Waste Plastic Solid Fuel : RPF(Refuse Paper & Plastic Fuel)

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What's RPF？

- **Abbreviation of Refuse Paper & Plastic Fuel**
- **High quality solid fuel using non-reclaimable used paper and plastic waste as raw materials**
- **RPF provides with much superior fuel performance than RDF, due to strict material control by using industrially record traceable waste plastic and thoroughly-selected non-industrial waste plastic**
- **In high demand from the dying, paper and lime industries as an alternative to fossil fuels such as coal, coke and oil**

RPF（Refuse Paper & Plastic Fuel)

Diameter

40mmΦ

20mmΦ

8mmΦ

Figure 1 RPF samples

What advantages does RPF have?

A. Stable quality

B. Availability to control calorific value

C. Handling easiness (High-densified pelletized form)

D. Easy emission gas control at incineration process in a boiler etc.(Emits almost no chlorine gas or dioxins)

E. Economical thriftiness compared with other fuels

F. Contribution to reduce CO_2 gas emission by curtailing fossil fuel use

How much can RPF reduce CO_2 emission?

Table.1 Comparison of Carbon Dioxide(CO_2) emission RPF vs Coal (Imported)

Fuels	Calorific Value #1 GJ/t	Calorific Value (Converted to kcal/kg)	CO_2 emission coefficient #2	CO_2 emission amount per ton	CO_2 emission rate RPF vs Coal
RPF	26.6 GJ/t	6,354 kcal/kg	1.5700 t-CO_2/t	1.57 t-CO_2/t	65.15 %
Coal (Imported)	26.6 GJ/t	6,354 kcal/kg	0.0247 t-C/GJ	2.41 t-CO_2/t	100.00 %

Reference — Conversion Factor(CF) to calorie basis --- 4.18605

#1 Agency for Natural Resources and Energy(ANRE) Feb. 2002 「エネルギー源標準発熱量の改定について」

#2 Ministerial Ordinance No.3 by Ministry of Economy, Trade and Industry(METI), Ministry of the Environment(MOE) Mar. 2006 「特定排出者の事業活動に伴う温室効果ガスの排出量の算定に関する省令」

Note

GJ(Giga Joule)=10^9J(Joule) 1.00000kcal=4.18605kJ

CO_2 emission amount per ton for Coal(Imported), described as 0.0247 t-C/GJ, should multiply 3.67=44/12(MW of CO_2/at.wt. of C) to convert t-CO_2/GJ

How does RPF get manufactured?

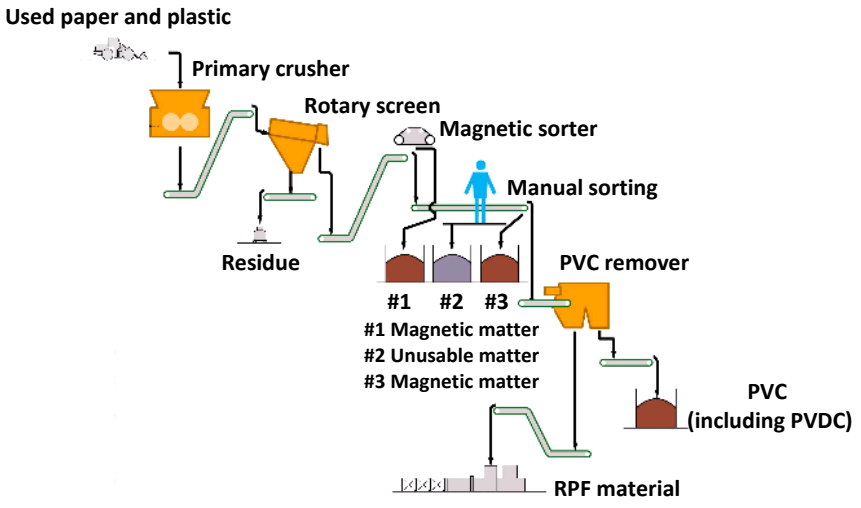

Figure 2 Raw materials selection process

How does RPF get manufactured?

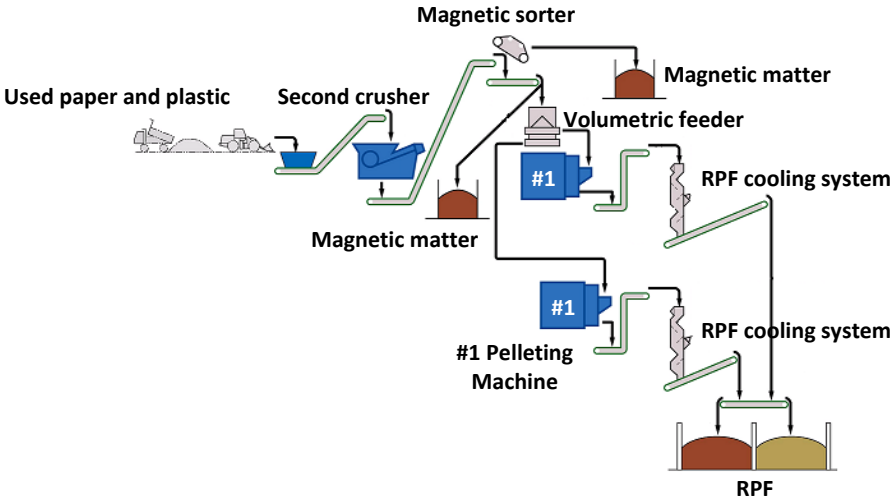

Figure 3 RPF manufacturing process

QC standards

Table 2. RPF QC（voluntary) standards

Items(Extracted)	RPF equiv. to coal	RPF equiv. to coke	Analysis method
Higher Calorific Value	> 6,000kal/kg	>8,000kcal/kg	JIS Z7302-2
Moisture	<3.0%	<0.5%	JIS Z7302-3
Ash content	<7.0%	<5.0%	JIS Z7302-4
Total chlorine	<0.3%	<0.2%	JIS Z7302-6
Sulfur	<0.2%	<0.2%	JIS Z7302-7
Nitrogen	<0.5%	<0.5%	JIS Z7302-8

Note: Advocated by JRPF on March 31, 2004

How much is RPF demanded for?

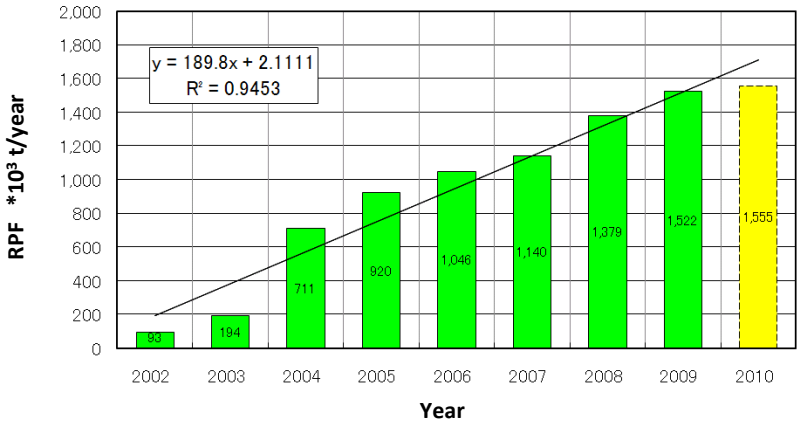

Figure 4 Annual change of domestic RPF demand, researched by JRPF as of April 2009, summed up annual RPF demand for 31 pulp, 5 lime and 6 other industrial manufacturing sites

C-RPF: The next generation technology

C-RPF is the latest fueling technology, manufactured through the following A to C process.

A. Carbonizing all combustible non-industrial waste including kitchen garbage to get char
B. Removing inappropriate portion out of the char and rinsing and drying it for dechlorination
C. Mixing crushed waste plastic into the char to adjust calorific values and to form pellets

C-RPF is one of the ideal recycling technology, converting combustible waste produced from local governments into high-quality solid fuel and is a biomass fuel developed jointly by IHI Corporation and Seki-Shouten Co., Ltd.

C-RPF Profiles

Diameter : ϕ 40mm

Calorific value : 6,000kcal/kg app.

Chlorine Conc. : 0.2% app.

C-RPF

Merits:
A. Stable quality
B. Fuel proportion (nonvolatile fixed carbon/volatile portion) adjustability of char
C. Low chlorine contents
D. Taking advantage of self-generated thermal cracking gas at carbonizing process as its heat source
E. Reducing the cost of the installation and the maintenance
F. Economically superior to other fuels

Thank you for your attention

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