2017 SWANA EXCELLENCE AWARD ENTRY
Recycling System Award
Emerald Coast Utilities Authority

Title of Entry: Emerald Coast Utilities Authority
Materials Recycling Facility

Jurisdiction: Escambia and Santa Rosa Counties, FL

Approximate Population: 325,000
Cost per Household: $82.31
Approximate Budget: $10.7 million

Contact: Randy Rudd, Deputy Executive Director of Shared Services
Randall.Rudd@ecua.fl.gov; 850-969-3334
EXECUTIVE SUMMARY

The Emerald Coast Utilities Authority’s (ECUA) Materials Recycling Facility (MRF) is a remarkable example of how governmental agencies can come together to solve a challenging recycling issue in an extraordinarily short timeframe. The ECUA, a public entity, partnered with Escambia County, Florida (County) to develop an ECUA-owned MRF at the County’s landfill. The partnership worked under an expedited timeframe to build a 53,460 square-foot single stream MRF capable of processing 25 tons-per-hour. Strategic planning for the $10.7 million facility began in 2015 and was completed in just 18 months. ECUA decided to employ a dynamic process where the equipment, site development, and operations schedules were compressed by overlapping the design, permitting, procurement, negotiations, and construction. ECUA has constructed a modern high-tech MRF with several state-of-the-art enhancements to allow for advanced automation, customization for desired materials removal and processing, and automatic performance reporting thus producing a cleaner and more marketable material.

From Initial Planning to Grand Opening in ONLY 18 Months!

Link to Video of ECUA’s MRF

Video source: The Pulse@pulsegulfcoast. “New recycling center opens in Pensacola” October 26, 2016. Facebook post.
ECUA, an independent special district public entity, was created in 1981 to own, manage, finance, promote, improve, and expand water and wastewater systems previously owned by Escambia County and the City of Pensacola. ECUA began offering garbage and yard waste collection in Escambia County in 1992, and expanded into the collection of recyclable materials with third-party processing in 2009. Over time, ECUA also expanded its service provision to include portions of neighboring Santa Rosa County. In addition, the MRF processes recyclables from beyond ECUA’s service area.

Handling the varying political, economic and community needs of a waste management system can be a complicated and challenging issue when multiple agencies are involved. That all changed in October 2015 when the key regional third-party recycling facility unexpectedly announced it would be closing, leaving ECUA without a viable solution for its recyclables. Only one facility located within the region remained operational, but lacked the throughput capacity needed to handle the volume of ECUA’s recyclables (could only process 30%) and it significantly increased their tipping fee after the other facility closed. In December 2015, ECUA announced it would have to landfill collected recyclables while determining a more viable solution. Clearly an issue, the governmental agencies and elected officials came together to seek a recycling processing solution.

ECUA and the County formed a partnership to develop a strategy for a long-term solution in handling the region’s recyclable materials. The first key decision was determining to develop a publicly-owned MRF and be responsible for recyclables processing on the Emerald Coast, and no longer have to rely on a third-party processor. Second, the facility would be owned by ECUA
but located on the County's property at their landfill. This would enable the facility to provide a “one-stop-shop” for the ECUA fleet and other haulers within the region.

In order to fast track the project, ECUA determined to take a construction management approach utilizing parallel tracks; one for the equipment procurement managed by Kessler Consulting, Inc. (KCI), and another for site development utilizing a design/build platform managed by Baskerville-Donovan, Inc. (BDI). Once equipment was procured, the private operations procurement was managed by KCI.

One key factor was the sizing of the facility, to handle the current needs of ECUA collections and the potential needs of others within the region. The facility also needed to provide an economy of scale to gain the interest of and attract a private operator, and have the capability to easily expand to meet future demands. ECUA established a 25-tons-per-hour design capacity to meet both these needs. ECUA issued a two-page Notice of Intent to Procure for a single source stream. In a nutshell, the procurement document said, "here's how much waste we have, here's the composition...you're the experts...tell us what we need and give us a design." ECUA then went into parallel negotiations with equipment suppliers. Within 3 months of the initial Notice of Intent, the contract was awarded to Bulk Handling Systems (BHS) and, a mere 2 months after that, the final system was designed and approved for manufacturing.

A few of the primary planning and design aspects that were incorporated include:

- A layout that can easily accommodate future throughput expansion. The MRF's capacity can increase without changes to the existing system or structure by adding process modules.

- An investment in glass clean-up technology to create a better marketable material.

- Climate controlled cabins for all staff, along with many other safety and worker accessibility features.
A key decision in the building design was to perform a value-engineering assessment of a pre-engineered metal building versus a clear span building. Based on cost and time constraints, a custom clear span building was selected. The design/build process allowed the site work to begin while the building design was being finalized, all the while taking into account the equipment design being managed by another team.

Keeping in mind that the equipment procurement and site development were being conducted at the same time, one of the key aspects was maintaining flexibility to allow for adjustments to the design/layout of equipment and building as the project progressed.

The clear-span building is a custom-made structure by Big Top Fabric Structures that offers ample amounts of natural light during the daytime. This is a refreshing change when compared to the typical metal buildings. The structure was less costly than a traditional metal or concrete building and provided uninterrupted space without columns, allowing for more flexibility in the internal layout of the facility.
As the facility design and construction were underway, ECUA began the procurement of a private operator. ECUA issued a Request for Information (RFI) to obtain data from interested vendors. The RFI clearly articulated the project specifications including waste data, processing system components, commodities produced, operating and contract specifications, and RFI submittal requirements. Key components of the RFI were to clearly specify the contractor’s responsibilities, including a 90% revenue share to ECUA, and requested that contractors propose a per-ton processing fee. This led to parallel discussions with several companies and shortly thereafter, contract negotiations with Zero Waste Operations, LLC (Zero Waste).

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<th>MRF Operator Performance Standards</th>
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<td>• Process all materials within 48 hours</td>
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<td>• No outdoor storage of recyclable materials or recovered materials</td>
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<td>• Single stream residue not to exceed 18% of inbound tonnage</td>
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<tr>
<td>• Maintain a clean and orderly site and facility</td>
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<tr>
<td>• Contractor may process non-ECUA recyclables and pay a per-ton host fee</td>
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<tr>
<td>• Pay ECUA 90% of Average Market Value based on the recyclable materials’ composition</td>
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Operations procurement was timed to occur after the equipment design was established so that operation vendors could bid accurately knowing the equipment that would be installed in the facility, warranty, and spare part packages. Operations procurement was completed during the final phase of construction, allowing the operations contractor to begin on “Day 1”.

The expedited planning, design, and construction of the MRF was possible due to strong team work and well-organized synchronization of ECUA, consultants, manufacturers, contractors, and the facility operator! The team is depicted below.

Sciease Construction and Management, Inc.  Kelson Electric
USE OF EQUIPMENT/SYSTEMS AND TECHNOLOGIES

Residential and commercial recyclable waste arrives at the state-of-the-art 53,460 square-foot, 40,000 tons-per-year MRF facility located at the Perdido Landfill in Escambia County, Florida. Customers include ECUA and its approved suppliers, private local waste haulers, and engaged municipal clients.

Step-By-Step Overview of the Processing Equipment System

The BHS processing system includes the following:

- **1** Tipping Floor
- **2** Metering Bin
- **3** Pre-Sort Cabin
- **4** Material Sizing Disc Screen
- **5** OCC Separator
- **6** Debris Roll Screen with Magnetic Head Pulley
- **7** Nihot SDS Glass Clean Up System
- **8** OCC QC Sort Cabin
- **9** NewSorter Screen
- **10** Polishing Screen
- **11** Fiber QC Sort Cabin
- **12** Plastic Sort Cabin
- **13** NRT SpydIR Dual Eject PET/Mixed Plastic Optical Sorter
- **14** Eddy Current Separator
- **15** Container QC Sort Cabin
- **16** Storage Bunkers with Leveling Augers
- **17** High Speed Multi-Material 2 Ram Baler

MATERIALS RECOVERED

- Corrugated Containers
- Mixed Paper/Newsprint
- PET
- HDPE (Natural and Color)
- Mixed Plastics
- Aluminum Cans
- Tin Cans
- Glass Rich Heavies/Fines
- Mixed Rigid Plastics
- Scrap Metal
Description of the Advanced Recovery Process Equipment

**Metering Bin with Bag-Ripping Teeth**

![Metering Bin with Bag-Ripping Teeth](image1)

An efficient processing system requires that an even, steady flow of material be presented to the sorting equipment. Uses a combination of a variable speed conveyor and a metering wheel to control the rate and depth of the material flow. Equipped with bag-ripping teeth to increase effectiveness of downstream separation.  

**Benefit:** Increased Speed and Efficiencies

**NewSorter Screen**

![NewSorter Screen](image2)

The BHS NewSorter screen automatically separates old newsprint (ONP) from mixed paper and rigid containers by using patented in-line discs.  

**Materials Removed:** Newsprint

**Material Sizing Disc Screen**

![Material Sizing Disc Screen](image3)

The compound inline tri-disc provides the best sizing and separation available in the market. The unique geometry provides true dimensional sizing and minimizes wrapping of long, stringy materials when compared to traditional disc screens.  

**Benefit:** Product separation with minimal cleaning and maintenance.

**Polishing Screen**

![Polishing Screen](image4)

The most vital tool in the facility, the polishing screen ensures maximum recovery of containers and fiber streams. It’s a world-renown screen that makes 3 distinct sorts in a single pass: 2-D fiber, 3-D containers, and fines. It also features a “no wrap” design.  

**Materials Removed:** Mixed Paper; Containers; Fines/Residue

**Combined OCC Separator and Debris Roll Screen**

![Combined OCC Separator and Debris Roll Screen](image5)

The BHS OCC Separator recovers more cardboard than any other screen. The inline disc sizes the material, allowing ONP, Mixed Paper and containers to fall through while large OCC and rigid browns carry over the top. The DRS below is specifically designed to maximize glass removal without loss of valuable containers.  

**Materials Removed:** OCC, Glass/Fines

**Container Line & NRT Optical Sorting**

![Container Line & NRT Optical Sorting](image6)

The container line features a magnet to capture ferrous metals, an eddy current separator to capture non-ferrous metals, and is highlighted by a dual-eject NRT SpydIR optical sorter. The SpydIR employs NIR detection to identify PET and mixed plastics while in flight, and an extra ejection block enables the equipment to create three outgoing material streams. The optical sorter features continuous auto-calibration and PET Boost technology, a proprietary algorithm that boosts the detection of thin-walled and “wet” PET containers.  

**Materials Removed:** Tin Cans, Alum. Cans, PET, HDPE, Mixed Plastics

**Storage Bunkers with Leveling Augers**

![Storage Bunkers with Leveling Augers](image7)

The facility’s storage bunkers were installed with leveling augers to minimize material pile up near the waste output location.  

**Benefit:** Minimizes material movement efforts and increases efficiencies.

**Nihot SDS Glass Clean Up System**

![Nihot SDS Glass Clean Up System](image8)

The result of this process is a glass cullet product virtually free of shredded paper and other lightweight contaminants, improving marketability and minimizing disposal costs. 60-70% of air is recirculated and it requires little maintenance.  

**Materials Removed:** Glass Rich Heavies; Light Fines

**High Speed Multi-Material 2-Ram Bailer**

![High Speed Multi-Material 2-Ram Bailer](image9)

High-speed balers feature a combination of state-of-the-art electronics and advanced structural engineering for the ultimate in power and efficiency.  

The programmable PLC controller features automatic and manual controls, diagnostics, and bale set-up functions. The controller enables easily switching between recyclable materials.  

**Benefit:** Material Adaptability

Use of Equipment/Systems and Technologies
State-of-the-Art Design

ECUA has constructed a modern high-tech MRF with several state-of-the-art enhancements to allow for customization for desired materials removal and processing, creating cleaner and more marketable materials. Advanced automation and support capabilities enable the plant to automatically report on system performance and send proactive alerts to the operations team and BHS Total Support technicians.

Nihot Single Drum Separator (SDS)

ECUA decided to invest in the Nihot SDS add-on so that a marketable 3-color mixed glass cullet material could be made for resale to the manufacturing industry (that meets glass beneficiation specifications), rather than taking the “low cost option” of using glass for daily landfill cover.

Materials <2.5” are transferred to a Nihot SDS for glass clean-up. The SDS removes the lightweight contamination such as shredded paper, leaving a clean glass heavies product. The SDS is a rugged but finely designed air separation device that utilizes negative pressure to separate materials based on density. The machine is both mechanically and electronically tunable to provide precisely targeted separation.

Since 60-70% of the air used by the SDS is recirculated, only a small filter on the balance of the airflow is required. This extremely efficient glass cleanup system provides superior material separation with almost no maintenance required. The result of this process is a glass cullet product virtually free of shredded paper and other lightweight contaminants, improving marketability and minimizing disposal costs. The unit requires only the most basic maintenance, minimizing operating costs and maximizing uptime.
NRT Optical Sorters with In-Flight Sorting™

NRT Optical Sorters use high speed near infrared (NIR) sensors and color cameras to identify and recover materials. This system is programmable to separate a wide variety of materials as compositions of recyclables evolve over time.

When a targeted product is detected, a high-pressure blast of air ejects the item onto a collection conveyor. This is typical of all optical sorting technology, but not all optical sorters are created equally. Some fundamental characteristics differentiate NRT Optical Sorters from those manufactured by others. The result is higher recovery and purity rates, and more profit.

NRT Optical Sorters use In-Flight Sorting™ technology, meaning they detect and eject items while in-flight after the items leave the belt, rather than detecting over the belt and then ejecting the material as it passes the ejection nozzles sometime later.

In-flight Sorting™ technology eliminates product loss caused by bottles rolling or moving between the point of detection and ejection. Since the bottle is already in flight at the point of detection, its aerodynamics and path of flight are more predictable than when detected on the belt. Thus, this system reduces the loss of valuable commodities.

PET Boost is an enhancement to the NRT SpydIR optical sorters. Most optical sorters have difficulty identifying PET bottles that are thin-walled, contain liquid (wet), or are obscured with full sleeve labels.

The 3D (container) fraction requires further sorting and purification before it is ready to bale. The container stream is passed through a combination of NRT optical sorting and magnetic separation equipment that recovers various commodity types. Tin Cans are removed with an electromagnet and deposited directly into a storage bunker. HDPE-N and HDPE-C are recovered by manual sorters and deposited directly into storage bunkers. PET is recovered with an NRT SpydIR optical sorter and transferred to a manual QC station. Mixed Plastics (#3 - #7) are recovered with the addition of a second ejection block on the NRT SpydIR optical sorter. Following the optical sorters, a Container QC Cabin is used to visually identify and manually extract any items not captured by the mechanical process.
REGULATORY COMPLIANCE

Florida has recycling legislation with a state-wide 75% recycling goal by 2020. ECUA’s Board and Escambia County Commissioners were committed to creating a state-of-the-art facility to help meet Florida’s recycling goals.

“Building this partnership has been instrumental in eliminating our reliance on outside contractors for the processing of this region’s recyclables. Now, we can focus on what’s really important: keeping recyclable material out of the landfills and putting them to good use once again.”

— Stephen Sorrell, ECUA Executive Director

Regulatory compliance and protecting the environment were woven throughout the design and procurement process. Below are some of the key compliance aspects for this project.

Site Compliance

The MRF site was strategically located at the Escambia County Perdido Landfill in an area historically used for stockpiling materials, thus significantly reducing new environmental impacts. Site enhancements were made to the facility’s existing stormwater controls to improve stormwater quality.

The clear-span building was sized to have all recyclable material processing and storage occurring within the enclosed structure. This greatly reduces impacts to stormwater, litter, and vectors. Noise and dust are reduced by having all materials handling activities indoors.

Operational Compliance

The MRF is operated by Zero Waste Operations, LLC (Zero Waste), a California company that helped develop the facility’s permitted Operations Plan and is responsible for ensuring all compliance requirements are being met. Zero Waste has been in compliance with state standards for operations and has received no violations from the Florida Department of Environmental Protection. Zero Waste ensures a compliant facility by using a daily facility checklist to inspect and document the facility’s maintenance and pollution mitigations. Each shift has at least two facility custodians responsible for maintaining the MRF.

All activities are monitored and recorded using a video surveillance system, both inside and outside the facility. A Facility Load Checking Program is in place to ensure proper wastes are received and facility staff are performing random load audits.
WORKER HEALTH AND SAFETY

The health and safety of the workers at the facility was an important aspect considered during the design of the facility and is vital in the day-to-day operations. During the design of the processing equipment, ECUA decided that all sort staff would be located within climate controlled cabins with HVAC, air filtration systems, lighting, and noise insulation. Cabins have plenty of windows and natural light due to the open-span white fabric building thus creating a favorable work environment for sorters. Workers are also insulated from the loud noises generated by the disc screens, rolling stock, and baler.

The facility meets OSHA requirements but ECUA didn’t stop there! A Safety Expert was hired before operations began to walk the facility and identify additional safety aspects that could be added to go above and beyond OSHA’s best practices and apply ANSI Z245.41 safety standards for the Processing of Commingled Recyclable Material.

Training Programs

BHS provided training services covering on-site maintenance and operations of all aspects of the facility to successfully transition the startup operations over to the plant personnel. BHS provided side-by-side training for the plant operators. Sort staff received training on how to identify target materials and use proper sorting techniques, and maintenance mechanics worked directly with BHS experts to learn every detail of keeping the plant running smoothly using hands-on and classroom techniques.

Zero Waste has a training program outlined within the MRF’s Operating Plan, which requires in-depth health and safety training during orientation, and monthly safety meetings to provide ongoing training including assessments of existing procedures. The MRF uses a Daily Health & Safety Checklist to ensure work conditions within the facility are ideal.
PERFORMANCE, ECONOMICS AND COST-EFFECTIVENESS

The facility’s design focused on operational and safety excellence, open and aesthetic building design, and the incorporation of energy conservation and cost-control measures, while also meeting or exceeding environmental requirements. ECUA streamlined and achieved functionality, operability and cost-effectiveness by allowing industry leaders to have input into the facility’s design and operation. This resulted in a MRF that will serve the entire region well into the future.

Performance elements have been woven throughout the project and can be seen in the project’s first contract with the equipment provider. BHS’s contract includes a 2-year warranty, service package, and spare parts allowance to ensure smooth and uninterrupted operations with strong support from BHS.

The ECUA MRF became operational in late August 2016, and thus far the system is operating as promised and meeting performance goals. The performance goals were a critical part of the Operations negotiations process, which included:

- Recyclable materials are to be processed within 48 hours of being received at the MRF
- The contractor will receive and process all recyclable materials within the MRF building
- Maximum turnaround time of 20 minutes
- Maintain a litter-free site, building, and road

Financial Terms with the operator, Zero Waste, included:

- Operating Fee of $46.30 per ton
- Consumer Price Index adjustments annually
- Average Market Value (AMV) calculated monthly
- Revenue Share of 90% on incoming tons
- Host Fee of $15 per ton of non-ECUA single stream recyclables and $10 per ton of host push and bale recyclables

The MRF was performance tested and demonstrated its ability to meet required standards for throughput, material quality, and recovery of target materials.

Since beginning operations, the AMV revenue share has been higher than the operation fee, meaning that ECUA is receiving net revenue!
Following the acceptance testing, the MRF has continued to operate efficiently and within the terms of the agreement and Operations Plan. For the month of March 2017, the MRF processed 2,858 tons of recyclables at a rate of 21 tons per hour. The MRF operated 94.5% of the time with a total downtime of 7 hours and 1 minute. The average amount of down time per day was 18 minutes with an average of 2.8 occurrences per day (79 occurrences in total).

Run time (uptime) is measured as the amount of time that the infeed conveyor is moving. Another measure is the amount of time the system is actually energized (available production time), whether the infeed is moving or not. Uptime percentage is the ratio of infeed time to system time (available production time).

To reduce downtime, the following processes are utilized:

1. Operator inspects and services the equipment to prevent machinery malfunctions;
2. Employees are trained to identify a potential hazard before it reaches the equipment that is susceptible to damage;
3. Daily performance is tracked and operators and sorters are involved in the discussions of improving the system’s effectiveness;
4. Accountability for performance is encouraged; and
5. Performance measures are tracked to identify any developing trends.

The MRF is operating within the approved budget. ECUA funded the total $10.7 million cost of the MRF with $7.7 million out of reserve funds and a 9-year, $3-million loan from the Closed Loop Fund. Based on the current recyclables commodity values, ECUA expects to repay the cost of the facility in 8 years. Return on the MRF investment is used to pay the debt service for the facility and fund an equipment replacement fund to replace the sorting equipment as it ages.

The MRF is generating revenue that exceeds expectations and costs have been below the approved budget. The operational and economic performance of the MRF has exceeded the planned expectations.

ECUA believes it has a successful recycling program because it provides customers with a simple, easy-to-use recycling program that accepts a full range of recyclables, including glass and mixed plastics at a fair and self-supporting price.
As a public entity, ECUA’s recycling program encompasses far more than the MRF’s performance. It is a matrix of dynamic recycling, diversion, and education programs, all of which help to meet the State’s 75% recycling goal.

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<tr>
<th>ECUA’s Recycling and Diversion Program</th>
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<tr>
<td><strong>Voluntary Single Stream Recycling Program</strong></td>
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<td><strong>MRF</strong></td>
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<td><strong>Biosolids Composting Facility (BCF)</strong></td>
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<td><strong>Bulk Recycle Program</strong></td>
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<td><strong>Education</strong></td>
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The ECUA Sanitation Department funds ongoing educational outreach through its operating budget, which benefits from $700,000 per year in avoided disposal fees due to the construction of the new ECUA MRF. Below are a few examples of educational material developed in 2016.
PUBLIC ACCEPTANCE, APPEARANCE AND AESTHETICS

ECUA had to overcome a sudden processing challenge when it learned that the privately-operated recycling facility in Alabama was unexpectedly shutting down in October 2015. This was the third processing facility used by ECUA since the launch of its recycling program in 2009 to close before the end of their contract with ECUA. The Alabama facility was the last (and closest) processor with the capacity to process the volume of ECUA’s collected recyclables. A short-term and partial solution could have been another private facility within reasonable proximity; however, this facility could only process 30% of ECUA’s recyclables and it drastically increased the tipping fee, making this option too costly. As a last resort, ECUA announced to all that it would temporarily start transferring its recyclables to the County Landfill while the MRF was being constructed.

ECUA was able to make good on its promises to their customers, surrounding municipalities and other governments when it opened the MRF just 18 months after its conception.

“With the opening of this facility, we will no longer be completely dependent on outside parties to process our recyclables. We will control our destiny, and each year, we will snatch 40,000 tons of material that would have languished in the landfill in perpetuity, and recycle it for future use. Today is a testament to the people of our community who embrace recycling and who wanted a greener world.”  — Ms. Lois H. Benson, ECUA Board Chairman and Representative for District 2

Since opening the MRF, ECUA has expanded its service area, accepted recyclables from neighboring communities, and seen a significant increase in recycling participation! The MRF is open for group tours and has conducted 43 tours in the past 8 months.

ECUA has a successful education and public relations program, which has played a vital role in informing Emerald Coast residents of the state-of-the-art MRF, which will serve the recyclable processing need of the area for years to come.