

# Leading the Recycling-oriented Society with a Recycling Business

Ensuring smooth recycling is a key requirement for building a recycling-oriented society. JFE is meeting this need with advanced recycling businesses which apply a variety of unique technologies, beginning with waste plastic recycling as blast furnace feed, utilizing steel plant facilities as an infrastructure for recycling.

## Waste Plastic Recycling for BF Feed

JFE currently recycles more than 100,000 tons/year of waste plastics by converting industrial waste plastic into raw material (substitute for coke) for its ironmaking. Because waste plastic recycling for BF feed makes an important contribution to reducing CO<sub>2</sub> emissions and saving coal, it is a key technology for recycling waste plastic.



Waste plastic recycling for BF feed

## NF Board for Concrete Forms Manufactured from Recycled Plastic

In addition to chemical recycling of plastics, primarily as blast furnace feed, JFE also established a commercial material recycling business in 2002. Use of recycled plastic as a substitute for plywood in NF Board for concrete forms reduces CO<sub>2</sub> emissions and helps preserve rain forests. Because used NF Board can also be recycled as a raw material for ironmaking, it is an environment-friendly, Zero Emission product.



NF Board production line

## PET Bottle Recycling

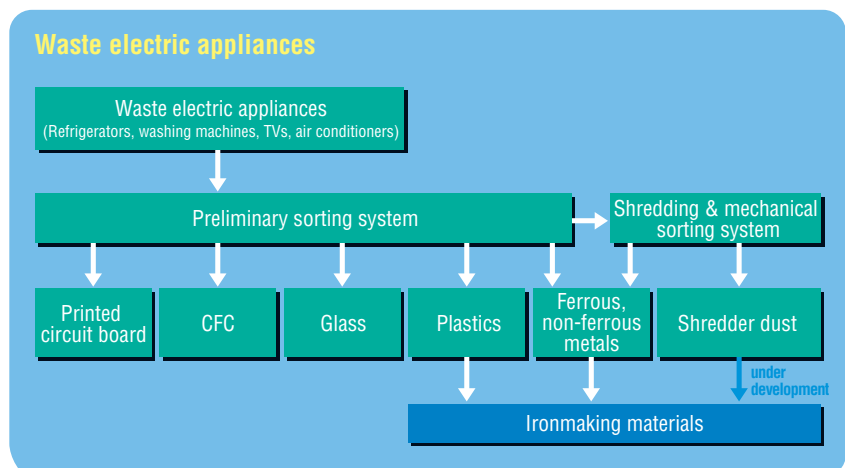
The JFE Group operates a PET bottle recycling business at East Japan Works (Keihin). Using PET bottles collected by local municipalities, PET resin flakes are recovered by a process of crushing, classification, washing, etc. and sold to polyester manufacturers and makers of PET sheets for egg cartons and similar packaging. Labels and caps are recycled as material for ironmaking in this distinctive Zero Emission process.



PET bottle recycling plant.

## Home Electric Appliance Recycling

Japan's Electric Household Appliance Recycling Law requires recycling of scrapped refrigerators, washing machines, televisions, and air conditioners. To meet this need, JFE invested in an appliance recycling business located in its steelworks, where it efficiently dismantles appliances and recycles most steel and non-ferrous metals and waste plastics to iron and steel production processes. Thus, the steelworks is an indispensable part of the infrastructure for a recycling society.





## Recycling by Waste Gasifying & Melting (Municipal / Industrial Waste, Shredder Dust)

Using the JFE THERMOSELECT waste gasifying & melting furnace, the Chiba Recycling Center at East Japan Works (Chiba) completely recycles industrial waste from Chiba Prefecture and the surrounding region, as well as waste plastic collected under the Containers and Packaging Recycling Law, as fuel gas for the steelworks.

At West Japan Works (Kurashiki), JFE invested in a PFI business called Mizushima Eco-Works, which is now constructing a JFE THERMOSELECT plant for municipal / industrial wastes and shredder dust and is scheduled to start operation in April 2005.



Chiba Recycling Center

## Food Waste Recycling

Chiba Biogas Center at East Japan Works (Chiba) uses the BIGADAN process to produce fuel gas for the works from food waste by methane fermentation. Residue from the process is recycled to the Thermoselect plant at the Chiba Recycling Center, achieving zero-emission 100% recycling.



Chiba Biogas Center

## Proof Test of Vinyl Chloride Dechlorination System

Because vinyl chloride comprises 15% of all plastics, a treatment process for this material is an essential requirement for plastic recycling. In addition to a technology for separating and removing vinyl chloride from container and packaging plastics, JFE has also developed a technology for separating chlorine (Cl) from vinyl chloride itself, for example, in pipes and gutters. This enables Cl-free recycling in blast furnaces. The separated Cl is also recycled as hydrochloric acid (HCl). This technology is now in the proof test stage, aiming at commercialization.



Demonstration plant for vinyl chloride de-Cl process

## Primary Recycling Operations at JFE

Operation	Started in	Capacity
Waste fluorescent tube recycling	April 1995	6,000 t/yr
Waste plastic recycling for BF feed	October 1996	50,000 t/yr
Waste gasifying & melting recycling	April 2000	50,000 t/yr
(1)Chiba	April 2005 (scheduled)	160,000 t/yr
(2)Kurashiki		
Plastic containers & packaging for BF feed	April 2000	120,000 t/yr
Plastic containers & packaging gasifying	April 2001	30,000 t/yr
PET bottle recycling	April 2002	10,000 t/yr (approx. 200 million bottles)
Concrete form boards from recycled resin	Sept. 2002	2 million/yr
Packaging plastic sorting & compacting	(1)Nagoya Aug. 2000	60,000 t/yr
(2)Sendai	Dec. 2000	20,000 t/yr
(3)Hiroshima	April 2004 (scheduled)	40,000 t/yr
Can/PET bottle sorting & compacting	Kawasaki Sept. 2003	5,500 t/yr
RDF recycling	(1)Haibara Town, Nara Pref. Nov. 2000	2,500 t/yr
(2)Nogi Town, Tochigi Pref.	Dec. 2002	5,500 t/yr
Home electric appliance recycling	April 2001	800,000 units/yr
Dry cell battery recycling by non-ferrous metal melting furnace	March 2002	1,500 t/yr
Dry cell battery recycling by electric furnace	March 2003	1,000 t/yr
Food waste recycling	Aug. 2003	10,000 t/yr