Business for Old Electrical Appliances Commences

1. Introduction

The "Specific Household Appliance Recycling Law" (the Home Electric Appliance Recycling Law) became effective on April 1, 2001. NKK Trienekens Co. was founded to carry out this recycling business and contribute toward the building of a resource recycling society. At present, investment in NKK Trienekens Co. is 30% NKK Corp., 40% Mitsui & Co., Ltd., 20% Sanyo Electric Co., Ltd., 5% Nippon Express Co., Ltd., and 5% Sankyu Inc.

The Home Electric Appliance Recycling Law requires electrical appliance manufacturers to recycle four kinds of electrical appliances (refrigerators, washing machines, TV sets, and air conditioners). Electrical appliance manufactures may either carry out the recycling business themselves or subcontract it to another company. NKK Trienekens Co. carries out this business on behalf of electrical appliance manufacturers.

The facilities for this business have operated smoothly since April of this year, even though the number of appliances received has exceeded the planned amount.

2. Outline of facilities

2.1 Outline

Facility site : Mizue area in NKK Keihin Works
Date of completion : March, 2001
Site area : About 8400 m^2
Buildings : TV recycling house
Building area about 700 m^2
Pre-dismantling & crushing house
Building area about 2000 m^2
Facility capacity : A total of 800000 units per year of four types of electrical appliances
Objects for recycling : Four kinds of electrical appliances (refrigerators, washing machines, TV sets, and air conditioners) and industrial wastes including OA equipment

Photo 1 shows an overall view of the facilities.

2.2 Facilities

Simple and reliable equipment were selected during planning of the facilities after full studies were conducted on individual equipment. Candidate systems were identified based on NKK's long experience in crushing and recycling facilities.

Photo 1 Overall view of the facilities

2.2.1 Manual dismantling facility

The manual dismantling facility includes handling gear for removing the old electrical components from the appliance, a weighing scale, a work bench, chlorofluorocarbon collection system for accumulating refrigerator and air conditioner cooling media.

2.2.2 Crushing & sorting facility

The crushing & sorting facility includes a crushing machine, an air sorting device, a magnetic separator, an eddy current separator, a urethane compactor, and a chlorofluorocarbon collection facility for insulation.

3. Outline of disposition of old electrical appliances

TV sets are disposed of in the TV recycling house. Specifically, printed circuits and cables are recovered, and the cathode-ray tube and housing are removed. The plastic housing is utilized as a raw material for the blast furnace.

Cathode-ray tubes are treated by a specialized cullet company and are reused as cathode-ray tubes.

In the pre-dismantling & crushing house, refrigerators, air conditioners and washing machines are dismantled manually.

Plastics and other resources are manually recovered from refrigerators and air conditioners, as in the case of TV sets. Chlorofluorocarbon for cooling is also recovered.

For washing machines, in addition to the above items, brine is removed from the brine ring attached as a balancer to the upper part of the washing tub.

Plastics are recovered to the utmost extent in all of the manual dismantling operations for use as a raw material for the blast furnace.

After manual dismantling, the residuals are put into a crushing machine and sorted mechanically.

After sorting by air, urethane from refrigerator insulation is compressed and then used as a raw material for the blast furnace. Chlorofluorocarbon from urethane heat insulation is used as a foaming agent. In our plant, after deaeration, the chlorofluorocarbon is adsorbed and recovered by a foaming agent recovery system using activated carbon. This system contributes to protection of the ozone layer and the prevention of global warming.

Iron and non-ferrous metals are recovered by magnetic and the eddy current separators, respectively, and then utilized as raw materials for the converter.

Photo 2 shows the facility for collecting chlorofluorocarbon from insulation, and **Fig.1** is a flow diagram of the process.

4. Control system

The "recycling slip for home electric appliance," which is attached to each appliance, is used to control the proper disposition of old electrical appliances. The flow of recycling of each old electrical appliance is controlled using the bar code on this slip. This bar code is also used for plant control.

Photo 2 The facility for collecting chlorofluorocarbon from insulation material

5. Features of business

A major feature of this business is that most of the resources recovered from recycled appliances in this facility can be utilized in NKK's iron manufacturing process. In particular, plastics, which account for about 30% of the materials in electrical appliances, have the advantage of being directly used as a raw material for the blast furnace, which is being promoted by NKK.

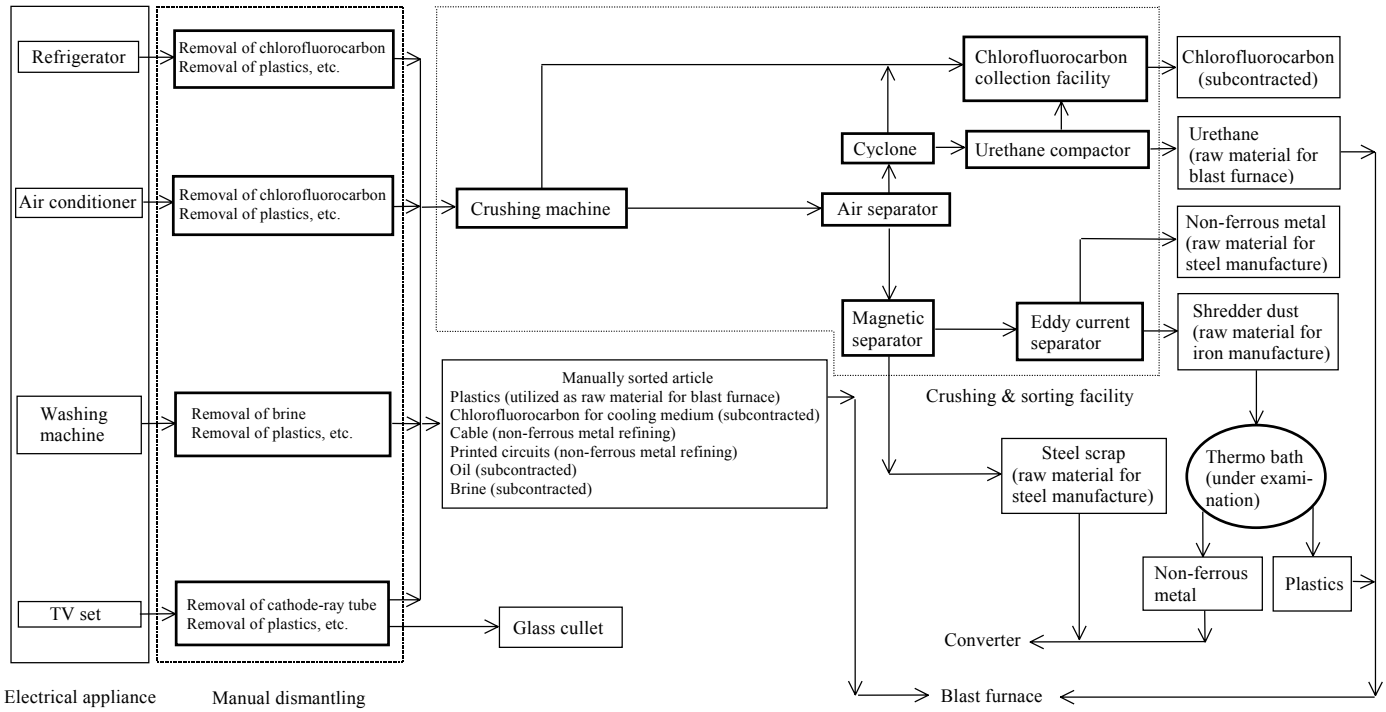

Fig.1 Process flow

The recycling ratio for the four appliances is currently 55% or more for TV sets, 50% or more for refrigerators, 50% or more for washing machines, and 60% or more for air conditioners. However, recycling ratios as high as 90% or more will be achieved in the next phase by incorporating technology for utilizing shredder dust as a blast furnace raw material. NKK is currently conducting proof tests on this technology, which uses a thermo bath.

6. Conclusion

The recycling business for old electrical appliances is an epoch-making business that represents a turnabout of Japan's administration of wastes in accordance with the appliance recycling law, which follows the "Containers and Packaging Recycling Law." NKK Trienekens Co. will continue technical development in this business field, contributing to Japan's environmental protection effort.

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