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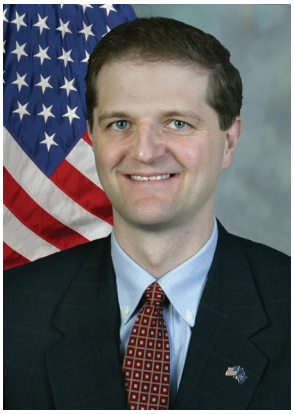
The Chairman's Corner

Rep. Scott E. Hutchinson, Chairman



With this month's observance of America Recycles Day and the imminent implementation (January 24, 2013) of Pennsylvania's electronic waste recycling law (the Covered Device Recycling Act), an article I came across recently seems particularly timely.

The article is also especially interesting to me because the Joint Legislative Air and Water Pollution Control and Conservation Committee played a very active role in furthering electronic waste (e-waste) legislation, and recycling in general has always been one of the committee's most consistent areas of interest. The committee helped to develop, write and secure passage of the Waste Tire Recycling Act, for example.

The article I mentioned has to do with what looks to be the next advancement in dealing with e-waste. That next step is biodegradability (or dissolvability, if you prefer) of electronic components. Environmentally, it has the potential to further reduce e-waste before the waste ever needs to be recycled or remediated. Economically, it has the potential to open new markets and new manufacturing processes in a variety of fields that use electronic components.

According to the article in *Nature News*, researchers have designed flexible electronic components that are water soluble and that will dissolve on a prescribed schedule. The components could be used to make smart devices that disintegrate once they are no longer useful. In other words, the electronic components do the job they are supposed to do, and when that job is finished they then degrade away, leaving no electronic waste to be recycled or disposed of.

Right now, the technology is very cutting edge and is still basically in the lab-design and lab-testing phase. But the potential for a variety of commercial applications is out there as research progresses. And, it is a competitive field with more than one group of researchers pursuing the technology.

The *Nature News* article focuses on one group of researchers and one application – the biomedical field. It cites the work done by John A. Rogers, Ph.D., a materials scientist at the University of Illinois at Urbana-Champaign, and his associate Fiorenzo

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In This Issue...

Joint Legislative Air and Water Pollution Control and Conservation Committee

Notes from the Director

CRAIG D. BROOKS, EXECUTIVE DIRECTOR

A market research firm projected in an October 2012 report that the global electronic waste recycling and reuse market will expand to $18.27 billion by 2017 from an estimated $9.83 billion in 2012.

The report identifies certain factors and driving forces behind the global e-waste recycling and reuse markets in the next few years and provides analysis of the e-waste recycling and reuse industry, market trends and industry restraints. The report also analyzes historical e-waste recycling data, recycling and reuse market size and production forecasts, along with in-depth geographic trends.

The electronic waste recycling and reuse market is expected to expand at a 13.4 percent compound annual growth rate, and e-waste recovered from households is estimated to top 12.26 million tons by 2017

According to the report, the market will expand at a 13.4 percent compound annual growth rate. E-waste recycling and reuse has expanded rapidly since 2010, when 3.61 million tons of electronic waste from household appliances was recycled and the industry was valued at $8.68 billion. The report indicates that the electronic waste recovered from households will top 12.26 million tons by 2017. Previous studies have also suggested that the industry will grow rapidly but have pegged its value as much less.

In other e-waste news, the Environmental Protection Agency (EPA) recently launched the Sustainable Materials Management (SMM) Electronics Challenge, a voluntary program that encourages original electronics manufacturers and retailers to increase the amount of used electronic devices collected and to send them to third-party recyclers.

There are three levels of participation. Companies may join at the bronze, silver or gold level. Bronze participants pledge to send up to 50 percent of used electronics to recyclers, silver participants pledge to send between 50 percent and 95 percent, and gold participants pledge to send 95 percent to 100 percent. EPA says the opportunity to participate at different levels reflects the need for flexibility in the program in an effort to accommodate manufacturers and retailers and to encourage participation.

Companies that have pledged to participate in the program include Best Buy, LG Electronics, Panasonic, Samsung, Sharp, Sprint, and Staples.

Because used electronics have materials in them that can be recovered and recycled, the SMM Electronics Challenge will help reduce the economic costs and environmental impacts of securing and processing new materials for new products, according to EPA. The SMM Electronics Challenge will also help repurpose and safely dispose of cell phones, computers and other devices that we use every day.

Participants in the program also pledge to publically disclose all information on their respective electronics collection and recycling. By joining the SMM Electronics Challenge, companies are committing to refurbishing and recycling more used electronics, and by using third-party recyclers, they are helping to drive the use of environmentally protective practices.

Although encouraged by the program, the Electronics Takeback Coalition has suggested that EPA include measures in the program to prohibit participants from exporting e-waste to developing countries.

More information on the SMM Electronics Challenge is available at: http://www.epa.gov/smm/electronics/index.htm. Information on the market research report is available at: http://www.transparencymarketresearch.com/e-waste-recycling-and-reuse-services.html.

RESEARCH BRIEFS

Each month, the committee's staff researches and prepares a number of "briefs" on several topics relevant to the Joint Conservation Committee's mission. Very often, these briefs include references to reports and further research on the topics so that readers may pursue issues on their own.

Please Note: The information and opinions expressed in the Research Brief articles do not necessarily represent the opinions or positions of the Joint Legislative Air and Water Pollution Control and Conservation Committee, nor those of the Pennsylvania General Assembly.

Growth in Federal Fleet Size Masks Right-sizing in Several Agencies

-- Tony M. Guerrieri, Research Analyst

Federal agencies spend billions of dollars annually to operate a fleet of about 449,000 civilian and non-tactical military cars, trucks, and other vehicles, excluding postal vehicles. Cumulatively, they consume millions of gallons of fuel daily.

A report by the U.S. Government Accountability Office (GAO) provides information about the size and composition of federal fleets and the reasons agencies' fleets increased or decreased over time. It found that federal agencies have been making their vehicle fleets more fuel efficient in recent years but the number of these vehicles has been growing.

The GAO selected four agencies – the U.S. Department of Agriculture (USDA), the U.S. Department of the Interior (Interior), the U.S. Department of Veterans Affairs (VA) and the U.S. Air Force – as case studies.

As the federal government strives to be environmentally friendly and economically conscious, alternative fuel vehicles (AFV) – vehicles that operate using ethanol or batteries – are becoming more common. Overall federal agencies increased the portion of their fleets made up of AFVs from about 14 percent to 33 percent from 2005 to 2011. Some agencies in the report had notable increases, for example the Interior's alternative fuel fleet grew by 509 percent, with AFVs making up 25 percent of its fleet in 2011. The VA has an even larger percentage of AFVs, at 52 percent.

Those increases followed various legislation and policies aimed at changing the composition of federal fleets as a means of improving U.S. energy efficiency. Some of those directives also sought to reduce the vehicle fleet. However, according to the report, the federal government's fleet of vehicles has increased by seven percent between 2005 and 2011, from about 420,000 vehicles in 2005 to more than 449,000 vehicles in 2011. The numbers exclude tactical military vehicles as well as the roughly 210,000 vehicles operated by the independent U.S. Postal Service.

Some agencies decreased their fleets while others increased the number of vehicles. The change in fleet size from agency to agency varied considerably. For example, one-third of the agencies (eight of 24) with the largest number of vehicles decreased their fleets by at least two percent during this period. Of the four agencies the GAO selected for review, the USDA and VA increased their fleets by five and 49 percent respectively, while the U.S. Air Force and Interior decreased their fleets seven and nine percent respectively.

The GAO report found that while federal agencies have been making vehicle fleets more efficient, the number of vehicles is increasing

Big gainers included the U.S. Department of Homeland Security, up about 18,000 to about 56,500, the U.S. Army, up about 7,700 to about 78,700, and the VA, up about 5,300 to about 16,400. Those three, along with the Air Force, Navy, USDA, and the Justice and Interior departments, account for about 80 percent of the federal vehicle fleet, while 35 other agencies hold the remaining 20 percent.

Some agencies have tried to cut vehicle costs. The Air Force last year found 6,000 underutilized vehicles that if eliminated could save the Air Force $500 million or more. Over the last year, the Air Force has cut 739 vehicles from its fleet.

Fleet managers at the four selected agencies stated that various factors can influence changes in

fleet size. The USDA and VA reportedly acquired more vehicles from 2005 to 2011 to accommodate expanded programs and services, among other factors. For example, the VA acquired 5,367 additional vehicles in part to provide transportation to and from VA health care facilities for veterans who require health care services but are not able to drive themselves. In contrast, the Air Force and Interior reportedly decreased the number of vehicles in part through efforts targeted at reducing their fleets and costs. For example, through efforts to identify under-utilized vehicles, Interior eliminated 451 vehicles.

The U.S. Government Accountability Office's report, *"Federal Fleets: Overall Increase in Number of Vehicles Masks That Some Agencies Decreased Their Fleets"*, is available at: http://gao.gov/assets/600/593249.pdf.

Stormwater and Wastewater Planning Framework Allows Cities Greater Creativity

-- Craig D. Brooks, Executive Director

The Environmental Protection Agency (EPA) wants to ensure integrated wastewater and stormwater planning is implemented at the local level, but the effort has to be driven by the municipalities and not the federal government.

Therefore EPA is encouraging "one water management" by forming partnerships to help communities overcome economic and technological barriers. Ultimately, however, every municipality must decide on appropriate solutions that work for them.

EPA's integrated planning framework, released in June 2012, addresses concerns expressed by cash-strapped municipalities that want to build or upgrade their water infrastructure to better manage stormwater and wastewater overflows. Under the framework, municipalities will be allowed to modify discharge permit, long-term plans for combined sewer overflows, or enforcement orders for managing combined sewer overflows. This framework allows communities to prioritize water management goals such as water conservation, or lower wastewater treatment costs so that limited public dollars can be used in ways each municipality finds most valuable.

Many cities are demonstrating the value of green infrastructure and this framework appears to be working everywhere because it is so flexible. Recently EPA issued an integrated planning policy for municipalities that emphasizes the use of green infrastructure as an alternative to traditional pipes and drains to manage stormwater and wastewater. According to EPA, green infrastructure reduces stormwater runoff volumes and reduces peak flows by utilizing the natural retention and absorption capabilities of vegetation and soils.

As commercial and residential development grows, so do spans of impervious surfaces. However, this challenge can be taken on by municipalities that adopt green infrastructure. This technological development and innovation has always been a part of the Clean Water Act (CWA).

EPA has suggested that municipalities considering integrated planning need to evaluate how to best meet CWA regulatory obligations within their specific financial obligations. The integrated planning framework allows communities to sequence projects to pursue their highest environmental priorities first, by tapping the insights of all interested parties, including state and federal regulators. The agency is also open to reexamining past consent decrees that incorporate value engineering and green solutions to save a city millions of dollars in water treatment costs.

As the Clean Water Act's 40th birthday was observed in October 2012, the EPA encouraged "one water management" to help communities overcome economic and technological barriers in wastewater and stormwater planning

While many cities realize millions of dollars can be saved by adopting green infrastructure, in these tough economic times, many are having difficulty allocating public funds for these changes. The solution may be to leverage private dollars in the service of green standards.

In Philadelphia for example, the city is partially financing its stormwater retrofits with pricing structures and incentive credits for private developments that are built in a manner that supports the city's combined sewer overflow compliance goals. The fees, being phased in through 2014, charge separate square foot rates for impervious surfaces and those that are not, with substantial credit given to those parcels that can handle the first inch of stormwater on-site. Once a private development is complete, and built-in green stormwater handling features are successfully demonstrated, the credit is activated for four years. The credit can be renewed every four years, up to a maximum of 40 years.

Philadelphia is a test case for how well this public encouragement of privately funded green infrastructure development can work. The city estimates that $36,000 spent by a contractor to make an acre's stormwater management green could be paid off in 10 years using the incentive credits.

Top 10 U.S. Cities for Clean Technology

-- Tony M. Guerrieri, Research Analyst

As clean technology continues to make its mark across the nation, there are certain cities that are coming out as leaders in the "clean tech" industry. The consensus of a report by Clean Edge, a research and advisory firm with a concentration on the clean tech sector, is that the U.S. clean tech market is currently dominated by West Coast cities.

Clean Edge's first-ever *"U.S. Metro Clean Tech Index"* evaluates the nation's 50 largest metropolitan regions to highlight clean tech investment, innovation, and cluster development, spotlighting the top 10 clean tech cities.

Nearly 90 percent of all clean tech venture capital funds ($13 billion of $14.9 billion) went to companies headquartered in these areas, also home to 72 percent of all Leadership in Energy and Environmental Design (LEED)-certified building square footage.

In addition, America's top 50 cities are where more than 95 percent of all U.S. registered hybrid electric vehicles are parked and the location of more than 70 percent of all U.S. clean energy patents. These findings mirror many of the state-level findings from Clean Edge's *2012 State Clean Energy Index*.

Against this backdrop of clean tech concentration, Clean Edge ranked each metro area on almost two dozen different indicators in four broad categories: green buildings; advanced transportation; clean electricity and carbon management; and clean tech investment, innovation and workforce. Key market indicators include hybrid electric vehicles (EV), EV charging stations, certified green buildings, clean tech patents and venture capital investments. All quantitative metrics are balanced out to account for population size.

The rankings are based on a 100-point scale. San Jose, California, home to Silicon Valley, barely edged San Francisco for No. 1 on the list, by 82.2 to 81.4 points, thanks to its top ranking in concentration of clean tech venture capital and its high scores in patent activity, university technology development and electric vehicle and hybrid-EV deployment. San Francisco had a high concentration of LEED-certified green buildings and public transportation.

The drop-off to No. 3 was precipitous, but once again it was a West Coast city, as Portland, Oregon was ranked third with a score of 64.8 points. Portland led in concentration of LEED projects and EV charging stations per capita and was helped by the fact that Portland General Electric operates the country's leading green power purchasing program.

Sacramento was fourth (59.4 points) and Seattle fifth (56.5 points), giving the West Coast a clean sweep of the top five spots on the list. Denver (54.5 points) and then Los Angles (52.2 points) followed, and finally at No. 8, with Washington, D.C. (50.4 points), a city east of the Mississippi made the list. Boston (49.4 points) and Austin, Texas (48.6 points) rounded out the top 10.

Other notables in the Midwest and Northeast, coming from various metro regions, included Chicago (43.9 points), New York (41.2 points) and Minneapolis (36.9 points).

The West Coast led the way in ratings of the nation's metropolitan area clean technology markets

Birmingham, Alabama had the lowest score of 2.9 points among the 50 metro regions ranked in the index, just below New Orleans with a score of 3.6. Memphis (6.6 points), Richmond, Virginia (9.5 points) and Jacksonville, Florida (10.6 points) rounded out the bottom five of the index.

Two Pennsylvania cities were included among the top 50 metro regions in the nation. Philadelphia finished 17th with a score of 32 points followed by Pittsburgh at No. 37 with 17.4 points.

The pulse of clean tech in the U.S. is undeniably urban, the report said. As the industry expands and competition heats up, these metro areas will increasingly compete against one another, and against cities around the world, to capture the clean tech opportunity.

Clean Edge defines the metro regions using federal Metropolitan Statistical Areas.

An executive summary of *"U.S. Metro Clean Tech Index"* is available for download at: http://www.cleanedge.com/sites/default/files/Metro2012summary.pdf.

States Ask EPA to Waive Ethanol Blending Requirement

-- Craig D. Brooks, Executive Director

Some states have asked the Environmental Protection Agency (EPA) to waive the requirement to blend ethanol into gasoline for two years to allow the corn crop to rebound following the recent drought. Waiving the renewable fuel standard (RFS) would also drive down corn prices for livestock producers.

Given the likely impacts to the livestock and poultry industries, not to mention the impact and increased cost for consumer food products due to the undersupply of corn, state representatives suggest that exercising EPA's authority to waive the requirement seems appropriate. Conversely, as the waiver request is limited in scope, any resulting impact on the biofuels industry would be minimal.

Delaware has asked EPA to waive the RFS in its entirety for two years and only require gasoline to contain up to five percent ethanol in the second year. Ethanol industry and corn growers said waiving the renewable fuel requirements would cause more economic harm because ethanol is less expensive than gasoline.

Under the RFS contained in the Energy Independence and Security Act of 2007, EPA is requiring that 15.2 billion gallons of renewable fuels be blended into the 2012 fuel supply. The 2007 law requires that the 2013 fuel supply contain 16.5 billion gallons of renewable fuels. The governors of Delaware, Arkansas, Georgia, Maryland and North Carolina have petitioned the EPA to waive the requirement because of the drought. Other states are expected to follow.

Corn accounts for 95 percent of livestock feed and although the ethanol industry converts some of its byproducts into livestock feed, such feed is not always appropriate for all species. Further refining the byproduct, known as dried distillers grains, to produce biodiesel also reduces nutritional value.

In its comments, the American Feed Industry Association calls on EPA to waive the RFS through 2013. According to the association, a temporary waiver of the full RFS mandate blending of ethanol with motor fuels for the remainder of 2012 and all of calendar year 2013 is immediately necessary to mitigate the economic devastation of the 2012 Midwestern drought – the worst in nearly 80 years – on corn production. The association has asked EPA to link the renewable fuel standard requirements to the country's corn supply. There is federal legislation pending on this very subject. The association is one of 19 livestock and animal feed industry groups that have asked EPA to waive the RFS.

According to the U.S. Poultry and Egg Association, waiving the RFS could reduce corn prices by as much as $2 per bushel and reduce overall costs of food by two percent. Delaware suggests that waiving the RFS would free up more corn for the livestock industry while simultaneously driving down feed prices. Delaware's poultry consumes 35 million bushels of corn annually. At $47.50 per bushel for corn, Delaware's poultry industry anticipates spending more than $262.8 million on feed in 2012. If corn prices increase to $8.50 per bushel in 2013, it would cost the industry an additional $35 million just in Delaware alone.

What to do about the drought-ravaged corn crop and renewable fuel standards is the topic of conversation in EPA

Despite Delaware's projections, some state farm bureaus are opposed to waiving the ethanol requirement. The Nebraska Farm Bureau, for example, which represents corn growers and livestock producers, has suggested that waiving the RFS would have minimal impact on corn prices and would not completely eliminate the use of corn for liquid fuels. About one-third of the gasoline in the nation would still need to have ethanol because of federal, state and local clean air rules, particularly in larger urban areas on the East and West coasts of the United States.

The American Fuel and Petrochemical Manufacturers has suggested that gasoline refiners are approaching the blending wall – a point at which the amount of ethanol required by the RFS exceeds the amount of ethanol that can be permissibly blended into gasoline.

More information on the RFS is available at: http://www.regulations.gov/#!docketDetail;D=EPA-HQ-OAR-2012-0632.

On the Horizon . . .

A LOOK AT UPCOMING EVENTS

No events are scheduled at this time.

Check the committee website at http://jcc.legis.state.pa.us for events that may be added to the schedule.

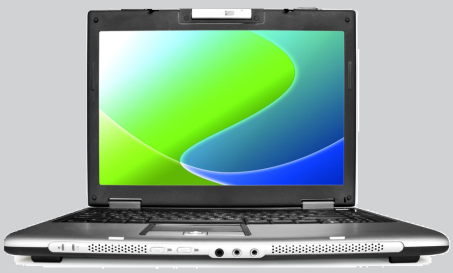
Don't forget to Visit Our Website

Learn More at http://jcc.legis.state.pa.us

To learn more about the Joint Legislative Air and Water Pollution Control and Conservation Committee, simply pay a visit to our website.

Website visitors will find information such as the Environmental Issues Forums schedule; the *Environmental Synopsis* monthly newsletter; committee members; current events; committee reports; staff contact information; committee history and mission; and links to other helpful sites.

The website address is http://jcc.legis.state.pa.us. Stop by the website often to keep up with committee information and events.



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Readers are also reminded that the *Synopsis* is available on the committee website each month after the *Synopsis'* printing. The website address is http://jcc.legis.state.pa.us.

Printed on Recycled Paper

Omenetto, a biomedical engineer at Tufts University in Massachusetts. Rogers et al, who published an article about the technology in *Science*, use silicon as the base material for what are sometimes called "transient electronics". Combined with Omenetto's processed silk on which the electronic components are placed, every part of the system will disintegrate.

For the bio-medical uses Rogers is working on, one should consider the possibility of medical implants that don't need to be surgically removed because they disintegrate naturally. And, do it on a schedule determined by the makeup of the silicon-silk composition. According to the article, the team has so far designed an imaging system that monitors tissue, a thermal patch to prevent infection after a surgical site is closed, solar cells, and strain and temperature sensors.

Rogers, who has received funding from sources such as the U.S. Defense Department's Defense Advanced Research Projects Agency (DARPA) and the National Science Foundation, acknowledged that biomedical applications may be the "low-hanging fruit" in seeking commercial applications for the technology, and said that consumer electronics and other applications are possible with further research. One of the keys will be taking the technology from the concept stage to the more "commercially relevant" stage. That is yet to come and will require additional targeted research.

Another individual working on biodegradable electronics is right here in Pennsylvania. Christopher Bettinger, Ph.D., a professor of materials science at Carnegie-Mellon University (CMU) in Pittsburgh, has also been involved in research on the topic for a number of years. He and his associates are looking at some other applications.

To read the article on biodegradable electronics in *Nature News*, go to www.nature.com/news/1.11497

For example, Bettinger described electronics sensor networks which might be used to determine characteristics such as temperature or pH of a geographic area covering a significant distance. The "transient electronics' sensor network could be easily distributed, by air for example, record the data needed and then instead of having to be collected and disposed of, would simply degrade away into nothing.

Bettinger confirmed the cutting edge nature of the technology and noted he was working on his first patent for biodegradables in 2008. He noted that while research in the field is in its fledgling stages, there are a growing number of scientists and engineers interested in this domain who often share the same vision.

He agreed that there is a wide variety of potential uses of the technology which could extend some day to consumer electronic devices, such as the electronics portions of computers, cell phones and the like. While there are other non-electronic components which would still require more traditional e-waste recovery and recycling efforts, it is encouraging that e-waste could someday be significantly reduced.

The bottom line is that advancement of the biodegradable electronics technology could have beneficial impacts down the road environmentally, economically, and in improving the quality of life and health of Pennsylvanians.

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