

TOYOTA |

recycling & improved resource use



Toyota's vehicle distribution center in Newark, New Jersey, won an award from the state Department of Environmental Protection, recognizing their recycling program.



“Toyota has a relentless commitment to eliminating waste or *muda* — i.e., any expenditure of time, money, material, effort, or other resource that does not generate perceptible value for the customer.”

– The Toyota Way



- > REDUCING WASTE — THE TOYOTA PRODUCTION SYSTEM
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TOYOTA'S CULTURE AND PRINCIPLES stress the fundamentals of eliminating waste and a commitment to a recycling-based society. Our Global Vision 2010 requires that we work on the transition from the era of large-scale production and large volume consumption toward a recycle-oriented society that promotes action to conserve, reuse and recycle. The same concept is inscribed in our Earth Charter. This requires us to always be concerned about the environment, to take on the challenge of achieving zero emissions at all stages — in production, use and disposal — and to pursue production activities that do not generate waste.

This chapter describes how we design vehicles using renewable resources, how we reduce waste and water consumption in our operations, and how we recycle. The way we achieve our goals in these areas is in small, incremental steps of continuous performance improvement. We call this *kaizen*.

Kaizen means to be relentless in our pursuit of improvement. It emphasizes “the elimination of all kinds of waste and every activity that does not produce added value.” It is how we achieve all our goals and targets. Throughout this report, we provide examples of *kaizen* projects that have brought environmental, and often economic and other advantages to our company, our suppliers and our customers. *Kaizens* are not achieved by chance: We invest in training all our employees in how to implement *kaizen* ideas, which are actively sought and considered at all levels of the organization.



Toyota is using a renewable resource — soybeans — in the foam of passenger seats in the Toyota Corolla and the Lexus RX.

> **REDUCING WASTE — THE TOYOTA PRODUCTION SYSTEM**

We apply Toyota Way practices when we use the Toyota Production System (TPS). TPS, also known as lean manufacturing or just-in-time manufacturing, is the system that organizes manufacturing and logistics at Toyota. The main goals of TPS are to provide the highest quality, lowest cost and shortest lead time to the customer; employee satisfaction; and market flexibility and cost reductions for the company. Elimination of *muda* — factors or elements that increase costs but do not add value — is the philosophy behind our cost reductions. The wastes from our manufacturing processes are *muda*, and we use TPS and The Toyota Way to eliminate, reduce or reuse materials whenever possible. TPS is key to Toyota’s ability to simultaneously improve our vehicle quality, cost and lead time. For more information on TPS, please visit www.toyota.co.jp/en/vision/production_system.

> **DESIGNING VEHICLES USING RENEWABLE RESOURCES**

When we design a vehicle, we try to increase our use of renewable resources. Toyota North America made a significant step forward with the introduction of soy oil-based polyurethane foam for passenger seats in both the Corolla and the Lexus RX. Toyota worked with suppliers to include 5% of the natural soy material without impacting performance. Using soy in polyurethane seat foams lowers the amount of petroleum used for production and reduces the carbon footprint of each vehicle.

Along with soybeans in seats, Toyota is aggressively developing a North American vision that incorporates all aspects of biorenewable materials in future vehicles. Among other materials, Toyota is investigating PLA, a plastic made entirely from corn that is currently being used in many disposable goods such as drink cups and food packaging; and natural based fabrics for vehicle interiors.

Toyota will continue to evaluate materials from renewable resources in order to introduce additional environmentally preferable parts in our vehicles.

> WASTE REDUCTION AND RECYCLING IN OUR OPERATIONS

We work to reduce waste and increase recycling throughout our business. We describe our targets in these areas and some of our projects at our manufacturing plants and at our sales and logistics operations.

Manufacturing

The 5Rs — refine, reduce, reuse, recycle, and recover energy — have been the key to waste reduction efforts in our manufacturing plants. **Using these methods, our plants in North America achieved zero waste to landfill (defined as a 95% or greater reduction in waste to landfill from 1999 levels), and have maintained this status.**

We have reduced nonsaleable waste (nonhazardous waste plus materials Toyota pays to have recycled) to just under 28 kg/vehicle. **In the first year of our new five-year Action Plan, we have already exceeded our target to reduce this waste to 30 kg/vehicle.** We will continue efforts to further reduce this waste (please see Figure M to the right).

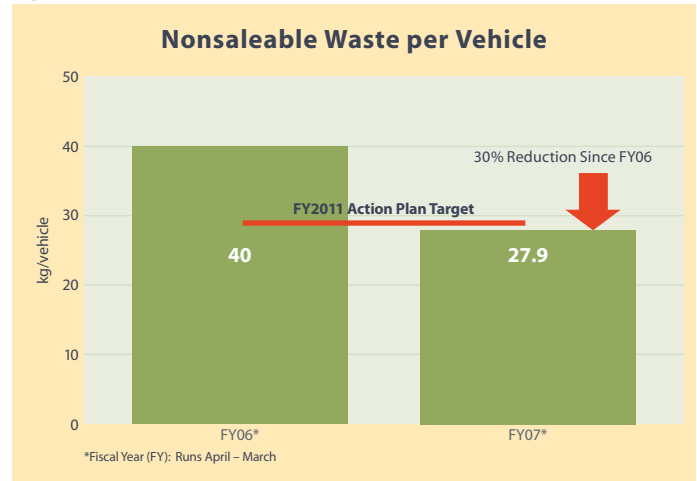
Alabama Plant Reuses Coolant Waste

Our engine plant in Alabama implemented a process to reuse coolant from machining. Purchasing individual cleaning systems for each coolant tank would have been too costly, so we looked into a central system where dirty coolant could be stored and cleaned, and the clean coolant stored for reuse. Similar systems have been successfully implemented at our sister plants in West Virginia and Kentucky. We have been able to increase the frequency of the coolant tank cleaning to eliminate any potential risk to quality, without increasing our waste disposal costs or VOC emissions. During normal coolant tank maintenance, we now clean and reprocess roughly 75% of the coolant that is pulled out of our machining lines. This project was so successful for the existing engine plant, that we implemented this process on the new V8 engine line in March 2007.



At our plant in Alabama, employees from the environmental department worked with production to implement a coolant recycling process.

Figure M



Indiana Plant Uses Toyota Problem Solving Process to Reduce Nonsaleable Waste

Toyota's *respect* for our communities and the environment guides us as we set environmental goals and targets. Employees at our Indiana assembly plant put The Toyota Way into action using Toyota's problem solving process, by *challenging* themselves to reduce nonsaleable waste by 40% by FY2011. Employees first examined all of their wastes in great detail and identified all of the major nonsaleable waste streams. Wastewater pretreatment sludge was identified as one of the largest of these streams.

The problem solving team practiced *genchi genbutsu*. They went to the source and looked at the facts of wastewater pretreatment, including metals removal efficiency and metal effluent levels. The team found that excess ferric sulfate, a chemical used for treatment, resulted in more waste. Their analysis helped them set a target to reduce ferric sulfate in the wastewater pretreatment sludge by 75% by October 2006.

The team developed a plan to *kaizen* the wastewater treatment process that included establishing treatment parameters, standardizing work, conducting trial operations and training. When the project was implemented, the actual reductions were well below the target.

Through *teamwork*, the plant was able to put Toyota Way values into action and implement a successful waste reduction strategy that has moved the plant a third of the way toward its FY2011 target. Employees will begin this process again to evaluate the remaining components of their waste in an effort to meet their challenge and achieve their long-term target.

Nonproduction Facilities

At our design facility in Ann Arbor, Michigan, we began collecting data about our waste streams and are working on a proposal to reduce overall waste-to-landfill. We recycle paper, cardboard, and metals, and are currently investigating alternatives to Styrofoam™ used in the cafeteria.

In the cafeteria at our Canadian sales headquarters, we introduced containers, cutlery and plates made from corn, sugarcane and potatoes. These items are compostable, and do not end up in a landfill.



Sales and Logistics

The Toyota Waste Avoidance and Recycling Program (WARP) is our national waste management program. This provides centralized support for initiatives that both reduce waste and increase the recycling of the waste we produce. Through WARP, environmental coordinators at our vehicle and parts distribution centers, regional offices and our U.S. sales and distribution headquarters can share best practices and coordinate cross-division waste reduction efforts, as well as find recycling vendors for the waste they are unable to prevent.

Our U.S. sales headquarters and the parts distribution center in Los Angeles were joint winners of California's 2006 Waste Reduction Awards Program (WRAP) of the Year award. This award distinguishes Toyota as one of California's top five models for waste management. Together, the two locations were able to divert more than 4.6 million pounds of material from landfills.

Sales Offices

Toyota's U.S. sales division headquarters is using WARP to reduce the overall amount of waste produced and increase the recycling rate of the remaining waste. **In FY2007, the U.S. sales headquarters campus exceeded its target of recycling 60% of its waste by recycling 64%.** In addition, the waste that was not recycled was sent to the Southeast Resource Recovery Facility (SERRF) in Long Beach to generate electricity, and the resulting ash was used as road base. Furniture that has been replaced during remodeling, such as desks and bookshelves, was donated to local schools, churches and other organizations, diverting 104,000 pounds of waste from landfill. As a result of these and other efforts, the campus was able to achieve zero landfill.

Toyota's Canadian main sales campus has a target to divert 95% of its waste from landfill by FY2010. **We diverted 80% of our waste in 2006, and plan to reach 90% by the end of 2007.** We started by introducing china and metal cutlery in our new cafeteria, which reduced the amount of Styrofoam™ and plastic containers in landfill. We then introduced compostable disposable containers, cutlery and plates made from materials such as corn, sugarcane and potatoes. As a result, almost all of the waste from the cafeteria is composted and diverted from landfill. Prior to this initiative, 53% of waste at the Head Office was compostable items that were being sent to landfill.

At our Canadian sales headquarters, we also have a target to reduce paper consumption by 25% per person by FY2010 from a baseline year of 2004. **We are achieving this target with the help of our Smart Print Solution, which provides an improved and confidential printing process.** This program reduces our costs for paper and print consumables, helps us reduce our paper use, and enables us to track printing so that we can identify future *kaizens* by eliminating misprints, lost documents and reprinting. The Smart Print Solution has been implemented in all office areas at our Canadian headquarters.

ELECTRONIC WASTE ROUNDUP

For the past few years, some Toyota locations have organized "E-Waste Roundups" on Earth Day for Toyota employees to bring electronic waste from home to be recycled. This gives these materials a second useful life, and also keeps toxic materials from our landfills.

In FY2007, Toyota employees brought more than 40,000 pounds of equipment to be recycled, including computers, consumer electronics, microwaves, monitors, printers and televisions. The parts distribution center in Ontario, California, brought more than 65 pounds per employee to their event; and in Toronto, where a collection was held for the first time, employees brought in a total of over 5,500 pounds (2,500 kg) of e-waste. In addition to electronic waste, some facilities also collected eyeglasses for donation to the local Lions Club, and had a Goodwill truck on hand to allow employees to donate other types of products. The employee Earth Day E-Waste Roundups complement the "Keep IT Green" program, started in 1999 to recycle all sales and logistics IT electronic equipment throughout the U.S. and Puerto Rico. To date, the Keep IT Green program has diverted over 2.6 million pounds of equipment from landfill.



Parts Distribution

As part of our new five-year Environmental Action Plan, Toyota's parts distribution centers in the U.S. set a target to reduce nonregulated waste sent to landfill by 33% by FY2011, from a FY2006 baseline. **In FY2007, the parts centers reduced nonregulated waste to landfill by 11%, one-third of their five-year target in the first year.**

Parts Packaging

Toyota part distribution centers use over 30,000 reusable metal shipping containers in place of cardboard and wood pallets. Instead of becoming waste, like the wood pallets and corrugated cardboard, the metal shipping containers can be returned to the nearest part distribution center and reused. In FY2007, the returnable container program saved 3.4 million pounds of cardboard and 9.8 million pounds of wood, resulting in a savings of \$5.3 million in packaging costs.

In addition, Toyota has improved packaging on a number of products to reduce the overall amount of materials needed to ship Toyota parts. For example:

- By changing the packaging configuration for the FJ Cruiser roof rack, we now package two roof racks instead of one in each carton. In the process, we save 180,000 pounds of cardboard, 375,000 pounds of wood, and more than \$500,000 annually.
- We implemented a *kaizen* in August 2006 to switch bumper cover packaging from a cardboard box to a much lighter recyclable plastic bubble bag. Conversion to returnable modules for bumper covers eliminates one million pounds of wood annually and saves more than \$430,000 in annual logistics costs. The new bumper covers also increase overall storage locations in the part centers by 65%. By taking up less volume in trucks, the new bumper covers remove over 600 truck trips from the roads each year, saving diesel fuel and reducing greenhouse gas emissions.



An employee at our Los Angeles, California, parts distribution center was determined to find a recycler for windshield glass, rather than send it to a landfill. Windshield glass is much more difficult to recycle than glass bottles because of the specialized materials that give it shatter resistance. After more than a year of looking for a vendor, Toyota sent almost 22,000 pounds of automotive glass for recycling.



Some of our billboards get a second chance: During a recent Scion xB prelaunch campaign, billboards were recycled into toiletry kit giveaways; and Lexus made wallets out of its billboards and handed these out at the Environmental Media Awards.

Vehicle Distribution

Toyota's vehicle distribution centers in the U.S. have a target of recycling 90% of their waste by FY2011. **In FY2007, we almost achieved this target by recycling 89.9%.** These efforts have not gone unrecognized. The vehicle distribution center at Port Newark, New Jersey, received the large business recycling award from the New Jersey Department of Environmental Protection. Toyota employees there accessorize vehicles and recycle almost every piece of the packaging. Through their efforts, the vehicle distribution center at Port Newark achieved zero waste to landfill and sent less than a pound of waste to a waste-to-energy facility for each vehicle processed.

THREE TOYOTA OPERATIONS ACCEPTED INTO THE KENTUCKY EXCEL PROGRAM

Toyota's manufacturing plant and vehicle distribution center in Georgetown and the parts distribution center in Hebron were accepted as master members of Kentucky EXCEL, the environmental leadership program of the Kentucky Department for Environmental Protection.

Master membership is the highest level of the program. To attain it, the three locations had to demonstrate comprehensive environmental management planning, submit to an independent third-party assessment of compliance, and commit to and report on at least four voluntary projects that benefit Kentucky's environment.

Toyota's environmental projects include replacing petroleum-based oils in equipment with vegetable-based oils, composting, hosting a hazardous waste collection event for employees and residents of Scott County, and implementing an employee battery recycling program.



> **WATER CONSUMPTION IN OUR OPERATIONS**

We work to reduce water consumption throughout our business. Below, we describe water reduction targets and projects at our manufacturing plants and at our sales and logistics operations.

Manufacturing

We look for opportunities to reduce water usage and reuse water in our manufacturing processes. We also pilot water treatment technologies and implement them when feasible.

We are currently exceeding our target of reducing water use at our North American manufacturing plants to 0.98 kgal/ vehicle, by FY2011 (please see Figure N below). We are evaluating our water target based on production projections at current plants, and at new plants and expansions that will be completed during the FY2011 Action Plan.

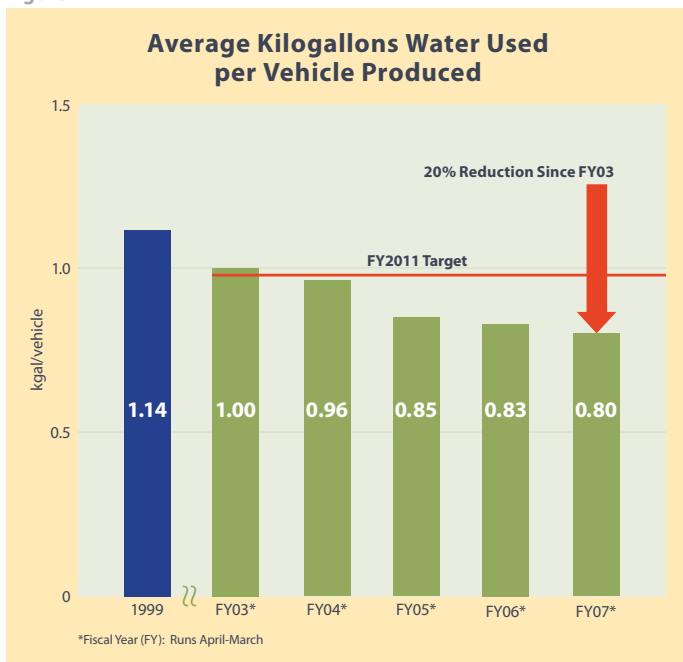
Kentucky Plant Recycles Rainwater and Industrial Wastewater

Our plant in Kentucky reuses rainwater that runs off from parking lots and rooftops. The rainwater is pumped from a retention pond and then treated by ultra filtration and reverse osmosis in the wastewater treatment plant. The water is then used in boilers and chiller systems. The plant recycles about 30 million gallons of rainwater and industrial wastewater every year, reducing the demand for water from their public utility.

West Virginia Plant Improves Water Management

A periodic loss of the city water supply at our plant in West Virginia has been the cause of some production down time. To protect our operations, we installed a 65,000 gallon emergency supply capable of using recycled water to allow the plant to operate in case of an outage.

Figure N



A biological wastewater treatment system was also installed to handle coolants and other oily wastes that were previously shipped off-site for treatment. Enhanced segregation of waste oil has improved its quality, which now allows larger volumes to be recycled. On-site segregation and treatment improvements have also reduced off-site transportation of wastewater by more than 95%, greatly reducing costs and CO₂ emissions from transporting this waste.

Sales and Logistics

We are currently evaluating water consumption at all U.S. sales offices and logistics sites. When the evaluation is complete, we will establish a baseline and subsequent water reduction target. In the meantime, at the Portland, Oregon, vehicle distribution center, rainwater is being harvested to flush toilets and natural rainfall is used for all landscaping, rather than relying on a landscape irrigation system. In water-limited southern California, recycled water is used for landscape irrigation at the Ontario parts center, the Los Angeles regional sales office, and the sales headquarters' South Campus. In addition, the South Campus complex uses recycled water for toilet flushing and building cooling. The West Basin Municipal Water District has described South Campus as the most diverse user of recycled water in Los Angeles County.

Our Canadian facilities are on track to meet our target to reduce water consumption by 10% by 2010, from a baseline of 2004. Our 2006 water consumption decreased 8% from 2004. In 2006, we reconfigured the sprinkler zones and installed state-of-the-art moisture sensors at our headquarters campus. These sensors work like a sponge to mimic water absorption in the soil. When the "sponge" is dry, the sensor goes off and triggers the sprinklers to turn on for a predetermined amount of time. We expect a 20-30% water savings with this installation. Testing the new zones and testing for leaks took place in 2006, causing higher water consumption. We expect 2007 to be a more normal year for water consumption.

RECYCLING & IMPROVED RESOURCE USE HIGHLIGHTS

- Our manufacturing plants have achieved and maintained the status of zero waste to landfill.
- In FY2007, the returnable container program in Toyota parts distribution centers saved 3.4 million pounds of cardboard and 9.8 million pounds of wood, resulting in a savings of \$5.3 million in packaging costs.
- We have reduced water use per vehicle produced by 20% since 2003.