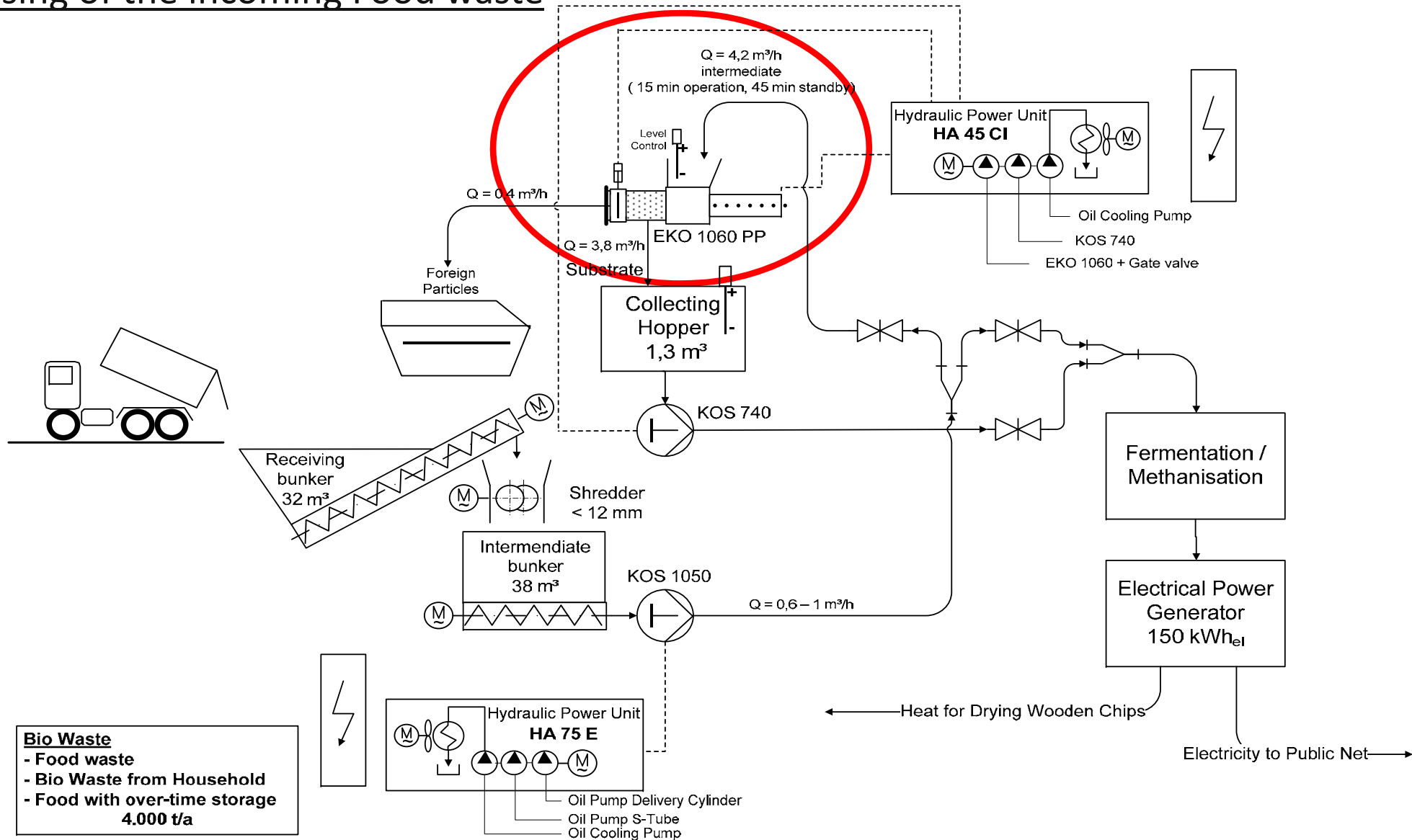
This material will be shredded to a particle size larger than 12 mm.

After the shredding the material will be pump for separation of the packing material to a special **Pump & Press** EKO single Piston pump if required.

The preparation of one (1) meal creates 100 g of Food Waste!



Processing of the incoming Food waste





Shown Equipment:

Putzmeister

EKO 1060 PP

Material coming from the
Tank

Pipeline for the substrate
(Biomass)

Pipeline for the Reject
(Anorganics)

Food waste with expired storage time



Received material



Reject with
containment of
foreign particles



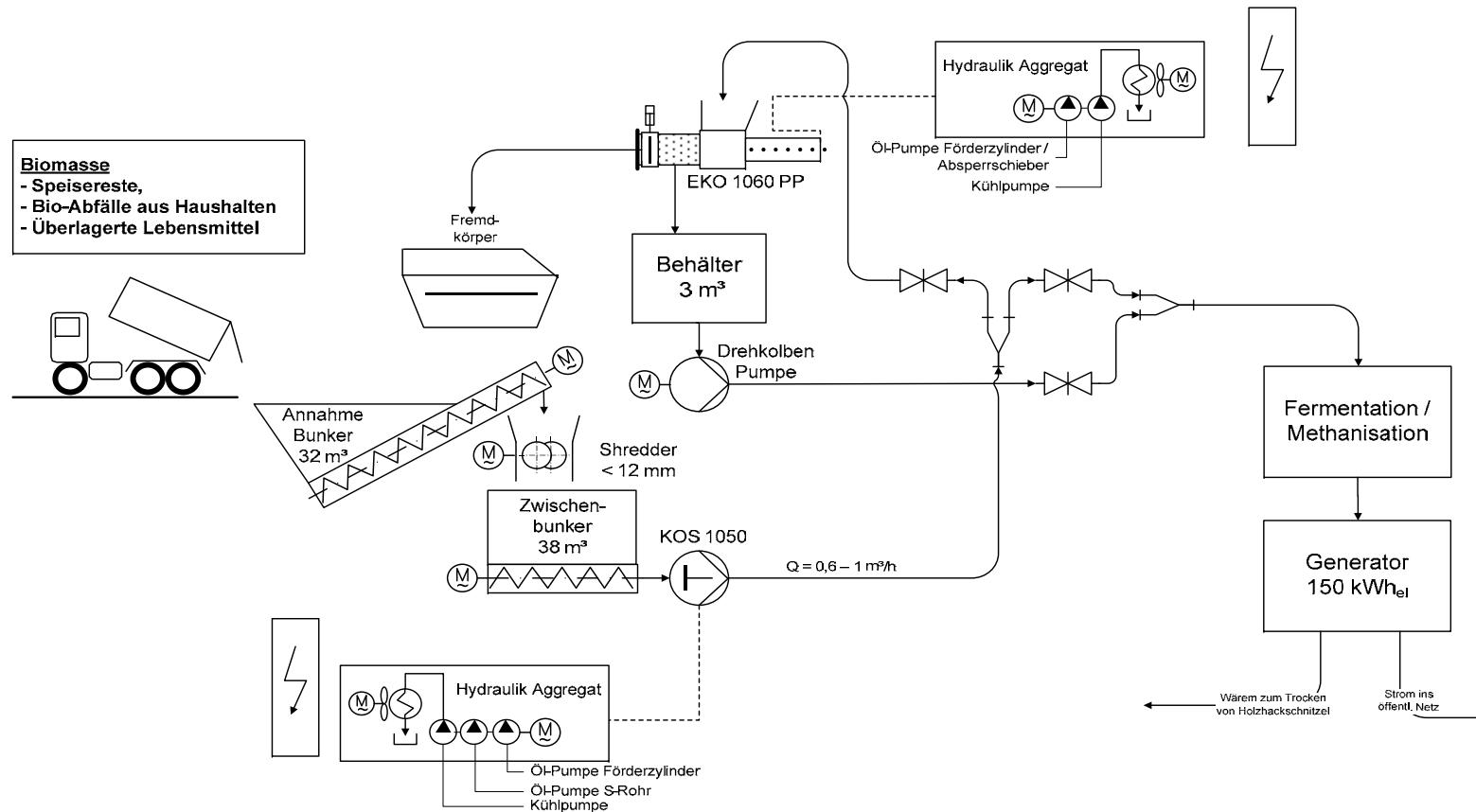
Squeezed material, perfect for the following
fermentation process



Reject



Shredded food waste



1 t of Biomass (20 % DS)



200 m³ Biogas

200 m³ Biogas contains

120 m³ CH₄ + 80 m³ CO₂

120 m³ CH₄



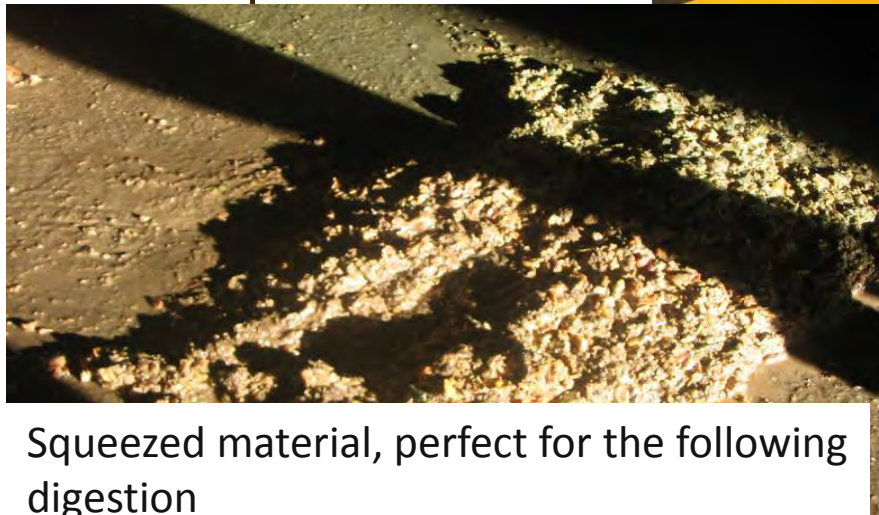
1.260 kWh_{thermal}

1.260 kWh_{thermal}



420 kWh_{electrical}

Food Waste at the BioPower Plant



The preparation of one (1) meal creates 100 g of Food Waste!



- Corn, Wheat Fibers and Pig Manure are mixed in a THS mixing screw prior to feeding the biomass into a fermentation tank with a KOS Piston Pump

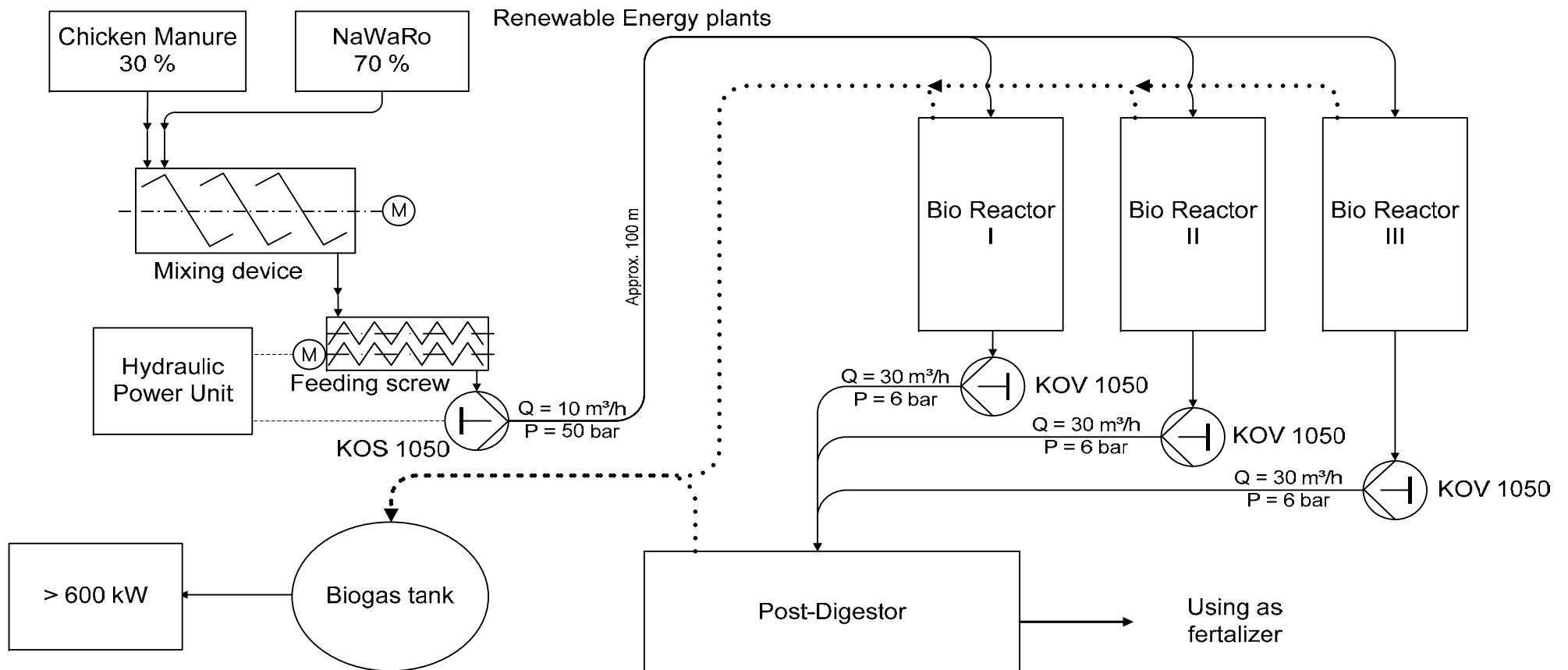


- Corn and Wheat Fibers are stored in two different silos above the THS mixing screw.
- Pig manure is pumped by an other Pump into the hopper of the THS

Using Animal Excrement as an Energy Source

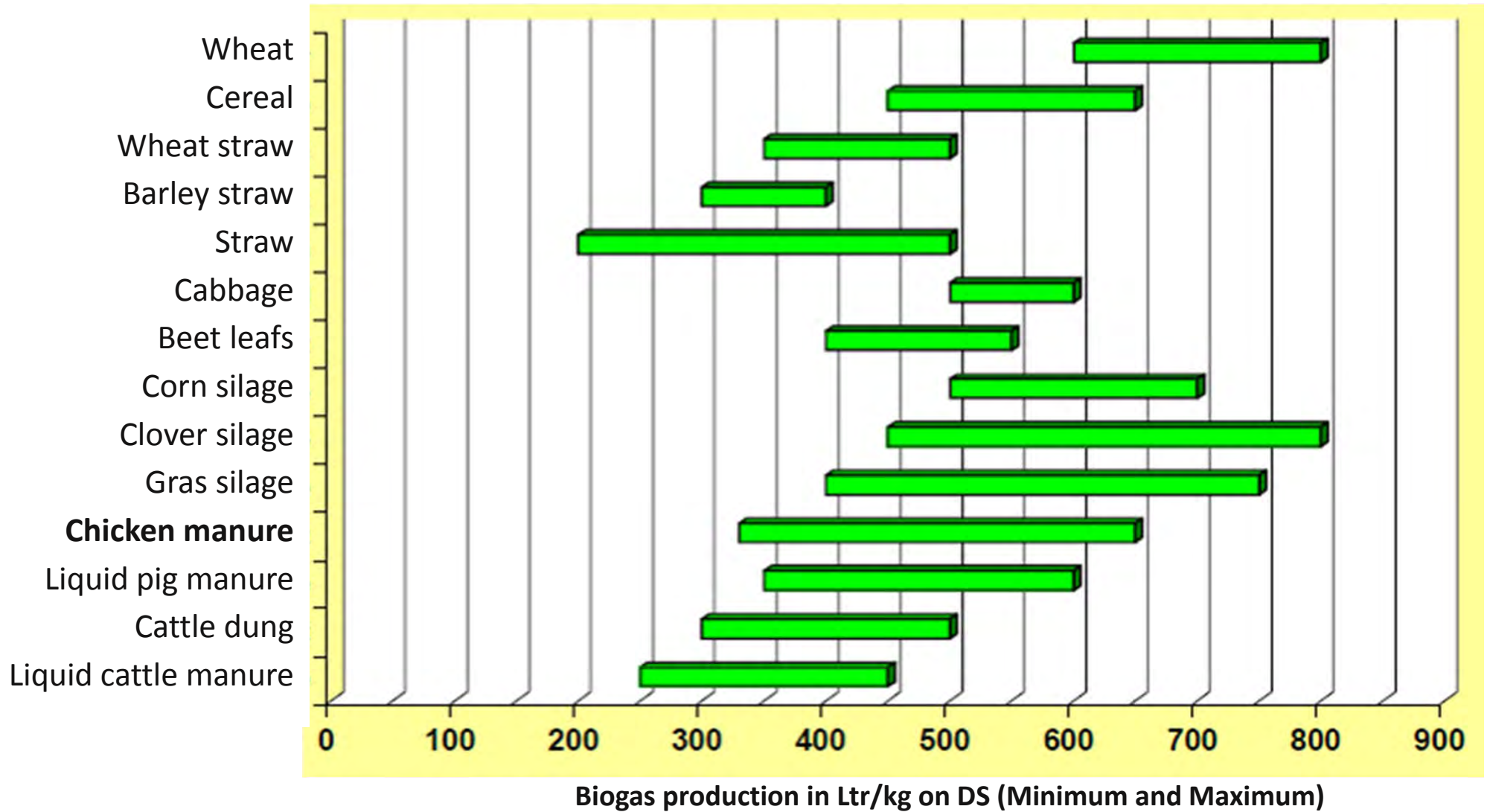


Pumping Chicken Manure mixed with Corn and Wheat into Biogas Reactor











OWS
DRANCO - Process

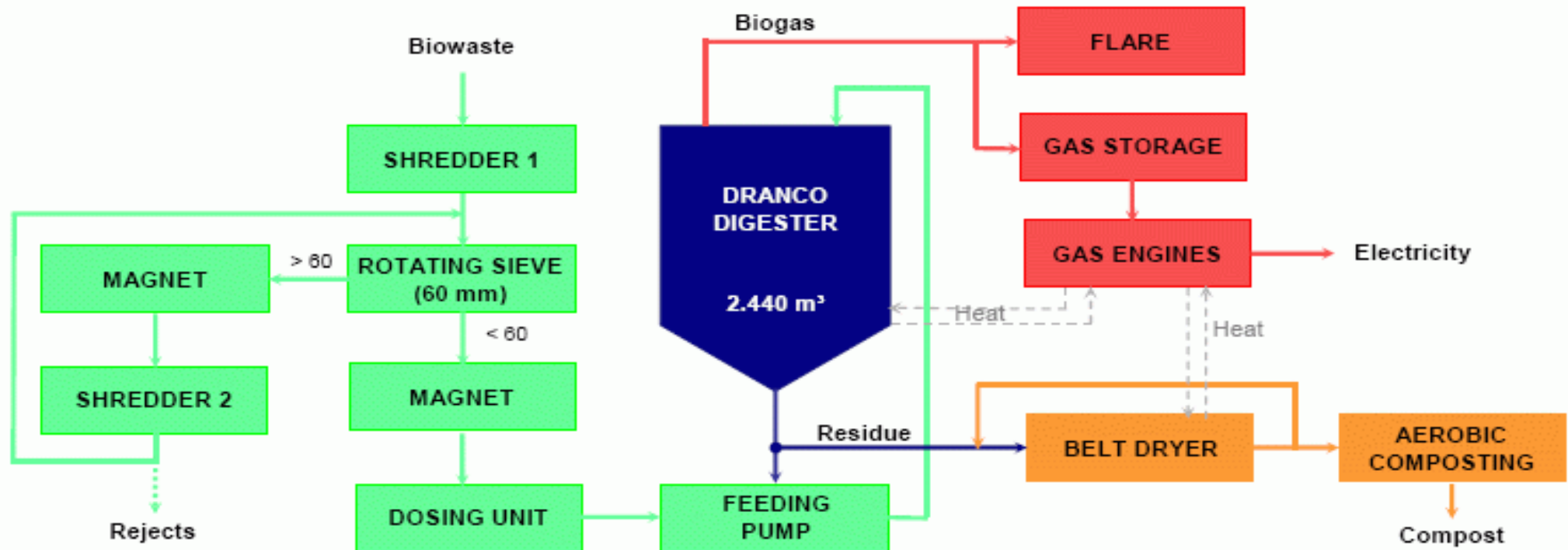
Valorga International
Valorga – Process

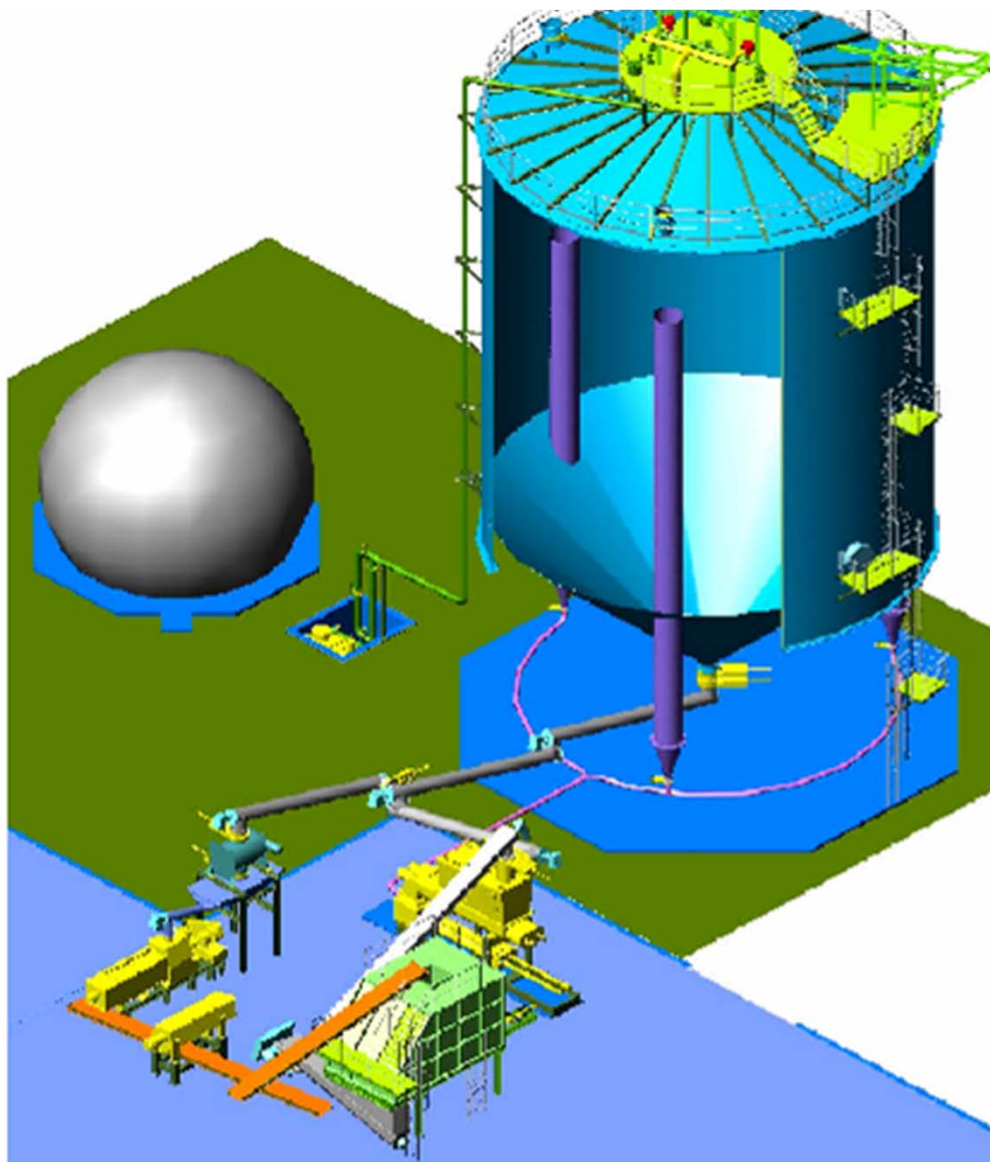
Dranco Process

www.ows.de



DRANCO plant Leonberg (Germany)





The DRANCO Process Characteristics

- digester loading: 10 to 20 kg /m³ reactor per day
- temperature range: thermophilic: 48 to 57°C (or mesophilic: 35 to 40°C)
- retention time in the digester: 15 to 30 days
- biogas production: 100 to 200 Nm³ of biogas per ton of waste
- electricity production: 220 to 440 kWh per ton of waste



Putzmeister Piston Pump at the
Dranco Plant Leonberg / Germany

Collecting

Mixing Device
(450 m³/h)

Piston Pump
(150 m³/h; 10 bar)

Hydraulic Power Pack (132
kW)



Typical Size of a OWS installation

Location:	Leonberg / Germany
Plant Capacity:	30,000 t/a
Digestion capacity:	30,000 t/a
Waste type:	Biowaste
Reactor volume:	2,440 m ³
Start-up:	December 2004
Client:	Abfallwirtschaft Landkreis Böblingen / Germany

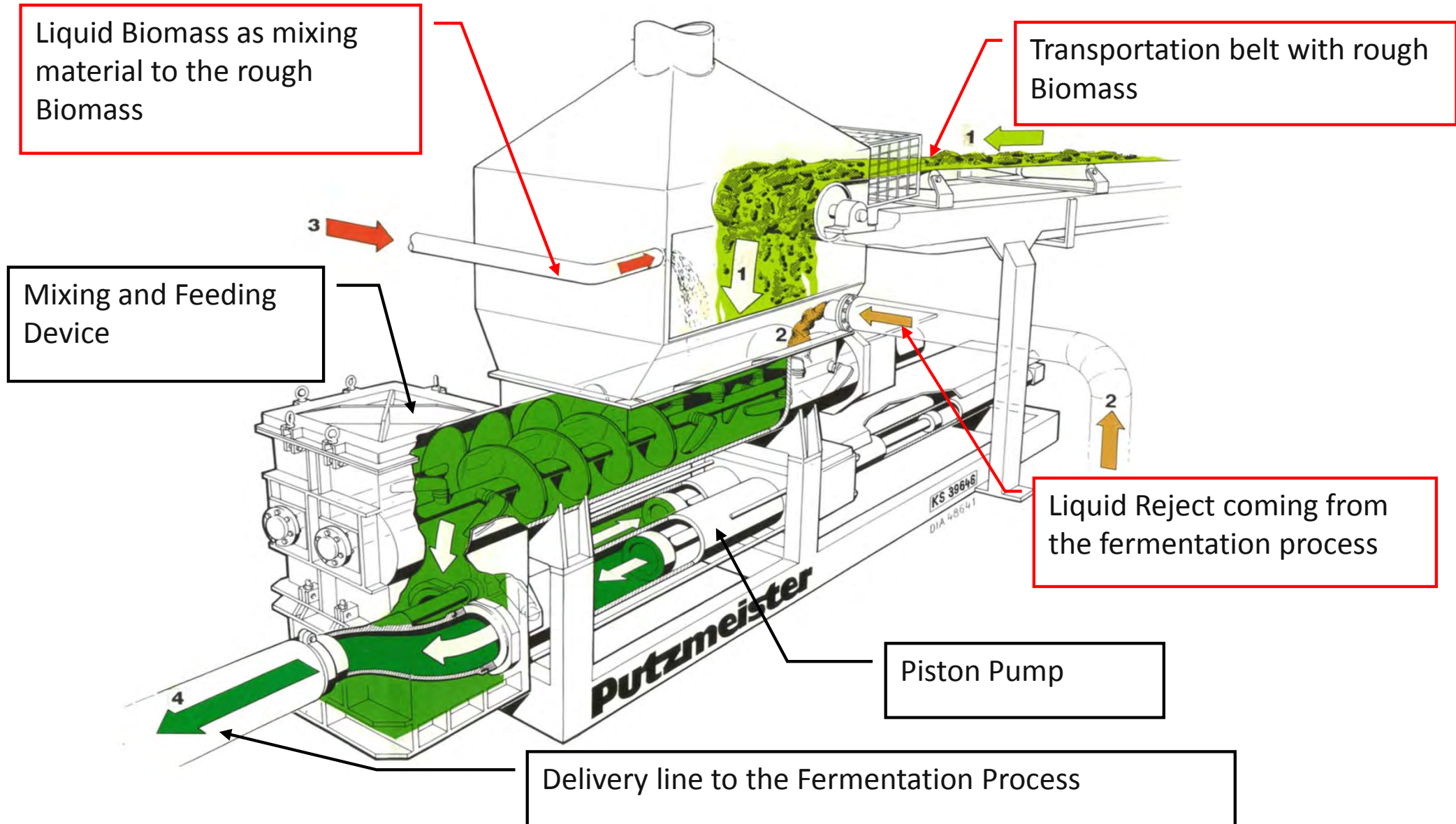
Valorga Process

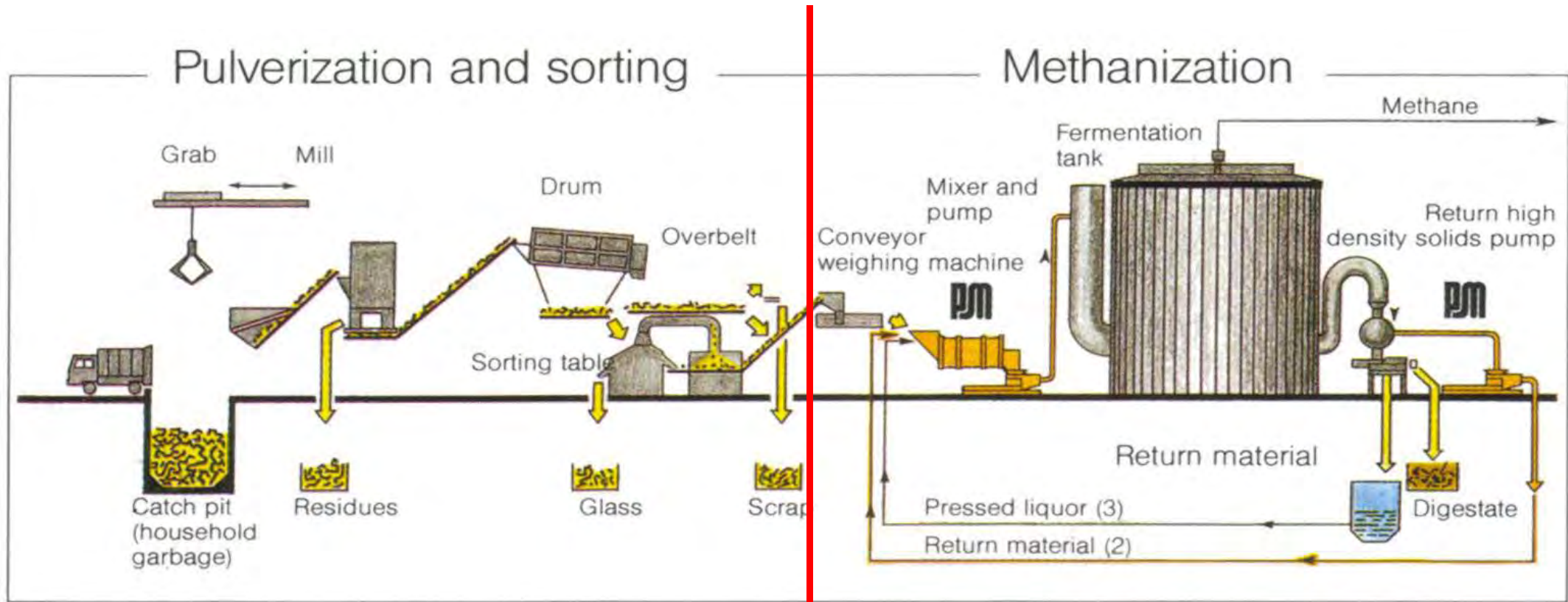
www.valorgainternational.fr



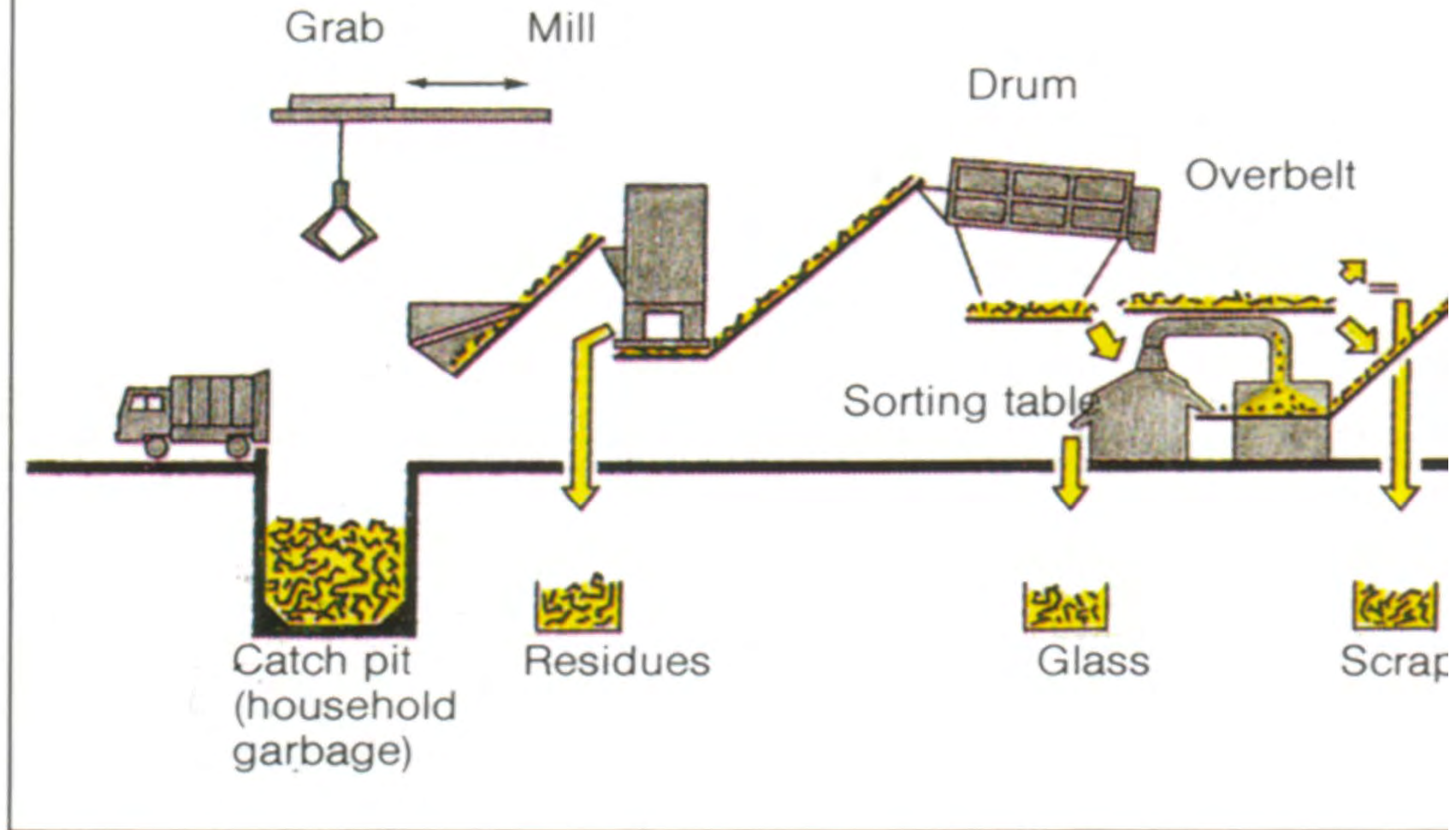
Benefit from using Piston Pumps

The KOS Piston Pump

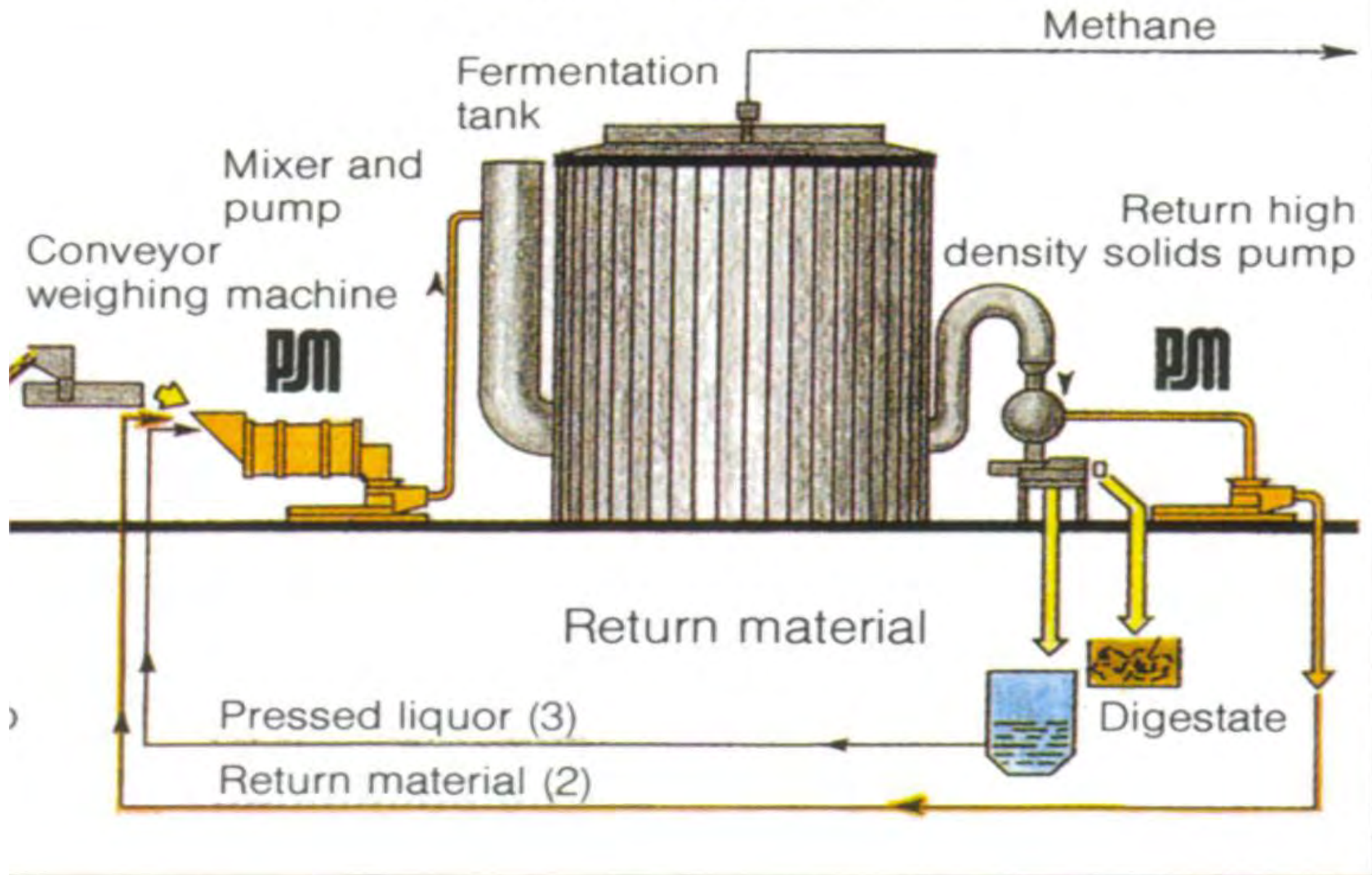




Pulverization and sorting



Methanization

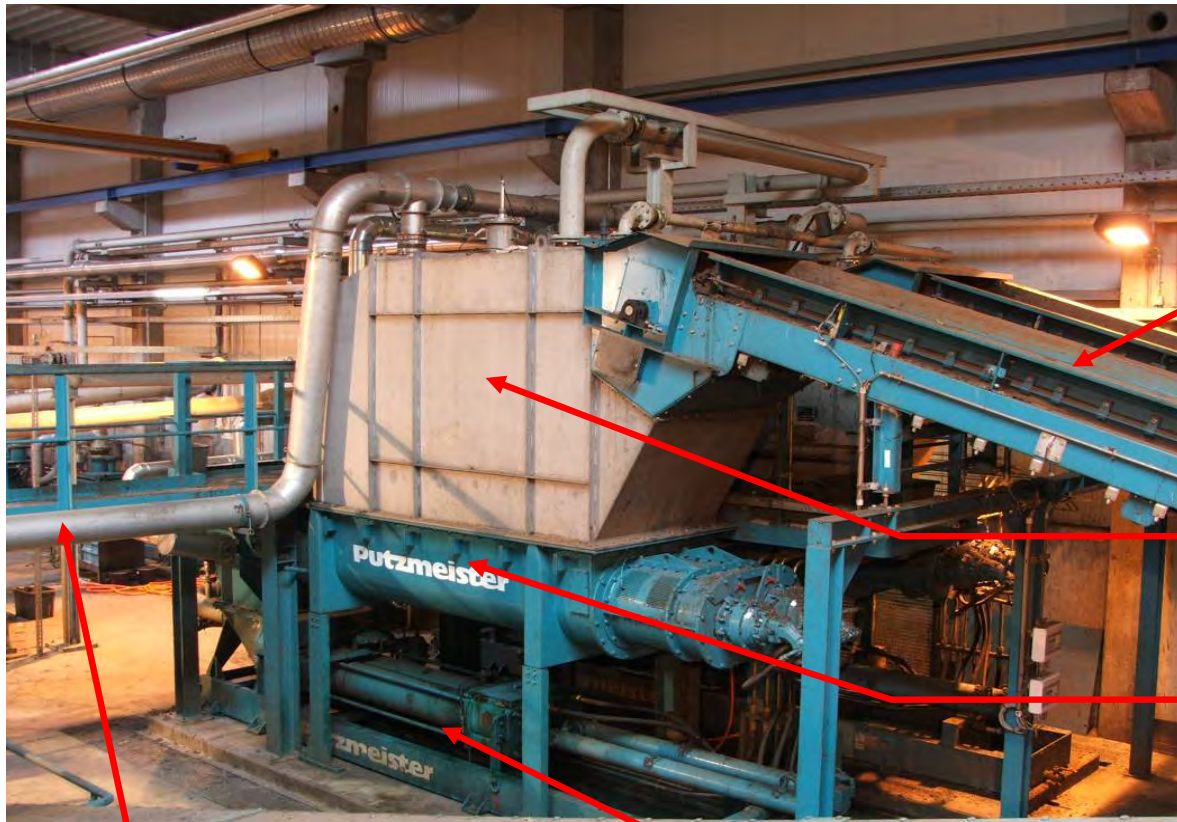




Typical material for a Valorga installation.

The material is collected household waste.

Due to the fact that this material contains a lot of inorganic fractions the production of Methane Gas is lower as with pure organic material as for example food waste



Introduction pump with mixing auger and collecting hopper

Feeding belt with fresh biomass

Collecting hopper

Mixing screw
(450 m³/h)

Introduction piston pump
(150 m³/h, 10 bar)

Return line of digested material



Typical size of a Valorga Process

Location:	Hannover / Germany
Treatment capacity:	100,000 t/a
Digester volume:	3 x 4,200 m ³
Retention time:	25 days
Biogas production:	90 Nm ³ /t input digestion
Specific methane yield:	190 – 220 Nm ³ /t input digestion
Start-up:	2006



OWS / Belgium Dranco - Process

19 Installation in 10 Countries

Rome / I	Brecht I / B	Salzburg / A	Bassum / Ger	Leonberg / Ger
Alicante / ES	Brecht II / B	Pusan / Korea	Münster / Ger	Pohlsche Heide / Ger
Terrassa / ES	Idelux / B	Chablais / CH	Kempten / Ger	Leszno / PL
Vitoria / ES	Hotaks / J	Bourg-en-Bresse / F	Kaiserslautern / Ger	Wijster / NL

Valorga International Valorga - Process

20 Installation in 10 Countries

Amiens / F	Calaise / F	Cadix / ES	Barcelona / Papethe / Tahiti	Genf / CH	Hannover / Ger	Beijing / PRC	Schanghai / PRC
Varenes-Jarcy / F	ES		Tilburg / NL	Engelskirchen / Ger		Yingkou / PRC	
Rounne / F	La Coruna / ES	Mons / B	Tondela / P	Freiburg / Ger		Bassano / I	
			Tratolixo / P				



- All different kinds of material with a certain organic content could be prepared and pumped. The material can be liquid as well as bulky
- With a piston pump it is possible to adjust the flow of material into the fermenter to have always the correct feed for the digesting process
- Pipe line are hermetically closed and have no environmental impact of smell or leakage



- With the a single cylinder piston pump or a double cylinder piston pump it is possible to pump also material with a very percentage of dry solid and also containing large particles
- With the special single cylinder piston pump it is possible to separate inorganic foreign particles from the material and guarantee a trouble free production of Methane gas in the fermenter
- Due to the heavy duty design and the long experience with the PUTZMEISTER equipment it is possible to operate the Bio Methanisation Process and the production of Energy at 24 h/d for years



Thank you!

Any questions?



ENGINEERED FOR SUCCESS

Our machines and plants provide highest performance, quality and reliability.

SOLID PARTNERSHIP

The cornerstone of any collaboration is trust. Our promise is to take the best care of our customers and focus on their needs and requirements. We treat our partners with absolute respect and conduct our business with fairness and trust at all times.

EXPERIENCE PAVES THE WAY

Our global team of highly skilled and motivated people work continuously to improve our products and services. Setting the trend in our industry, we continue to significantly invest in research and development.

Putzmeister is a worldwide leading solution provider for pumping, mixing and placing concrete, mortar and industrial solids.

With our parent company Sany Heavy Industries, we are amongst the world market leaders in our business.

