

# Materials & Energy Recovery Division

Editor: Tom White

SUMMER 2012



## MESSAGE FROM THE CHAIR

*By Bob Faia*

On July 1, 2012, I was pleased and honored to accept the position of Chair for the Materials and Energy Recovery (MER) Division of ASME, succeeding Tom White, who remains actively involved with our Newsletter and Website. The five (5) members of our new Executive Committee are mentioned elsewhere within our Newsletter. I have been involved in the Power industry for 42 years starting in 1970 at the Riley Stoker Corporation, where I was first introduced to Waste – To – Energy (WTE). I remain very active in the WTE industry

at Helfrich Bros Boiler Works Inc., providing total In- Plant- Services for this now very mature industry. I have always marveled over the concept of Integrated Waste Management and especially the concept of converting waste to useable, sustainable energy. The MER Division continues to support WTERT, SWANA and the Energy Recovery Council, combining all our strengths whenever possible to contribute to the success of this important industry.

Today, with ever-growing interest in renewable and green energy, WTE has become more acceptable than ever before. With that said, we should all take this opportunity to renew interest in WTE and capitalize on its role and fit into this new green energy movement, which is widely accepted nationally and internationally, by the public, the power industry, media, government and academia. We should all embrace this new – old concept and foster the management of existing facilities, promote expansion, of this proven environmentally sound technology, and encourage continued research and development.

I urge you to support your local ASME chapter and I would hope that all of the degreed engineers in the industry choose WTE as their primary discipline to help us grow and develop a stronger member population. We should routinely nominate peers within our industry, to promote volunteer leadership recruitment, student and early career engineer programs.

As Chair of the ASME MER Division, I thank you all and look forward to providing support within the WTE industry. Please visit our ASME MER Division website. ♦

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## NAWTEC 20:WTE Technical Sessions, Exhibits, and Plant Tours in Portland, ME

*By Thomas M. White, PE*

A very successful NAWTEC 20 drew 388 attendees and over 50 exhibit booths to the Holiday Inn by the Bay in Portland, Maine from April 23-25, 2012. Thirty two technical papers (29 being peer reviewed) were presented on new WTE technologies, improving plant operations, changes in the MSW stream, and R&D.

The highly anticipated ASME MER Division “Honors & Awards” luncheon was held on Monday, April 23. Scholarships were announced for three recipients; two WTE facilities received recognition; and one Medal of Achievement was awarded. These are detailed in other sections of this newsletter.

On Wednesday, April 25, 47 attendees visited three ECO-MAINE facilities in Portland: a 500 TPD WTE facility, a single-stream MRE, and an ashfill/landfill.

We now look forward to NAWTEC 21 which will be held in Fort Myers, FL in the spring, 2013. We encourage all to consider volunteering to author or peer review technical papers for NAWTEC 21. The ASME MER Division Technical Papers Committee consists of Marco Castaldi (mc2352@columbia.ed) and Mark White (mwhite@covantaenergy.com). Please contact either Marco or Mark regarding your interest in contributing to NAWTEC 21. ♦

## QUALIFIED RESOURCE RECOVERY OPERATOR (QRO) COMMITTEE NEWS

by John W. Norton, PE, BCEE



The Certification System for WTE system operators continues to receive scrutiny from the ASME QRO Subcommittee.

Some major WTE firms have indicated that the QRO examinations are too cumbersome, too expensive, and “miss the mark” in some ways. Now, with the WTE industry recovering and beginning to expand, other issues are popping up: what about operator certifica-

tions for “alternative technology”, what about plants with two differing technologies, what about states that seem to have developed a more simple certification process (perhaps too simple), how does one become knowledgeable in this modern field of WTE so that one can pass the certifications tests and examinations?

It is a difficult Standard to achieve (that is not all bad), but the industry is in need of more operators and the failure rate for the existing QRO examinations is rising. There is not a single text or training session that can provide all the necessary up-to-the minute knowledge that needs to be tested. Where can one look for such training and education? It takes several books and documents.

Perhaps it would be wise to establish levels of WTE operator certification. The wastewater processing industry has long had a 3 or 4 level certification process that serves all the states well. The first level of certification deals with the “language of the field”, what is a digester, or combustion, and so forth. The second level deals with the science of the field: how does digestion, or combustion work? The third level deals with matters of sizing and design; what steps must be taken before or during digestion, or combustion? And the highest level deals with management concerns: how does one staff and budget for operations? At present, the QRO standards define three levels of certification: Combustion only operator, 15 of the 90 operating plants in the United States have chosen to use a certification standard which is far different from the present ASME QRO Certification System. Are their substitute standards ade-

quate, as the Clean Air Act says they should be? If they do not use a field exam as part of the certification process, can it be considered “equal” to the ASME standard? Virginia, Connecticut, and Minnesota have standards which are not necessarily “easier” to pass, but are easier to manage, and thus much less expensive to the operating plants.

Some states have cited the ASME QRO examination process as the operator qualifications standard by which “alternative energy” system operators should meet. This is not technically possible, however, as the ASME QRO standard does not allow one to hold a QRO certification unless one is actually operating a WTE plant. “Alternative technology” is a term all too often used by people that cannot tell you what they mean, nor explain why they are advocating its use.

Several WTE plants are expanding with addition of a third or fourth processing line. The new addition may likely have a slightly different technology than the plant’s existing lines. The question is: how should the QRO System handle site specific exams that utilize such dual type technology? The QRO System has always maintained that separate field examinations must be used for differing technologies. Are we now to accept the idea that one operator can understand two types of technologies?

Many of the long standing QRO rules need to be reconsidered. An outside review of the existing QRO Standards by some prestigious body is necessary and likely to be undertaken soon. Changes are likely to be necessary. The first step, however, is to ask USEPA if it means to continue to cite the ASME QRO process as a qualifying tool for WTE plant operators and if it intends to put teeth into the definition of an acceptably “equal” operator certification process by individual States. Also, USEPA needs to explain what they understand the term “alternative energy” to mean.

Anyone with QRO questions or interest in being a member of this QRO certification process as a committee member, or field testing designee, should e-mail John Norton at [jnortons@aol.com](mailto:jnortons@aol.com) or call (937) 223-5848. New test questions for the QRO question bank, with citations of authority (i.e. text books, peer reviewed papers, etc.), are always welcome for consideration. ♦

## ASME-MER DIVISION SCHOLARSHIP AWARDS NEWS UPDATE

by Amit Chattopadhyay, PE

### Summary of program

The Scholarship Program continues to be an important part of the ASME MER Division activities. The division awards an annual total of up to \$18,000 in scholarships (divided between the student

and the university) with a view to stimulate interest in students in materials and energy recovery from solid waste and related fields in environmental engineering. Scholarships are awarded to qualified graduate, undergraduate and continuing education students.

### MER Division Scholarship Awards (2011 – 2012)

First Ranked Student:	James W. Levis
Amount: \$6,000	NC State University
Second Ranked Student:	Naomi Klinghoffer
Amount: \$4,000	Columbia University
Third Ranked Student:	Yani Dong
Amount: \$4,000	Columbia University

For details of the program visit: [www.divisions.asme.org/MER/](http://www.divisions.asme.org/MER/) (Please click MER Division link, followed by “Student Activities” to access the scholarship offer.)

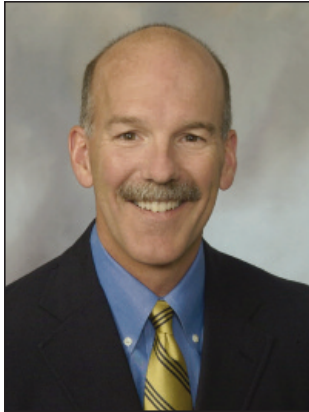
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## MATERIALS & ENERGY RECOVERY DIVISION 2012 AWARDS

by Nathiel Egosi, PE

### Medal of Achievement Award

The Materials & Energy Recovery Division Medal of Achievement is bestowed in recognition of distinguished and continued contributions over a substantial period of time in the advancement of solid waste processing technology.



#### RECIPIENT

Mark Weidman, President Wheelabrator Technologies, Inc. Serving as president of Wheelabrator since 2005, Mark A. Weidman is responsible for the safe and efficient operation of Wheelabrator's \$2.5 billion asset base, consisting of 17 waste-to-energy and five independent power plants. Currently these facilities employ over 1,000 people and generate annual revenues in

excess of \$800 million. Prior to his appointment to president, Weidman had been vice president of operations since 2001. In this previous role, Weidman was instrumental in setting and achieving goals ensuring the continuous improvement in all areas of the company's operation. He was also the driving force behind attaining OSHA VPP status for all Wheelabrator facilities. Before joining Wheelabrator, Weidman served as the president and CEO of the processing division at Synagro Technologies, Inc.

Weidman had also worked for Wheelabrator/Bio Gro for 11 years, where he was appointed president in 1996. Weidman has experience in industrial and municipal water and wastewater treatment operations and hazardous waste management as well. He holds an engineering degree from Penn State and is a registered professional engineer.

### Facility Recognition Award

#### WINNER

Honolulu Program of Waste Energy Recovery (H-Power)  
Kapolei, Hawaii

#### PARTICIPANTS

Owner – City and County of Honolulu  
Operator – Covanta Honolulu

#### WINNER

Existing RDF Processing Facility – 1851 tpd MSW in two processing trains  
Expansion Mass Burn Unit – 900 tpd in one unit to be operational in 2012

### Facility Description

The facility consists of two refuse-derived fuel (RDF) processing trains and two 854 ton-per-day RDF combustion trains. The boiler design is the Combustion Engineering (CE) VU-40 Boiler and is similar to the RDF facilities in Hartford, Connecticut and Detroit,



Michigan. Municipal solid waste (MSW) received on the tipping floor front-end loaders are used to stack the waste. Bulldozers are used to compact the waste in storage piles that optimize the limited storage space in the receiving area. The MSW is examined for bulky materials, household hazardous waste, medical waste, or other waste that is undesirable or unacceptable for the facility. These items are separated from the waste stream and staged for proper disposal.

MSW is then fed to the infeed conveyors of each of the two processing lines at a controlled rate using the front-end loaders. The conveyors elevate the MSW and convey it past a picking station and to the RDF processing system. Each of the two RDF processing lines consists of a primary shredder (flail mill), drum magnets, and two stage trommel screens. The first stage removes process residue (glass, dirt and grit less than one inch) and the second stage removes appropriately sized materials (one to four inches) to send them directly to RDF storage. The trommel overs (or waste larger than four inches) is passed through a secondary shredder, and then to the RDF storage building.

The RDF storage building allows for surge capacity. Normal practice is to store the RDF for a few days because this tends to result in more uniform fuel properties. The storage floor is managed by limiting the amount of time that RDF is on the floor using a type of "first in first out" system. Front-end loaders are used to stack the RDF and to reclaim the material for feeding the boilers. The reclaim conveyors transport the RDF to the power block facility (PBF). The conveyors discharge into metering bins with five sets of auger screws at the bottom to meter the RDF to the boilers. The RDF is swept into the boiler by an air feed system.

Combustion occurs in a semi-suspension manner as the material is blown to the back of the grate in the furnace. Much of the lighter and smaller material is fully or nearly fully combusted above the grate while the larger and heavier particles complete

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combustion on the grate. The grate slowly travels toward the front of the unit as combustion is completed. The grate is a traveling design with underfire air passing through it from below. The underfire air cools the grate and provides oxygen for complete combustion and burnout of the RDF.

Flue gas passes through the furnace and into the boiler for heat recovery. The furnace walls consist of Inconel clad waterwall tube sections. A primary and secondary superheater is provided after the flue gas turns into a horizontal section. No screen tubes or generating section is provided ahead of the superheater. The superheater is followed by a generating bank, economizer and tubular air heater before passing to the air pollution control equipment (APC). From the APC equipment, the flue gas passes through the induced draft fan and into the stack.

Superheated steam (850 psig/830°F) is sent to the steam turbine generator to produce electricity. The steam is condensed using water from the circulating water system and is reused in the boiler system. Heat is rejected at the facility cooling tower. The flue gas passes through the economizer and into the air pollution control (APC) equipment for each boiler. The APC equipment for each boiler consists of a rotary atomizer type spray dryer absorber (SDA), and baghouse. An activated carbon system has been installed and is available, but is typically not required to be in operation to meet emission limits. The facility was originally proposed with only electrostatic precipitators (ESP). SDA systems were added to the design prior to construction due to a permit remand.

Ash from the MSW combustion falls off the end of the grate into an ash quench tank. From there it is discharged by a drag chain conveyor onto a belt conveyor and transferred to the ash processing building. Originally, the only metals recovery at the facility was the ferrous metals removed from the MSW during processing and metals recovered from the bulky waste. Subsequently, a bottom ash metals recovery (BAMR) system was installed to recover ferrous and nonferrous metals from the ash. Ferrous and nonferrous metal is sold to local scrap dealers. The ash residue and processing residue are transported to a landfill.

Caprock wells provide brackish water that is used for make-up to the circulating water system. Cooling tower blowdown is reinjected. Other than the blowdown reinjection, the facility has zero liquid discharge.

City water is used for boiler make-up after passing through both reverse osmosis units and a demineralizer.

The electrical generation system consists of a turbine-generator and support systems that produce up to 50 MW of electricity for export to HECO. The facility is a major component of Honolulu's solid waste disposal system and also provides renewable electrical power for up to the 5% of the island's needs.

Covanta Honolulu, a wholly-owned subsidiary of Covanta Energy Corporation (Covanta) is responsible for operation of the facility. The facility is owned by the city and county of Honolulu. The initial service agreement had a 20-year term. The contract has been modified to provide continued operations, install the reverse air baghouses and provide design and construction of a 900 TPD mass burn unit on the same site, which is currently under construction for operation in 2012.

## Innovative and Technical Contributions to Solid Waste Processing

- Following completion of the expansion unit, landfilling waste other than H-POWER ash and residue will essentially be eliminated on the island.
- A unique sludge receiving, pumping and distribution system, with a separate odor control system, has been developed and will be incorporated into the facility design. This system is designed to pump the sludge to the boiler feed chute, where it will be distributed across the width of the chute, mixing the sludge directly with the waste, minimizing any potential of upsets to combustion control.
- A shredder has been incorporated into the design that will allow bulky waste to be shredded.
- Bottom Ash Metals Recovery (BAMR) system has been installed and operating since 1999.
- Ferrous metals recovered from MSW in an RDF processing system can be contaminated with a great deal of tramp material. The materials are shredded and reprocessed to provide a cleaner and more valuable product.
- Brackish water obtained through caprock wells is used for cooling of both the existing unit and the new unit.
- Air-to-air preheaters are an almost unique feature of the facility in the waste to energy industry. Covanta has installed, tested and optimized modifications to the air preheater to slow cold end corrosion of the air preheater tubes. This modification incorporated a tube-in-tube design which reduces the heat transfer of the first section of the air heater tube, increasing the combustion air temperature while maintaining a tube metal temperature above the acid gas dew point.
- The new baghouses on the RDF boilers have been equipped with bag break detectors at the outlet of each baghouse compartment to provide early warning of bag damage.
- Other facilities and communities will look to H-POWER in the future to see how the integration of the RDF and mass burn technologies has been accomplished. The concept of combining the two types of technologies allows for a more comprehensive and strategic management of the island's wastes.
- The expansion unit will also employ new and innovative technology for NO<sub>x</sub> control using Covanta's VLN™ technology allowing the boiler to operate at lower O<sub>2</sub> levels, which results in improved boiler efficiency.
- The facility has experimented with various sized openings in the Waste Processing Facility (WPF) trommels allowing the flexibility of adjusting the characteristics of the RDF and of the fines that pass through the trommel for disposal as process residue.
- Currently Covanta Honolulu stands with Monsanto, Chevron, the Pearl Harbor Shipyard, and the Makewao Post Office, as the only VPP facilities in Hawaii.

## Facility Economics

The initial contract for facility construction was for approximately \$150 million. The permit remand that added scrubbers added \$40 million to the construction cost. To allow a private entity to take advantage of the tax benefits available through new legislation (tax recovery act of 1986), the city sold the facility for \$312.5 million to the Ford Motor Company's Retirement Program, DOH Partners, prior to the completion of construction and then leased the facility back. At the end of the lease period, the city repurchased the facility for its residual value of \$18 million.

Tipping fees at the facility are \$38.50 per ton municipal and \$77 commercial which applies to all city facilities including the landfill. There are no realistic alternatives for disposal on the island to provide an economic comparison.

Electricity generated at the facility is purchased by HECO at their avoided cost which is heavily influenced by the price of oil. At \$100 per barrel, the avoided costs are approximately \$0.22 per kWh on-peak (10 hrs per day, 5 days per week) and \$0.16 per kWh off-peak. The electric revenues are split between the city and Covanta 90/10 for energy and 66/33 for capacity which results in an overall average of approximately 81½% / 18½%.

## Facility Recognition Award

### HONORABLE MENTION

Covanta Marion  
Brooks, Oregon

### PARTICIPANTS

Owner/Operator – Covanta Marion  
Operator – Marion County

### WINNER

550 tpd

## Facility Description

The Covanta Marion Inc. (CMI) municipal solid waste combustion (MWC) facility is located in Brooks, Oregon. The facility consists of two identical mass burn boilers of Martin GmbH Stoker Combustion System design. Each boiler is rated at 275 tons of municipal solid waste per day and generates up to 13.1 megawatts of renewable energy that is sold to Portland General Electric. The MWCs were constructed in 1985 and installed in 1986. The Marion facility was the first mass burn waterwall resource recovery facility burning municipal solid waste in the United States to use dry flue gas scrubbers and fabric filter baghouse to control acid gases and particulates. In addition to municipal solid waste, CMI processes about 90 tons per month of supplemental waste including non-hazardous medical waste.

CMI has had a long-term contract to process waste for Marion County since 1986. CMI has met its obligation to process at least 145,000 tons of waste per year, and has consistently outperformed its contractual obligation year after year. CMI has met its power generation requirement to the County every year of its 26 years of operation. The facility has had above 90% availability year after year and is consistently in the 93-94% availability range.

## Innovative and Technical Contributions to Solid Waste Processing

- CMI was the first energy from waste facility in the U.S. to be equipped with a scrubber/baghouse (1986).
- CMI became an Oregon OSHA VPP Star site in 2008 and completed its recertification in 2011, continuing in the program until 2014. The Marion facility has not incurred an OSHA recordable accident since June 2009 and has operated over 900 days since its last reportable environmental event.
- The Covanta Marion facility participated with the National Energy Technology Laboratory on a boiler corrosion study.
- CMI received its EarthWISE certification in 2011 from Marion County. This is recognition for being an environmentally conscientious company that does its part to reduce its carbon footprint on the environment. Some key elements to achieving this certification:
  - Replacing the lighting around the facility with high-efficiency compact fluorescent lighting
  - Putting lighting on motion detectors so they shut off when no one is around
  - Replacing induced draft fan controls with variable frequency speed drives to save power
  - Installed dishwashers in the lunch room and control room and the use of dishes and silverware instead of paper products
  - Using recycled copy paper
  - Purchase of Energy Star-rated washer and dryer

## Facility Economics

The tipping fee is currently \$67.50 as set by the county. This tipping fee has not changed since the facility began operations in 1986. ♦



## UPDATE ON SUPREME COURT RULINGS AND WASTE FLOW CONTROL

by John W. Norton, PE, BCEE

New and extremely tight emission regulations and a US Supreme Court Ruling in 1994 combined to nearly kill the WTE industry from 1992 through 2007. How?

The continuing successful operation of about 100 major WTE plants demonstrated that these plants could comply with the extreme regulations (closely monitored non-compliance periods were measured in rare minutes). However, the **Supreme Court ruling** in the Carbone case appeared to say that “Flow Control” was illegal under the US Constitution’s “Commerce Clause.” This was a Big problem for WTE.

“Flow Control” is the authority needed by a municipality to direct the “flow” of its solid waste into a specific route, for example: the local WTE facility. Normally, a community needs to issue bonds to finance any large WTE facility. To get the financing, they must show that they can control the flow of waste into the new facility and thereby pay off the bonds. Flow control is accomplished by the cities through the use of waste delivery contracts negotiated with their suburbs for the term of the financing (bond issue).

Without flow control cities could not finance WTE facilities even if they could comply with the extreme regulation limits in the amended Clean Air Act. Frankly, without flow control, cities couldn’t even plan for the long term disposal of solid waste via any alternative, not even recycling or a new and fancy landfill.

In 2007, however, the US Supreme Court made a ruling in the “*United Haulers*” case that restored the ability of cities to finance long term solid waste solutions, including new WTE plants. The court noted in this ruling that Congress has correctly, in RCRA, carved out a vital role for local government in the management of the nation’s solid waste in order to assure the good health of its citizens.

Interestingly, neither of these Supreme Court cases dealt with WTE specifically. They dealt with landfills. In the *Carbone* case (*C&A Carbone, Inc. v. Town of Clarkstown*, 511 U.S. 383, 1994) a town in Michigan abruptly ruled that the existing privately owned landfill was to be preserved for their own use, not the free trade that the private landfill owner was already accepting from as far away as New Jersey and New York. That seems unfair all by itself; government should not suddenly restrict a private business like that. The *Carbone* Court struck down the ordinance on the basis that solid waste was a commodity in commerce and that the Commerce Clause in the U.S. Constitution invalidates laws that discriminate against such commerce on the basis of its origin, or its destination, out-of-state.

On the other hand, the more recent *United Haulers* case (*United Haulers Association, Inc. v. Oneida-Herkimer Solid Waste Management Authority* 05-1345, 2007) ruled that a community could negotiate an agreement for a new private landfill, while also restricting its use to the County’s selected wastes. Herkimer County, in up-state New York, was willing to permit a new landfill, if they could restrict its use to their own needs and prevent outside haulers from filling it up. With this prior agreement, the private owner developed a new landfill for the Herkimer County Solid Waste District. Outside haulers (from the New York City area) sued to gain access to it. The Court ruled against the haulers, saying that such “flow control” is in line with the US Constitution and the nation’s oft-cited authority to do such long term planning (permitting and controlling) for health reasons. This seems reasonable.

And it has been construed to mean that WTE, the cleanest approach to solid waste management, is once again financeable. Many new WTE projects are now under development in many states. ♦

## WTERT – COLUMBIA UNIVERSITY

by Dr. Nickolas J. Themelis

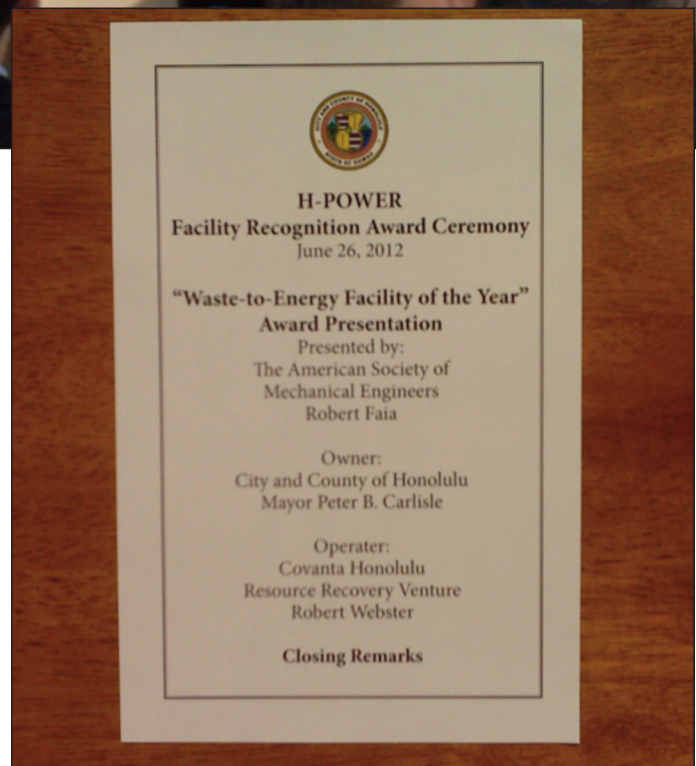
The Waste to Energy Research and Technology Council (WTERT), headquartered at Columbia University, presented eight papers at NAWTEC 20. Yani Dong and Mackenzie Pomerano of the Earth and Environmental Engineering Department were among the winners of MER/ASME Fellowships recognized by Amit Chattopadhyay of Arcadis (Malcolm Pirnie) at the MER/ASME luncheon of NAWTEC 20.

The 2012 Bi-annual Meeting of WTERT will be held at Columbia University on October 18 -19 and will include papers on the latest developments in the global waste-to-energy industry. At the gala dinner of October 18, sponsored by MER/ASME, the WTERT 2012 Award will be presented formally to the Editor of Waste Management World, the most widely circulated waste management magazine in the world. Also, MER/ASME will sponsor a WTE facility bus tour on Wednesday, October 17. As in past years, this meeting will be attended by many MER/ASME members at a special registration fee. For more information on this event, please keep an eye on the WTERT web, [WWW.wtert.org](http://WWW.wtert.org). ♦

## H- POWER WINS WTE PLANT OF THE YEAR AWARD AND MARION COUNTY RECEIVES HONORABLE MENTION

Further to the Plant of the Year Award and Honorable Mention presented to H-Power and Marion County, respectively, at this year's NAWTEC 20 conference in Portland, ME. Bob Faia the Chair of ASME Materials and Energy Recovery Division, on June 26, 2012, represented the Waste – To – Energy Plant of the Year award at the H – Power Facility in Honolulu for all the employees, in the presence of the Honorable Mayor Peter Carlisle, and Facility Manager Robert Webster. The City and County (Owners) and

Covanta Energy (Operators) were very appreciative and honored that the ASME MER Division participated in this well attended and successful ceremony for all their employees, who obviously could not attend the NAWTEC 20 ceremony in Portland ME. Congrats to all involved! The photograph below illustrate Robert Webster, Covanta H – Power Facility Manager (far left), Bob Faia Chair of ASME MER Division, (center) and Honolulu Mayor Peter Carlisle (far right) and the Facility Recognition plaque. ♦



# Materials & Energy Recovery Division



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