

Recycling in North Carolina: Momentum toward Sustainable Materials Management

August 2011

Division of Environmental Assistance & Outreach

North Carolina Department of Environment and Natural Resources



Recycling in North Carolina: Momentum toward Sustainable Materials Management

Executive Summary

This report details recent advancements in recycling in North Carolina that are helping to reduce disposal, to return discarded materials to the stream of commerce and to grow the state's economy. The report documents a broad transition that is occurring in North Carolina as more materials leave the "waste stream" and become true commodities that fuel business and job growth and that deliver a wide-range of environmental benefits.

Beginning in the early 1990s and through 2006, North Carolina experienced a steady rise in solid waste disposal, with tonnage consistently outpacing population growth. A strong economy helped spur more waste generation, but even in years of economic slowdowns during that time period, disposal maintained its upward momentum.

Recycling in North Carolina also made strides in this period with expanding community recycling programs and steady development of the state's private sector recycling infrastructure. Still, these achievements only served to moderate – and not reverse – the escalating disposal rates.

However, from Fiscal Year 06-07 to Fiscal Year 09-10, per capita disposed tonnage in North Carolina fell 26 percent. The economic recession helped explain this drop but there are indications that recycling is also playing an increasingly significant role in reducing disposal.

This report shares recent data on the beneficial effects of recycling not only on the state's solid waste disposal issue but also on its economy. The main findings of this report include:

- Local government recycling programs have built a solid track record of capturing recyclable commodities from the waste stream and have recently begun a new period of expansion.
- Recent policy measures designed to divert recyclable commodities from landfills are showing strong signs of success.
- Recycling is steadily contributing to job creation and business growth in North Carolina, while providing valuable materials to in-state processors and manufacturers.
- Even as the construction economy struggles in North Carolina, private construction and demolition (C&D) facilities are increasing their recycling efforts.
- Composting is an active area of recycling expansion and can be expected to contribute increasingly to the state's waste reduction efforts.
- Additional materials are becoming recyclable as collectors, processors and end-users boost their appetite for a wider range of recovered products and commodities.

Even as momentum builds around recycling in North Carolina, challenges lie ahead to its further growth:

- Recycling opportunities do not exist in every setting where North Carolinians generate recyclables.
- North Carolina still falls well short of providing the supply of materials needed by major in-state processors and manufacturers.
- Market value for some materials, especially for some C&D wastes, remains marginal and must be strengthened over time.
- Local government curbside and dropoff programs are performing better but still need improvement, especially in overall public participation and in the range of materials collected across programs.
- Access to material recovery facilities (MRFs) is unevenly distributed across the state. MRF capacity and efficiency will also demand improvement over time to facilitate greater collection of recyclable materials.
- Large portions of the waste stream – for example, household food waste and related organics – remain largely untouched by diversion efforts.

Recycling in North Carolina: Momentum toward Sustainable Materials Management

This report details recent advancements in recycling in North Carolina that are helping reduce material disposal, return discarded commodities to the stream of commerce and grow the state's economy.

Recycling's General Benefits for North Carolina

Recycling delivers a range of benefits to North Carolina:

- It reduces landfill disposal of waste, delaying and to some degree preventing the need for additional disposal capacity and saving communities and waste generators money through avoided disposal costs.
- It provides vital materials to in-state manufacturers. Industrial facilities in North Carolina that make consumer packaging, paper, textiles, steel and glass all rely on a supply of recycled material as production feedstock.
- It creates jobs and spurs economic development. As shared in this report, recycling has a proven track record of increasing employment and presenting business opportunities for North Carolinians.
- It helps North Carolina achieve its environmental goals, contributing substantially to the general reduction of energy use and the generation of greenhouse gases. North Carolina's local government recycling programs annually reduce the emission equivalent of 3.6 million metric tons of carbon dioxide.

Trends in Waste Disposal

From the early 1990s through the late 2000s, North Carolina witnessed a persistent increase in waste disposal. Fueled by strong economic growth, the pace of disposal outstripped the steady climb in the state's population, resulting in a rising per capita disposal rate. Thus, rather than meeting its statutory goal of reducing per capita waste by 40 percent, the state actually experienced an increase in per capita disposal of 34 percent from Fiscal Year 91-92 to Fiscal Year 05-06.

In Fiscal Year 06-07, per capita disposed tonnage in North Carolina started to fall. This trend continued into Fiscal Years 07-08, 08-09 and 09-10, with a total decline of 26 percent in just four years. Figures 1 and 2 below show the history of landfilled tonnage and per capita disposal since the early 1990s.

Figure 1: Waste Disposal and Population Growth

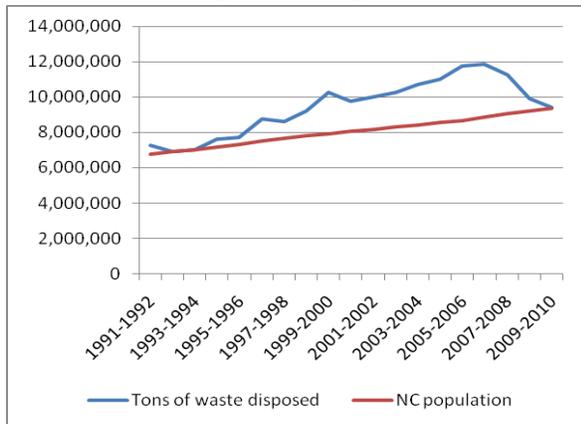
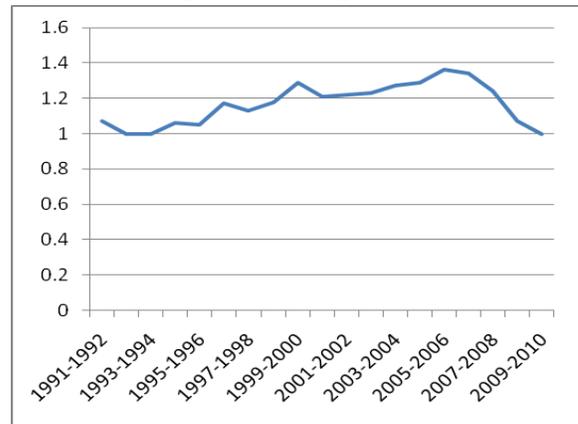


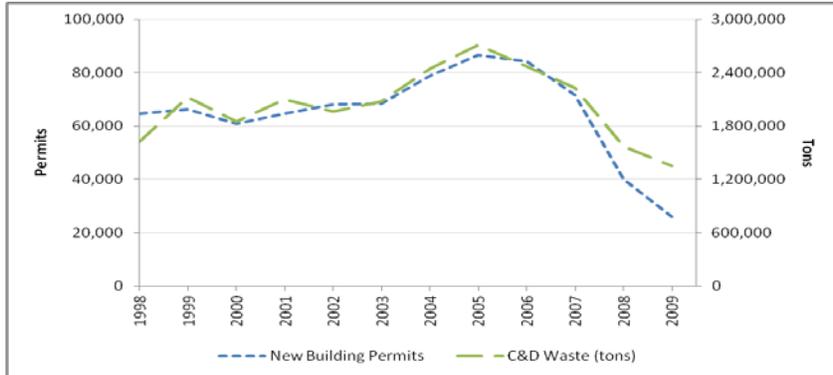
Figure 2: Per Capita Waste Disposal



The 2008-09 recession, which reduced overall the nation's gross domestic product by 12 percent, accelerated the drop in disposal that began in 2007 as economic activity slowed across all sectors. In total, North Carolina's disposed waste stream fell by more than 2.4 million tons between 2006-07 and 2009-10, while population increased by more than a half million people during the same period. It is important to note that the decline in North Carolina's disposed waste began prior to the start of the recession, indicating that other factors may have been in play.

A major driving force behind North Carolina's disposal growth was the increase in construction and demolition (C&D) debris, which accounted for as much as a third of the state's disposed tons by 2005. As shown in Figure 3 below, the decline in construction activity and disposed C&D waste during the recession certainly helps explain the overall decrease in landfill disposal.

Figure 3: Disposal of Waste in C&D Landfills Compared to New Building Permits, 1998 - 2009

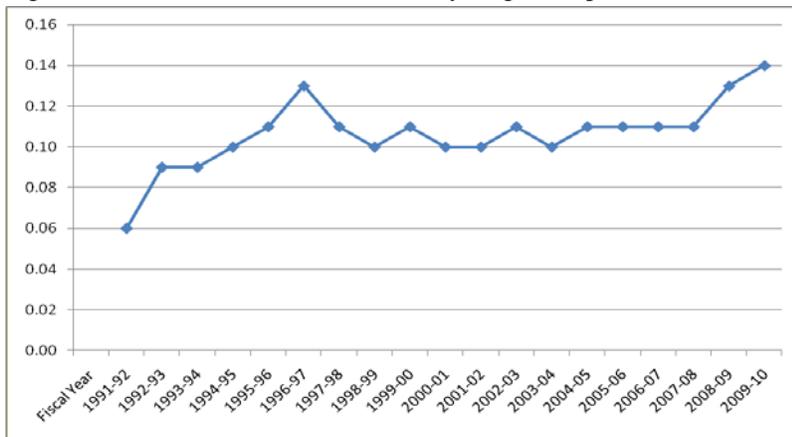


However, the situation with C&D waste only accounts for approximately half of the overall drop in disposal. Although the economic recession reduced other types of waste generation as well, there are strong indications that increased recycling is a significant factor in the decline of landfill disposal of waste. A combination of successes in the development of local programs, the implementation of recycling policies and the growth of the private recycling sector appears to have North Carolina on track toward reduced disposal through increased recycling.

Local Government Recycling Program Performance

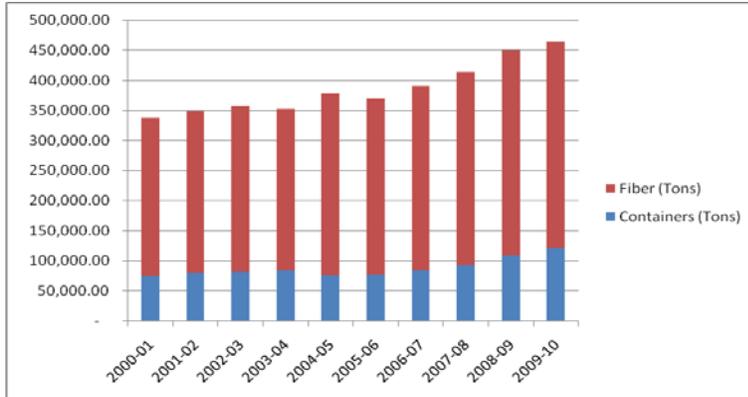
North Carolina's municipalities and counties have built a solid record of capturing recyclable commodities from waste and have recently begun a new period of expansion. A surge in new curbside programs, the steady performance of local collection services, and a rise in the capture of core household materials such as paper and containers are all key factors in the reduction of disposed tonnage. As seen in Figure 4 below, the ratio of total local government recycling tonnage to overall disposal has been relatively consistent, but in FY 2009-10 enjoyed the highest ever recorded number. This ratio indicates that the growth of recycling through local government programs is outstripping the growth in overall disposal.

Figure 4: Ratio of Local Government Recycling to Disposal – FY 91-92 to FY 09-10



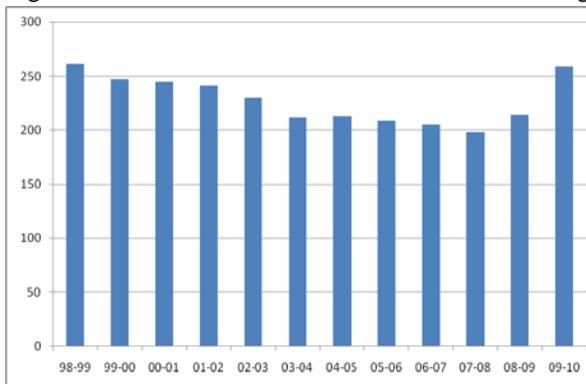
FY 2009-10 also saw another increase in the recovery of basic curbside and drop-off materials. Figure 5 shows the tonnage of commodity diversion by local government programs over the past ten years, demonstrating a jump of over 80,000 tons since the time when North Carolina's per capita disposal rate started to decline in FY 05-06.

Figure 5: Collection of Fiber and Containers by NC Local Governments, FY01 –FY10



One factor behind the additional recycling tonnage is an increase in the number of local government curbside recycling programs. As shown in Figure 6, curbside programs are becoming more prevalent across the state after a period of slow decline, in part the result of new collection efforts by small and medium-sized towns. Curbside recycling services were offered to a record 1.62 million North Carolina households in FY 09-10.

Figure 6: Number of Local Government Curbside Programs, FY 98-99 – FY09-10



North Carolina municipal curbside programs are also undergoing a fundamental shift in their collection systems that result in increased efficiency and a more convenient service for households. Almost every major municipal curbside program has moved or will soon move from use of small bins to wheeled carts and every new curbside program developed in the past two years has started with cart-based collection. An estimated 400,000 households received a cart for curbside collection in the past year, representing an addition of 12 million gallons of recycling storage capacity. Because of the increase in convenience, the re-engagement of curbside customers and the opportunity to also add new materials when carts are distributed, communities adopting carts are typically experiencing 30 percent increase in participation and tonnage collected.

Additional local government initiatives reducing material disposal include an increase in recycling services provided to multifamily properties and to businesses, both of which are traditionally underserved sectors. More specific information about local governments offering recycling service to bars and restaurants in particular is discussed below.

In summary, local government recycling programs have played an important role in diverting commodities from landfills in North Carolina. However, since FY 05-06 local programs have begun a renewed expansion that is helping not just to slow but to reverse the increase in waste disposal.

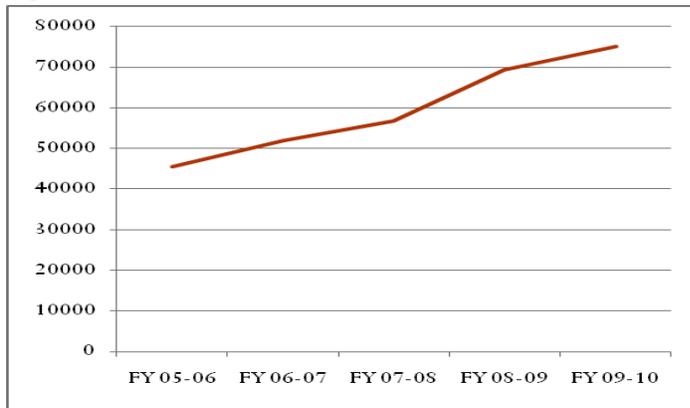
Effects of Recent State Recycling Legislation

Recent policy measures designed to capture recyclable commodities from waste are showing strong signs of success. The beneficial effects of recycling legislation since 2005 can be seen both in the performance of local recycling programs and in the growth of the state's private sector recycling economy.

Two major bills passed in 2005 have spurred additional diversion of commodities from landfill disposal. H1518 created the first statewide bar and restaurant program in the United States and was in part a response to the need for additional recycled glass by the state's two glass bottle manufacturers, St. Gobain with plants in Wilson and Henderson, and O-I with a plant in Winston-Salem. The total tonnage of glass now captured by the ABC program is an estimated 25,000 to 29,000 tons per year.

In combination with the increased performance of local curbside recycling programs discussed above, the ABC law has been a driving force behind rising local collection of glass, as can be seen in Figure 7 below.

Figure 7: Local Government Collection of Glass, FY06 – FY10



H1465, another major piece of legislation passed in 2005 and implemented in 2009, added three new materials to the items banned from disposal in North Carolina: plastic bottles, wooden pallets and oil filters. All three bans have had the desired effect of both reducing commodity disposal in landfills while also helping encourage further expansion of the state's recycling industry.

As with the glass targeted in the ABC law, the plastic bottle disposal ban was a direct response to the chronic shortfall in material supply available to plastics recyclers. The ban has proven to be a major factor in improving the performance of local government recycling programs. Figure 8 shows that the ban helped almost double the known recycling rate for plastic bottles through public curbside and drop-off programs since the law's adoption in 2005. However, Figure 9 also shows that despite a doubling of the recycling rate since 2005, there is still room for improvement in plastic bottle recovery in the state.

Figure 8: Local Government Collection of Plastic Bottles, FY00 – FY10

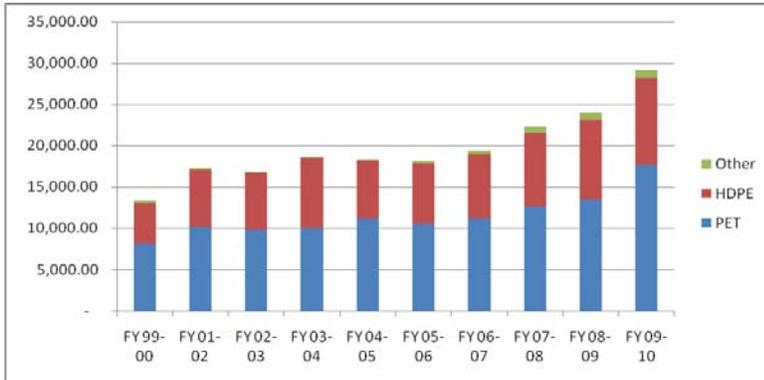
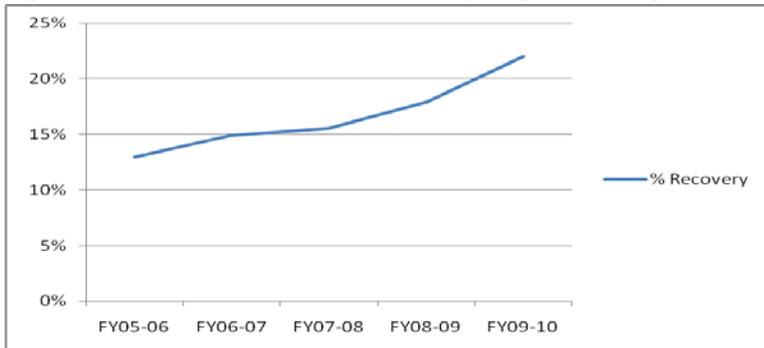


Figure 9: North Carolina Plastic Bottle Recycling Rate through Local Collection Programs, FY06 – FY10



Although representing a much smaller portion of the waste stream, oil filters are now also diverted at dramatically higher levels as a result of the disposal ban. The ban provided a major impetus to public collection efforts in terms of both numbers of programs and overall tonnage, as can be seen in Figures 10 and 11 below.

Figure 10: Number of Local Government Oil Filter Recycling Programs, FY06 – FY10

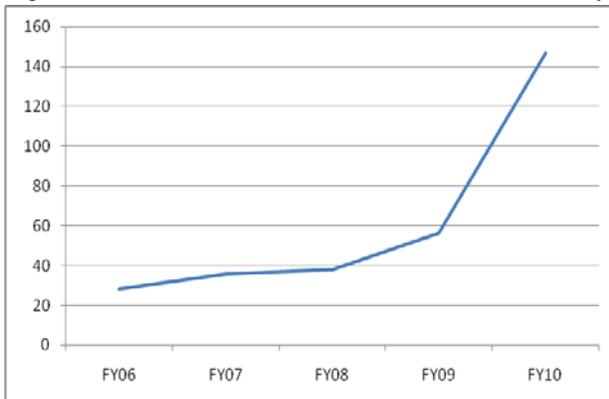
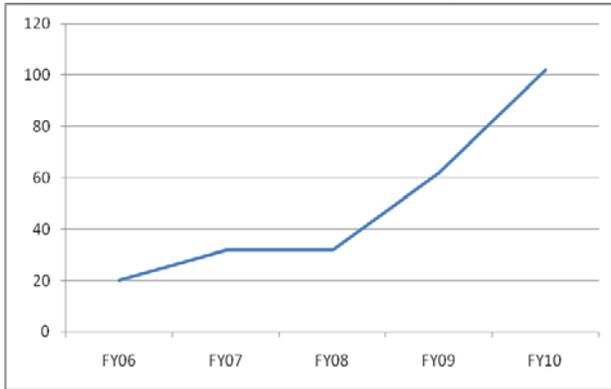


Figure 11: Tons of Oil Filters Collected by Local Government Recycling Programs, FY 06 – FY10



The oil filter disposal ban also had a very healthy effect on private companies involved in the collection and processing of filters. Recyclers enjoyed a doubling of tonnage and an almost 250 percent increase in customers as the ban came into effect, as shown in Figures 12 and 13.

Figure 12: Tons Collected by Private Filter Recyclers

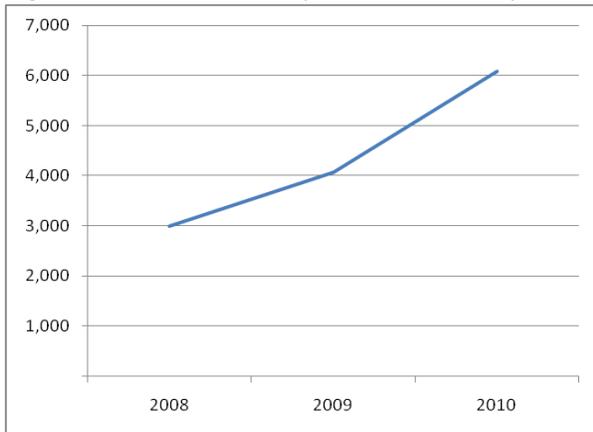
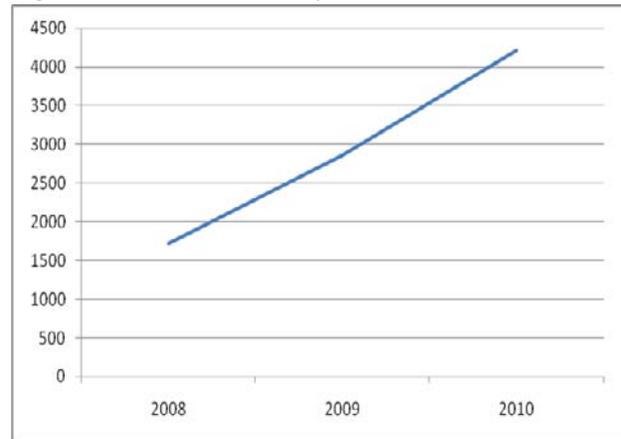


Figure 13: Private Filter Recycler Customers, 2008 –10



A third commodity subject to the disposal ban passed in 2005 was wooden pallets. Pallets already enjoyed a strong history of recovery prior to the ban, supported by an extensive infrastructure of pallet recycling companies across the state. But the ban helped further boost both pallet recycling tonnage and the business of pallet recyclers in North Carolina. Figures 14 and 15 below show both the jump in tonnage and the positive business effects of the pallet ban for pallet recyclers.

Figure 14: Tons Recycled by Private Pallet Recyclers

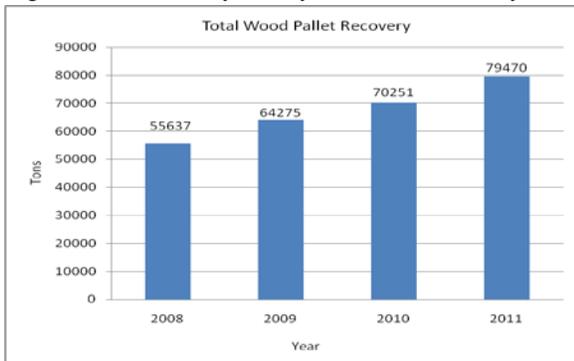
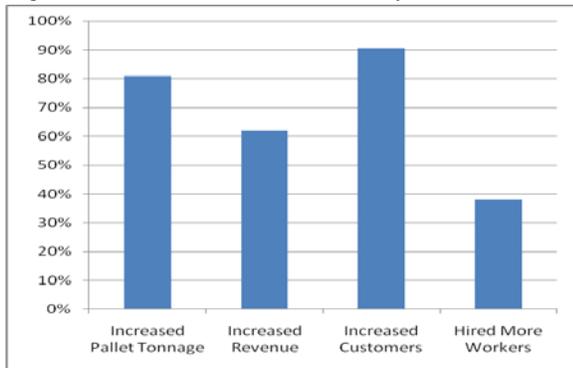
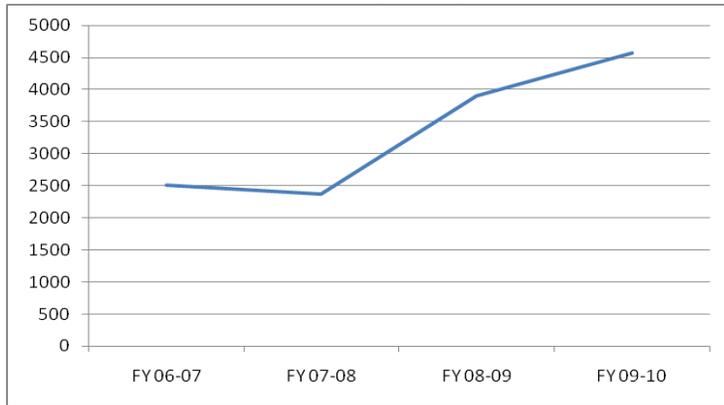


Figure 15: Ban Effects on Pallet Recyclers' Business



Electronics recycling has been another active area of policy development in North Carolina. Legislation passed beginning in 2008 and then modified and amended in 2009 and 2010 set the stage for implementation of a “producer responsibility” approach to diversion of electronic materials from disposal, placing requirements on computer and television manufacturers to help support a statewide electronics recycling system. As the legislation was being developed, it helped spur early adoption of local government electronics recycling programs. Figure 16 below shows the increase in electronics recycling tonnage collected in community programs since FY 06-07.

Figure 16: Tons of Electronics Recycled by N.C. Local Governments



North Carolina has also enjoyed the growth of a very strong electronics recycling sector. Over the past decade, some of the nation’s leading electronics processors have invested more than \$50 million in plant and equipment in the state, creating more than 300 jobs for North Carolinians.

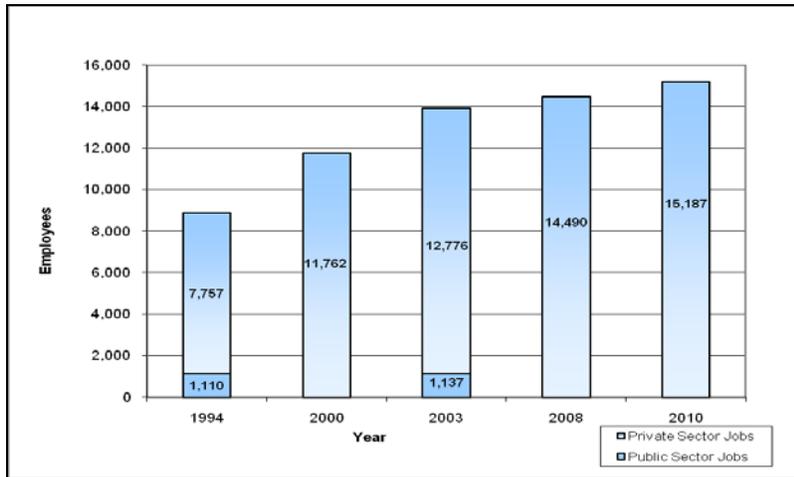
In summary, the net effect of the major pieces of recycling legislation passed since 2005 has been substantial. The legislation has helped drive local recycling program performance and private recycling activity as well. The laws appear to be serving their core dual purpose of delivering commodities back to the economy while reducing the rate of material being disposed of in landfills in North Carolina.

Recycling’s Contribution to the State’s Economy

Recycling is steadily contributing to job creation and business growth in North Carolina, while also providing valuable materials to in-state manufacturers. NC DENR has conducted a series of recycling employment studies since 1994, recently doing more frequent analyses about every three years. Each successive study has documented recycling job growth in North Carolina, with a doubling of private sector employment between 1994 and 2010.

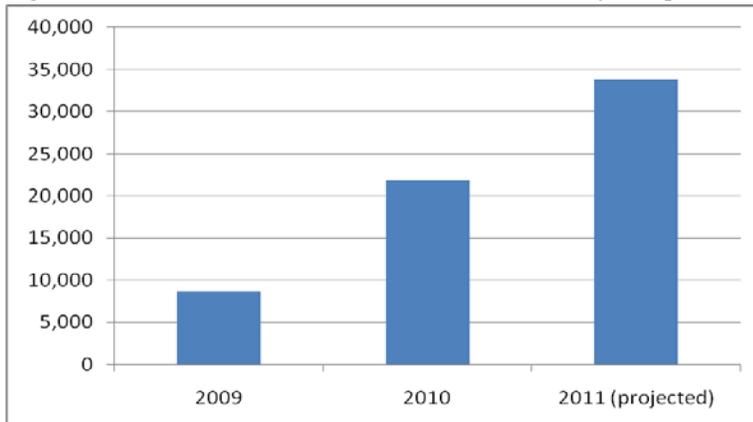
Most impressively, recycling jobs grew by 4.8 percent through the most recent recession, even as general unemployment hit double digits across the state.

Figure 17: Growth of Recycling Employment in North Carolina, 1994 - 2010



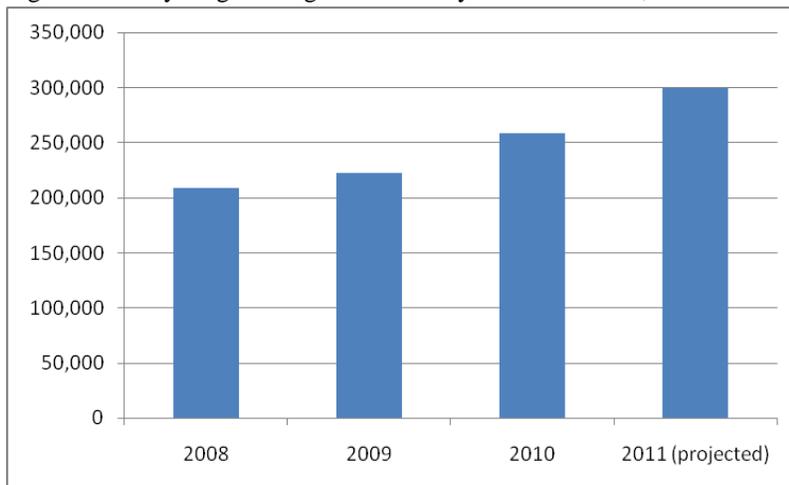
In addition and in conjunction with increasing jobs, recycling is a dynamic source of business creation in North Carolina. One example is the relatively recent advent of many new small recycling collection companies, designated as “independent recyclers” to differentiate them from larger solid waste hauling firms. Both the ABC legislation and the disposal ban on plastic bottles have spurred the development of these companies, who also seem to be responding to a general surge in interest in recycling among commercial waste generators and the public. Although no specific recycling tonnage data is available from the independent recyclers, Figure 18 projects the quadrupling of customers they serve from 2009 and 2011.

Figure 18: Increase in Numbers of Customers Served by Independent Recyclers



Private recycling service providers of all kinds, including both the independent recyclers cited above and more traditional solid waste haulers, have seen an increase in commodity tonnage since 2008. A survey conducted in 2010-11 indicates that privately collected common recyclables rose by more than 50,000 tons from 2008 to 2010 and was projected to continue its upward growth into 2011, as shown in Figure 19. It should be noted that this data is not comprehensive – a number of major hauling companies did not complete the survey and so the resulting information does not represent the full breadth of private sector recycling activity in North Carolina. However, the trend line is clear and provides yet another indication of how increased recycling is helping to reduce disposed tonnage in the state’s landfills.

Figure 19: Recycling Tonnage Collected by Private Haulers, 2008 to 2011



Another area of recycling business growth has been the expansion in new single-stream material recovery facilities and the transformation of formerly dual-stream or source-separated MRFs to single stream. The development of this single-stream capacity has entailed a total investment in excess of \$20 million and presents new opportunities for both public and private sector recycling collection efforts in various regions of the state. A list of facilities that have been built or modernized since 2008 includes:

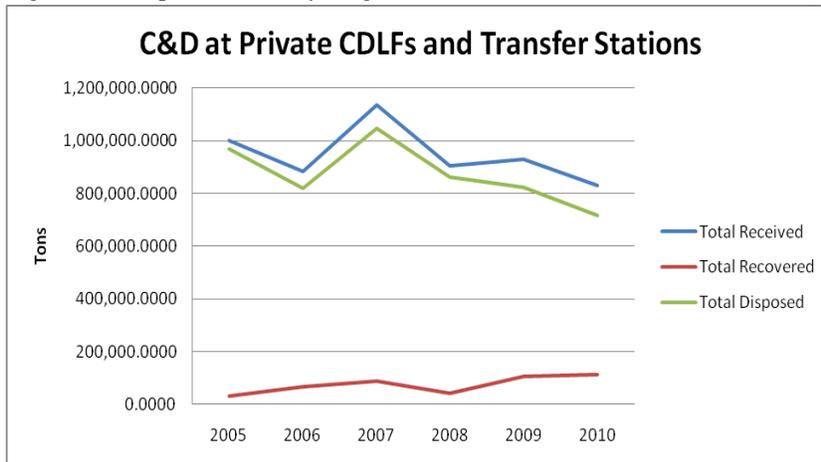
- Benfield Sanitation, Statesville
- Curbside Management, Asheville
- Mecklenburg County MRF, Charlotte
- Person Industries, Roxboro
- North Davidson Sanitation, Welcome
- Pratt Industries, Fayetteville
- Sonoco, Raleigh
- Sonoco, Charlotte

The past three years have witnessed major capital expenditures for increased recycling capacity in North Carolina including investments in tissue mills using recycled paper, plastic bottle recycling facilities, electronic scrap processing and production of recycled glass cullet. Robust and growing interest in using recycled commodities as core industrial materials promises more opportunities for recycling business and job creation across the state.

C&D Recycling Making Progress

Up until 2007-08 construction and demolition activity was a huge driver in increasing the North Carolina waste stream and since then has been a major factor in the decline of waste disposal. But even as the construction economy struggles in North Carolina, private sector construction and demolition facilities are also finding new ways to increase their recycling efforts, diverting materials such as wood, cardboard, sheetrock, metals, brick and concrete from landfills. Figure 20 below captures both aspects of this story in showing the drop in disposal at private C&D waste facilities and the increase in the amount of recycling of the incoming stream. Private C&D facilities have more than tripled their recycling tonnage since 2005, reaching an all-time high of 112,315 tons diverted from disposal in 2010.

Figure 20: Disposal and Recycling of C&D waste at Private C&D Facilities, 2005 - 2010



An area of recent success in C&D recycling is the use of old shingles in pavement. Since 2007 a number of the state’s large paving companies have found ways to process shingles into their asphalt mix. The use of petroleum-rich old shingles saves the paving companies money in avoided purchase of liquid asphalt. Although no official tonnage data is readily available, it is estimated that at least 40,000 tons of shingles are now being diverted from North Carolina landfills each year, up from zero tons in 2007.

Increasing Opportunities for Composting and Organics Diversion

Composting is an active area of recycling expansion and can be expected to contribute increasingly to the state’s waste reduction efforts. In addition to the baseline infrastructure of local government yard waste management programs that divert at least 500,000 tons of material from disposal each year, the commercial composting industry is also growing in North Carolina.

Large commercial composting operations now serve the Triangle and greater Mecklenburg and Buncombe county areas. These companies processed more than 220,000 tons of organics in 2010 and have capacity for managing additional materials. A number of commercial composters are exploring investments in digestion technology that will extract energy from organic wastes while also producing value-added soil amendments. Some commercial composters are also integrating food collection routes into their business models and others are receiving food waste collected by independent haulers.

As commercial and industrial solid waste generators start to move beyond the recycling of cardboard, pallets and other traditional recyclables (with some generators committing to “zero waste”), food wastes and other organics are the next big portion of their waste streams remaining to be addressed. A prominent example is Wal-Mart, whose stores across the state are diverting all of their produce waste representing as much as 24,000 tons of material per year. Other commercial and institutional generators are beginning to follow suit. These efforts will not only help reduce disposal tonnage further in North Carolina but will also present business opportunities for a growing sector of the state’s recycling economy.

Expansion in Material Recyclability

Additional materials are becoming recyclable as collectors, processors and end-users expand their appetite for recovered products and commodities. In addition to shingles mentioned above, a sampling of other materials that are experiencing improved market and infrastructure conditions include:

- Carpet – increasing demand by carpet fiber processors such as Wellman, Leigh Fibers and Shaw Industries and the presence of two collectors already active in sourcing carpet and carpet pad in North Carolina can be

expected to drive increased diversion of this material. The ongoing activities of the industry-led Carpet American Recovery Effort (CARE) may be useful to North Carolina's efforts to grow this part of the recycling economy.

- Mattresses – although no processor is yet active in state, recyclers in South Carolina are sourcing discarded mattresses from North Carolina generators. Some success has already occurred in university mattress recycling projects and at least one county has experimented with mattress recycling. Under the auspices of the Product Stewardship Institute, there also appears to be mattress industry interest in fostering additional diversion.
- Consumer plastics beyond bottles – some of the state's largest MRFs and their associated community recycling programs (Mecklenburg County, Greensboro, Cary, Durham and Raleigh) have added or will soon add a wider array of plastics to their curbside collection mix. In addition to common consumer packaging such as yogurt and butter tubs, bulky plastics such as lawn furniture, buckets, toys and other large items may be a next big wave of plastics diversion.

Challenges to Waste Reduction and Recycling in North Carolina

Waste reduction and recycling since FY05-06 is diverting larger amounts of recyclable commodities from the disposed waste stream. However, despite the achievements on a number of fronts, recycling in North Carolina faces some challenges it will need to overcome to increase the current momentum:

- Recycling opportunities do not exist in every setting where North Carolinians generate recyclable commodities. Finding ways to spread those opportunities will be critical to expanding recovery of key materials, especially beverage containers.
- North Carolina still falls well short of providing a supply of materials needed by major in-state processors and manufacturers. In particular, the state is home to a glass manufacturing industry and large plastics processors who consistently have to source materials from out of state to serve their capacity needs.
- Markets and the value for some materials, especially for some C&D waste, remain marginal and will need to be strengthened over time. A number of C&D materials, such as gypsum wallboard, have negative market value and the demand for other materials such as wood, brick and concrete is uneven and underdeveloped. Progress in stabilizing and increasing market value will be particularly helpful in improving the sustainability of C&D recycling.
- Local government curbside and dropoff program performance is getting better but is still in need of improvement in the areas of overall public participation and consistency in the range of materials collected across programs. Many curbside programs still fall short of an achievable benchmark of 400 pounds per household served per year. Community programs using the same MRF often fail to collect the full range of materials that the MRF allows. Initiatives to address these issues will help bolster the contribution local programs make to overall waste diversion.
- Access to MRFs is not evenly distributed for communities across the state. MRF capacity and efficiency will also demand improvement over time to facilitate greater collection of recyclable materials. Although North Carolina has seen a remarkable increase in MRF capacity since 2008, some areas of the state are not served by these facilities, which forces long-range shipment of commingled recyclables and holds back the improvement of both local programs and private collection activities.
- Large portions of the waste stream – for example, household food waste and other organics – remain largely untouched by diversion efforts. Opportunities to address those wastes will need to be developed. In some areas of the U.S., three-stream collection programs that allow households to separate organic discards from trash are achieving residential diversion rates exceeding 60 percent. Fostering this next stage of materials diversion will not only reduce landfill disposal but could also feed a growing organics recycling industry.

Conclusion

Since FY05-06, North Carolina has seen its waste disposal rates fall while making strides in waste diversion through recycling. A combination of improvements in local recycling programs, effective recycling policies and development of a strong private recycling infrastructure is helping the state reach toward more sustainable materials management. In this process, more North Carolinians are starting to see the “waste stream” as really a “materials stream” that is loaded with resources and commodities. Though a number of challenges lie ahead, the recent achievements of recycling in North Carolina suggest that it is on track to help the state meet some of its most important environmental and economic goals.