Smart Fleets: The Future of the Waste and Recycling Industry

Smart fleets are no longer the wave of the future—they're already here.

■ By Martin Demers and Bryan Dodds

Refuse collection fleet managers face increasing pressures to deliver collection services that are more efficient, responsive, environmentally-friendly and safe. To do so, trucks need to be smarter by integrating technology to collect and communicate important data regarding routes, drivers, customers and vehicle systems for a completely transparent fleet operation. As a result, the industry is seeing a sharp rise in demand for capabilities beyond basic vehicle tracking.

Enter the era of the 'smart truck'—a truck with a brain. The brain is essentially a central computer that controls all bodily functions, and the nervous system is the network that relays messages back and forth from the brain to different parts of the body. Similarly, new onboard computing solutions for waste collection trucks are like the brain and central nervous system linking trucks and drivers to the back office.

This year marked the launch of the waste industry's first complete "smart truck" solution—refuse trucks that come outfitted or retrofitted with onboard computing (OBC) capabilities as a standard feature. These smart trucks capture and store electronic control module (ECM) and other vehicular data to provide accurate performance reporting and real-time alerts. They provide unprecedented real-time information to drivers and dispatchers about a truck's load-weight, route status, service completion, vehicular telemetry, driver activities and more, and further manage a wide range of inputs from a vehicle's on-board systems (such as cameras, scales, RFID readers, tire pressure and fuel monitoring).

The result is a truck with total visibility into route progress, greater driver accountability, improved customer service, optimized safety and vastly improved fuel efficiencies. Like our brain and nervous system, they are designed to ensure easy control and real-time communications and information transfer between drivers, vehicles and the back-office.

Smart fleets offer the following distinct advantages over traditional refuse collection fleets:

• Improved efficiencies through route management and automation of driver duties.

Smart trucks deliver a wide range of integrated features allowing drivers and operations personnel to gain seamless, real-time access to valuable information.
Photo courtesy of McNeilus.

Left: Monitoring route progress using software for bin monitoring. Bins are represented on the map by icons of various colors that indicate their status.

Bottom right: Sample view of the back-office live video streaming. Truck icons on the map represent the vehicles' current positions.
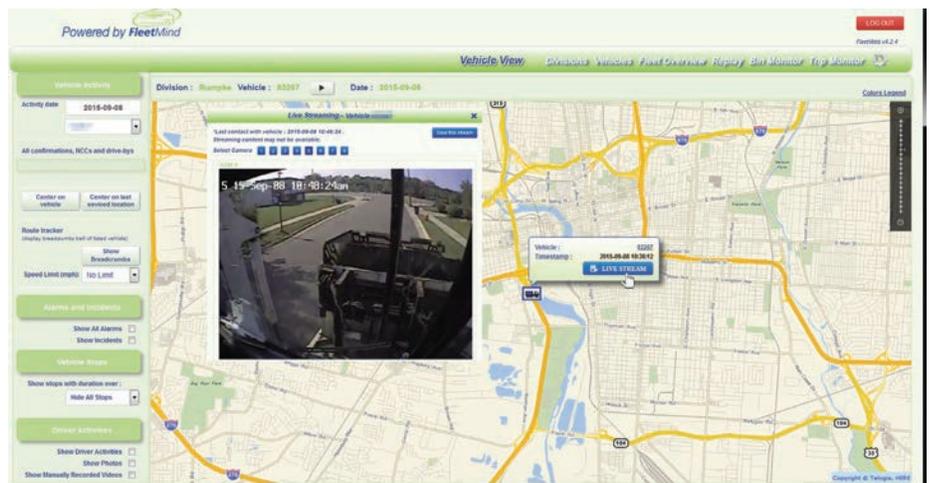
- Greener fleets through greater fuel efficiencies and decreased emissions.
- Significantly safer working environment with driver tracking and scoring, real-time alarms and alerts, video feeds and a streamlined communication system that eliminates distractions when driving.
- The ability to provide better customer service with automated service verification and real-time service reports to expedite customer claims and issue resolution.

Enhanced Efficiencies

Automation of common tasks and functions will make a fleet vastly more efficient. For example, RFID tracking of containers enables real-time service verification and the ability to automate 90 percent of a standard route. Smart trucks now provide real-time visibility into truck location and activity, can verify service accuracy, and can quickly identify carts that have been moved or stolen, or require servicing. Individual customer information—from damaged carts to insufficient cart capacity—is easily captured into a centralized database. This further ensures immediate and accurate information for billing processes.

Smart trucks automatically provide driving directions to the truck's next stop based on run sheet data—no driver input is required. They further provide a graphical view of the calls to the driver, and will automatically re-calculate the route when a driver selects an out-of-sequence manual stop. This ensures that each route is optimized for time and distance, thereby reducing overall mileage. Smart trucks further reduce costs related to employee overtime, overall mileage, overtime and the time spent planning and implementing daily routes.

ABI Research cites such benefits as more than 12 percent increases in service profitability, 13 percent improvements in vehicle use, and nearly 15 percent decreases in travel time with smart trucks. The ultimate fuel saving is achieved by having a truck generate more or similar revenues in less time.

Improved Fuel Consumption Management

Fuel costs account for a major portion of the total fleet operating cost and will vary according to vehicle type, driving style and mileage—so managing fuel consumption is a critical part of effective fleet management. Smart truck systems provide the tools to support leaner and greener fleets by improving fuel consumption, reducing overall mileage and monitoring driver behavior.

In a recent South African study, a statistical comparison of the baseline vehicles with smart trucks shows the fuel usage per ton of payload, measured from January 2008 to September 2013, was reduced by 14 percent. This equates to 14 percent less CO_2 emissions.[1]

A smart truck can help reduce fuel consumption—and an organization's carbon footprint—by:

- Increasing density so it takes less time (and therefore fuel) to service customers.
- Optimizing routes to use less fuel and driving time.
- Using alarms to monitor and reduce idling to reduce amount of fuel burned.
- Identifying aggressive driving patterns through alarms.
- Identifying vehicle maintenance problems.
- Collecting the ECM codes (engine malfunction) so that engines can be repaired before problems escalate. A healthy engine burns less fuel.

Right: Sample view of DVR monitor. In-vehicle software enables the driver to show the navigation panel in full-screen mode and view the route polygon, vehicle path and bins.

Bottom: Viewing vehicle activity reports in report management software. This enables back-office personnel (e.g., Operations, Dispatch, Customer Service) to select a vehicle and generate a report of its activities, such as alarms, incidents, inspection reports, videos and still photos.
Images courtesy of Fleetmind.

Vehicle Activity

Date from 2015-08-31 Date to 2015-08-31 Generate

Alarms					Incidents			Inspection Reports			Videos		Photos	
Name	Alarm Start	Alarm End	Duration	Driver Name	Timestamp	Speed	Videos	Timestamp	Type	Image	Timestamp	Nbr Files	Timestamp	Nbr Files
Contains	Contains	Contains		Contains	Contains			Contains						
Idle time > 5 mins	2015-08-31 06:21:51	2015-08-31 06:36:45	894		2015-09-03 12:30:58	42	2	2015-09-01 11:37:47	Pre-trip		2015-08-31 08:47:34		2015-08-31 08:47:36	
Idle time > 5 mins	2015-08-31 07:30:39	2015-08-31 07:49:24	1125		2015-09-03 13:07:09	18		2015-09-01 11:39:47	Post-trip		2015-08-31 12:51:31		2015-08-31 08:47:40	
Hard braking	2015-08-31 07:51:54	2015-08-31 07:52:08	14		2015-09-03 14:04:54	42							2015-08-31 12:51:36	
Hard braking	2015-08-31 07:57:44	2015-08-31 07:58:09	25		2015-09-03 14:24:36	21	2							
Idle time > 5 mins	2015-08-31 09:45:26	2015-08-31 09:50:10	284											
Idle time > 5 mins	2015-08-31 10:26:52	2015-08-31 10:28:45	113											
Hard braking	2015-08-31 10:34:14	2015-08-31 10:34:28	14											
Hard braking	2015-08-31 10:41:35	2015-08-31 10:41:49	14											
Hard braking	2015-08-31 10:42:56	2015-08-31 10:43:10	14											
Hard braking	2015-08-31 10:43:36	2015-08-31 10:44:00	24											
Idle time > 5 mins	2015-08-31 10:58:16	2015-08-31 11:00:19	123											
Hard braking	2015-08-31 11:20:10	2015-08-31 11:20:24	14											
Hard braking	2015-08-31 11:26:51	2015-08-31 11:27:05	14											
Hard braking	2015-08-31 11:28:42	2015-08-31 11:28:56	14											
Idle time > 5 mins	2015-08-31 12:41:10	2015-08-31 12:41:33	23											
Idle time > 5 mins	2015-08-31 14:17:33	2015-08-31 14:20:46	193											
Hard braking	2015-08-31 15:24:33	2015-08-31 15:24:47	14											
Hard braking	2015-08-31 15:39:45	2015-08-31 15:39:59	14											
Total Items: 20					Total Items: 4			Total Items: 2						

Optimized Safety

Every day, more than 150,000 refuse trucks travel through cities, communities and neighborhoods to collect our garbage. Making sure they do so safely is everyone's number one priority. Statistics from the U.S. Department of Transportation (DOT) indicate that 3,154 people were killed and more than 424,000 injured because of distracted driving in 2013.[2] The direct and indirect costs of these accidents are huge. The reality is that most accidents are avoidable and better safety management can reduce the risks significantly.

Refuse collection drivers have to be multi-taskers. They have to drive the trucks, empty carts and containers, follow routing instructions, interact with dispatch, respond to customer service issues and more—mostly in real-time. On a typical day, a refuse collection driver has the potential to be distracted in hundreds of ways. Drivers can have too much to think about, too many buttons to press, too many calls to answer or make, and too many reports to submit. Eliminating or seriously reducing the risk of distraction is of utmost importance. Smart trucks can radically reduce distractions by improving the driver experience and distraction risks.

Driver behavior is also essential to improving safety. All drivers have different tendencies and driving styles, some of which can be risky and downright dangerous. Whether it's speeding, hard braking, distractions or poor awareness, many accidents could be avoided by curbing risky behaviors and coaching drivers on safer operating practices.

Smart trucks can significantly reduce these risks in two ways. First, they reduce driver distractions by streamlining the navigation and service process. Second, they track driver behavior and relay the information to management so that they can address unsafe driving practices. Up-to-date data from the South African study (2008-14) shows that the baseline vehicles had 2.53 accidents per million kilometers traveled compared to the smart trucks' 1.53 accidents.[3]

Enhanced Customer Service

In today's fast-paced world, response times and accuracy of information are the cornerstones of good customer service. In the waste industry, this means capturing real-time data and visuals to inform customer service responses, identifying trucks closest to a customer location, optimizing service routes, using remote diagnostics to prevent breakdowns, locating assets and ensuring safety.

Smart trucks now come with the ability to capture snapshots, video snippets and continuous recording from up to eight truck-mounted cameras. Real-time video and audio capabilities allow unparalleled oversight and visibility into fleet and truck operations. This delivers unprecedented new insights into truck activity for a level of customer service that has never before been possible.

The Wave of the Future

More and more communities and municipalities are benefitting

Case Studies: Today's Smart Fleets

Bluewater Recycling Association

Located in southwestern Ontario, Canada, the Bluewater Recycling Association manages recycling efforts for 20 municipalities servicing some 150,000 people in 70,000 households—one of the largest multi-material resource management municipal cooperative organizations in Canada to provide waste reduction and environmental services. Bluewater has built a reputation for leading the industry in terms of using the latest technologies and techniques to optimize its services and its operations, and understood that by automating its services it would be more productive, safe and cost-effective

Its first step was to employ automated collection vehicles with hydraulic controls to collect standardized containers. The next step was to automate service verification and improve visibility with new smart truck hardware, software and wireless technologies. Bluewater also knew that keeping drivers and vehicles constantly connected to the back-office is essential to fleet operations excellence. Management wanted to make sure that both its drivers and its back-office team had real-time communications capabilities. And they wanted to ensure improved communications with a solution that was easy for drivers to use to avoid distractions.

Finally, Bluewater looked to take advantage of new RFID technologies to automatically track and monitor collection activity. Using RFID tags, each garbage can is associated with a specific customer address. Fleet operations personnel now have visibility into customer activity to automatically view the customer being serviced when a container is lifted and verify accuracy of containers being serviced against driver run sheets.

As a result of their "smarter" fleet, Bluewater has improved customer service and accountability, ensured more accurate billing, better monitors driver and truck activity, and has improved their tracking of recycling assets.

Kimble Recycling and Disposal

Based in Dover, OH, Kimble Recycling & Disposal (formerly J&J Refuse) is one of the largest independently owned refuse carriers in Ohio. Kimble delivers dependable, cost-effective and environmentally responsible waste management services to residential, commercial and industrial customers in 20 counties in eastern Ohio.

As part of their ongoing drive for operational excellence, Kimble implemented a smart fleet solution that would help them improve their overall fleet operations. By using onboard computing technologies, they are able to make their drivers more aware of green-friendly driving techniques. Fleet mapping features let Kimble managers reconstruct the route taken by a driver on any given day, verify any deviations or unscheduled side trips, and view alarm criteria, such as exceeding a specified speed limit or excessive idling. This lets Kimble determine how their vehicles are being handled. Real-time monitoring of driver behavior and driving patterns allows Kimble managers to influence and educate drivers on more fuel and emissions-friendly driving approaches.

By using smart truck technologies, Kimble Recycling & Disposal were able to make their drivers more aware of efficient driving techniques, integrate with their back-office system, and improve service verification and safety.

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from smart fleets and improved fleet operational performance, complete visibility into truck and driver behavior, optimized routing, reduced maintenance costs and fuel consumption, and improved safety and diagnostics. Smart fleets are no longer the wave of the future—they're already here. | WA

Martin Demers is the CEO of FleetMind (Montreal, QC) and long-time technology industry executive. Under his leadership, FleetMind has grown into a leading onboard computing (OBC) solutions provider for waste and recycling fleets. Martin has often been published in industry publications including FleetOwner Magazine, Trucking Info Magazine *and* RFID Journal. *He is a frequent speaker at technology and waste management events. He can be reached at mdemers@fleetmind.com.*

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Notes
KIENHÖFER, F., & NORDENGEN, P. (2015, March 3). *Smart Trucks Know How to Get Themselves in Line.* www.bdlive.co.za/business/innovation/2015/03/03/smart-trucks-know-how-to-get-themselves-in-line.

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