

Polyurethane Foam Waste Energy Recoverable as RPF Raw Materials

Polyurethane foam waste generated on the construction sites,
can be reused as energy recoverable materials



What is RPF (Refuse Paper and Plastic Fuel)?

RPF is solid fuel which is prepared with waste of plastic, paper and small piece of wood materials (waste wood) as raw materials.

RPF is used as fuel in Paper Mills or Iron Mills as alternative of Coal.

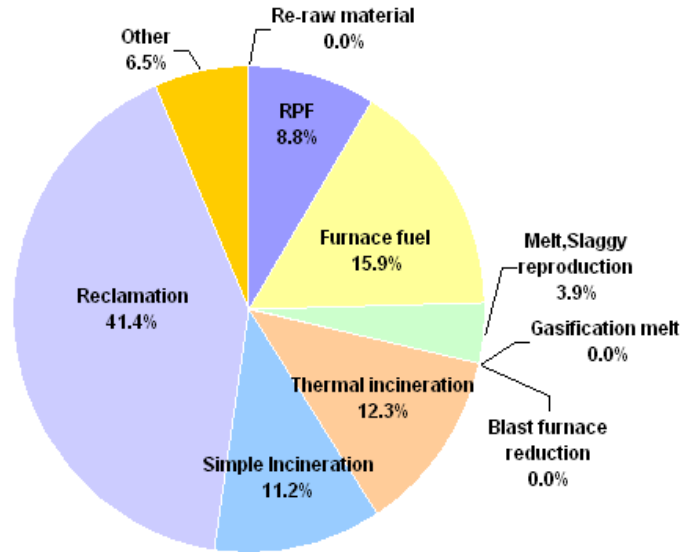
Waste of Rigid Polyurethane Spray Foam can be added to other waste materials as one of raw materials.

1 Current status of recycling polyurethane foam waste

● Current status of recycling of waste generated on construction sites

More than 50% of waste is not recycled or reused because the ratio of reclamation and simple incineration is more than 50%.

The ratio of RPF is only 8.8%.

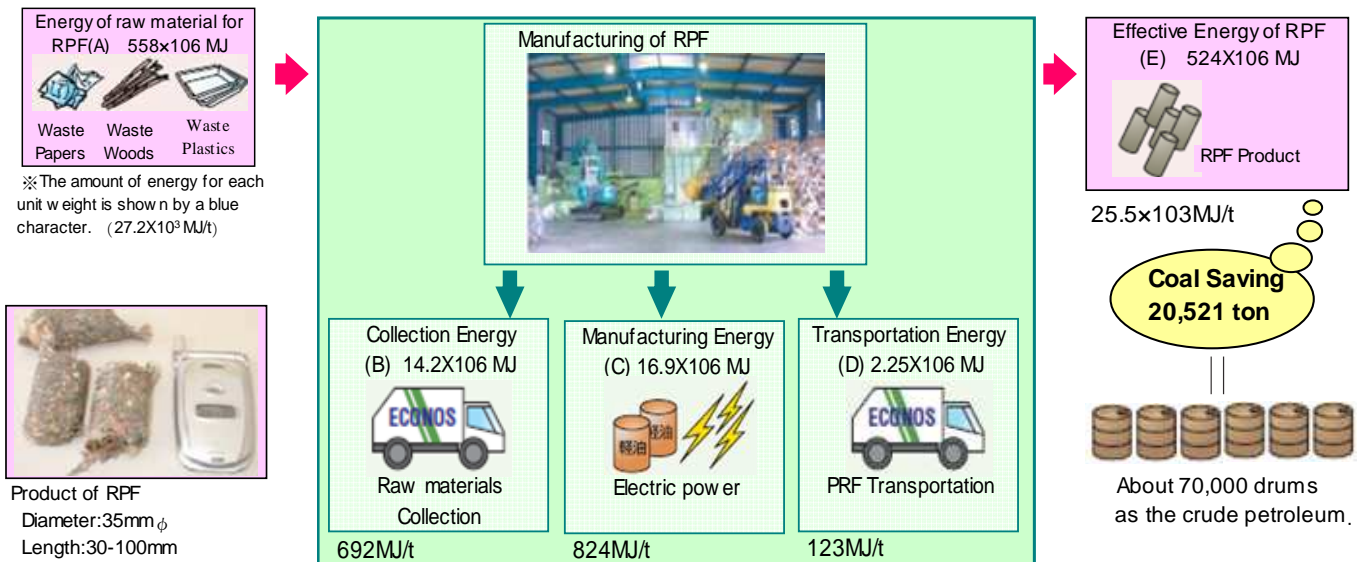


Excerpt from Ministry of Economy, Trade and Industry "Surveillance study for making to RPF using polyurethane foams waste" investigation report published in March, 2008

2 Adaptability to Environment

RPF is a fuel based on effective use of the possession energy of wastes and has a high calorie that corresponds to coal. (RPF has 27.2MJ/kg=about 6,500 kcal/kg)

It is possible to recover waste materials, which are simply incinerated, as a coal substitution fuel.



Excerpt from CSR report in 2006 of Ogawa Econos Inc.

How many percentage of energy can be reused by producing RPF from wastes?

$$(\text{Inherent energy material of waste}) - (\text{Energies for Collecting wastes, Manufacturing and Transporting RPF}) = (\text{Effective Energy})$$

100 %

6.4 %

93.6 %

About 35% of CO₂ emission can be reduced by making the RPF from Polyurethane foam waste.

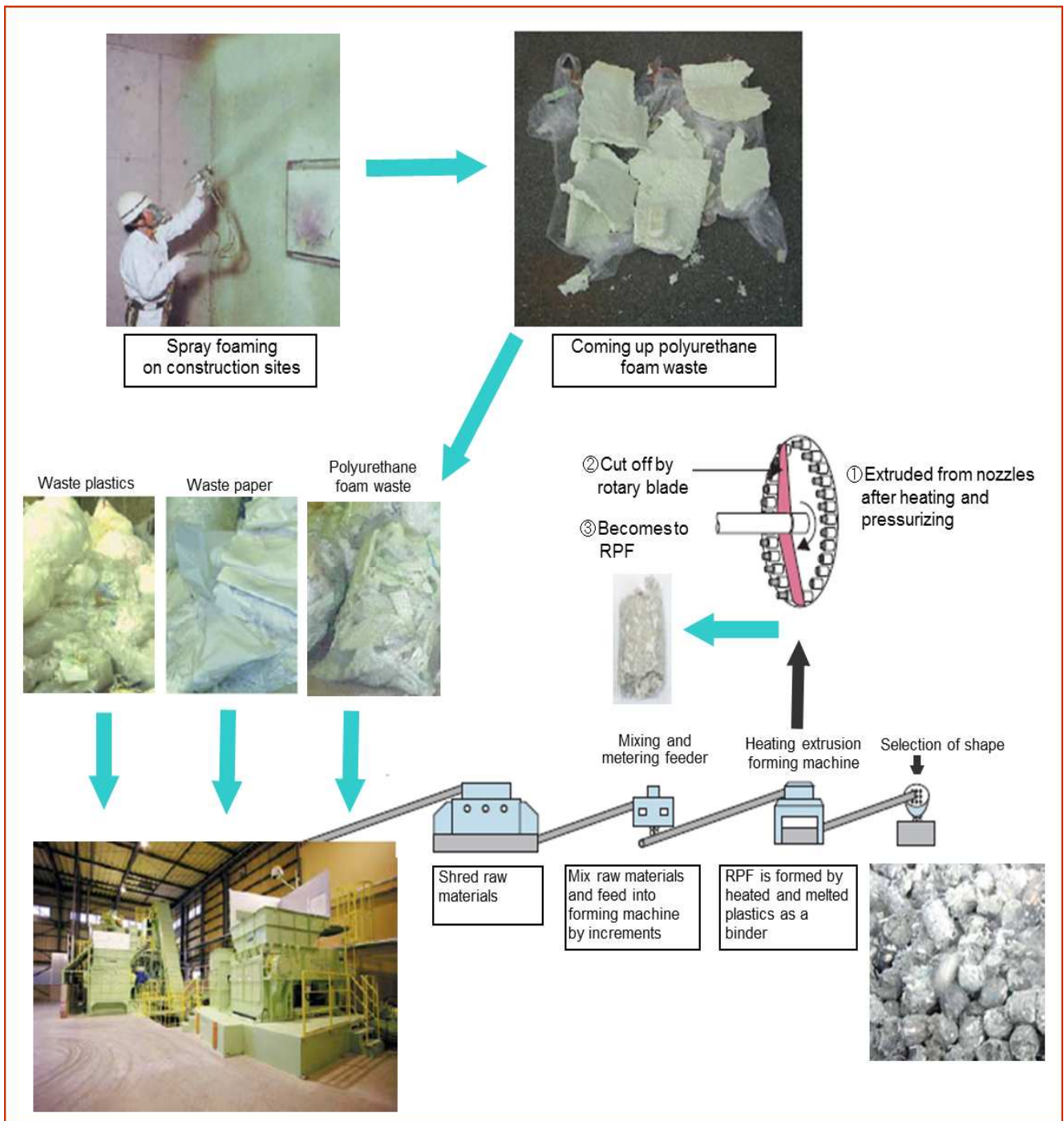
- * By substituting the current fossil fuel (as coal) to RPF, CO₂ exhausted from them can be reduced.
- * The raw material composition ratio of RPF; Polyurethane foam waste 10%, other waste plastics 50%, and waste papers or waste woods 40%

RPF used by Polyurethane foam waste

Results of verification test for producing RPF used by polyurethane foam waste

3-1 Outline of process for producing RPF

- Used materials :Scraps from polyurethane spray foam processing on construction sites. Polyurethane foam, Polyethylene sheet, Masking tape (paper)
- Used equipment: WP-375 made by TAZIRI CO., LTD.
Type of extrusion ϕ 35mm type (extruded from 95 nozzles and cut off) production capability 5-6m³/h.



3-2. Condition of verification test

Polyurethane foam waste		Paper		Waste plastic		Total
Weight(kg)	Ratio	Weight(kg)	Ratio	Weight(kg)	Ratio	Weight(kg)
100	10%	400	40%	500	50%	1000

* Paper: Waste Paper generated from paper mill

* Waste plastic: PE sheet, air cap, tray made of PS, and car interior material (PP etc.)

* Verification test place: Shomon Co. Ltd.

3-3. Result of verification test

Quality item	Standard of Paper-manufacture company (A company)	Measurement result of examination sample
Higher Calorific value (MJ/kg) (cal/g)	20.9 or more	28
	5000 or more	6800
Moisture (%)	10 or less	3.1
Ash content (%)	10 or less	9.5
Chlorine content (%)	0.3 or less	0.26
Sulfur content (%)	0.2 or less	<0.10
Nitrogen content (%)	1.0 or less	0.68
Shape Diameter (mm) Length (mm)	φ 8-50	φ 35
	10-100	50-100
Others		Externals are excellent

* The performance of RPF based on waste fills all standard values provided by a paper mill company.

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Effect for adoption of processing RPF from polyurethane foam waste

4-1. Reduction of disposal cost

- Current disposal cost of polyurethane foam waste at general contractors and insulation system processors (27 companies in total)^{*)}

The most answer: 6,000-8,999 ¥/m³.

- Estimated cost of making RPF from polyurethane foam waste.

About 4,000-5,000 ¥/m³

*) Ministry of Economy, Trade and Industry "Surveillance study for making to RPF using polyurethane foam waste" investigation report published in March, 2008

There is a possibility that making RPF can reduce the disposal cost of polyurethane foam waste.

4-2. Simplification of manifest management

The final disposal is unnecessary, and it is possible to return it on the same day of E-vote (On regulation of Japan)

4-3. Contribution to environment

- Saving of fossil fuel by use of RPF
- Reduction of carbon-dioxide emissions

How to collect and transport waste?

● Object materials of receipt

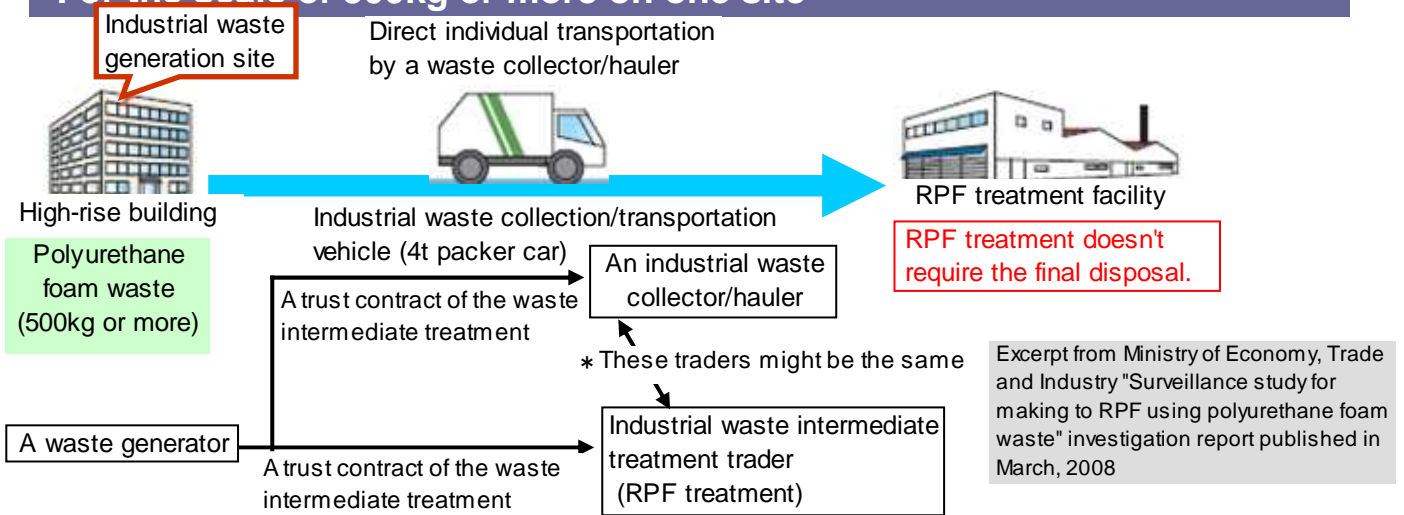
- Polyurethane foam waste, Polyethylene Sheet and Masking tape (paper) are materials for the receipt.
- Don't mix Metallic waste, Polyvinyl Chloride waste, and Concrete waste.
- Mixing the food and drink left-over is dangerous, because the gas generated by those rots might cause a fire of RPF in the factory.

✖ Taboo materials



● Efficient method of collection and transportation

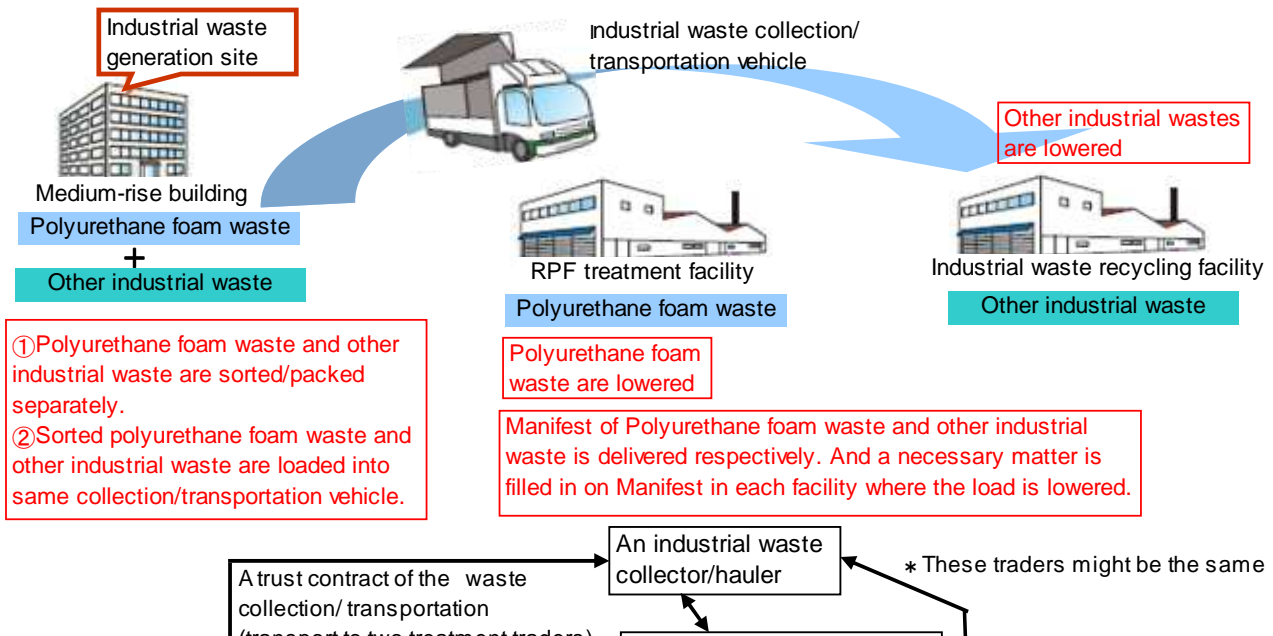
For the scale of 500kg or more on one site



Collecting from the locale and transporting it to the RPF disposing facility are efficient.

For the scale of less than 500kg on one site

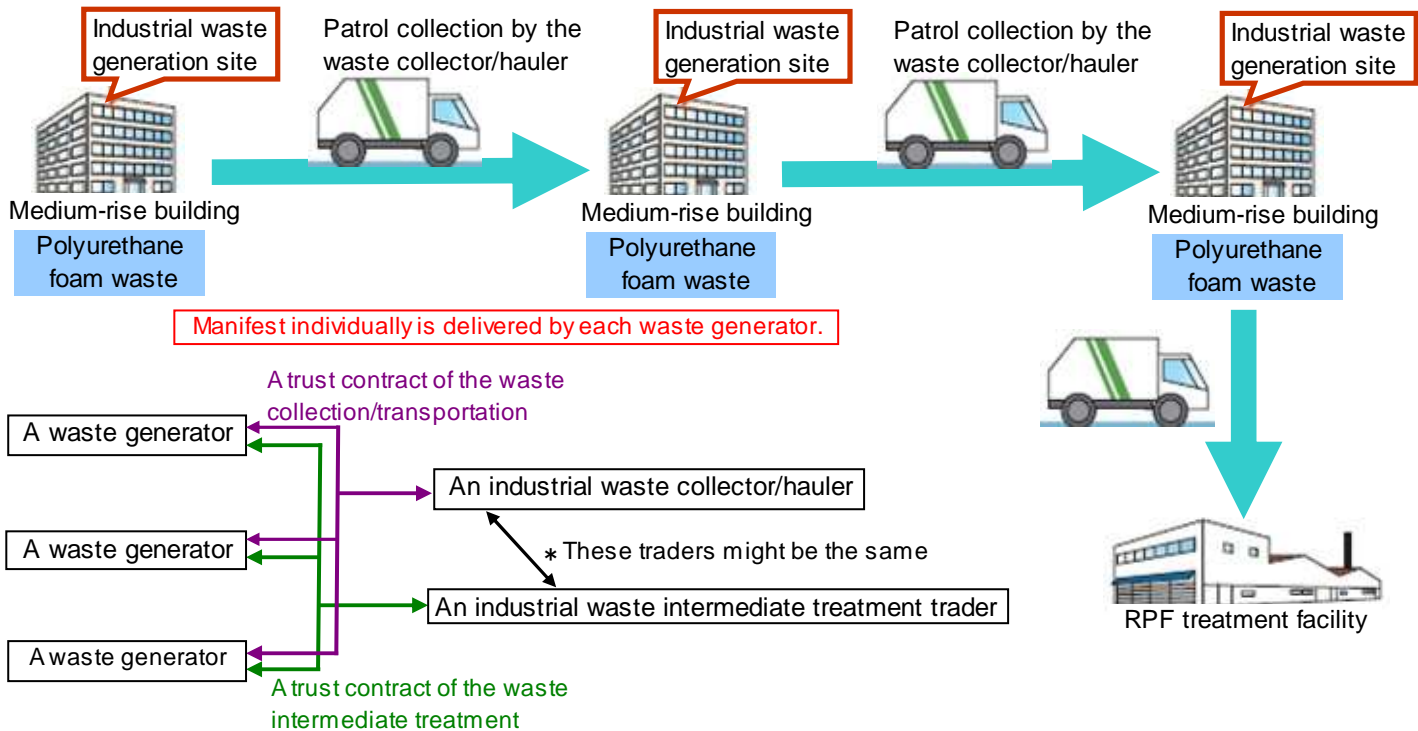
Example 1. Wastes are sorted in a construction site, and transported by a wing type 10-ton truck.



- ① Polyurethane foam waste and other industrial waste are sorted/packed separately.
- ② Sorted polyurethane foam waste and other industrial waste are loaded into same collection/transportation vehicle.

Excerpt from Ministry of Economy, Trade and Industry "Surveillance study for making to RPF using polyurethane foam waste" investigation report published in March, 2008

Example 2. Polyurethane foam waste generated from some sites is transported by one packer car.



There are various methods by the scale of the construction sites as above.
Please apply to the local government before performing it actually.

Inquiries for producing RPF from polyurethane foam wastes

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