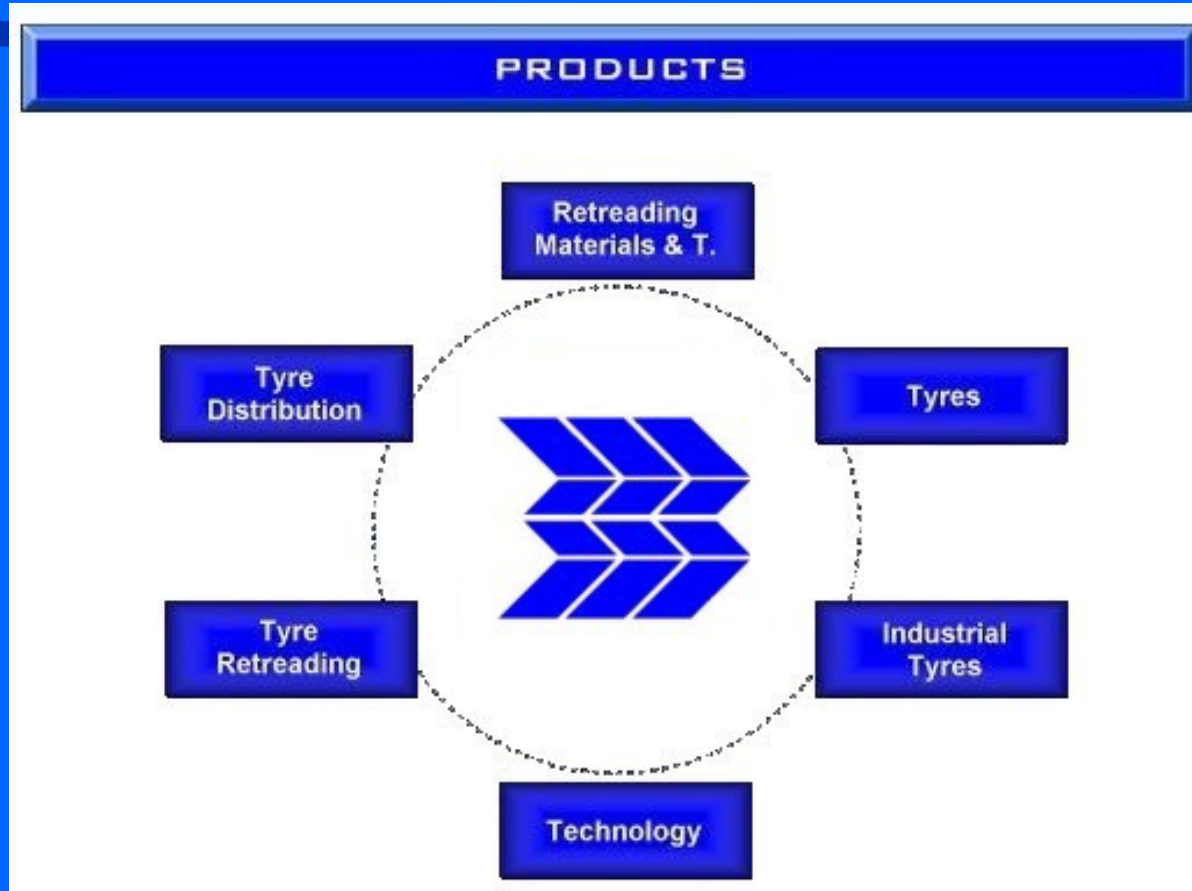


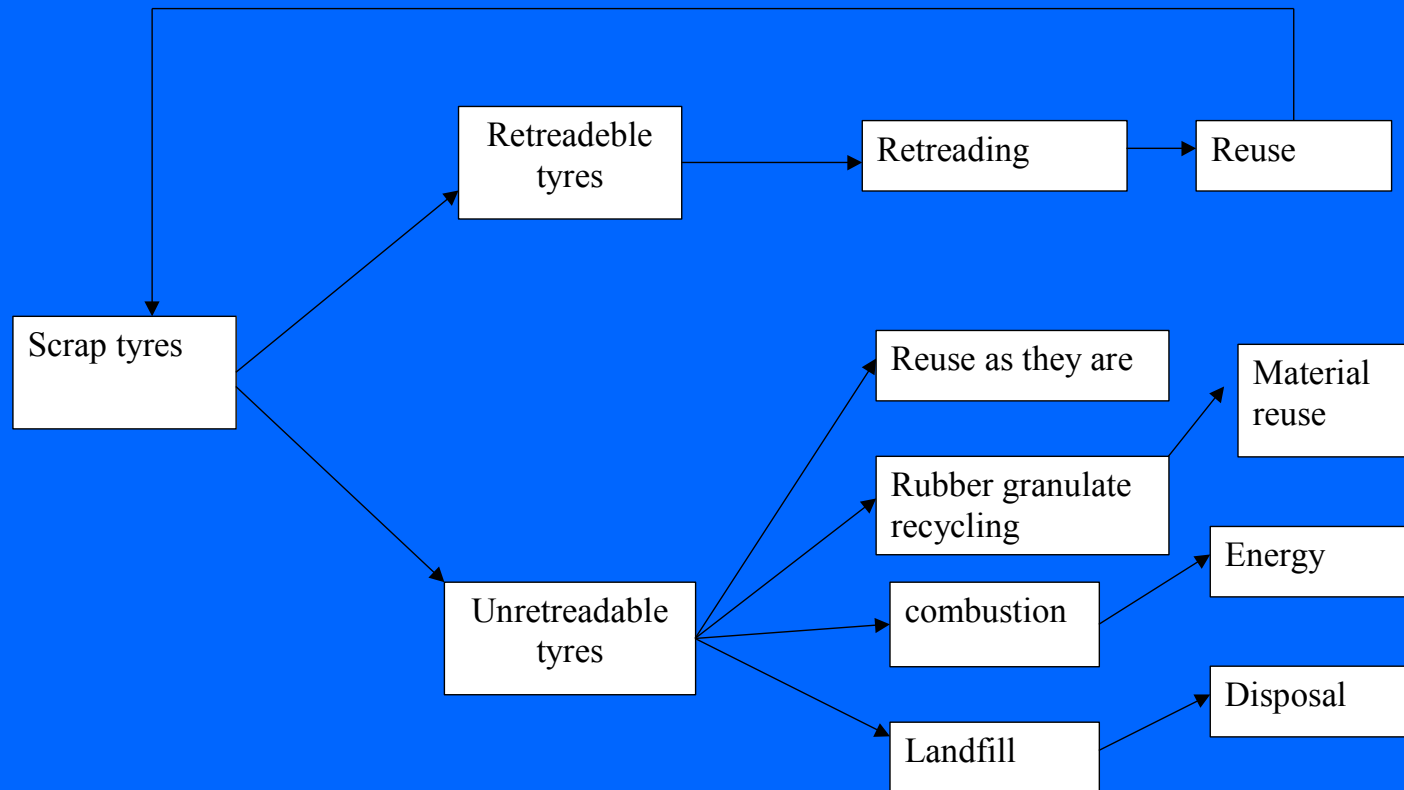
"Recycling and Energy"

"The 3rd Tyre Life"

Gruppo Marangoni



Scrap tyres cycle



Composition and calorific value (Scrap tyres)

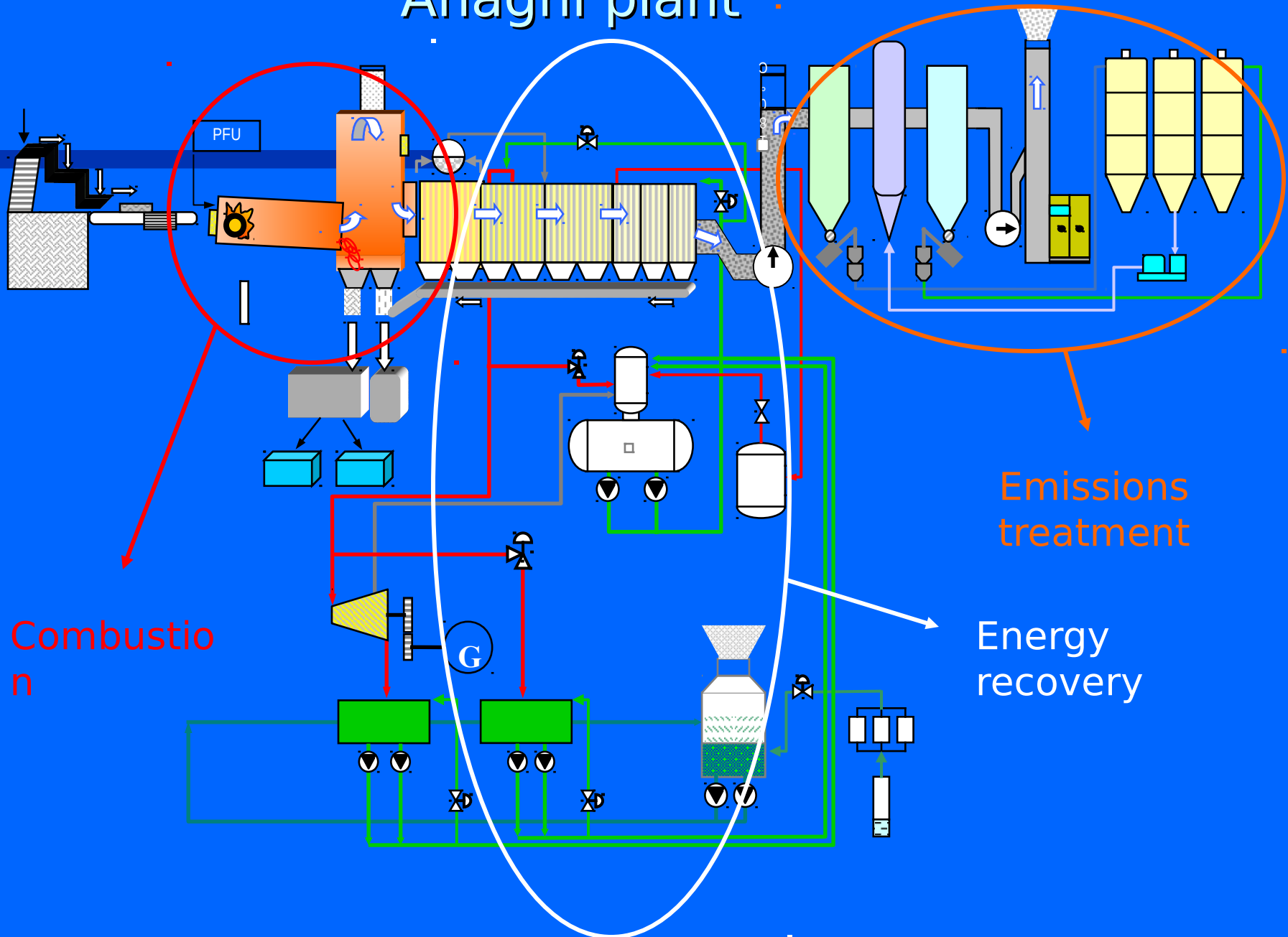
	CAR TYRES (% weight)	TRUCK TYRES (% weight)
Carbon	75 – 76	62 – 66
Hydrogen	6 - 7	5 – 6
Sulphur	1 – 2	1 – 2
Nitrogen	0,1 – 0,2	0,1 – 0,2
Iron	10 – 12	26 – 30
Zinc	1 – 1,2	2 – 2,5
Inert powder	3 – 4	3 – 4
Calorific power	5.500 – 6.000 kcal/kg	5.300 – 5.800 kcal/kg
Average weight	6,6 kg	60 kg

Annual Used Tyre Accumulation by EU State

Country	Used tyres per year	Population
Austria	41.000 t	8.045.800
Belgium	70.000 t	10.143.000
Denmark	38.500 t	5.251.600
Finland	30.000 t	5.116.000
France	380.000 t	58.265.400
Germany	650.000 t	81.845.000
Greece	58.500 t	10.474.600
Ireland	7.640 t	3.591.200
Italy	360.000 t	57.330.500
Luxembourg	2.000 t	412.800
Netherlands	65.000 t	15.492.800
Portugal	45.000 t	9.920.800
Spain	330.000 t	39.241.900
Sweden	65.000 t	8.737.500
UK	400.000 t	58.684.000
Total EU	2.542.640 t	372.6662.100

**FONTE:
ETRA**

Anagni plant



Plant Characteristics

WHOLE tyres combustion

ALL by-products recycling

Emissions in accordance with the
European laws

Technology ...



... and people





Main technological issues

Material study (refractories,
filtering bags, belts)

Steam generator cleaning system

Tyres automatic feeding system

Combustion control

Pollution control

EMISSIONS VALUES

	Description	DM 503 19.11.97 (Dir. 89/369/CEE e 89/429/CEE)	Directive 2000/76/CE (limiti dal 28.12.2005)	(1)
1	Carbon monoxide	50 mg/m ³ average day 100 mg/m ³ average hour	50 average day 100 average semi h	c
2	dusts	10 mg/m ³ average d 30 mg/m ³ average h	10 average day 30 average semi h	c
3	Organic substances	10 mg/m ³ average d 20 mg/m ³ average h	10 average day 20 average semi h	c
4	Hydrochloric acid	20 mg/m ³ average d 40 mg/m ³ average h	10 average day 60 average semi h	c
5	Fluoridric acid	1 mg/m ³ average d 4 mg/m ³ average h	1 average day 4 average semi h	c
6	SO ₂	100 mg/m ³ average d 200 mg/m ³ average h	50 average day 200 average semi h	c
7	NO ₂	200 mg/m ³ average d 400 mg/m ³ average h	200 average day 400 average semi h	c
8	Cd + Tl	0.05 mg/m ³ average h	0,05 average h	p
9a	Hg	0.05 mg/m ³ average h	0,05 average h	p
10	Sb+As+Pb+Cr+Co+Cu+Mn+Ni+V+Sn	0.5 mg/m ³ average sum h	0.05 mg/m ³ average sum h	p
11	PCDD + PCDF	0.0000001 mg/m ³ average 8h	0.0000001 mg/m ³ average 8h	p
12	IPA (idroc. pol. arom.)	0.01 mg/m ³ average 8h	0.01 mg/m ³ average 8h	p

N.B.:

- All value are referred to an oxygen concentration of 11% in the flue gas
- PCDD and PCDF are policlorodibenzodioxin and policlorodibenzofuran
- "c" is continuos monitorng, "p" is periodical monitoring

Hourly flows

INPUT:

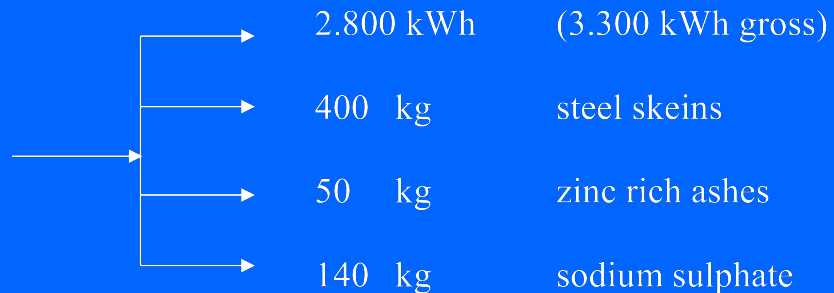
2.000 kg WHOLE scrap tyres

180 kg Sodium bicarbonate

20 ton industrial water

Selfconsumption: 500 kWh

OUTPUT:

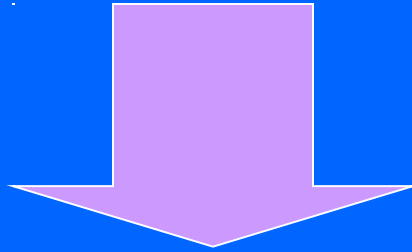


to the landfill 40 kg ashes

N.B: operating time: 7.700 h/year

ENERGY PRODUCTION

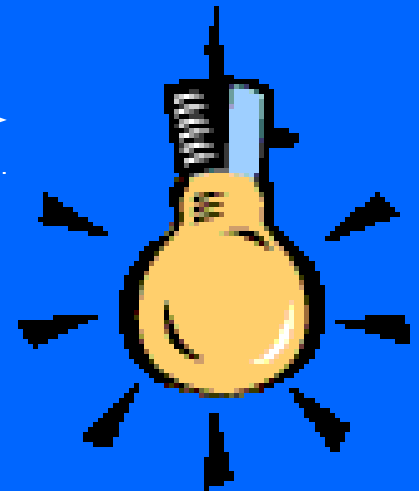
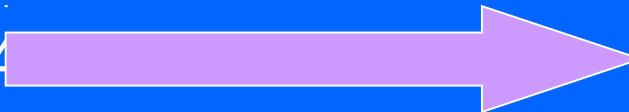
1 kg of scrap tyres $\rightarrow$ 1,4 kWh



1 car tyre $\rightarrow$ 10 kWh A 60 W bulb for 2 for 166 h



1 truck tyre $\rightarrow$ 84 kWh A 60 W bulb for 2 months



Main economical values (per year)

Budgetary cost (civil work excluded) :
20 milioni Euro

Net energy production 21.000.000 kWh

Scrap tyres disposed: 15.000 ton

Personell: 15 people

Maintenance cost: about 2.5% of the
plant cost

Other costs: bottom ashes disposal