

Plastics Institute of America, Inc.

A Non-Profit, Educational, and Research Organization

*Proceedings
Technology Exchange Program*

RECYCLINGPLAS IV—Conference

PLASTICS RECYCLING AS A FUTURE BUSINESS OPPORTUNITY

**May 24–25, 1989
At the Mayflower Hotel
Washington, D.C.**



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INTRODUCTION

Since the first RECYCLINGPLAS Conference was organized by the Plastics Institute of America in 1986, the scope and influence of these annual conferences has grown steadily. Their growth coincides with the remarkable explosion of interest and activity in the United States and in many other industrialized countries on the many problems involved with the practical recycling of plastics products. With some 330 participants from 10 countries, the fourth RECYCLINGPLAS Conference was probably the largest and most comprehensive forum on plastics recycling held in the U.S. to date.

The proceedings for RECYCLINGPLAS IV contained in this book cover a broad and important range of subjects. The papers describe:

- the expanding interest in recycling by the major producers of plastics resins
- the progress of new technology developed in Europe
- the problems of reclaiming marketable products from industrial plastics waste
- the views of government at federal and state levels on post-consumer packaging waste

These are both difficult and exciting times for businesses involved in recycling. The Plastics Institute looks to rapid progress in the next several years.

Sincerely,



William Sacks
Executive Director



Michael J. Curry
Program Chairman

WELCOME TO RECYCLING PLAS IV

Dr. Calvin J. Benning
Dir. Regulatory Affairs
Essex Chemical Company

I AM CHAIRMAN OF THE PLASTIC INSTITUTE AND I'M HERE TO WELCOME YOU TO OUR 4TH PLASTIC RECYCLING CONFERENCE.

THE INSTITUTE HAS BEEN IN THE AREA OF RECYCLING RESEARCH SINCE 1978. AT THAT TIME DOE STARTED TO FUND A PIA FELLOWSHIP PROGRAM FOR RESEARCH IN RECYCLING PLASTIC AUTOMOBILE SHREDDER WASTE. THESE PROGRAMS INCLUDED COLLECTION, PURIFICATION, COMPATIBLIZATION, AND EXTRUSION STUDIES, AND LASTED UNTIL 1987.

TODAY AND TOMORROW, WE WILL DISCUSS "PLASTIC RECYCLING" AS A FUTURE BUSINESS OPPORTUNITY. FIRST LET ME BE THE DEVILS ADVOCATE. WHY SHOULD THE INDUSTRY RECYCLE, WHEN WE HAVE SPENT SO MANY YEARS DEVELOPING MATERIAL TO PROTECT HEALTH (I.E. FOOD PACKAGING AND MEDICAL DEVICES) AND IMPROVE THE QUALITY OF LIFE (DISPOSABLE DIAPERS, CLOTHING ETC.); WHEN IT WOULD BE SO SIMPLE TO BURN THE PLASTIC AND RECOVER THE BTU VALUE.

HOWEVER THERE IS ONE MAJOR INCENTIVE TO RECYCLING; REGULATORY. I'M SURE YOU READ THE WRITING ON THE WALL AS I DO AND I'M SURE SOME OF YOU HAVE SEEN THE DATA ON MUNICIPAL WASTE LANDFILLS. THE ENVIRONMENTAL IMPACT OF PLASTICS IS DUE TO ITS STABILITY, INERTNESS, AND LONGEVITY WHICH THE INDUSTRY HAS WORKED VERY LONG TO ACCOMPLISH. (1) THE VOLUME NOT THE WEIGHT OF PLASTICS IS THE PROBLEM IN THE WASTE STREAM. THE CONTAMINATION OF GROUND WATER COMES FROM OTHER MATERIALS. IN SPITE OF THIS, PLASTICS ARE PERCEIVED TO BE FILLING UP THE LANDFILLS AND CONSTITUTING A LITTER PROBLEM AND ARE A THREAT TO HEALTH. WE CANNOT STOP LITTERING BUT WE CAN SHOW THAT PLASTICS DO NOT THREATEN OUR HEALTH.

THIRTY-TWO (32) STATES ARE PROPOSING LAWS THAT WILL MANDATE THAT PLASTIC CONTAINERS BE RECYCLED, BIODEGRADED OR BANNED. SEVERAL OF THE MORE DRASTIC EXAMPLES OF THESE ARE THE COMPLETE BANS PROPOSED IN WASHINGTON D.C., MASS., CONN., SEATTLE WASH., PORTLAND OR, AND SUFFOLK COUNTY NY. IT SHOULD BE NOTED THAT SEATTLE, PORTLAND, AND SUFFOLK COUNTY ARE ALSO PROPOSING TO INCLUDE A BAN ON POLYSTYRENE FOAM PACKAGING AND SUFFOLK COUNTY'S BAN INCLUDES PLASTIC GROCERY SACKS. SOME LAWS COULD BENEFIT RECYCLING SUCH AS A UNIFORM CODING OF CONTAINERS TO MAKE OPTICAL READERS AND SEPARATION MORE EFFECTIVE (THIS IS NOW A TEXAS REQUIREMENT). SO THERE IS AN INCENTIVE TO RECYCLING, IN SOME CASES, IT MAY BE ESSENTIAL TO THE SURVIVAL OF THE BUSINESS.

WHAT IS "PLASTIC RECYCLING" AS WE KNOW IT TODAY?

PLASTIC RECYCLING CAN TAKE SEVERAL DIRECTIONS -

1. TO RECOVER THE ORIGINAL MATERIAL
2. TO BE CONVERTED TO ANOTHER USE, OR
3. TO RECOVER THE CHEMICAL CONSTITUENTS OF THE MATERIAL.

ALUMINUM CANS, METALS, BOTTLES, PLASTICS & NEWSPRINT FIT IN CATEGORY #1. CATEGORY #2 REFERS TO OTHER AREAS SUCH AS INCINERATION AND COGENERATION. (WOOD PRODUCTS, PLASTICS, ETC.) AND... CATEGORY #3 INCLUDES THE TREATMENT OF PLASTICS (CHEMICALLY OR THERMALLY) TO PRODUCE A CHEMICAL RAW MATERIAL (I.E. PU TO POLYOLS).

RECYCLING AREAS

1. TO RECOVER THE ORIGINAL MATERIAL
2. TO BE CONVERTED TO ANOTHER USE
3. TO RECOVER THE CHEMICAL CONSTITUENTS
OF THE MATERIAL

SO YOU SEE "PLASTIC RECYCLING" CAN TAKE, SEVERAL DIRECTIONS. IT DEPENDS UPON THE FORM OF THE PLASTIC, THE POLYMER'S STRUCTURE AND PROPERTIES AND ECONOMIC INCENTIVE.

PLASTIC RECYCLING HAS THE POTENTIAL FOR BEING A SUBSTANTIAL NEW SOURCE OF FEEDSTOCK, AND QUITE A LARGE NEW BUSINESS AREA WITHIN THE INDUSTRY. THERE IS NO DOUBT THAT COMPANIES, BOTH LARGE AND SMALL ARE ENTERING THE FIELD. SOME HAVE MADE SIZEABLE COMMITMENTS IN THIS NEW AREA.

FOR EXAMPLE:

LET'S TAKE A FAST LOOK AT SOME OF THESE PROJECTS OR PARTNERSHIPS YOU WILL HEAR ABOUT LATER (7).

PARTNERS IN RECYCLING

1. AMOCO - MCDONALDS & RUBBERMAID ARE IN A PARTNERSHIP TO RECYCLE POLYSTYRENE FAST FOOD ITEMS. (WTE CORP. DESIGNED AND BUILT THE PLANT IN BROOKLYN, N.Y.)
 - . THE RAW MATERIALS COMES FROM McD AND LOCAL SCHOOLS
 - . TECHNOLOGY AND PROCESS TO RECOVER THE POLYSTYRENE RESIN IS AN IN-HOUSE TECHNOLOGY (WTE AND AMOCO)
 - . MARKETS (BOTH AMOCO AND RUBBERMAID HAVE A READILY AVAILABLE PRODUCT LINE)

PARTNERSHIPS

<u>WASTE MNG.</u>	<u>RECYCLER</u>	<u>RESIN</u>	<u>END PRODUCT</u>
AMOCO MCDONALDS RUBBERMAID	AMOCO W.T.E	PS/PS FOAM	INSULATION OFFICE ITEMS HOUSEHOLD ITEMS
W.M.I.	DUPONT W.M.I.	PET HDPE	RESIN
B.F.I.	WELLMAN	PET	RESIN
DOW/DOMTAR	DOW DOMTAR	PET HDPE (?)	BOTTLES CONTAINERS
MOBIL	MOBIL	PS/PS FOAM	RESIN - PS & PS FOAM PROD

SOME ADVANTAGES

- . AMOCO HAS A HISTORY OF INTERNALLY RECYCLING POLYSTYRENE AND POLYSTYRENE FOAM SHEET AND TRIM
- . BOTH AMOCO AND RUBBERMAID HAVE PRODUCT CANDIDATES AT SAME APPROX. PRICE.
- 2. DUPONT AND WASTE MANAGEMENT WILL JOINTLY BUILD SEVERAL PLASTIC RECYCLING PLANTS AND REPROCESSING CENTERS AROUND THE U.S. (PRESUMABLY THEY WILL COLLECT GARBAGE; CONVERT IT TO PLASTIC FLAKE OR PELLETS; AND SELL RESIN.)
- WMI - IS THE LARGEST WASTE HANDLER AND LANDFILL OPERATOR IN THE U.S.
- 3. WELLMAN HAS FORGED AN AGREEMENT WITH BFI, A VERY LARGE WASTE MANAGEMENT COMPANY TO TAKE THEIR PET & HDPE WASTE AND RECYCLE IT.
- 4. DOW/DOMTAR HAVE ANNOUNCED A NEW RECYCLED PET VENTURE FOR BOTTLES. (THEY INTEND TO COLLECT DISCARDED PET, CONVERT THE PET WASTE TO RESIN AND THEN INTO BOTTLES).
- 5. MOBIL CHEMICAL IS RECYCLING PS FOOD PACKAGING AND FAST FOOD ITEMS. LIKE AMOCO THEY HAVE EXTENSIVE EXPERIENCE IN FOAM SCRAP RECOVERY AND REUSE.

PRODUCT AREAS

**RECYCLED RESIN
TO PRODUCT**

<u>COMPANY</u>	<u>PRODUCT</u>	<u>RESIN</u>
PROCTER & GAMBLE (P & G)	DETERGENT BOTTLES	HDPE & PET
RUBBERMAID	OFFICE & HOUSEHOLD GOODS	PS
AMOCO	INSULALTION	PS FOAM
MOBIL	PACKAGING	PS FOAM
DOMTAR	CONTAINERS BOTTLES	PET HDPE
FORD	AUTO PANELS	POLYOLS/ PU
G.E.	EXTERIOR AUTO PARTS	STRUCTURAL ABS/FRP

PRODUCT AREAS

- A. P & G - WILL USE 20 MILLION LBS OF HIGH QUALITY HDPE RECYCLED SCRAP IN THEIR TIDE, CHEER, AND DOWNEY BOTTLES. P & G HAS TESTED PET IN SPIC & SPAN (TESTS WERE DELAYED DUE TO THE SHORTAGE OF RECYCLED PET). THREE BOTTLE MAKERS ARE INVOLVED WITH P & G THEY ARE: PLASTIPAK, PLYMOUTH, MICH; OWENS-BROCKWAY PLASTIC BOTTLE DIVISION OF O.I., AND CONTINENTAL CAN INC. P & G USES MULTILAYER CONSTRUCTION TO MAINTAIN PRODUCT PURITY - (RECYCLED-HDPE IS THE INNER PLY AND IS, APPROX. 20% OF THE BOTTLE'S WEIGHT).
- B. RUBBERMAID, AMOCO AND MOBIL WILL SELL POLYSTYRENE & PS FOAM PRODUCTS.
- C. DOMTAR - WILL SELL PET CONTAINERS AND PROBABLY OTHERS.
- D. FORD MOTOR CO. HAS PRODUCED MOLDED CFC FREE SOUND DEADENING PANELS USING POLYOLS FROM RECYCLED POLYURETHANE FOAM.
- E. G.E. HAS A MAJOR RECYCLING ACTIVITY FOCUSED ON RECLAIMING AUTOMOTIVE EXTERIOR PARTS.

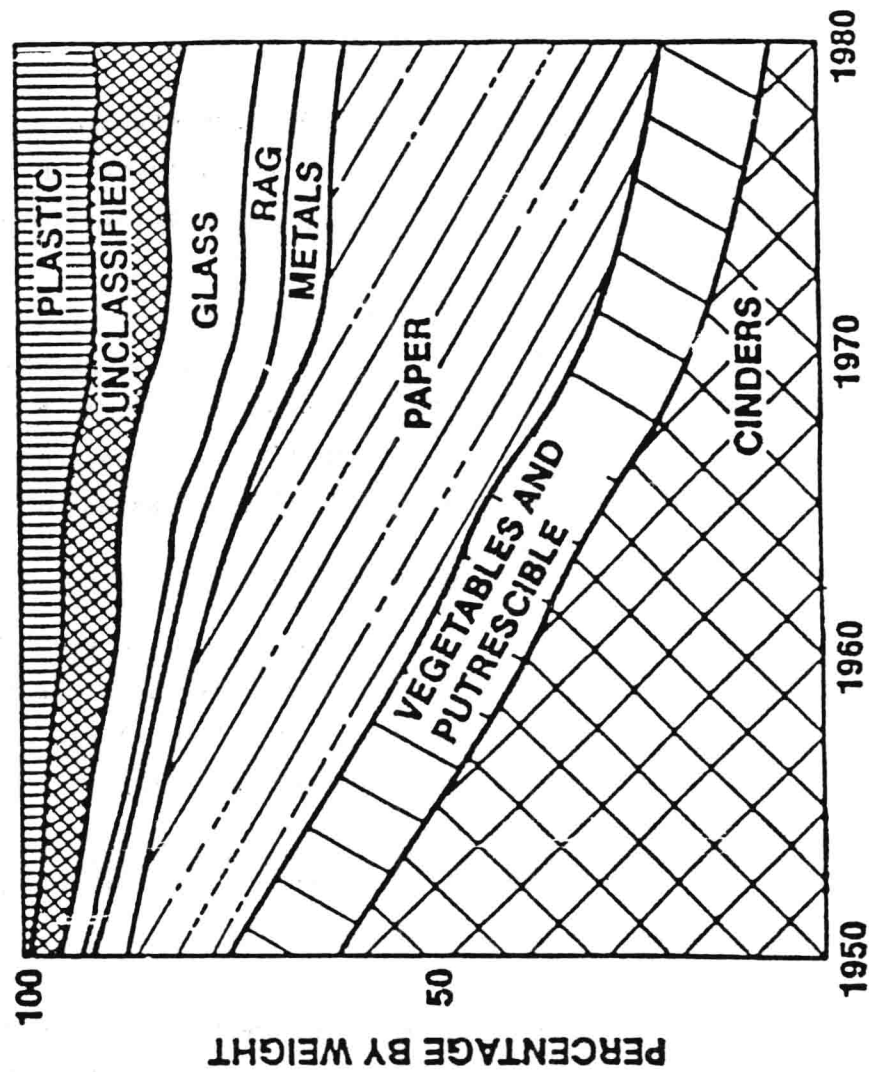
THE CONTINUED INVOLVEMENT OF LARGE COMPANIES, SUCH AS THESE, IN THE PLASTIC RECYCLING BUSINESS CAN HELP INSURE THE SUCCESS OF RECYCLING, IF IT IS TO REALIZE ITS TRUE POTENTIAL. THE MAJOR PLASTIC TRADE ASSOCIATIONS AND OUR OWN INSTITUTE ARE ALSO PLAYING A KEY ROLE IN RECYCLING THROUGH RESEARCH.

KEEP IN MIND THAT RECYCLED RESIN WILL ALWAYS BE AT THE MERCY OF THE PRICE OF THE PRIME RESIN. THE BIGGEST ECONOMIC HURDLES ARE THE PRICE OF THE PRIME RESIN; THE AVAILABILITY OF FEEDSTOCK AND HOW EFFECTIVE IS THE PROCESS (I.E. THE ECONOMY OF SIZE).

ONE FINAL NOTE THE INCENTIVE TO RECYCLE MUST BE PERMANENT TO SUSTAIN THE PLASTIC RECYCLING INDUSTRY IN ADDITION, THE RAW MATERIAL AND MARKET AREAS MUST ALSO BE PERMANENT. ONE HOPES THAT THE CHANGES IN NEWSPRINT WASTE AND MARKET PRICES WILL NOT BE DUPLICATED IN PLASTIC. NEWSPRINT USED TO BRING \$50/TON TO THOSE WHO COLLECTED THE MATERIAL. IN THE NORTHEAST SOME TOWNS PAY \$25/TON TO HAVE IT TAKEN OFF THEIR HANDS AND IN SOME CASES IT IS DUMPED INTO LANDFILLS. THE SUPPLY IS FAR GREATER THEN THE DEMAND.

FINALLY WE HAVE MANY OPPORTUNITIES IN THE AREA OF RECYCLING PLASTICS & I'M SURE WE CAN SOLVE THE PROBLEMS IF WE ARE GIVEN THE CHANCE.

WHAT GOES INTO A TYPICAL MUNICIPAL WASTE LANDFILL?



CRAWFORD, J.F. AND SMITH, P.G., "LANDFILL TECHNOLOGY," BUTTERWORTHS, LONDON, 1985.
ANNUAL USA DEPOSITION RATE = 300 MILLION METRIC TONS/YEAR (LU, J.C.S. et al., "LEACHATE FROM MUNICIPAL LANDFILLS," NOYES PUBLICATIONS, NJ, 1985).

"PLASTICS RECYCLING:
FROM PART OF THE PROBLEM TO PART OF THE SOLUTION"

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In this opening presentation of the Plastics Institute's Recyclingplas IV, it might be instructive to glance back at some of the dramatic changes that have affected plastics recycling in the four years since these conferences were inaugurated.

A look backwards convinces me that the plastics industry stands today at a critical juncture on the issues of proper disposal and reuse of its products, which include recycling, degradability, landfill, source reduction and incineration as well as the separate but related issues of litter, chlorofluorocarbons and global warming.

Judging the present in light of the past is admittedly risky. Nonetheless, the former history teacher in me reminds me that the past sometimes yields fruitful lessons, while my role as one MODERN PLASTICS editor covering these issues affords a relatively safe perch for prognostication.

I suggest we are at the cross-roads in four respects affecting plastics and the environment:

First, recycling, and post-consumer recycling especially, has shifted from being peripheral to being central in todays plastics' agenda. Recyclers, you are no longer bit players, but central characters in the plastics show. If Suffolk was tough, Minnesota's Twin Cities are tougher. On March 31, Minneapolis enacted the apparantly most far-reaching of any recent measures