

EXECUTIVE SUMMARY

MULTI WASTE RECYCLING PROJECT



Production location:
Moerdijk
In the heart of waste recycling Netherlands



MULTI WASTE RECYCLING PROJECT

TABLE OF CONTENT

Subject:	Page:
Introduction	1
Table of content	2
The project	3
Approach of the multi project	4
Summary and Business case	5 - 7
Financials Fase 1	8 - 12
Financials Fase 2	13 - 17
Opportunities & Treats	18
Pyrolysis	19
Technical description of the concepts	20 - 37



The Project:

Dutch Multi Waste Recycling (a new company, to be erected by Polykarpia) has the intention to start a project to clean up different waste streams:

The first step of the project is to start with:

The residue from a recycling plant called:

FLUF

The biggest hidden polluting waste stream:

WASTE TIRES

The plant will be built on reduced capacity to keep the project manageable, once started up the plant will be expanded to the desired capacity.

In a later stage, the following products are added:

The easy to transfer waste into energy:

PLASTIC

A logical ad-on waste:

DOMESTIC WASTE

The waste recycling concepts, developed by Polykarpia and his partners, will be used with the result:

Turn waste and waste residues into raw materials and energy

Different process lines will be built simultaneously, with very similar techniques to treat the different waste streams.

(for details, see chapter: Technical Description on page 20)

In contrast to the competition, Polykarpia and partners do not focus on quick solutions but wants to contribute in the minimizing of waste. Therefore, we go one step further by using transition techniques to turn waste into raw materials and energy. Even waste residues are further minimized to the maximum.

Some facts:

- A waste recycling plant recycles SLF (shredder Light Fraction) waste, but still produces 800 000 tons of waste yearly, called Fluf.
- Europe produces 330 million waste tires every year. According to the European Tire and Rubber association
 - The Netherlands produces 9 Million tons of Domestic waste yearly. With 7 main groups : 1) vegetable, fruit and garden-waste, 2) paper and cardboard 3) glass 4) plastics 5) textile 6) metals 7) others.



Approach of the Multi project.

The project is divided in three phases, this modular approach makes the project more manageable and with a lower risk and planning.

Fase 1: Start

2 Waste streams SLF and Waste Tires on reduced capacity.

Starting phase, realized before end of 2013.

Fase 2: Expansion in capacity

The SLF is expanded to double capacity.

Domestic waste is added and started up on reduced capacity.

Expansion phase, realized by the end of 2015.

Fase 3: Expansion in products.

The existing lines are expanded to full capacity

A line for plastic waste is added and started up

Expansion phase, realized by the end of 2017.



Summary of the Polykarpia recycling concept and Business case:

Starting fase, realized before the end of 2013:

Product 1:

1) SLF (Shredder Light Fraction) waste residue

In the multi waste recycle plant the next waste streams will be treated: 100.000 tons of Industrial waste residue from a waste recycling plant. The product will be pre-treated, so it can be charged to the Pyrolysis reactor to transfer it into:

be used as:

± 38 % Oil (38000 tons)
± 45 % Gas
± 17 % Ash (17000 tons)

The produced materials can

Transport fuel
Transferred to Electricity for plant energy.
Cement, Road construction, Fertilizer



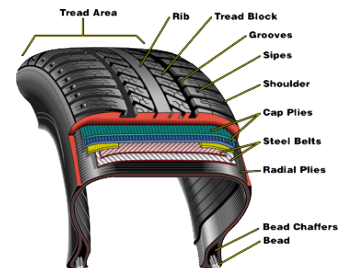
Product 2:

2) Waste tires

± 12 000 tons of waste tires are downsized to rubber crumb and the iron is removed. The rubber crumb is Pyrolysed into:

± 30 % Carbon (3.600 tons)
± 44 % Oil (5.200 tons)
± 15 % Steel (1.800 tons)
± 1 % Textile
± 10 % Gas

The produced materials can be used as:
Raw material in rubber - or carbon industry.
Process oil or fuel.
Raw material steel industry.
Raw material or internal fuel.
Internal fuel



The business case:

±€ 35 mil. Investment.

Production (tons/year): ±100.000 Fluf and 12.000 Waste tires.

Plant depreciation in 10 year.

Not included: Grants and CO₂ credits.

± € 7.8 mil./year On product sales:

and energy and CO₂ credit's.

Work generated for 80 people

Net Profit:

Year >	2014	2015	2016	2017	2018	2019	2020
Million €	7	7	8	8	8	8	9

Second fase, expansion in capacity and adding Domestic waste, realized in 2015

The SLF capacity is doubled and Domestic waste is added :

1) SLF (Shredder Light Fraction) waste residue

In the multi waste recycle plant the following waste streams will be treated: An extra 100.000 tons recycling line is added, so the total amount of waste recycled is 200.000 tons of Industrial waste residue from a waste recycling plant.

The product will be pre-treated, so it can be charged to the Pyrolysis reactor to transfer it into:

± 38 % Oil	(760.000 tons)	The produced materials can be used as:
± 45 % Gas		Transport fuel
± 17 % Ash	(340.000 tons)	Transferred to Electricity for plant energy.
		Cement, Road construction, Fertilizer



2) Domestic waste

A line, treating 36.000 tons of Domestic waste is started up. First selected for recyclables, than dewatered and fed in to the pyrolysis reactor and transferred into:

± 15 % Recyclables		The produced materials can be used as:
± 60 % RDF		(plastic, metal, paper, stones, wood)
± 70 % Water		Refuse Derived Fuel (fuel replacement)
± 60 mW Electricity		Clean water
± 3.5 mW Heat		



The business case:

- ± € 55 mil. Investment.
- Production (tons/y): ± 200.000 Fluf, 12.000 Waste tires and 36.000 Domestic waste.
- Plant depreciation in 10 year.
- Not included: Grants and CO₂ credits.
- ± € 53 mil./year On product sales:

and energy and CO₂ credit's.

Work generated for 153 people

Net Profit:

Year >	2014	2015	2016	2017	2018	2019	2020
Million €	7	17	17	18	19	19	20

Third fase, expansion in products, realized in 2017

The Multi plant is expanded with the following products:

Product 3

Plastic waste

30.000 tons of plastic waste are downsized to crumbs and fed to the pyrolysis reactor and transferred into:

± 70 % Oil (21.000 tons)
± 1.5 mW Electricity
± 3.6 mW Heat

The produced materials can be used as:
Transport fuel
Plant energy
Plant energy



Product 4

Domestic waste

An expansion of 36.000 tons to 72.000 tons/year of Domestic waste, first selected for recyclables, than dewatered and fed to the pyrolysis reactor and transferred into:


± 15 % Recyclables
± 60 % RDF
± 70 % Water
± 60 mW Electricity
± 3.5 mW Heat

The produced materials can be used as:
(plastic, metal, paper, stones, wood)
Refuse Derived Fuel (fuel replacement)
Clean water



This part of the project will be presented in a separate business plan together with the business calculation, because raw material prices will increase as well gate fee's for waste


Operational info to produce the Business calculation on page 5

		Prces in Euro's ex VAT		
2. Operational info				
		<u>Per year</u>		
Werkable days		351	days	
Sortingline				
Supply Gross waste tires		11.905	Ton	100%
Recycable-material (steel)		1.786	Ton	15%
Moisture		0	Ton	0%
Textile		119	Ton	1%
Net Rubber		10.000	Ton	84%
Pyrolysis				
		<u>ton</u>		
Minumum capacity pyrolysis per year		10.000		100%
Expected optimisation up to 30% in 4 years				
Expected capacity per year		10.000	ton/year	100%
Yield				
Yield oil		5.238	ton/jaar	44%
Yield energy		0	Mwe/a	
yield heat				200 KWth/h
Fuel from Fluf process		38.000	ton/year	
Prices				
	Euro			
Electricity	0,052	per Kwhe		
SDE-grant	0,00	per Kwue		
Oil	450,00	per ton		Calculated crude oil and steel price: \$ 100/barrel and dollar rating 1.5
Heat	0	Per Kwthh		Price heating oil 12-2-12 = 930 €/ton
Recycled material	300,00	per ton		Scrapsteel price feb 2013 = 281 €/ton
Sulphur	0,00	per ton		
Carbon Black	850,00	per ton		
Fuel from Fluf process	450,00	per ton		
Yields				
Gatefee/sortingline	ton/year		price/unit	Yield
Recycled materiaal	1.786	15%	300,00	535.800
Carbon Black	3.572	30%	850,00	3.036.200
Sulphur	600	100%	0,00	0
Gate-fee	11.905	100%	0,00	0
Total gatefee/products				3.572.000
Turnover ELECTRICITY				
	Mwe/h	Mwe/year	Price/Mwh	
Generators	0,00	0	52,00	0
Steamturbine		450	52,00	23.400
TOTAL: ELECTRICITY				23.400
Turnover oil/gas and heat				
	Ton/year		price €/ton	
Oil	5238,00		450,00	2.357.100
Ash	17000		30	510.000
Revenue heat	0,00	0	0	0
Fuel from Fluf process	38.000,00		450,00	17.100.000
Totaal oil/gas and heat				19.967.100
Total revenues				23.562.500


Personel costs to produce the Business calculation on page 5

				2013	2014	2015	2016	2017	2018	2019	2020	
7A. Labor costs				100%								
Labor costs		YearWage	Number	Total cost								
Managementfee	DR2 holding	125	1	125	125	129	133	137	141	145	149	153
Production leader +safety	HBO	60	2	120	120	124	128	132	136	140	144	148
Office	MEAO	35	2	70	70	72	74	76	78	80	82	84
Fuelpreparation	Proc eng	55	5	275	275	283	291	300	309	318	328	338
Pyrolysis	Proc eng	65	5	325	325	335	345	355	366	377	388	400
Post treatment	Proc eng	55	10	550	550	567	584	602	620	639	658	678
Logistic	MBO	30	10	300	300	309	318	328	338	348	358	369
Workers	LBO	35	40	1.400	1.400	1.442	1.485	1.530	1.576	1.623	1.672	1.722
Maintenance	MBO	26	5	130	130	134	138	142	146	150	155	160
Inernships		0	0	0	0	0	0	0	0	0	0	0
Gross Salaries			80	3.295	3.295	3.395	3.496	3.602	3.710	3.820	3.934	4.052
Social security charges												
Employers insurance part					571	588	605	624	642	662	681	702
Social funds					159	163	168	173	178	184	189	195
Pension provisions					314	323	333	343	353	364	375	386
Sick leave insurance					146	150	155	159	164	169	174	179
Others					127	131	135	139	143	147	151	156
Total Social charges					1.317	1.355	1.396	1.438	1.480	1.526	1.570	1.618
Other personnel costs												
Cantine costs			3	3	3	3	3	3	3	3	3	3
Travel and car cexpenses			3	3	3	3	3	3	3	3	3	3
Corporate clothing			3	3	3	3	3	3	3	3	3	3
Education			3	3	3	3	3	3	3	3	3	3
Other personnel costs			2	2	2	2	2	2	2	2	2	2
Total other personnel costs			14	14	14	14	14	14	14	14	14	14
TOTAL PERSONNEL COSTS					4.626	4.764	4.906	5.054	5.204	5.360	5.518	5.684

Cashflow sheet used for the Business calculation on page 5

 (Amounts in EUR 1.000)									
10. Cashflow	2013	2014	2015	2016	2017	2018	2019	2020	
Cash position, starting balance		-2.233	8.607	19.124	29.870	40.847	52.061	63.514	
Result after taxes		7.713	7.381	7.610	7.841	8.078	8.317	9.263	
finance charges									
Finance charges		1.882	1.882	1.882	1.882	1.882	1.882	941	
Release provisions		0	0	0	0	0	0	0	
Depreciation intangible activa		0	0	0	0	0	0	0	
Depreciation fixed activa		3.136	3.136	3.136	3.136	3.136	3.136	3.136	
Working capital									
Operational cash flow		12.731	12.399	12.628	12.859	13.096	13.335	13.340	
Decrease funding for VAT		0							
Increase in debtors		-950	0	0	0	0	0	0	
Increase in creditors		941							
Change in working capital			-9	0	0	0	0	0	
Investment in fixed activa	-31.360		0	0	0	0	0	0	
Start-up losses	-2.233								
Preparation costs	-850								
Investments	-34.443	0	0	0	0	0	0	0	
Acquisition loans									
-Crassus	0								
-Investors	35.343								
-Bank	-900								
-Guarantee credits/grants	850	0							
Interest payments		-1.882	-1.882	-1.882	-1.882	-1.882	-1.882	-941	
Repayment of loans									
- Bank		0	0	0	0	0	0	0	
-Guarantee credits/grants		0	0	0	0	0	0	0	
Financing cash flow	35.293	-1.882	-1.882	-1.882	-1.882	-1.882	-1.882	-941	
Cash-position, final balance	850	8.607	19.124	29.870	40.847	52.061	63.514	75.913	
Cashmutation		10.840	10.517	10.746	10.977	11.214	11.453	12.399	


Operational info to produce the Business calculation on page 6.

		Prces in Euro's ex VAT		
2. Operational info				
		Per year		
Werkable days		351 days		
Sortingline				
Supply Gross waste tires		11.905 Ton		100%
Recycable-material (steel)		1.786 Ton		15%
Moisture		0 Ton		0%
Textile		119 Ton		1%
Net Rubber		10.000 Ton		84%
Pyrolysis				
		ton		
Minumum capacity pyrolysis per year		10.000		100%
Expected optimisation up to 30% in 4 years				
Expected capacity per year		10.000 ton/year		100%
Yield				
Yield oil		5.238 ton/jaar		44%
Yield energy		0 Mwe/a		
yield heat		200 KWth/h		
Fuel from Fluf process		76.000 ton/year		
Prices				
		Euro		
Electricity		0,052		per Kwhe
SDE-grant		0,00		per Kwue
Oil		450,00		per ton
Heat		0		Per Kwhth
Recycled material		300,00		per ton
Sulphur		0,00		per ton
Carbon Black		850,00		per ton
Fuel from Fluf process		450,00		per ton
Yields				
Gatefee/sortingline	ton/year		price/unit	Yield
Recycled materiaal	1.786	15%	300,00	535.800
Carbon Black	3.572	30%	850,00	3.036.200
Sulphur	600	100%	0,00	0
Gate-fee	11.905	100%	0,00	0
Total gatefee/products				3.572.000
Turnover ELECTRICITY				
	Mwe/h	Mwe/year	Price/Mwh	
Generators	0,00	0	52,00	0
Steamturbine			52,00	0
TOTAL: ELECTRICITY				0
Turnover oil/gas and heat				
	Ton/year		price €/ton	
Oil	5238,00		450,00	2.357.100
Ash	17000		30	510.000
Products from City Waste	0,00	0	0	11894386
Fuel from Fluf process	76.000,00		450,00	34.200.000
Totaal oil/gas and heat				48.961.486
Total revenues				52.533.486
				=====


Personel costs to produce the Business calculation on page 6

				2014	2015	2016	2017	2018	2019	2020	2021
7A. Labor costs				100%							
Labor costs		YearWage	Number	Total cost							
Managementfee	DR2 holding	125	1	125	125	129	133	137	141	145	149
Production leader +safety	HBO	60	3	180	180	185	191	197	203	209	215
Office	MEAO	35	4	140	140	144	148	152	157	162	167
Fuelpreparation	Proc eng	55	10	550	550	567	584	602	620	639	658
Pyrolysis	Proc eng	65	5	325	325	335	345	355	366	377	388
Post treatment	Proc eng	55	20	1.100	1.100	1.133	1.167	1.202	1.238	1.275	1.313
Logistic	MBO	30	20	600	600	618	637	656	676	696	717
Workers	LBO	35	80	2.800	2.800	2.884	2.971	3.060	3.152	3.247	3.344
Maintenance	MBO	26	10	260	260	268	276	284	293	302	311
Inernships		0	0	0	0	0	0	0	0	0	0
Gross Salaries			153	6.080	6.080	6.263	6.452	6.645	6.846	7.052	7.262
Social security charges											
Employers insurance part					1072	1104	1137	1171	1207	1243	1280
Social funds					298	307	316	325	335	345	356
Pension provisions					590	607	626	644	664	684	704
Sick leave insurance					274	282	291	299	308	318	327
Others					238	245	253	260	268	276	285
Total Social charges					2.472	2.545	2.623	2.699	2.782	2.866	2.952
Other personnel costs											
Cantine costs			3	3	3	3	3	3	3	3	3
Travel and car cexpenses			3	3	3	3	3	3	3	3	3
Corporate clothing			3	3	3	3	3	3	3	3	3
Education			3	3	3	3	3	3	3	3	3
Other personnel costs			2	2	2	2	2	2	2	2	2
Total other personnel costs			14	14	14	14	14	14	14	14	14
TOTAL PERSONNEL COSTS					8.566	8.822	9.089	9.358	9.642	9.932	10.228

Balance sheet, used for the Business calculation on page 6.

 (amounts in EUR 1.000)									
9. Budgetted balances	investment								
	balance	31-12-2014	31-12-2015	31-12-2016	31-12-2017	31-12-2018	31-12-2019	31-12-2020	31-12-2021
Fixed activa									
Intangible fixed activa	0	0	0	0	0	0	0	0	0
Land/facilities	0	0	0	0	0	0	0	0	0
Buidings	3.000	2.700	2.400	2.100	1.800	1.500	1.200	900	
Machines and inventory primary	45.000	40.500	36.000	31.500	27.000	22.500	18.000	13.500	
Machines and inventory secondary	1.410	1.269	1.128	987	846	705	564	423	
	49.410	44.469	39.528	34.587	29.646	24.705	19.764	14.823	
Current activa									
VAT pre-financing	9.388								
accounts receivable									
Accounts recievable		950	950	950	950	950	950	950	
Working capital	0	0	0	0	0	0	0	0	
Bank	-3.809	26.801	54.849	83.473	112.687	142.496	172.912	205.052	
	5.579	27.751	55.799	84.423	113.637	143.446	173.862	206.002	
Total activa	54.989	72.220	95.327	119.010	143.283	168.151	193.626	220.825	
shareholders equity									
shareholders equity									
Input Crassus	0	0	0	0	0	0	0	0	
Input Government	0	0	0	0	0	0	0	0	
Input Investors	49.410	49.410	49.410	49.410	49.410	49.410	49.410	49.410	
General reserve			15.056	31.891	49.302	67.303	85.899	105.102	
Result for the year	-3.809	15.056	16.835	17.411	18.001	18.596	19.203	20.927	
	45.601	64.466	81.301	98.712	116.713	135.309	154.512	175.439	
Provision for deferred tax liabilities	0	0	0	0	0	0	0	0	
Financing									
Bank	0	0	0	0	0	0	0	0	
Others	9.388								
	9.388	0	0	0	0	0	0	0	
current liabilities									
Creditors		1.482	1.482	1.482	1.482	1.482	1.482	1.482	
	0	1.482	1.482	1.482	1.482	1.482	1.482	1.482	
Total pasiva	54.989	65.948	82.783	100.194	118.195	136.791	155.994	176.921	
controle	0	6.272	12.544	18.816	25.088	31.360	37.632	43.904	
	investment								
	balance	31-12-2015	31-12-2016	31-12-2017	31-12-2018	31-12-2019	31-12-2020	31-12-2021	
Ratio's									
S-ratio	82,9%	97,8%	98,2%	98,5%	98,7%	98,9%	99,0%	99,2%	
BAV	82,9%	89,3%	85,3%	82,9%	81,5%	80,5%	79,8%	79,4%	
ICR		9,54	9,92	10,18	10,44	10,71	10,99	22,54	
Sr. net debt-to-ebitda		0,00	0,00	0,00	0,00	0,00	0,00	0,00	
DSCR		11,14	10,46	10,65	10,85	11,05	11,26	22,69	
Debiteurentermijn		6,7	6,5	6,4	6,3	6,2	6,0	5,9	
RTV		33,9%	24,4%	20,6%	18,0%	15,9%	14,3%	12,8%	
REV		29,3%	20,7%	17,6%	15,4%	13,7%	12,4%	11,9%	
Cumulative result		15.056	31.891	49.302	67.303	85.899	105.102	126.029	
Average return on total investment		4,1%	7,8%	10,8%	13,4%	15,7%	17,7%	19,7%	
recieved interest investors		2.965	2.965	2.965	2.965	2.965	2.965	2.965	

Cashflow sheet used for the Business calculation on page 6.

 (Amounts in EUR 1.000)								
10. Cashflow	2014	2015	2016	2017	2018	2019	2020	2021
Cash position, starting balance		-3.809	26.801	54.849	83.473	112.687	142.496	172.912
Result after taxes		18.865	16.835	17.411	18.001	18.596	19.203	20.927
finance charges								
Finance charges		2.965	2.965	2.965	2.965	2.965	2.965	1.482
Release provisions		0	0	0	0	0	0	0
Depreciation intangible activa		0	0	0	0	0	0	0
Depreciation fixed activa		11.213	11.213	11.213	11.213	11.213	11.213	11.213
Working capital								
Operational cash flow		33.043	31.013	31.589	32.179	32.774	33.381	33.622
Decrease funding for VAT		0						
Increase in debtors		-950	0	0	0	0	0	0
Increase in creditors		1.482						
Change in working capital		532	0	0	0	0	0	0
Investment in fixed activa	-49.410		0	0	0	0	0	0
Start-up losses	-3.809							
Preparation costs	-850							
Investments	-54.069	0	0	0	0	0	0	0
Acquisition loans								
-Crassus	0							
-Investors	54.969							
-Bank	-900							
-Guarantee credits/grants	850	0						
Interest payments		-2.965	-2.965	-2.965	-2.965	-2.965	-2.965	-1.482
Repayment of loans								
- Bank		0	0	0	0	0	0	0
-Guarantee credits/grants		0	0	0	0	0	0	0
Financing cash flow	54.919	-2.965	-2.965	-2.965	-2.965	-2.965	-2.965	-1.482
Cash-position, final balance	850	26.801	54.849	83.473	112.687	142.496	172.912	205.052
Cashmutation		30.610	28.048	28.624	29.214	29.809	30.416	32.140

Opportunities:

The opportunity is taken to cooperate with a recycling company who reworks SLF (Shredder Light Fraction). They produce a waste stream called Fluf. Due to our knowledge and experience in the recycle industry we can rework this waste stream into oil/gas/ash which all can be reused as product or Energy. This contributes to our philosophy that all waste is reusable. As we can use the land and building facilities of the recycle company this also benefits the project as no external logistic is needed.

As the location is situated in the heart of the recycling business in The Netherlands, and the adjacent industrial location is available, the further opportunity is taken to use this to recycle waste tires to raw material (the Crassus waste tire concept), and in the near future plastics and domestic waste.

The start-up of the plant is planned before year end 2013.

The waste tire recycling plant will also be used as showroom for the Crassus concept and will be un-rolled worldwide.

The total plant can be used for:

- demonstration the recycling concepts
- visits of future customers or investors
- information center about the concepts
- to demonstrate the environmental friendly effects (no exhaust streams)
- to demonstrate the modular concept (modules of 30 t/d = ± 10.000 t/y)

Threats:

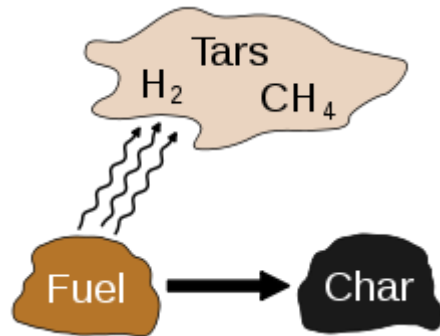
- More strict legislation by local, state and/or European governments could impact the growth and expansion.
- Expansion plans require further financial investments.
- Too fast growing of the company once the concept is proven.
- The local government has to be convinced about our environmental friendly, waste treatment concept.

Possible Grants:

WBSO	0% on wage taxes (instead of 42%) for R & D work
R & D	40% reduction hardware costs related to WBSO
Innovationbox	5% profit taxes (instead of 25%) on sales



All processes use Pyrolysis, and according to Wikipedia



Pyrolysis

From Wikipedia, the free encyclopedia

Jump to: [navigation](#), [search](#)

Simplified depiction of pyrolysis chemistry.

Pyrolysis is a thermochemical decomposition of [organic material](#) at elevated temperatures without the participation of oxygen. It involves the simultaneous change of chemical composition and physical phase, and is irreversible. The word is coined from the [Greek](#)-derived [elements](#) *pyr* "fire" and *lysis* "separating".



Our pyrolysis reactor as production unit

TECHNICAL DESCRIPTION

FLUF WASTE RECYCLE PROJECT

FEEDSTOCK:

- FLUF, waste from the SLF (Shredder Light Fraction) plant

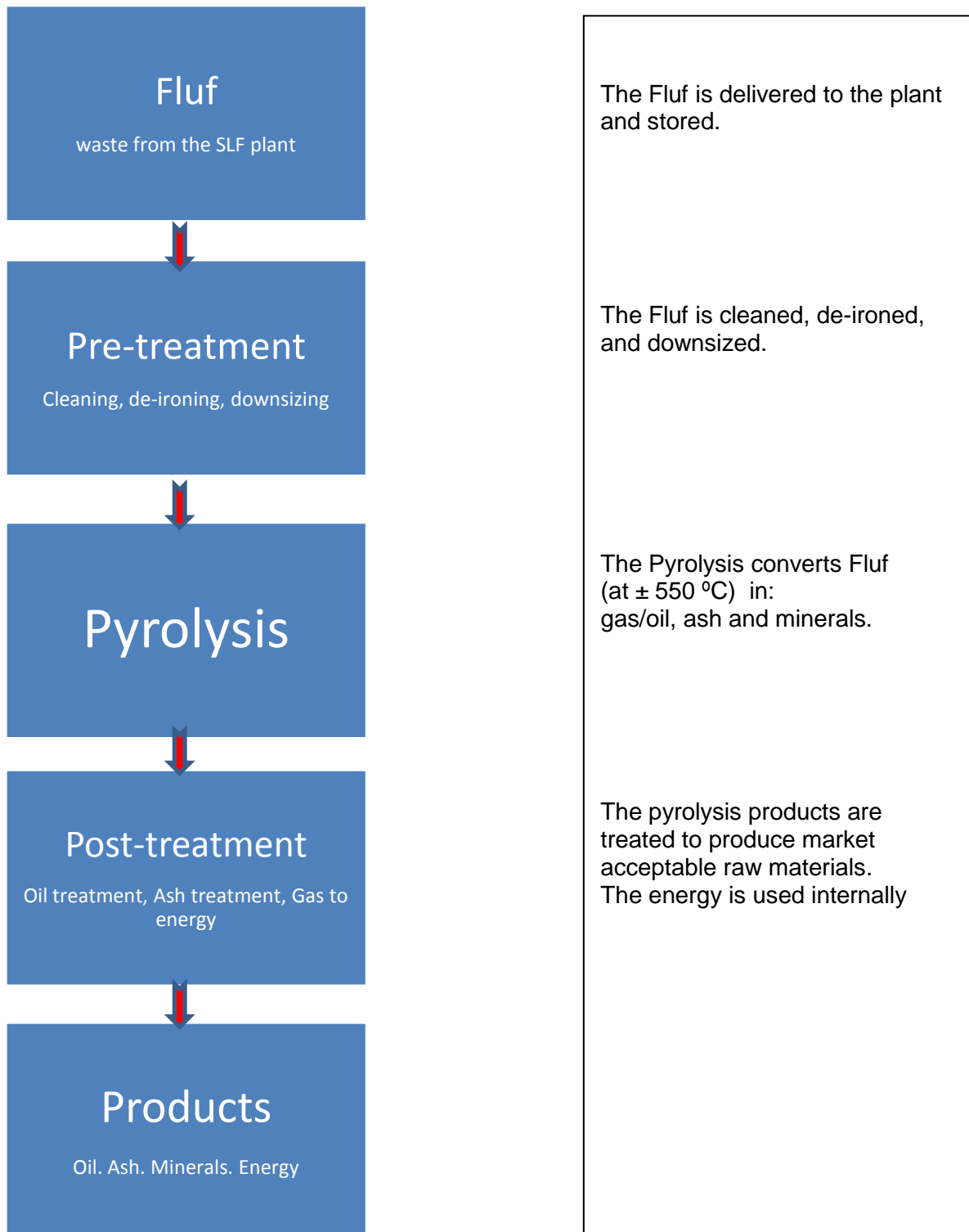
OUTPUT:

- OIL
- ASH, raw material for the cement, road construction industry or fertilizer
- ENERGY



PROCESS DESCRIPTION

The plant design is based on conversion of Fluf in products and energy.





De Fluf is treated in the pre-treatment unit to down size and de iron it.



The Fluf is pyrolysed in the continues pyrolysis unit



The oil is refined from crude pyrolysis oil to transport fuel

TECHNICAL DESCRIPTION DOMESTIC WASTE TO PRODUCTS AND ENERGY PROJECT

FEEDSTOCK:

- DOMESTIC WASTE
- WASTE RUBBER

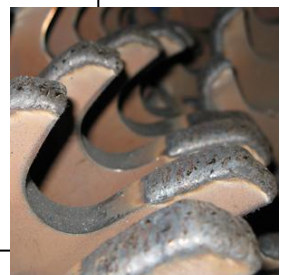
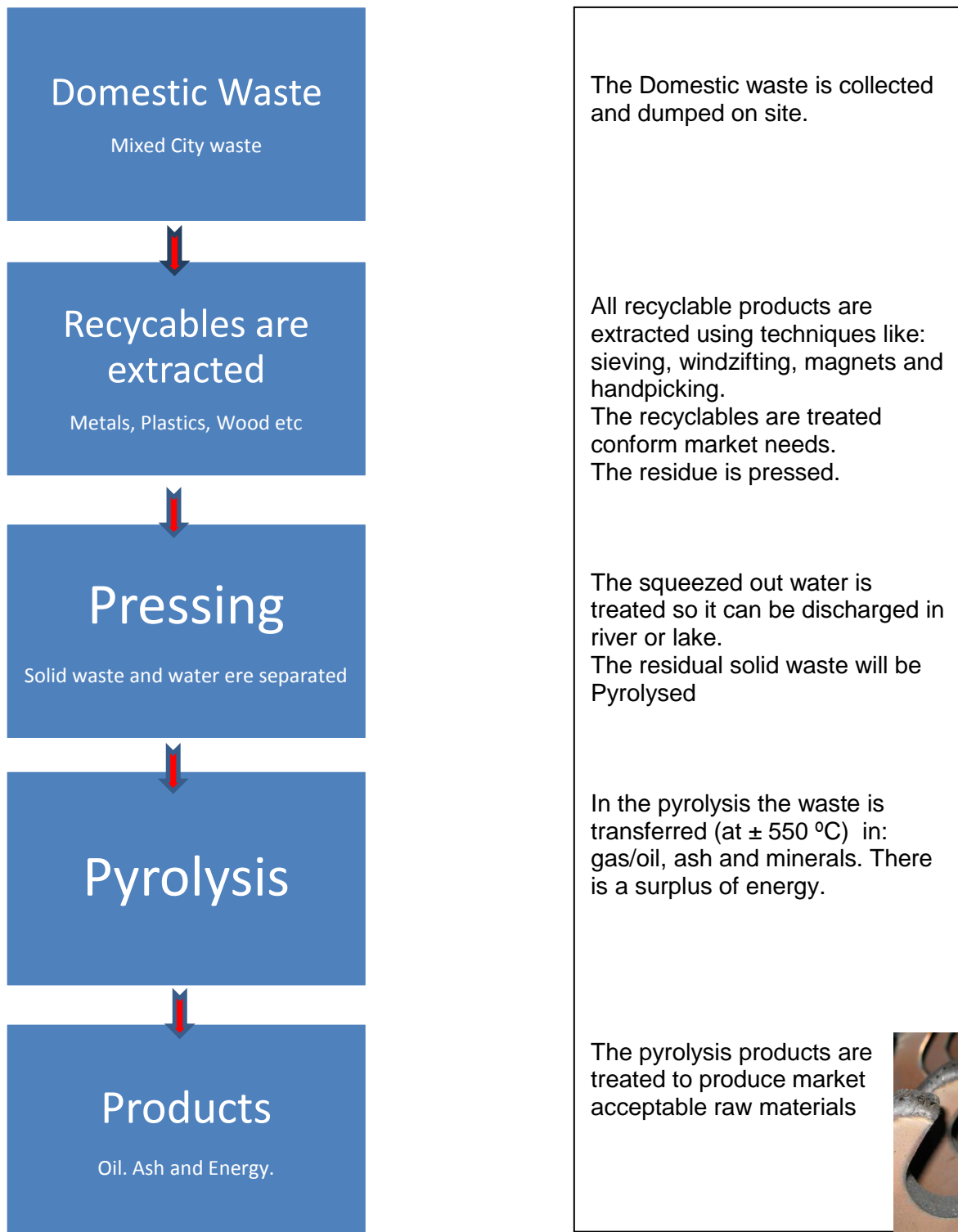
OUTPUT:

- RECYCABLES
- RDF (Revised Derived Fuels)
- COMPOST
- ENERGY



PROCESS DESCRIPTION

The plant design is based on conversion of domestic waste into products and energy.





The recyclables are extracted using different techniques.



The waste residual is pressed in a special design dewatering press.

Water is treated



The dry solid residual is Pyrolysed



The oil is refined from crude pyrolysis oil to transport fuel.

Gas is transferred into Electricity.

Ash and Minerals treated.

TECHNICAL DESCRIPTION WASTE TIRES TO RAW MATERIALS PROJECT

FEEDSTOCK:

- WASTE TIRES
- WASTE RUBBER



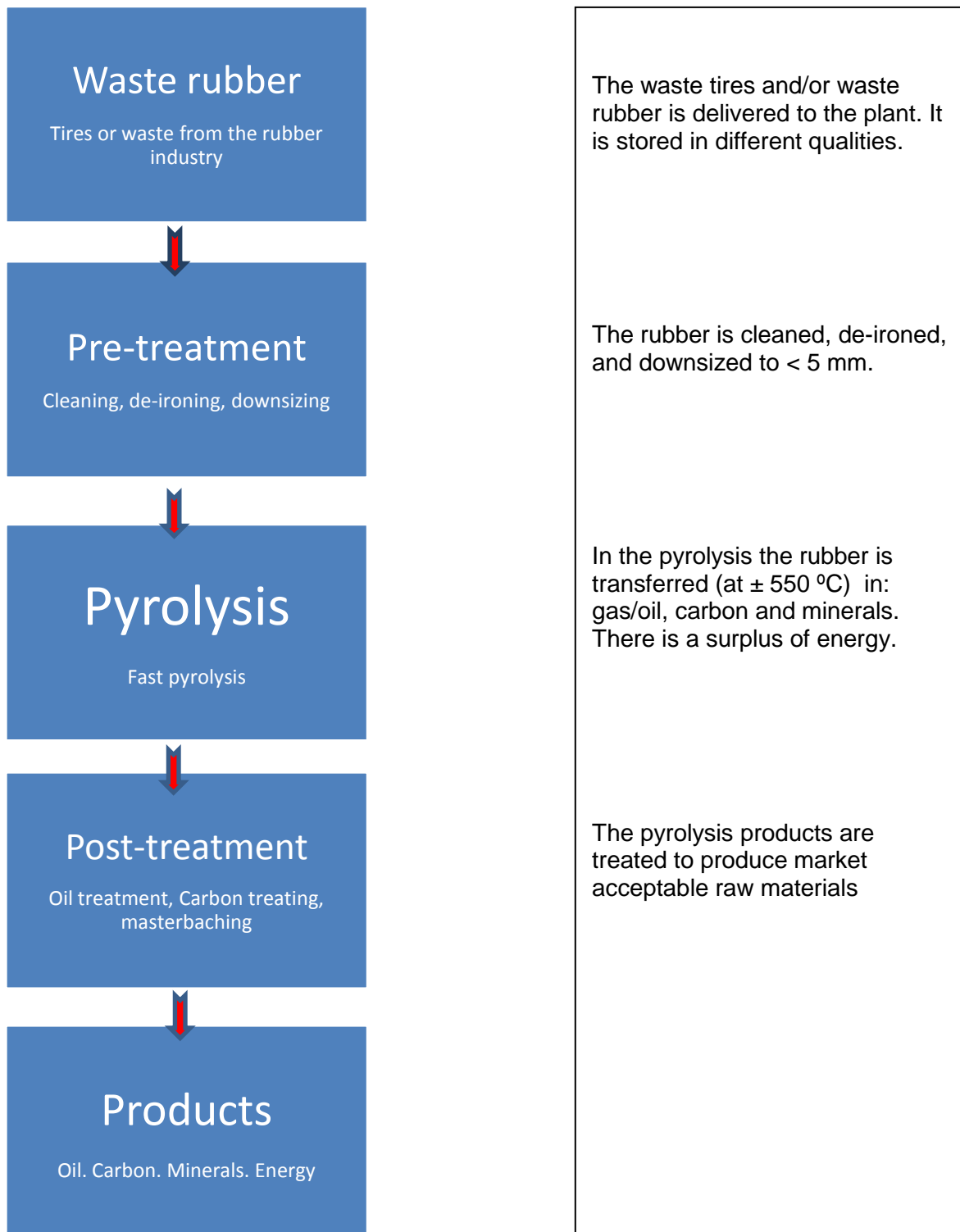
OUTPUT:

- OIL
- RAW MATERIALS FOR THE RUBBER INDUSTRY
- STEEL
- ENERGY



THE CRASSUS PROCESS DESCRIPTION

The plant design is based on conversion of waste rubber into raw materials.

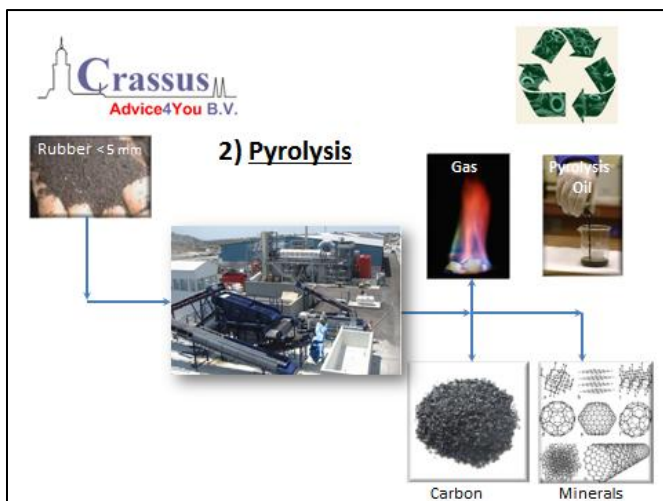


The Crassus PROCESS DESCRIPTION

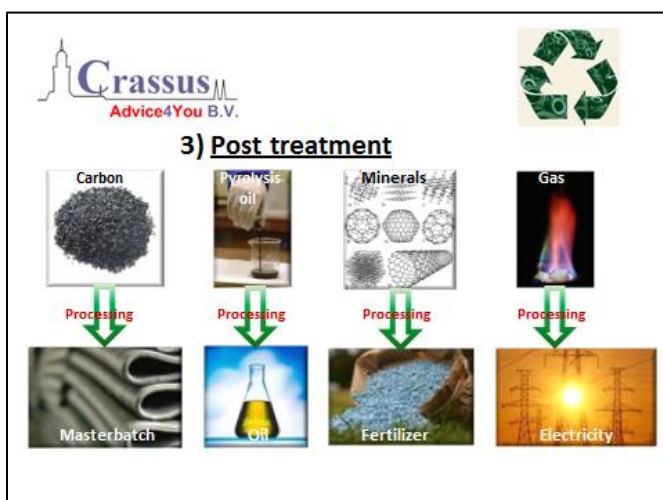
The plant design is based on conversion of waste rubber into raw materials.



Detailed information in Attachment 1



Detailed information in Attachment 2



Detailed information in Attachment 3

The produced materials can be used as:

- Carbon:**
raw material in rubber - or carbon industry.
- Oil:**
process oil or fuel.
- Steel:**
raw material in the steel industry.
- Textile:**
raw material or internal fuel.
- Sulphur:**
raw material in the rubber industry.

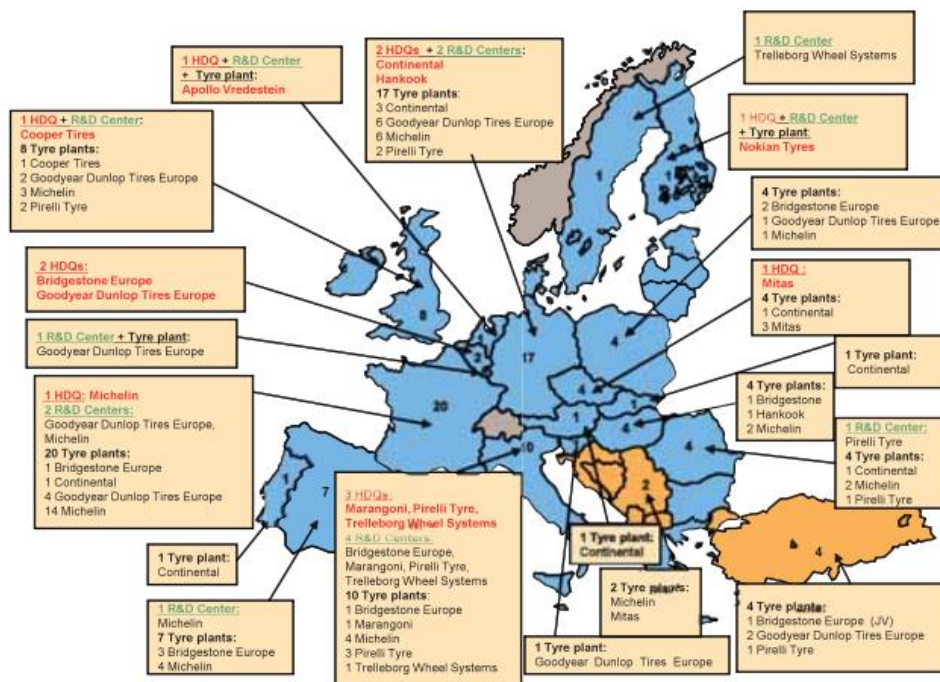
Tire Producers

Besides constructing sole plants, tire companies have shown interest as they produce 10 – 15% off-spec tires, most of them are dumped. Building waste tire plants close to the manufacturing plant is an advantage. They can use the produced oil, carbon black, minerals, steel and energy directly in the production process, so there is multiple advantage: solving the waste problem and cost reduction in materials and energy.

Companies shown interest are:

- Goodyear (headquarters) in Luxembourg.
- Michelin in Germany.
- Continental in Germany.
- Sava Tires in Slovenia.

Tyre producing plants in the EU: a dynamic presence



More opportunities: See next page.



Rubber article producers:

Besides tires there are many more rubber products and producers

As the tire industry produces 60% of the world amount of rubber products, there is still 40% of non-tire application.

They also, produce 10 – 15% off-spec product

Also this waste is mostly dumped.



This also contains: oil, carbon black, minerals, steel and energy

Here is also a multiple advantage by solving the waste problem and cost reduction in materials and energy.



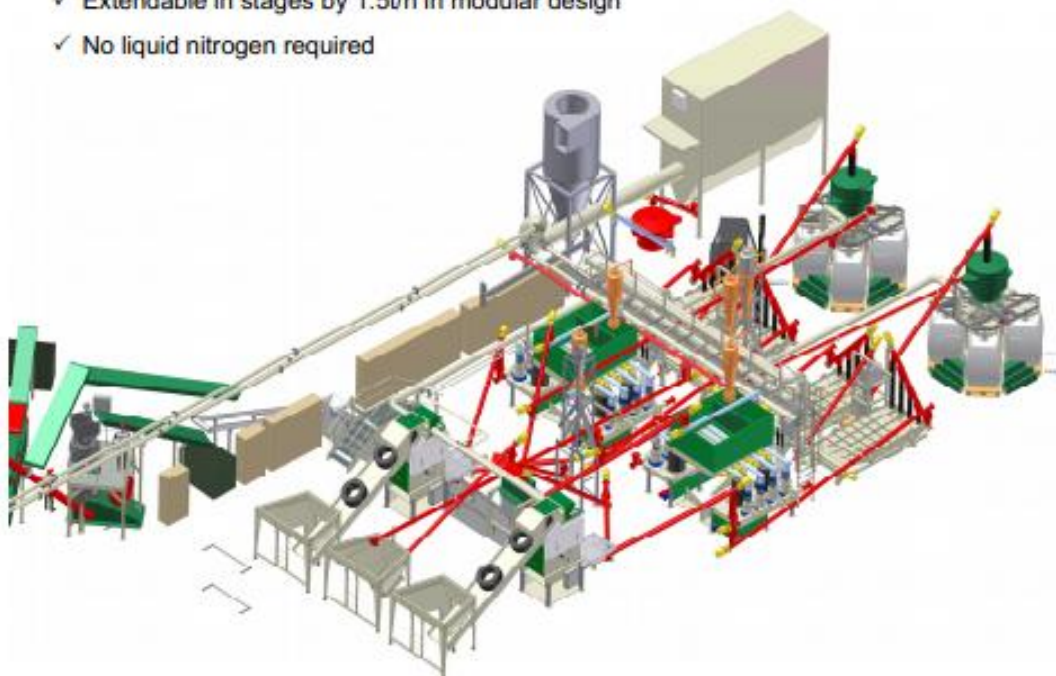
Belt Conveyors



Conveyor belt waste

Especially developed for used tires!

- ✓ Approved technology for passenger- and truck tires
- ✓ Two step reduction (< 16mm / < 4mm)
- 
 T2000 with unique feed-in and rotor system
 G200 with special gentle milling
- ✓ Material size in commercial quantities down to 0,5mm
- ✓ Wire treatment
 - ✓ Shredding techn 
 - ✓ Briquette press
- ✓ Highly flexible production method adaptable to every situation
- ✓ Low maintenance
- ✓ Space efficient layout concept for standard factory building
- ✓ Reliable customer orientatd concept
- ✓ Extendable in stages by 1.5t/h in modular design
- ✓ No liquid nitrogen required



The Pre treatment plant in Italy

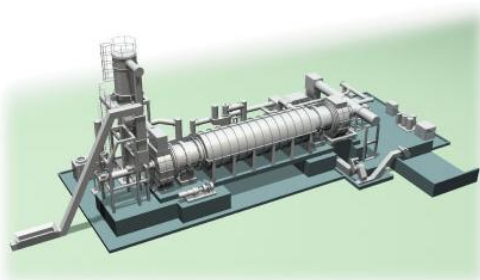


The Pre treatment plant in Hungary

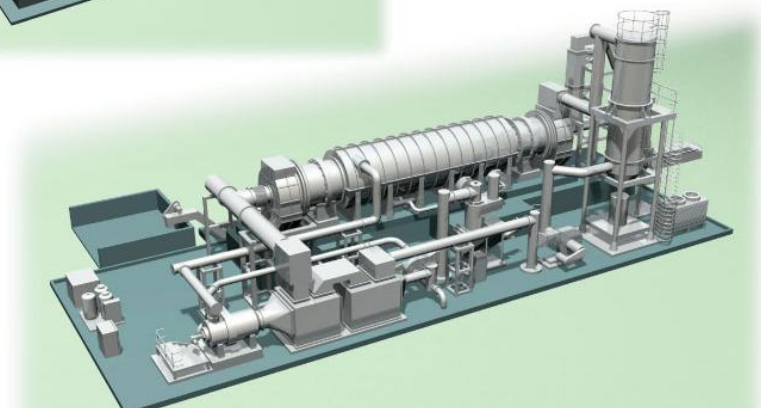


Attachment 2)

Proven Technology Pyrolysis system selected.



DIRECT LIQUEFACTION
&
CARBONIZATION SYSTEM
(CONTINUOUS TYPE)



The continues pyrolysis system



A production plant



The batch pyrolysis system



The oil refinery



**From
pyrolysis oil
to fuel**

Attachment 3: Post-treatment

Steel

The steel is separated in the pre-treatment, therefore, the steel is not heated in the pyrolysis system and thereafter compacted to generate the highest price.

Textile

The textile can be used as fuel.



Carbon Black

The Carbon Black is post treated and conditioned to make it acceptable as raw material in the rubber industry.

Pyrolysis oil

With the internal knowledge the oil is processed to be used as process oil in the rubber industry.



Minerals

Depending on the mineral and/or mineral price, they can be used in the rubber and/or fertilizer industry.

The surplus of heat and electricity can be sold as a product.



**We don't inherit the Earth
from our Ancestors**



We borrow it from our Children