



**Texas Business Review**

ISSN 0040-4209

© Bureau of Business Research, The University of Texas at Austin

Date: August 1997

Title: **Market Opportunities for Recycling in Texas Manufacturing Industries**

By: **Mina M. Dioun**

Abstract:

Report on a study of the opportunities for and challenges of incorporating recycled materials in the production processes of twelve important manufacturing industries in Texas, including, among others, the primary and fabricated metal, computer and electronics, and printing and paper industries.

# Market Opportunities for Recycling in Texas Manufacturing Industries

By

**Dr. Mina M. Dioun,**

Head, Natural Resources Program

Bureau of Business Research

University of Texas at Austin

With the passage of the 1991 and 1993 Omnibus Recycling Bills, the Texas legislature made recycling a priority. Lawmakers set a statewide recycling and source reduction goal and directed the creation or expansion of many state programs to promote and facilitate recycling activities in order to achieve that goal. Among those involved in this effort is the Office of Pollution Prevention and Recycling (OPPR) at the Texas Natural Resource Conservation Commission (TNRCC). The OPPR promotes recycling market development and provides technical and market-related information.

The success of any recycling program depends on the development of markets, which require both sufficient demand for recycled materials and sufficient supply of recyclable materials. By far, the largest demand for recycled materials and possibly the largest supply of recyclable materials comes from manufacturing. The Natural Resources Program at the Bureau of Business Research (BBR), University of Texas at Austin, studied the potential markets for recycled and recyclable materials among Texas manufacturers. From this research came a knowledge base for OPPR to use in their efforts to foster linkages among industries, generators, traders, brokers, and others.<sup>1</sup> Such linkages are vital to creating a sustainable recycling market in which buyers and sellers can trade efficiently.

## **Demand for Recycled Materials: The Opportunities and the Challenges**

Fundamental economic, technical, policy, and infrastructure factors determine whether recycled materials are substituted for virgin materials in manufacturing. Our study focused on the opportunities for and challenges of incorporating recycled materials in the production processes of twelve important manufacturing industries in Texas, including, among others, the primary and fabricated metal, computer and electronics, and printing and paper industries.<sup>2</sup>

The study confirms that manufacturing industries need research and information about costs, physical and chemical performance, overall quality, and availability of recycled materials in order to decide whether to use recycled materials. Many factors affect these decisions. For example, using recycled aluminum has become cost effective because the production of aluminum from virgin material is both expensive (due to increased price of material inputs, mainly bauxite) and energy intensive (using approximately 95 percent more energy than its recycled counterpart).

## **Estimation of Demand**

To determine how much demand existed among Texas manufacturers, we estimated the demand for inputs using an Input-Output model and the most current (1993) manufacturing data for the state. Input-Output models take into account the importance of interindustry trade—the buying and selling of intermediate goods. We developed a database of the dollar value of inputs purchased by two-digit SIC manufacturers.<sup>3</sup> This estimated demand for inputs represents the *potential* demand for recycled materials.<sup>4</sup>

Our estimates show that the demand among manufacturers within the same industry (by two-digit SIC code) is very important, and for about 50 percent of Texas manufacturing industries (by two digit SIC), the value of this intraindustry demand was among the three highest demands of those industries. This implies that industry associations can play an important role in promoting the demand for and supply of recycled materials among their members. Our analysis of interindustry demand shows that most industries purchase a very large portion of their inputs from wholesale traders, suggesting that promotion of demand for recycled materials can be done by providing incentives to wholesale traders.

### **Use of Recycled Materials**

We conducted a survey of Texas manufacturers by mailing questionnaires to 26,663 manufacturers. They were asked whether they *use* recycled materials in their manufacturing process, and if not, whether they are *planning* to use them in the future.<sup>5</sup> Survey results show that 4,480 manufacturers answered the question about using recycled materials in their manufacturing processes and 12,028 did not. Of those responding, 2,301 answered in the affirmative, with the highest percentages coming from paper and allied products (within this SIC code [26], 30 percent responded "yes"); primary metals (SIC 33; 24 percent); and printing and publishing (SIC 27; 20 percent). Of the "no" respondents, 615 indicated that they were planning to use recycled materials and 1,564 said they were neither using nor planning to use recycled materials.

### **Potential Supply of Recyclable Materials**

We estimated the amount of nonhazardous solid waste streams generated by Texas manufacturing industries to determine the potential supply of recyclable materials.<sup>6</sup> The estimations were carried out for 19 two-digit SIC manufacturing industries, by 29 waste streams, for the state of Texas as a whole, 15 TNRCC regions, and 24 COG (Council of Governments) regions. This is the most extensive and comprehensive estimation of its kind in existence for the state of Texas in terms of regional aspect and waste categories. Our estimates indicate both that Texas industries possess great potential for recycling and that many of them are already recycling their waste. The highest potential supply is *metal* (all kinds), 20 percent of total potential supply; *paper* (all kinds), approximately 16 percent; and *wood and saw dust*, approximately 14 percent; with the rest accounting for about 50 percent.

### **Conclusions**

Recycling market development can produce enormous environmental, health, and economic benefits as well as economic development opportunities for communities. Our estimates of Texas manufacturers' potential supply of recyclable materials and the potential demand for recycled materials, the database of potential users of the recycled materials, and the analysis of opportunities and challenges can assess the current market and indicate opportunities for building a sustainable recycling market in Texas and improving the efficiency of such a market.

For example, this information can be used by state and local governments, generators and processors, and manufacturers and traders of recycled materials to target potential users of recycled materials and potential suppliers of recyclable materials in different regions and industries in Texas. More specifically, the survey results can be used by OPPR to provide further information and assistance to the companies that use or plan to use recycled materials. Also, estimates of nonhazardous waste generation can help manufacturers locate recyclable materials and economic development agencies to promote "industrial eco-park," "green twinning," or "byproduct synergy" activities. Finally, estimated potential demand can provide information to wholesalers and other traders about what materials different industries are purchasing.

There is a need for comprehensive market-based policies and incentives-such as tax credits for buyers and sellers and expansion of waste exchange activities-to encourage manufacturers to recycle their waste and use recycled materials in their processes and traders to trade these materials. This will secure demand and supply and therefore stabilize the market.

## Notes

1. I am grateful to the OPPR at TNRCC for funding this project and to the BBR for its support. Also, I would like to thank the research staff, consultants, and graduate and undergraduate research assistants for their work on the project. This article is a brief synopsis of the four-volume report, *Market Opportunities for Recycling in Texas*. The complete report consists of economic and statistical analysis, estimation of Texas manufacturers' potential demand for recycled materials, estimation of potential supply of recyclable materials, results of a survey of Texas manufacturers, and policy recommendations. Additionally, two user-friendly databases on Paradox based on research results were constructed.
2. The industries were selected based on their contribution to Gross State Product and their potential for using recycled materials (according to our survey results).
3. The model was created using IMPLAN (Impact Analysis for Planning) software; a database was created by the Minnesota IMPLAN Group (MIG, Inc.).
4. These estimations, carried out for the state of Texas as a whole and for each of its 24 COG regions and fifteen TNRCC regions, are in our report and compiled into Paradox V. 5.0 (Novell Company) databases.
5. Also requested were the SIC codes that describe the firm's products, the firm's name, address, phone number, number of employees, and sales volume.
6. We used a "waste generation ratio model" to estimate the relationship between waste generated and economic activities of the industry by SIC code in one region to compute the amount of waste generated in another region.

---

Go to: [Top](#) | [TBR Home Page](#) | [BBR Home Page](#) | [UT GSB Home Page](#)

---

29 September 1997

Comments to: [sallyf@mail.utexas.edu](mailto:sallyf@mail.utexas.edu)