

FRP BOATS RECYCLING - IN CASE OF JAPAN -

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**Japan Marine Industry
Association (JMIA)**

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1. BACKGROUND

- ✓ Fiber Reinforced Plastics(FRPs) that are strong and durable have been used as boat material; on the other hand, FRPs are difficult to be recycled due to its strength.
- ✓ A large number of illegally dumped FRP boats were found on the seaside.
- ✓ The government asked the industry to develop FRP boats recycling system. JMIA (former Japan Boat Industry Association) accepted the request and began to develop a recycling program.
- ✓ Researches were carried out in 1990s to find available recycling technologies for the end-of-life(EOL) FRP boats. Basing on the results a way of recycling (using FRPs as substitutes for cement feedstock and thermal energy at cement plants) was decided.
- ✓ In 2005 JMIA's recycling program began to collect EOL FRP boats.
- ✓ As of March 2015, more than 6,000 units were treated.

2. OBJECTIVE OF THE PROGRAM

JMIA's FRP recycling program

- ✓ recycles FRP boats with less impact on the environment;
- ✓ promotes users' awareness of FRP boats recycling;
- ✓ cooperates with local governments to manage the sunken FRP boats.

3. OVERVIEW

JMIA's FRP recycling program

- ✓ is a voluntary (not mandated by specific recycling laws)
 - carrying out the corporate social responsibility (CSR);
 - basing on the Extended Producer Responsibility(EPR) principle.
- ✓ is operated under the Japanese waste management law.
- ✓ uses existing recyclers such as
 - vehicles/boats dismantlers; and
 - cement plants.
- ✓ is available throughout Japan. In our recycling network there are
 - 486 boat dealers & marinas;
 - 37 dismantlers;
 - 8 processing companies; and
 - 4 cement plants.

4. HOW DOES IT OPERATE?

Step1

Collect at “collection points” which are marina, dealers or dismantlers. Dischargers (boat users, local governments, etc.) pay recycling fees and transportation fees.

Step2

Transport the end-of-life(EOL) boats from the collection points to dismantling facilities.

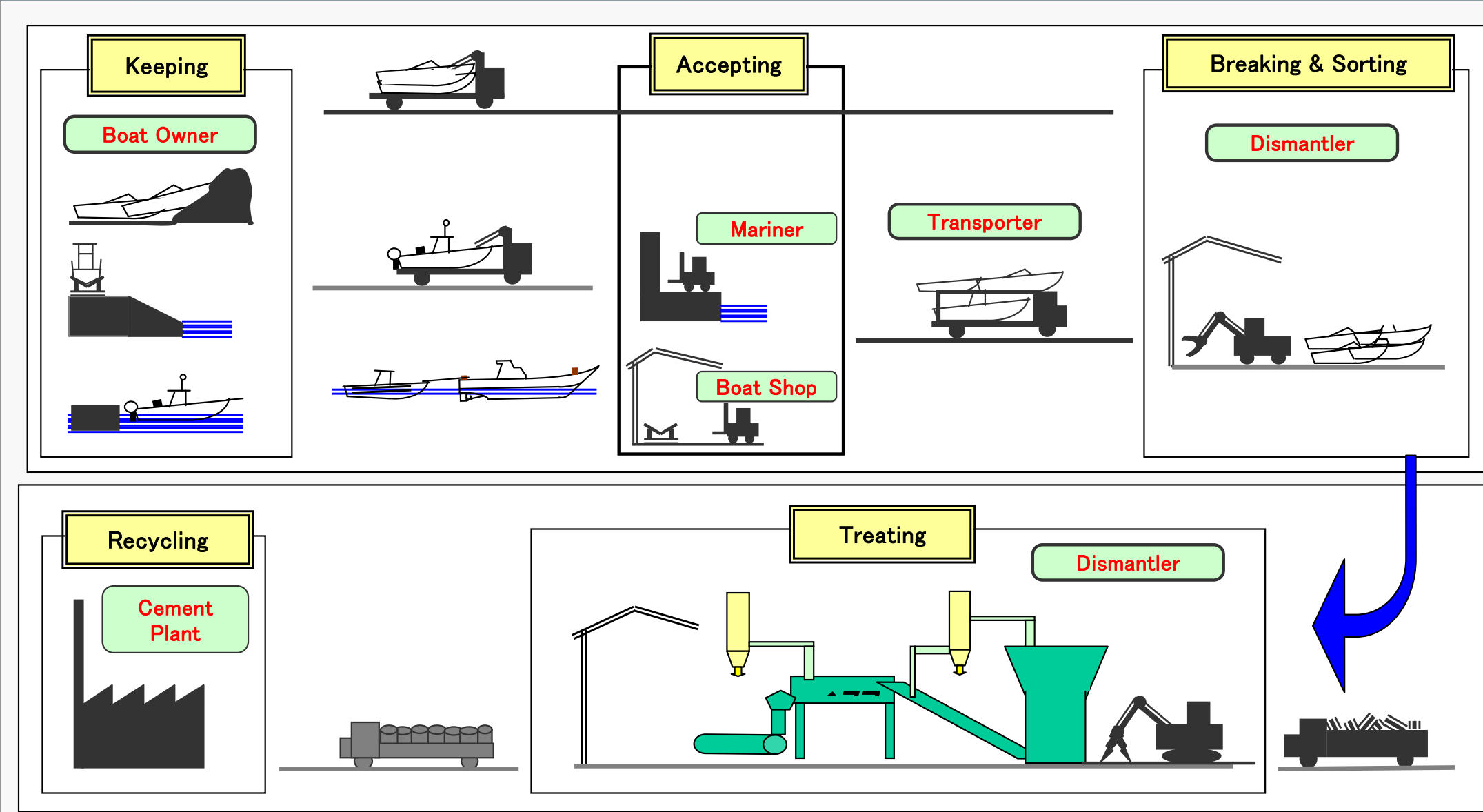
Step3

FRPs are separated from the EOL boats. Metals and plastics are sold by dismantlers. FRPs are chopped by shredders.

Step4

Shredded FRPs are treated in cement plants.

OPERATIONAL FLOW



5. SUCCESSES OF THE PROGRAM

- ✓ More than 6, 000 units have been recycled (2005-2014).
- ✓ High recycling rate with few wastes (only 12-13% of the total weight is landfilled. c.f. General dismantler's landfill rate after processing FRP boats is 82%.)
- ✓ Governmental supports at the national and local level (ex. Administrative circulars to ask cooperation to local governments by Ministry of land, Infrastructures, Transport and Tourism.)

6. FACING ISSUES

- ▶ There are high competitions with private recyclers and waste management companies;
- ▶ Awareness of users about FRP boats recycling is still low;
- ▶ Cheap dismantling (with high rate of landfill) is preferred by users;
- ▶ For users JMIA's system takes effort (administrative processes are quite complicated).

RECYCLING FEES

Those who want to recycle EOL FRP boats need to pay recycling fees to JMIA recycling center that organizes the program. The fees are decided on the boat's types and sizes. The table shows the typical fee per boat (yen).

Note: JMIA recycling center decides fees every one meter accepting up to the length 30m.

Type	Length over all		Fee (Yen)
Cabin Boat	L	< 6m	55,000
	6m ≤	L < 7m	78,000
	7m ≤	L < 8m	100,000
	8m ≤	L < 9m	127,000
	9m ≤	L < 10m	162,000
	10m ≤	L < 11m	202,000
Sailing Cruiser Yacht	L	< 6m	46,000
	6m ≤	L < 7m	60,000
	7m ≤	L < 8m	72,000
	8m ≤	L < 9m	87,000
	9m ≤	L < 10m	106,000
Work-Fishing Boat	L	< 4m	33,000
	4m ≤	L < 5m	43,000
	5m ≤	L < 6m	54,000
	6m ≤	L < 7m	68,000
	7m ≤	L < 8m	87,000
	8m ≤	L < 9m	112,000
	9m ≤	L < 10m	143,000
	10m ≤	L < 11m	180,000
Dingy Yacht	—	—	34,000
PWC	—	—	25,000

PHOTO-GALLERY

Transport



Pick up FRP boats from the sea



towing



on deck



pull up

Transport

Pull up boats from the sea



put on the track

transport

bring down

Break & Sort

In case of using shredding facilities



Drop in



Crushing



Crushing



Mix-Plastics



Metals



Dusts

Break & Sort

In case of not using shredding facilities (by hands and machines)



Crushing



Crushing



Sorting



FRPs



Mixed-Metals



Mixed-Plastics