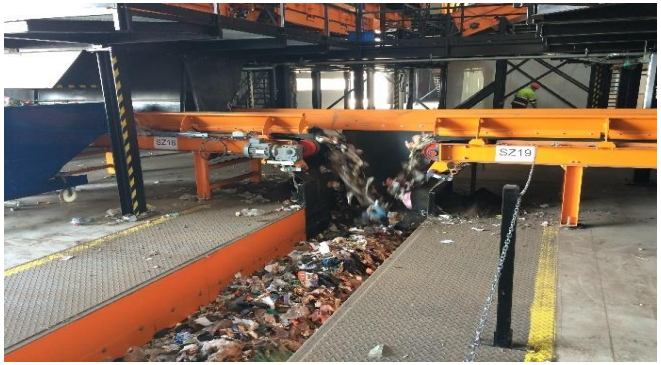
Vidras
Waste & Water

'Zero Waste for a clean and healthy world'

Concept- and Project Development for (City)Waste to Energy Solutions

Michèl Evers, Dick Broekhuis



Vidras Group

Company Profile

Our ambition:

From **city waste (MSW*)** to
Energy, Food and Drinking Water
(Zero Waste)

Upcycling for a clean and healthy world!

Vidras Group:

Deventer,
The Netherlands

info@vidrasgroup.com
www.vidrasgroup.com

Our contribution:

- Concept and Project Development for Upcycling Solutions
- Integral solutions
  . zero waste: (almost) no waste left
  . autarkic solutions
  . total value chain approach
  . bankable solutions
- Best selection of available technologies
  . International cooperation technology partners (e.g. Archea Biogas)
- Project Management
- Project Funding

Our way of working:

- Design - Build – Finance – Operate – Maintain
- Cooperation
  . Clients
  . Business associates (lead development)
  . Technology partners
- Feasibility Studies
  . Best local solution for waste recycling
  . Business Plan, Business Case
  . Investment and Finance Plan
- Co-funding and Project Insurance (e.g. Private investors, World Bank/IFC/MIGA)
- Project Management Turnkey Delivery
- Founded in 2010 by Michèl Evers and Dick Broekhuis

Vidras' Added Value

Design criteria:
Waste to Value
Zero Waste to Landfill
Decentralized
Autarkic solutions

Concept-/Project Development

Concept	*Local*
• Idea to Concept/Solution	• Waste value chain analysis
• Process flow design	• Site plan/lay out
• Mass Balance	• MSW/Biomass Analysis
• Energy Balance	• Feasibility Study
Technology	*Economy*
• Supplier selection	• Business Model
• Machine selection	• Business Plan & Case
• Local Purchase	• Investment Plan
• Proposal Management	• Funding Plan (incl. grants)

Project Management

Action

- Project structure
- Project preparation
- Project planning
- Co-financing
- EPC(M) Contracting
- Due diligence support
- Knowledge exchange
- Site visits
- Temporary solutions

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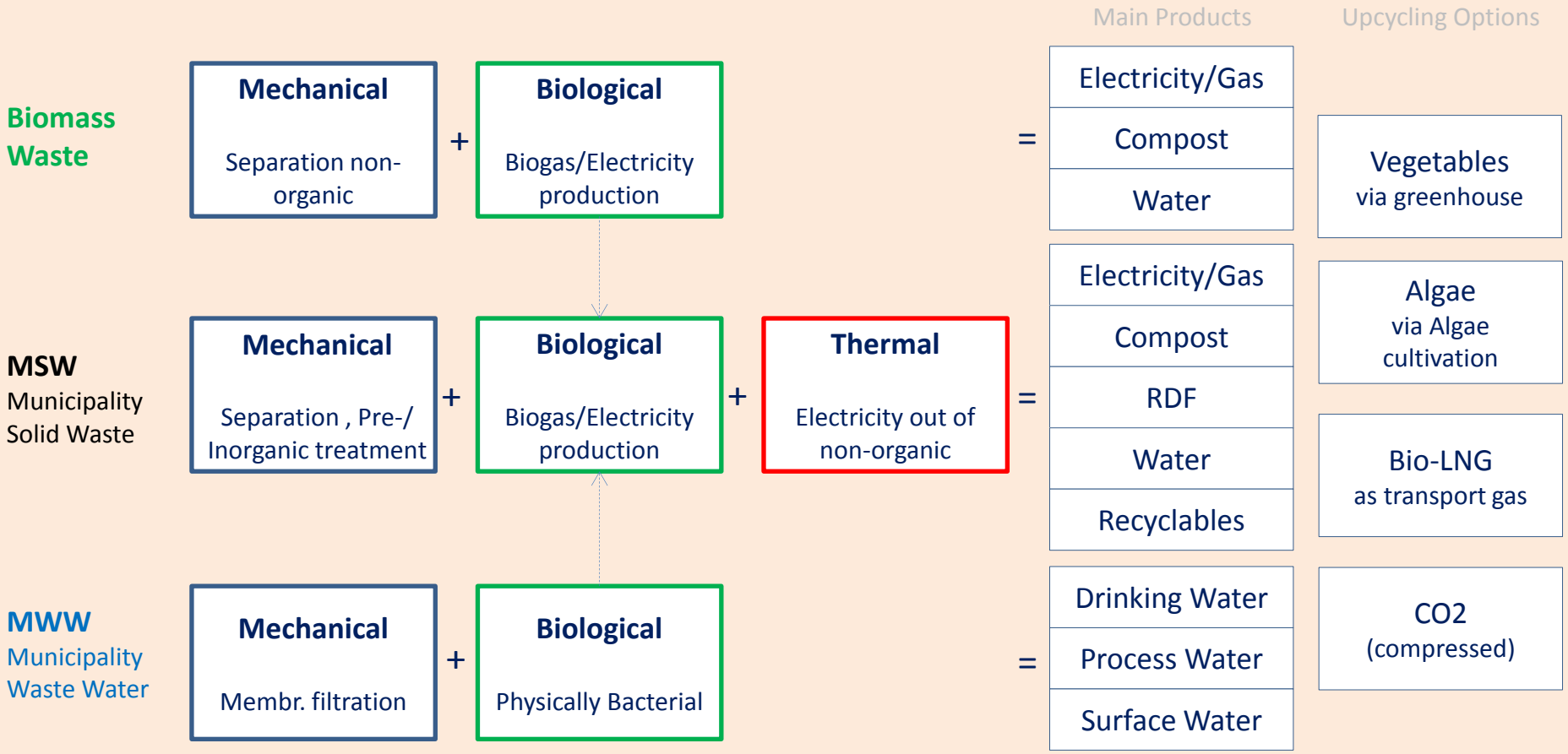
Portfolio of Waste-to-Energy Solutions



Critical issues:

- Performance yield in treatment process
- Energy use in process
- Reliability / uptime of machines
- Economic feasibility of solution

6 Countries
11 Projects

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Unique:

- MSW upcycling: products for local markets
- MSW: > 2 x more efficient process
- Patents: pre-treatment, digester
- CO_2 neutral solutions
- ©: Autarkic solutions: close to Zero Waste
- Combination of proven technologies from different businesses
- Technology partners are multinational companies, with more than 10 years experience
- Installed base (technology partners)
  biogas: > 100 installations worldwide
  MSW: > 3 plants worldwide

Vidras Consortium

Vidras Technology Deventer, The Netherlands Since 2014 Mr. Michèl Evers Mr. Dick Broekhuis www.vidrasgroup.com	**Concept- and Project Developer** Conceptual design of MSW plants Feasibility Studies, Business plan & business case s Process Flow, Mass Balance Project Management
Archea New Energy Hessisch Oldendorf, Germany Since 1997 Mr. Oliver Nacke www.archea-biogas.de	**Manufacturer of biogas systems** Biogas plants, based on plug flow digester Control system Digestate separator
Doppstadt Velbert, Germany Since 1996 Mr Henning Strunz www.doppstadt.com	**Manufacturer of recycling equipment** MSW pre-treatment; separation, press Biomass pre-treatment RDF refining, magnets, etc. Control System
Kelyo Zoetermeer, The Netherlands Since 2008 Mr. Kees Boone www.kelyo.nl	**Agent of CHP equipment** Biogas CHP module: Gas engine Generator, Gas system, gas flare, heat recovery. Control system
Others/Local	MSW gasification system Waste water purification system

Projects/Prospects

April 2017

Projects:

NL, Agriport	A7 Bio-digester (40 t/d)
UK, Southport	MSW plant (170 t/d)
Peru, Lima	MSW plant (1000 t/d) - FS
Peru, Cuzco	MSW plant (500t/d) – FS
Colombia	Jamundi 250 t/d concession

Prospects:

NL, Schiphol	Gasification plant
Ghana, Accra	MSW, 1000t/d
Colombia	3 x MSW 250t/d concessions
Peru, Arequipa	MSW 500 t/d
San Lucia, Castries	WW plant (63m3/hr)
Turkey, Sakarya	MSW, 650 t/d
China, Ningbo	MSW, 400 t/d

Developed Concepts

MSW:
. 100 ton/day
. 250 ton/day
. 500 ton/day
. 1000 ton/day

Biomass to Energy:
. Biomass-to-Gas

Others:
. Autarkic bungalow parks:
… 250 homes
… 3000 homes
. Gasification plant, Cat 1
. Bio LNG production plant
. Algae production plant
. Waste tires recycling plant
. Waste water treatment plant
. Agriculture School

Energy park:
. Biomass, Solar, Algae, waste water

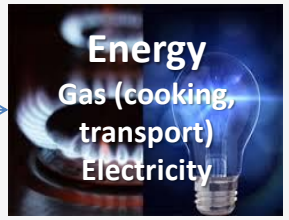
City Waste Solutions

(Energy, Food and Water)

Value Chain MSW:
High value end products
Close to Zero waste
No incineration

Basic

Options



Gasification Plant

extension for full power generation

Digestate

RDF

Hazardous Industrial waste

Hospital waste

Gasification Powerplant

Electricity

A generic 1000 MSW MT/day plant produces approx. 8 MWe
An additional biomass power plant can produce approx. 6 MWe

Food Production

Other extensions to end up with usable products

From Biogas plant

Liquid digestate

CHP

CO_2 + Heat

Bio Fuel
Medicin
Animal Feed
Pigment
…

Compost

CO_2 + Heat

From water purification plant

Flush water

Vegetables and Fruit

Drinking water

MSW Challenges

Investor' challenges:

- Proven technology
- Available land
- Role of the local municipality
- A 15 years concession
- Sales contracts
- Contracts for the input
- Gatefee for the supplied MSW
- A positive Business Case
- Owner of the garbage
- Waste collection partner
- Technology References
- ….

Operator' challenges:

- As simple as possible process
- Separate waste in recyclables
- Removal of sand and stones
- Maximum (>98%) use of organic fraction
- No pollution in fermentation process
- Short duration time in digester (< 15 days)
- High quality of compost
- Clean RDF split in in high and low caloric value
- Less energy use for operation as possible:
  - production of own energy and re-use of water
  - energy efficient equipment and processes
  - less extra water input with necessity of drying the feedstock
- Less (<10%)/no waste to be dumped to landfill.
- Training of employees; stick to the protocol

We Bring:

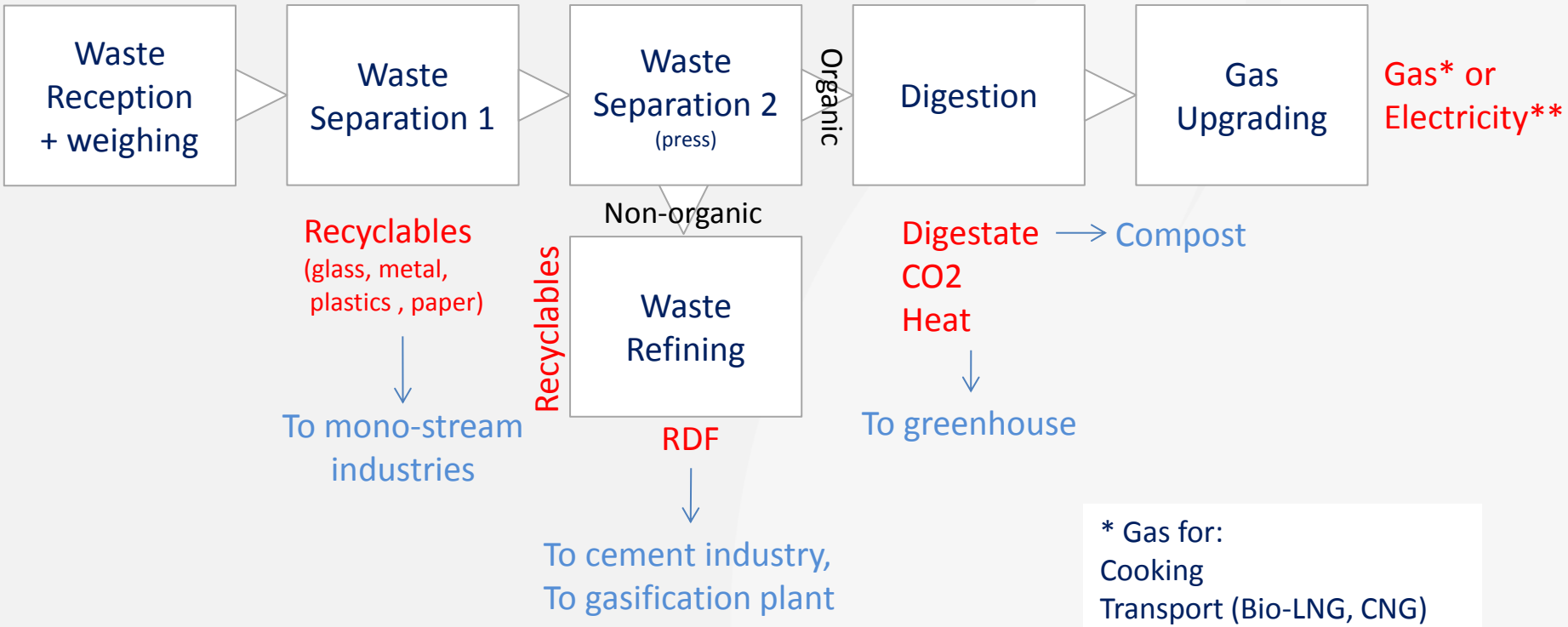
. 100% Solution for daily MSW
. Clean environment
. No Landfill anymore
. Circa 50 jobs
. Land for shares
. Co-funding
. Work for local companies
. Contribute to Social Programs

We Need:

. 7 Hectare of Land
. 20 year Concessions
. Permits, Licenses
. Access to the dumpsite
. Guarantied daily delivery of MSW
. Co-financing by local banks
. Cooperation with Municipality
. Pre-payment of the Feasibility study

MSW Plant Processes

(conceptual design: basics)

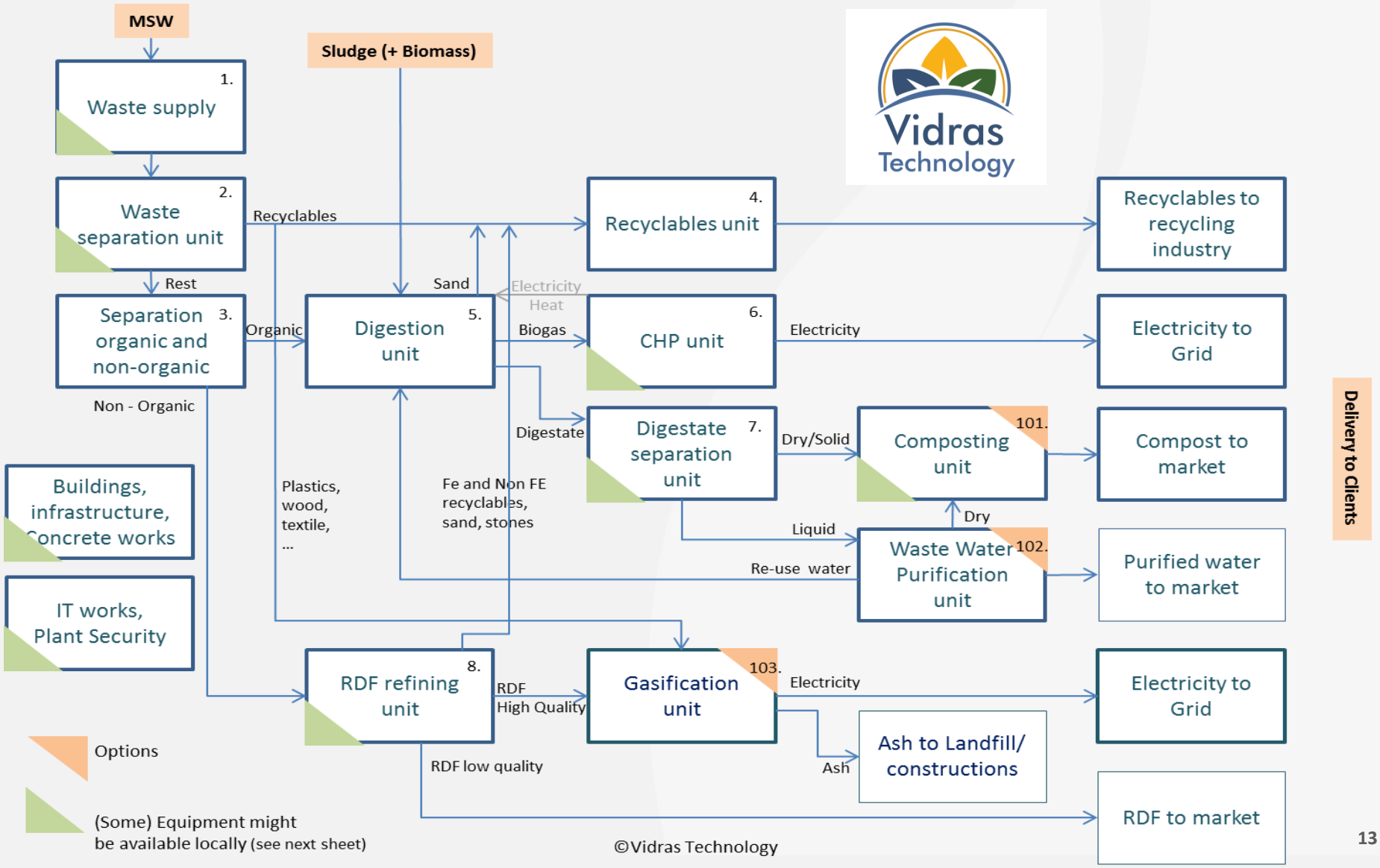


* Gas for:
Cooking
Transport (Bio-LNG, CNG)
Gas distribution (grid)

** Electricity for:
Electricity distribution (grid)

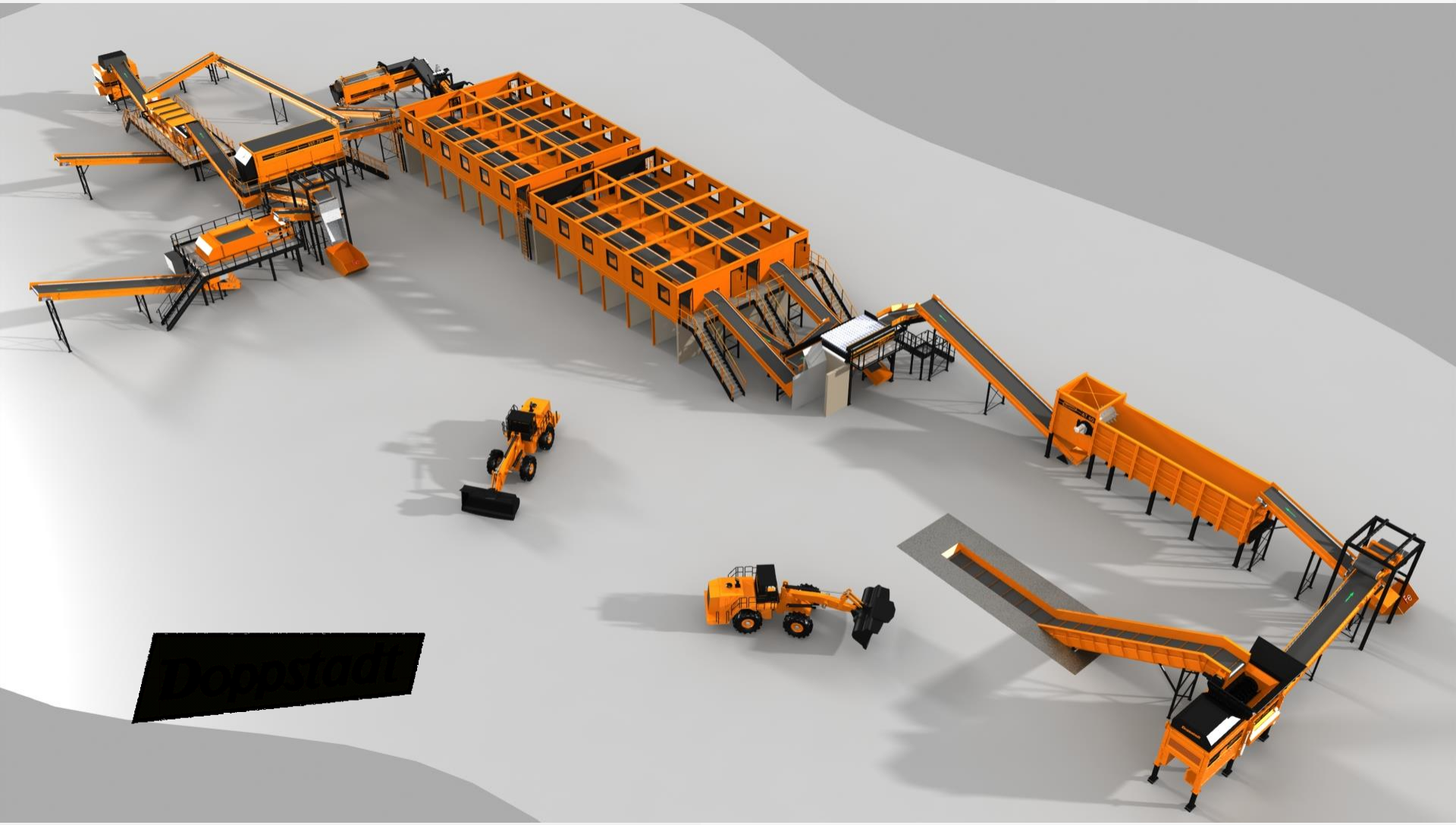
MSW Plant Processes

(conceptual design)



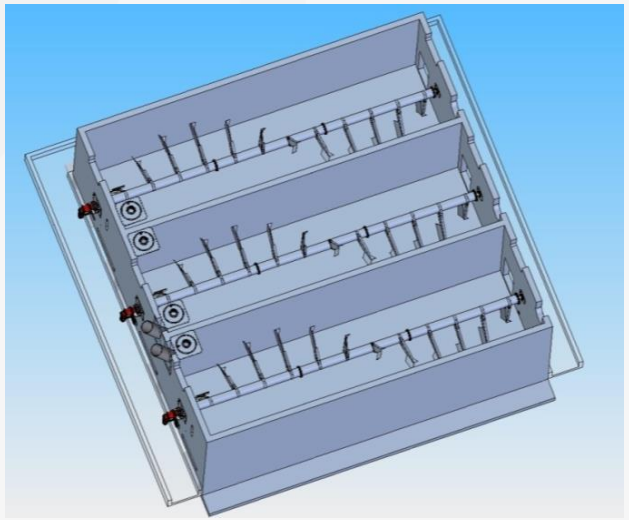
MSW Plant Processes

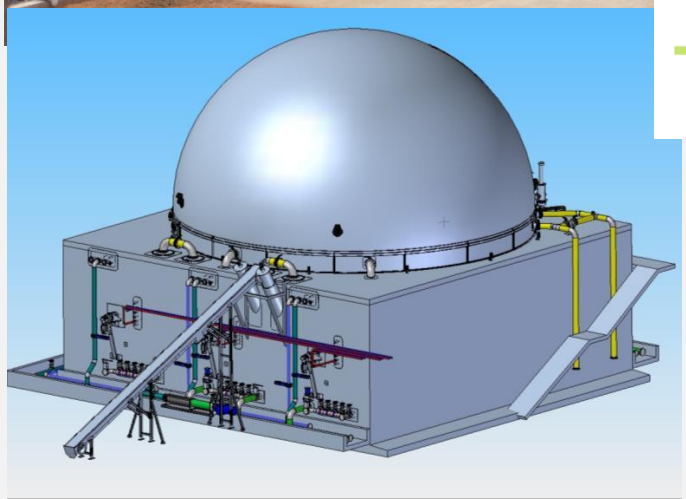
(pre-/post-treatment)



MSW Plant Processes

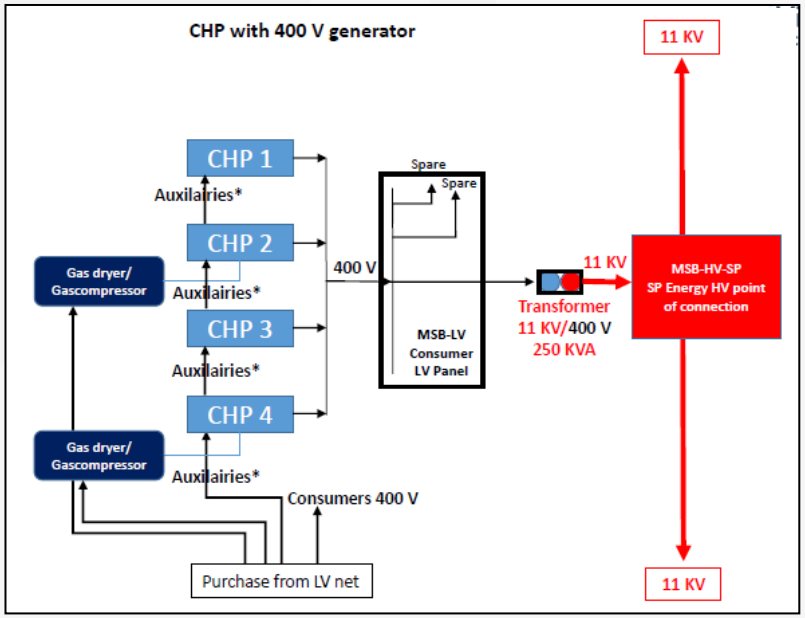
(digester: biogas production)

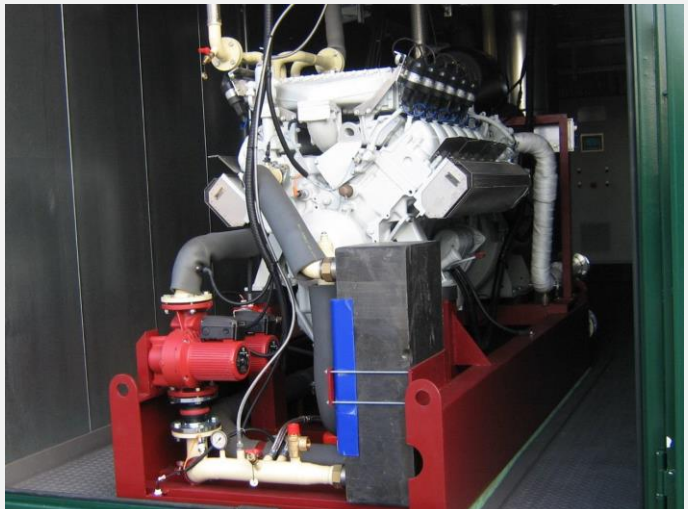




MSW Plant Processes

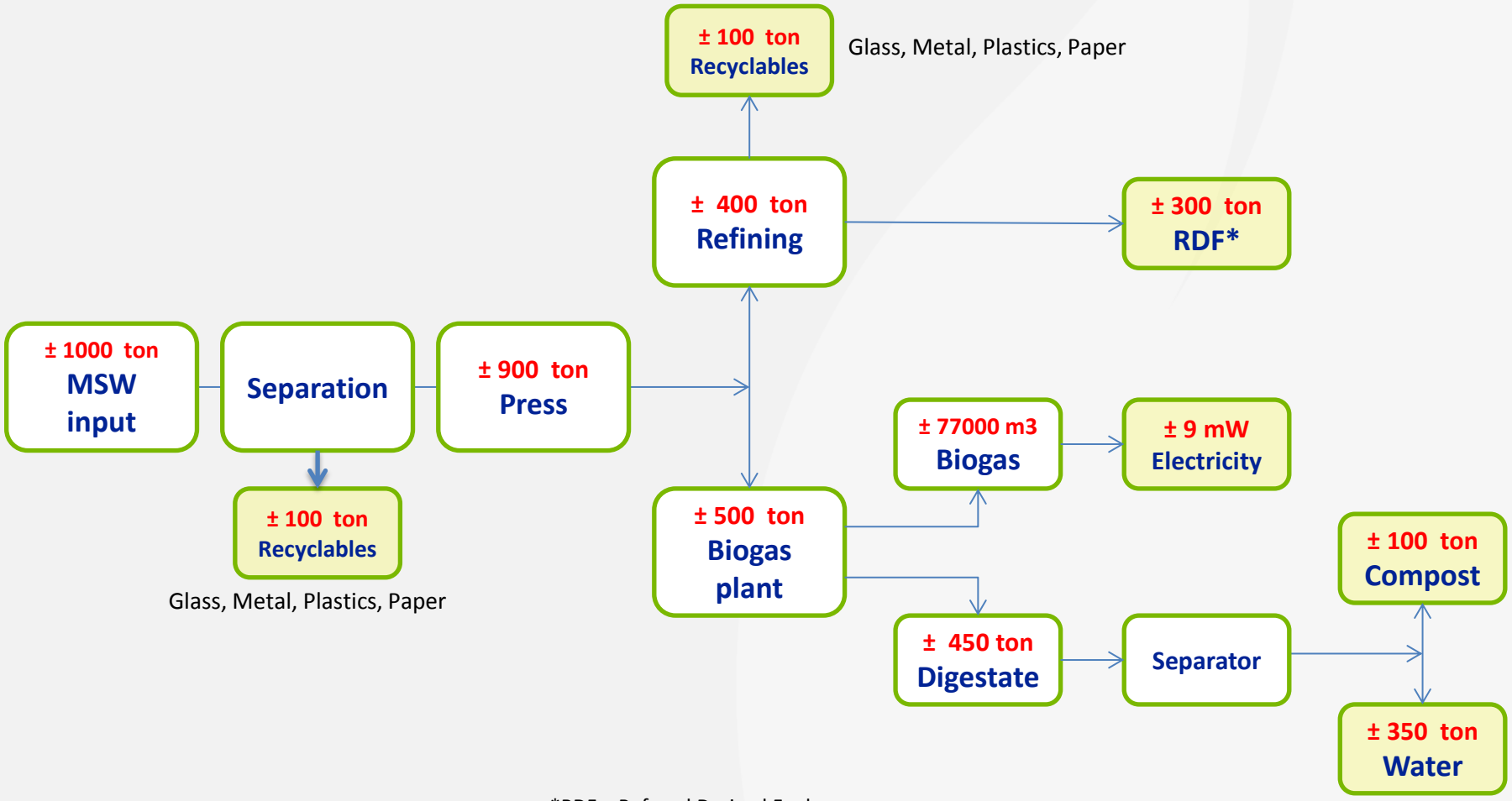
(CHP: electricity production)





MSW Plant Mass Balance

(basic)



*RDF = Refused Derived Fuel

Note!! Numbers used are rough estimations and depend on city waste compostition (to be determined for every project)

Keyfigures MSW Plant
1000 t/d

Basic Configuration without options

Key Figures			*Indicative calculation*		*Non-binding*
Type plant			1000	ton MSW/day	
Production					
	Daily Supply fresh MSW		1000	ton.day	
	As part of input:				
		Organics	520	ton.day	
		Recyclables + RDF	360	ton.day	
	Operations		24/7	hours	
			4	shifts	
	Space		7	ha	
	Output	Biogas	21.621.600	m3/yr	
		Electricity (out of biogas)	57.000	mWe/yr	
			7,8	MWe/hr	
		Heat	47.000	mWh/yr	
		CO2	11.332	ton/yr	
		Digestate dry part	65.000	ton/yr	
		liquid part, surplus	63.000	m3/yr	
		Drinking Water	31.115	m3/yr	
		Recyclables	30.000	ton/yr	
Investment		circa	€ 25.000.000		
P&L			*(rounded figures)*		
	Sales		€ 8.900.000	100%	
	Gross Margin		€ 9.036.723	102%	
	EBITDA		€ 5.300.000	60%	
	EBT		€ 2.200.000	25%	
	Depreciation				
		MSW equipment	10	years	
		Buildings, etc.	20	years	
Returns	ROI	yrs 5	8,8%	yearly	
	Free Cash flow		€ 3.812.052	yearly	
	Payback		6,3	years	

Assumptions

City **X**
Country Y
2011 4.000.000 inhabitants

2016 Calculation MSW
est.: 5.200.000 inhabitants
5.200.000 kg MSW
500.000 kg Landfill
5.700 ton/day

Price Electricity	0,129 €/kWh
Price fresh MSW	0,62 €/ton
Land	Free of charge
Interest	5%

Disclaimer: *These figures are indicative and not based on a performed local feasibility study. No rights can be obtained from these figures. The aim of the figures is to inform potential customers tentatively of the opportunities for implementing and operating a MSW plant. Further information at Vidras Group,* ***www.vidrasgroup.com***

Goa, India
- MSW, 60.000 tons/year-

Reference Location

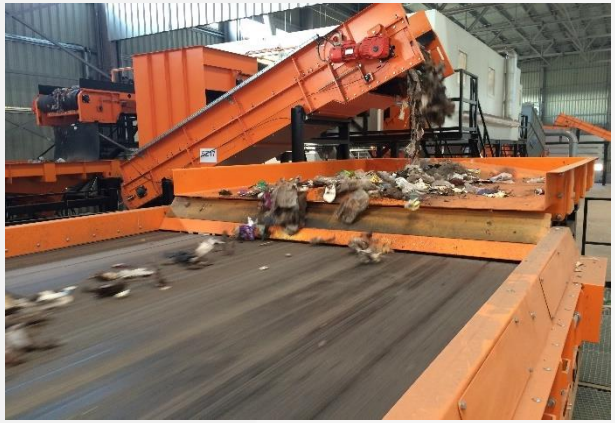
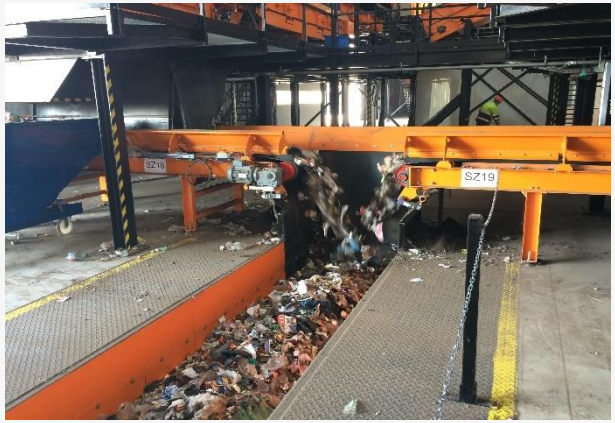
Originial film about India MSW plant is: https://www.youtube.com/watch?v=u5qqfDXXJvM&index=9&list=PLQOy61JsI1aG5nS__9pi60by7xjZHDzxm

Kelet Nograd, Hungary
- MSW, 160.000 tons/year-

Reference Location






Vidras
Waste & Water

From Trash to Cash

THANK YOU

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