

## **Arch Chemicals' Sustainability Investments and Projects To Reduce Carbon Footprint, Energy And Natural Resource Usage**

These company-wide sustainability goals are in turn supported by internal improvement goals and action plans at Arch's global businesses and manufacturing facilities. The achievement of these goals will require capital expenditures and related investments as well as innovative new manufacturing processes and product formulations.

Here are some highlights of sustainability projects and investments:

- **Arch Chemicals' \$30 Million Technology Upgrade Will Reduce Carbon Footprint at Major HTH Water Products' Facility**

Arch Chemicals' HTH Water Products business will be installing new drying technology at its largest global water sanitizer plant that will cut energy usage and greenhouse gas emissions and expand production capacity. Under this two-year, \$30 million project, the Company's plant in Charleston, Tennessee will be upgraded to a more efficient technology for drying slurries of calcium hypochlorite. After this phase of production, the water sanitizing product is transformed into dry tablets, granules and other user-friendly forms for use in swimming pools and spas, drinking water treatment systems, food sanitization and other applications.

This project will strengthen Arch's position as the largest global supplier of calcium hypochlorite water treatment products by enhancing both the efficiency and sustainability of our operations. We have already successfully demonstrated a similar drying technology at our calcium hypochlorite plant in South Africa.

Michael E. Campbell, Arch's Chairman, President and CEO, commented, "This project exemplifies our approach to sustainability: it both benefits the environment through greater energy efficiency and a reduced carbon footprint, and it makes us a more valuable supplier. In addition, this technology upgrade will lower operating costs in our HTH water products business and is a vital part of the Company's multifaceted margin-improvement plan."

- **Arch Wood Protection's Trentham, Australia Facility Cuts Water Use in Half**

Tucked away in the pristine environment of Victoria's Macedon ranges, Arch's Trentham Wood Protection business in Australia is one of the major industries in town. While this area was beset by flooding in early 2011, it faced poor rainfall and drought conditions for the previous 10 years. This has driven the requirement to meet not only the expectation of our water-conscious community but Arch's own objective to be good environmentally responsible citizens by conserving water and engaging in other sustainable practices.

The Arch Trentham team has been proactive in making notable step changes in water use at the site. As a result, this site since 2006 has achieved an overall reduction in water of over 50% -- and they're not stopping there!

This significant reduction has been a result of the work to implement both re-use and rain capture projects. The building roofs and sealed surfaces provide excellent surface area to capture water for reuse in the plant as 'process water.' The implementation of suitable storage and piping has allowed process water to be effectively stored, transferred and used around the site. The cumulative capacity of all process water tanks currently sits at approximately 250 kiloliters. Over the four-year project scope, the site has connected all manufacturing plants and wash-down areas to the process water system.

The Trentham plant can also claim 'zero water discharge' with no release to either storm water or trade waste. Excess water on site is handled through an on-site dam. The dam is protected via a 'first flush' system, which is a series of tanks that allow the water to be tested for contamination prior to discharge.

The Trentham plant has an ultimate vision for 'water neutral' manufacturing (zero water in / zero water out). To achieve this, the focus is on increasing process rain water storage and reducing processes that still use delivered water. Specific projects include replacing an existing inefficient cooling tower with refrigeration, reviewing the option to replace a second cooling tower with refrigeration and installing an additional 30 kiloliters of capacity for rain water capture.

The management of water is a dynamic process. The site continues to leverage best practice initiatives from all industry and is continually seeking feedback and ideas from all employees. The site manages this process through continual review of its Environmental Improvement Plan, which also serves to meet both EPA requirements and compliance against our ISO 14001 accreditation.

- **Preserving Baobab Forests, Reducing Carbon Dioxide and Providing Jobs; Arch Personal Care Products' Sources Natural Baobab Oil in South Africa**

Arch Personal Care Products is engaged in an exciting sustainability project in rural South Africa, under which our business is purchasing Baobab tree oil from a local nonprofit organization. In addition to providing Arch with a natural oil that has wonderful skin-conditioning properties, this project is helping provide jobs for approximately 1,000 local citizens and is helping sustain regional Baobab forests. These trees in turn help draw carbon dioxide from the air, which is an additional sustainability benefit.

This is but one of numerous projects and initiatives worldwide to expand Arch Personal Care's portfolio of certified natural and organic cosmetic ingredients. This business has already registered more than two dozen products under organic certification systems such as Eco-Cert in the European Union. This business' warehouse in New Jersey has also been certified for its safe and sustainable product handling and shipment practices under a U.S. Department of Agriculture organic certification program.

- **Arch Pool Chemicals Ocean Cargo Sustainability Project; Reducing Greenhouse Gas Emissions and Shipping Costs**

An Arch Chemicals' pool chemical sourcing team has developed an ocean cargo and truck freight shipping sustainability project that is significantly reducing greenhouse gas emissions while saving the company's HTH Water Products' business tens of thousands of dollars each year on freight costs.

This sustainability project sprang from a review by the Arch team of the process of shipping trichlor pool chemicals from our supplier in China to the Port of Los Angeles in California. From there, the pool chemicals are routed by truck to various Arch distribution warehouses across the United States. The sourcing team determined that we could both reduce the total carbon footprint of these shipments and save tens of thousands of dollars on freight costs if we are able to load more pool chemicals on the cargo vessels and the trucks. To do so, the team first worked with our Chinese supplier to develop a more efficient way of loading the trichlor product into the corrugated bulk shipping containers known as gaylords. In this way, we are able to sharply reduce (by at least 18 each year) the total number of ocean containers needed for shipments from China to our distribution centers.

The team also asked our third-party trucking company to use tri-axle trailers to pick up the cargo containers from the Port of Los Angeles. The extra axles on the trucks allow them to carry the heavier cargo containers.

Maryann Jashinske, an Arch Packaging Manager who assisted with this project, reports that these relatively simple packaging and distribution changes will eliminate 128 tons of carbon dioxide per year in fuel emissions associated with the cargo ships and trucks. Moreover, in addition to reducing freight costs, the new, more efficient cargo loading and distribution process should reduce countless hours of paperwork processing and warehouse handling.

- **Arch HTH Water Products Business Saves Wood, Water and Reduces Plastic Packaging by Offering More Concentrated Version of Algaecide**

Arch Chemicals' HTH Water Products business is scoring another victory for Sustainability as it switches from offering a 10% HTH® algaecide product in a gallon plastic container to a more concentrated, 30% algaecide product in a container that is about one-third the size. The algaecide in the new, smaller container will allow 100% more product to fit in the same shelf space at the store. The new, more concentrated algaecide was first offered to retailers in 2010. By the time the gallon containers of algaecide are phased-out, the switch to the smaller plastic containers will offer the following sustainability benefits:

- Reduction of water use by 733,000 gallons per year. This is enough water for 20 Americans for one year.
- Elimination of more than 81 tons of plastic packaging per year.

- Elimination of more than 100 tons of corrugated cardboard packaging -- the equivalent to saving approximately 800 trees per year!
- Reduction of wood usage by eliminating more than 4,500 pallets per year.

This new sustainability packaging initiative is the result of a collaborative effort among product management, packaging, marketing, regulatory and technology teams at HTH Water Products. The new, smaller algaecide packaging qualifies for a Packaging Score improvement at Wal-Mart, a major retail customer for HTH Water Products and a leader in encouraging its suppliers to implement sustainability and other “green” improvements in its products and packaging.

Wade Beebe, Business Director, HTH Water Products, adds, “We are continuously focusing on ways to reduce our carbon footprint through packaging redesign, product innovation and supply chain improvements. These efforts not only help us support customer initiatives and improve profitability, but it’s just the right thing to do.”

- **Arch Kentucky Plant Receives Industrial Retrofit Grant to Reduce Energy Usage and Carbon Emissions**

Arch Chemicals’ Performance Urethanes manufacturing facility in Brandenburg, Kentucky, is one of three companies in the state receiving an Industrial Facility Retrofit grant from Kentucky. The funding, which was provided to the state by the federal government through the American Recovery and Reinvestment Act of 2009, is being used by the companies for energy-efficiency upgrades of their manufacturing facilities.

The \$450,000 in grant money was used by Arch in early 2011 to install a condensing economizer on the existing natural gas boilers. The economizer’s function is to lower the flue gas temperature and condense a portion of the water in the flue gas into a liquid. The heat that comes from the condensation is used to assist in pre-heating the water that is used to produce steam. This will significantly reduce natural gas consumption -- thus saving energy -- and reduce greenhouse gas generation by 2,000 tons per year.

GE, Arch and International Paper were selected through a competitive request for proposals process conducted by the Kentucky Cabinet for Economic Development. Thirteen proposals were received, and recipients were chosen based on factors such as the number of jobs that would be created or retained and the amount of energy projected to be saved per grant dollar invested. The cabinet also considered the recipients’ degree of investment and impact in the local community and the ability to contribute matching funds.

- **Aquaculture: A Sustainability Breakthrough**

Arch is pursuing major opportunities to preserve and protect the vital, natural resources of fish and other seafood worldwide by providing our protective biocides for use in treating and

coating aquaculture nets to prevent the growth of “foulants” on the nets. These foulants not only restrict the free flow of oxygenated water to the fish or other seafood, but they also force aquaculture farmers to replace the nets frequently, which is both a costly move and one that stresses the fish.

It is estimated that in the next 20 years, aquaculture will satisfy more than 50% of the world’s growing demand for seafood. To address this megatrend, we have tailored our marine antifouling paint biocides for use as protective agents on aquaculture nets. Our biocides, for example, are being used in Australia and South Africa on nets in the first fish farms where prized blue-fin tuna are being raised.

The growth in aquaculture will also lead to innovative disease and hygiene management (e.g. safe antibiotics for fish feed) and to the use of chlorine-based sanitizers and conservation agents for fish processing and distribution functions. Indeed, Arch’s calcium hypochlorite sanitizers are already being used to clean shrimp farm tanks before a new batch of shrimp is raised and harvested.

The successful spawning and raising of southern bluefin tuna in captivity was hailed recently by Time Magazine as the Second Best Invention of 2009. This breakthrough promises rich harvests ahead for fish farmers and consumers worldwide who love tuna, whose natural stocks are severely depleted.

Arch is working with an aquaculture firm on the use of our Omadine® biocide as the antifouling agent in their blue fin tuna and salmon fish farm nets and pens in Australia and Tasmania. As they have done for more than 20 years on ships’ hulls, our environmentally preferable biocides deter the growth of algae and other foulants without persisting in the environment and harming valuable marine life. This, then, is the soul of sustainability -- raising threatened but prized species of fish in a sustainable manner for harvest and sale to consumers.

We already have business in Norway in fish net applications and are working with people in the U.S. and South America and Denmark to expand this application. This is a good, sustainable application where our biocides are valued because of their proven performance and because of our strong regulatory support and analytical ability to show that antifouling biocides can be used safely and successfully on fish nets.

- **Environmental Benefits of Preserved Wood**

Arch Wood Protection, by providing compounds that preserve and protect wood from fungal decay, insects such as termites, water and even flames, is helping sustain renewable forests and reduce greenhouse gas emissions. Preserved wood is made from plentiful species of wood; the only major building product that is sustainable.

- The trees come from managed timberlands where they grow rather rapidly. They are replenished in as little as two decades' time.
- The collection and processing of wood uses far less energy than that required for production of alternative materials, even when you add in pressure-treatment.
- The treating process extends the life of the resource, reducing demands on forests and eliminating the extra transportation necessary for shorter-lived products. Moreover, by giving renewable softwoods such as pine the durability and long life of hardwoods, the pressure treating industry helps reduce the devastation of teak, mahogany and other hardwood forests in Malaysia, Thailand and other developing regions.
- Growing trees absorb carbon dioxide and wood products sequester carbon -- two factors that reduce greenhouse gases.
- The treating process emits no wastewater, and government agencies classify the air pollutants as "insignificant."
- Copper-based preservatives are made largely from recycled materials, namely copper wire and etchants.
- Because wood is so strong for its weight, wood projects can often be installed with lighter-weight, lower-impact equipment than required to install other building materials.
- Wood provides noteworthy insulation – thermal, acoustic, and electrical.

On top of these environmental features, wood is readily available, easily modified and colored, and can be worked with common tools and without special skills. Wood has a natural appearance that people like – plastics are trying to look like wood; we don't try to make wood look like plastic. And, if that isn't enough, preserved wood is usually less expensive than competitive materials.

- **Arch Treatment Technologies' Wolmanized® Outdoor® Wood Has Substantial Sustainability Benefits over Wood Plastic Composite Decking**

A recently completed cradle-to-grave Life Cycle Assessment (LCA) has shown that Wolmanized® Outdoor® wood pressure-treated with copper azole preservative has substantial environmental benefits over wood plastic composite decking.

Conducted by engineering consultant AquAeTer, Nashville, for Arch Treatment Technologies, Inc., Atlanta, the detailed investigation indicates that composite decking requires 15-17 times

(depending on preservative formulation) more fossil fuel and 2.4 times more water than Wolmanized Outdoor wood, while resulting in emissions with potential to cause 2.9-3.0 times more greenhouse gas and 5.0-6.5 times more acid rain.

LCAs have been done on wood, treated wood, and micronized copper processes, but this is the first cradle-to-grave LCA on wood protected by micronized copper azole.

The production of Wolmanized Outdoor wood, which is protected by copper azole, is licensed by Arch Treatment Technologies to treating companies which use preservatives sold by Arch.

AquAeTer is a multi-disciplinary engineering firm providing scientific and technical services to a variety of industries. It has gained special expertise in developing LCAs related to treated wood. Not only is an LCA a tool for comparing alternative products, but it provides guidance on reducing environmental impacts. Copies of the executive summary and the entire 426-page study are available from Arch Treatment Technologies, [www.WolmanizedWood.com](http://www.WolmanizedWood.com).