PRODUCTION AND UTILIZATION OF CARBONIZED REFUSE DERIVED FUEL

T. Sato, K. Shiotsu, Y. Yamaguchi, and S, Yamada
Kawasaki steel Corporation Environmental System Division
1 kawasaki cho chuoku Chiba city Japan

Introduction

Refuse Derived Fuel, namely RDF, is produced from municipal waste by the process of crushing, selection, drying, lime mixing and pelletizing press. RDF has above twice of calorific value and more stable of quality than the municipal waste. In this report, carbonization of RDF is proposed and the result of its research is described.

Laboratory Test

Basic data was presented by laboratory test.
Fig.1 and 2. show heat resolution behavior of RDF. In low oxigen condition, volatile matter (ex.tar) of RDF is vaporized and reduced lower than 10% through decomposition.
Chlorine content in ash begins to decrease in over 950℃ condition. And it can be reduced to 1/4-1/3 by washing.

Field Test Plant and Proposed Process

30 t/d RDF carbonization plant shown in photo 1 ,2 and Table 2, was constructed in Mizushima Works and field tests have been conducted since April 2000.Example process of combination of carbonization plant with RDF plant is shown in fig.3. In this process, exhaust gas heat from decarbonization process is efficiently reused in RDF manufacturing.

Characteristics of Carbonized RDF

Table.1 shows low-heat value of RDF and carbonized RDF .
Table.4 shows that the dioxins value in varied carbonization temperature is out of question compared with soil level.
The results of dissolving test shown in Table.5, are fully satisfied to use it as soil improvement material.

Utilization of carbonized RDF

Applications of carbonized RDF in ironmaking process are shown in fig.4. We evaluate that carbonized RDF can be used as an alternative material of powdered charcoal or coke at steel making process,for example,Blast Furnace and Coke Oven.

Not only for material recycle as above, other applications are under research such as soil improvement, activated carbon for pollutant adsorption in water, gas and soil, and heat insulation.

Conclusion

RDF carbonization plant was built and field tests were conducted. It is evaluated that the Carbonized RDF can be an alternative material of fossil fuels or materials for many fields.

Table1 low-heat value

kJ/kg(kcal/kg)

Item	kj/kg(kcal/kg)
RDF	18300(4372)～18914(4519)
Carbonized RDF	16370(3911)～17810(4255)

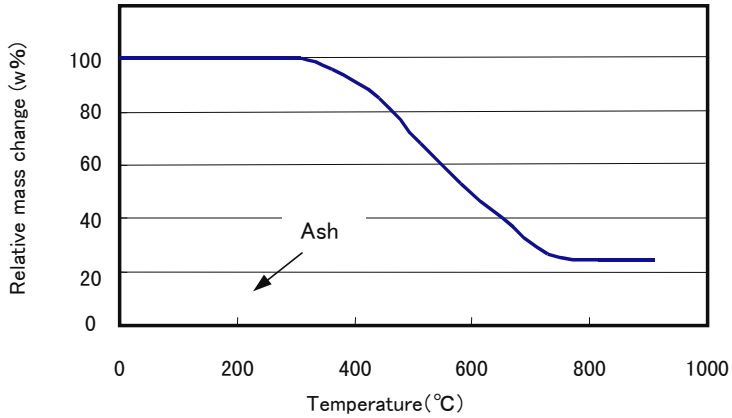

Fig.1 Heat resolution behavior of RDF

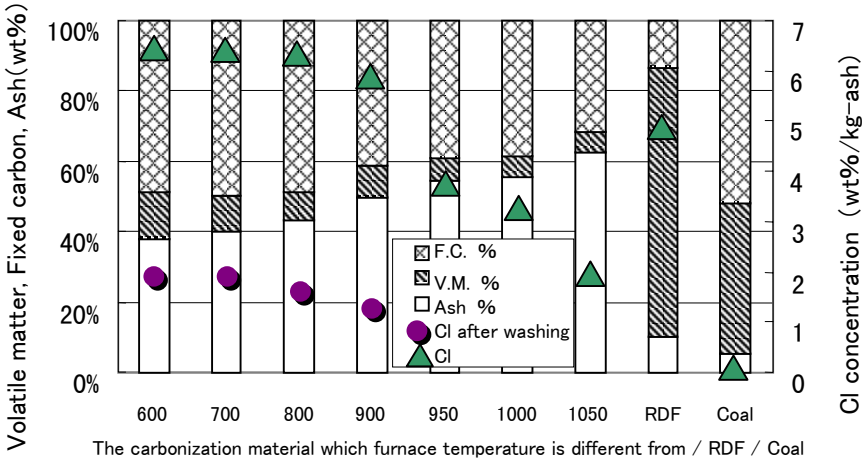

Fig.2 Heat resolution behavior of RDF

Photo1 Demonstration plant of carbonized RDF

Photo2 Carbonization furnace

Table2 Specification of the demonstration plant

Plant capacity	RDF(raw material)	30T/d
	Carbonization RDF	7.5T/d
	Operation time	8hr～24hr/d
Storage capacity	RDF storage	30T/d
	Carbonized RDF storage	10T/d
Transportation	RDF	15T-track
	Carbonization RDF	10T-dump or continuous supply to PCI coneyer
Operation	Labor	Always one person
	Operation	Filling up RDF

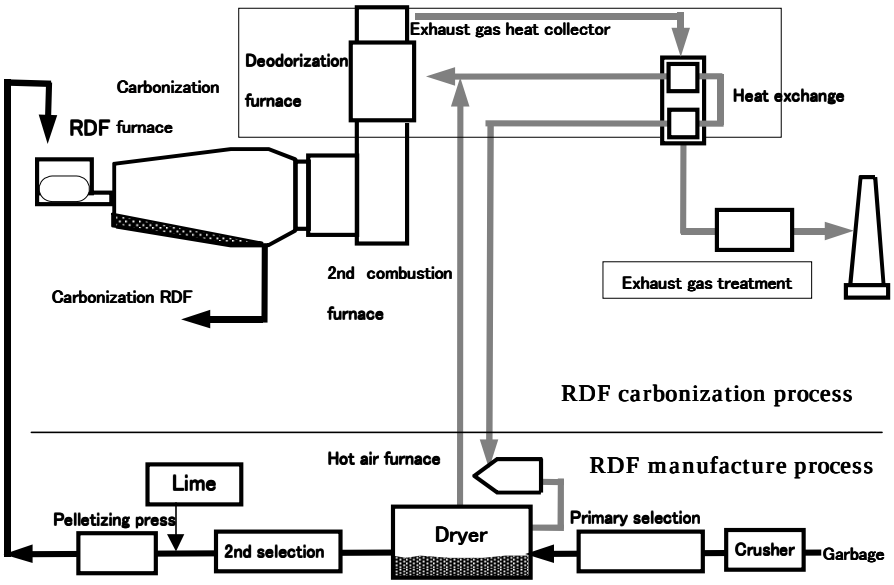

Fig. 3 Kawasaki Steel carbonization system

Table3 Dioxins analysis

Temperature	DXNs		Co-PCBs		Total
	pg/g	pg-TEQ/g	pg/g	pg-TEQ/g	pg-TEQ/g
600℃	27	0.0000	1900	0.220	0.220
700℃	27	0.0360	2900	0.029	0.065
800℃	31	0.0012	8700	0.100	0.100

Table4 Dissolving test

Item		pH=4	pH=7	pH=12
Cd	mg/l	N.D.	N.D.	N.D.
Pb	mg/l	N.D.	N.D.	N.D.
Cr^{6+}	mg/l	N.D.	N.D.	N.D.
As	mg/l	N.D.	N.D.	N.D.
T-Hg	mg/l	N.D.	N.D.	N.D.
Se	mg/l	N.D.	0.005	N.D.
CN	mg/l	N.D.	N.D.	N.D.
Organic P	mg/l	N.D.	N.D.	N.D.
PCB	mg/l	N.D.	N.D.	N.D.

Measuring method: Notification No.13 of the environment agency N.D.: Not detected

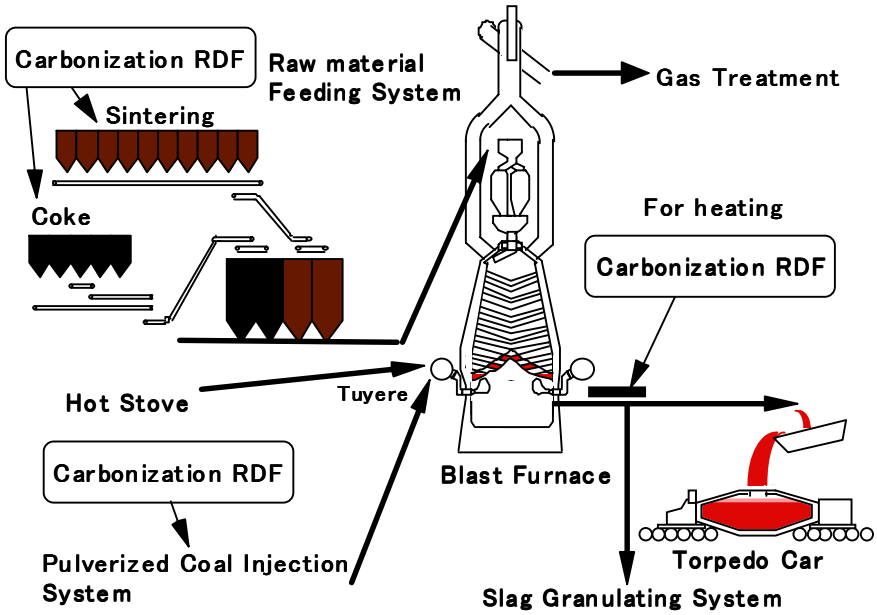

Fig.4 Applications of carbonized RDF in ironmaking process

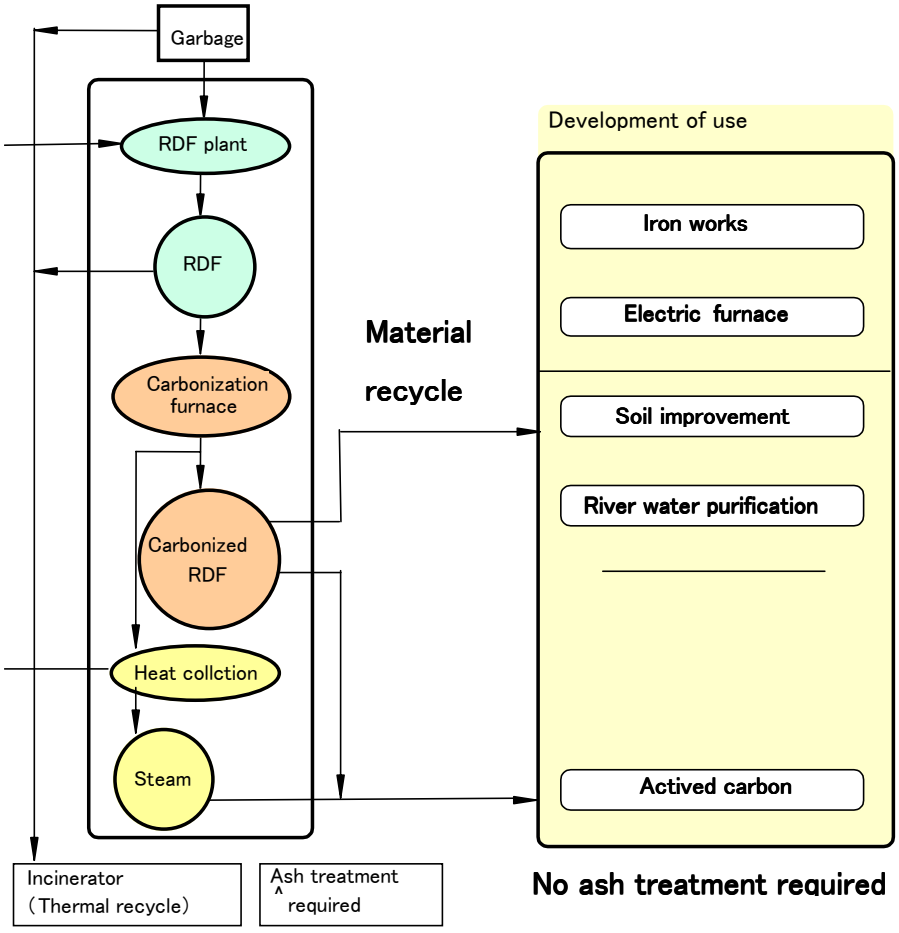

Fig.5 Carbonized RDF use outline