



Chemistry Shapes the Future



Responsible Care®
OUR COMMITMENT TO SUSTAINABILITY

AICM

Sustainable Cases and Practices



SUSTAINABLE DEVELOPMENT GOALS

Preface

In recent years, natural disasters brought by climate change, melting glaciers, rising sea levels and the frequent occurrence of extreme weather indicate that the world has been affected by climate change. Climate change poses a growing threat to the world's development. Sustainable development is an important way to address climate change.

As the times go on, the global understanding of development is changing. Countries now agree that sustainable development offers the best path to improving the lives of people around the world which promotes prosperity, economic opportunity, social well-being and environmental protection. Thus in September 2015, the UN officially announced 17 sustainable development goals (SDGs) at the UN summit which are the inheritance and development of the UN millennium development goals (MDGs).

The 17 sustainable development goals aim to shift to a sustainable development path that addresses the social, economic and environmental dimensions of development. The chemical industry is the foundation for understanding and the key to overcoming the world's most pressing sustainability challenges. Chemical products must be produced in a form that protects the environment and human health and saves resources.

As the representative of international leading chemical enterprise in China, AICM commits to promoting the initiative of responsible care in China and sharing good practices and practices in the industry to promote the sustainable development of enterprises. RC is the vital foundation for sustainability, but not sufficient condition to achieve chemical sustainability. So, AICM setup sustainability subcommittee in mid of 2018 which is under RC Committee to response the latest policy trending and seek the sustainable solutions as well as share the sustainable practices within our members. Sustainability subcommittee aims to strengthen the communication with industry and government to create positive impact for stakeholders along the value chain, and assist them to achieve sustainable development.

This booklet is the first edition published by AICM and based on the information provided by 6 member companies. In the future, the information provided by member companies shall be updated irregularly. The booklet is a collection of innovations and contributions made by member companies in achieving the SDGs. Hoping to bring some enlightenment to peers and also want the public can really understand the efforts and contributions made by the chemical industry for the harmonious society and green development, and establish a positive image of the chemical industry.

Sustainable Cases and Practices from AICM Members

BASF



From trash to treasure for closing the food value chain – BASF's certified compostable biopolymer ecovio®

UN SDGs

BASF supports the United Nations Sustainable Development Goals (SDGs) in making our planet more sustainable. BASF contributes to the UN SDGs through our products and business solutions along the value chain.

Innovative sustainable solution

Sustainable consumption and production is about promoting resource and energy efficiency, sustainable infrastructure, and providing access to basic services, green and decent jobs and a better quality of life for all. In the face of climate change and a growing human population the concept of a Circular Economy is becoming more and more important for the food and nutrient cycle.

Biodegradable plastics contributes to closing the food value chain. BASF's bioplastic ecovio® is a high-quality, completely compostable polymer. It consists of BASF's biodegradable polymer ecoflex® and polylactic acid (PLA), which is derived from renewable resources based on sugar. ecovio® is biodegraded by microorganisms and their enzymes, leaving only water, carbon dioxide and biomass. Under the conditions of an industrial composting plant – respective temperature, high moisture, defined oxygen content – biodegradation only takes a few weeks.

ecovio® products are just as high-performing and strong in use as conventional plastics. BASF has developed a material portfolio for a variety of applications, including agriculture mulch films, food packaging, garbage bags, among others. So far, ecovio® has been used in many cities and farms in China, making organic waste to valuable resources.

Contribution and benefit

Biodegradable mulch film for better yields and soil protection

In China, the conventional technique of using mulch film made from non-biodegradable polyethylene plastic is becoming a serious environmental problem. The film helps plants to grow by keeping heat and moisture in the soil, but all of the film is left behind in small, thin strips on the fields. When plowed under, the plastic pieces hinder root growth and thus lower future yields.

Farmers who have switched over to using biodegradable mulch film made from ecovio® have been able to increase their yields. This has also been proven by large-scale experiments that BASF has been carrying out for years in cooperation with local partners and organizations. For example, in one test field for potatoes in the province of Guangdong, yield was increased by 18 percent, which also reduced harvest costs by 11 percent.



Contribution and benefit

Compostable food containers ensuring food safety and facilitating segregated organic waste and composting

The latest application of ecovio® is for food takeout packaging, replacing single-use plastic lunch boxes and cups. At the 4th Taobao Maker Festival in 2019, Ele.me, Alibaba's food delivery platform, served food and drinks in paper bowls and cups coated with a thin layer of the certified compostable ecovio® PS 1606.

These bowls and cups can be composted together with separately collected food wastes in industrial composting plants, thus contributing to easier sorting of food waste and reducing environmental pollution of plastics. The resulting compost provides agricultural soil with valuable nutrients and helps fight soil erosion.



Caption:

The ecovio-coated bowls and cups can be composted directly after use with separately collected food wastes in an industrial composting facility.

Celanese



About Celanese

Celanese Corporation is a global technology leader in the production of differentiated chemistry solutions and specialty materials used in most major industries and consumer applications. Our businesses use the full breadth of Celanese's global chemistry, technology and commercial expertise to create value for our customers, employees, shareholders and the corporation. As we partner with our customers to solve their most critical business needs, we strive to make a positive impact on our communities and the world through The Celanese Foundation. Based in Dallas, Celanese employs approximately 7,700 employees worldwide and had 2018 net sales of \$7.2 billion. For more information about Celanese Corporation and its product offerings, visit www.celanese.com or our blog at www.celaneseblog.com.

Continued Steam Integration and Optimization of Heat Recovery Boiler

At Celanese, our goal is no harm to our employees or contractors, communities in which we live and our environment, while achieving 100 percent quality and reliability, employee development and growth. Our pursuit to be the first-choice chemistry solution for our customers begins with the collaboration, innovation and growth of our employees. We embrace our responsibility to be good stewards in all we do by taking leading actions for the safety of our customers, employees, partners, communities and shareholders – and by creating the materials we produce, while protecting our natural resources.

At the Celanese Nanjing Integrated Chemical Complex, a kettle boiler was designed in an acetic acid unit at the reactor cooling loop, providing cooling to the reactor and recovery process reaction heat simultaneously. Condensation from the unit is pumped into the shell side of the kettle boiler to generate low pressure (LP) steam. The steam can be regulated within a certain pressure range by pressure control valves and can supply the different needs of our downstream units.

From 2016 to present, tremendous improvements have been implemented, including steam pressure reduction to generate extra steam and optimize the downstream users' application. Others include efforts to balance the turnaround between different units.

This activity increased the steam generation of kettle boiler to almost triple the steam generation compared to the initial design. The total steam reduction from the external supply is approximately 25 ton/h.

DSM



Developing eco-friendly and healthy materials to promote green transformation of the coatings and Paint industry

DSM is a global purpose-led, science-based company specializing in Nutrition, Health and Sustainable Living, dedicated to creating brighter lives for all.

With the sustainability as the core value, DSM integrates it into all business activities. On the one hand, relying on its scientific innovation capacity DSM continuously update and develop the sustainable products, meanwhile enable and support the customers and industries in sustainable transformation. On the other hand, DSM constantly improves its environmental performance and increases its social participation and shared values with stakeholders, and gradually moves towards a comprehensively sustainable business mode.

In China, DSM has made an important contribution to the comprehensive use of waterborne coatings by container suppliers. Through the Water-based Coating Platform and after many years of efforts, DSM cooperating with the industry upstream and downstream eventually led to a comprehensive "Oil-to-Water" action in China's container industry, which reduced the average annual Volatile Organic Compounds (VOC) emissions from 140,000 tons to 12,000 tons. In China, 8 out of 10 TEU containers are coated with DSM water-borne resin.

In June 2019, DSM with China Cheryang Group-a professional manufacturer of environmentally friendly coatings, jointly launches a new "Discovery Plant-based Paint" for Children. Discovery® is a new environmentally friendly coating resin provided by DSM for this paint. Its raw materials mainly come from plants, such as seeds, bark, Castor seeds and other agricultural wastes, so it is called "plant-based".

Discovery® is also good for people. Specifically, it is low release in Volatile Organic Compounds (VOCs) and other toxins during their production and processing. The new type of paint based on Recovery® has dual characteristics of environmentally and health friendly, so it is especially recommended to used for Children's room wall and furniture etc.

DUPONT

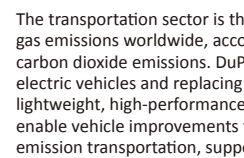


DuPont has a renewed energy and a new purpose - to empower the world with the essential innovations to thrive. Our ability to bring sustainable solutions to market is an absolute expectation of our customers, our shareholders, our employees and our communities. To fulfill our ambitions, nothing short of bold thinking and more importantly, bold doing, will get us there.

Our complex, hyper-connected world is changing fast and the sustainability challenges the world is facing are evolving even faster. As a founding member of the World Business Council for Sustainable Development, DuPont has been a sustainability leader for decades and committed to using a science-based approach to our innovations and our goals. It is how we contribute to solving the world's biggest challenges.



Southern California's Orange County Water District's Groundwater Replenishment System utilizes DuPont's FILMTEC™ reverse osmosis membranes to treat and transform wastewater into over 100 million gallons of clean drinking water every day. FILMTEC™ reverse osmosis elements clean roughly 14 liters of water per minute for each man, woman, and child on the planet.



The transportation sector is the fastest growing generator of greenhouse gas emissions worldwide, accounting for about 23 percent of total global carbon dioxide emissions. DuPont is improving motors and batteries in electric vehicles and replacing heavy metal automotive parts with lightweight, high-performance transportation resins. Our technologies enable vehicle improvements for safer, more fuel-efficient, and lower emission transportation, supporting a lower carbon economy.



DuPont's production process for DuPont™ Nomex® fibers yields a secondary product, hydrochloric acid that is traditionally not considered to be marketable. DuPont partnered with Gonvarri Steel Services to create a beneficial use of this byproduct, eliminating both the byproduct waste and the required neutralization process. This initiative also significantly reduces annual water use, electricity consumption, and ground transport.

We manage risks associated with our operations and products by: striving to prevent injuries, illnesses, and incidents; meeting or exceeding all applicable regulations; and continuously improving our Responsible Care® Management System.

Ingevity's Sustainability Mission Statement -- we integrate responsible economic, environmental and social principles into our global business strategy and decision making. Our objective is to create value for Ingevity and all of its stakeholders by purifying, protecting and enhancing the world around us, today and well into the future.

On the recovery system of Ingevity Special Materials (Zhuhai) Co., Ltd. Installed RTO, RTO is efficient organic off gas treatment equipment.

The continuous improvement of Ingevity Special Materials (Zhuhai) Co., Ltd. will not stop. The RTO case is only one of many cases of Ingevity Special Materials (Zhuhai) Co., Ltd., like Zhuhai's Auto Tech Lab (similar to the one in Chas) recycles used gasoline into the employee shuttle buses, Use the sawdust as the raw material which leftover by furniture produce, etc.

Ingevity provides specialty chemicals, high-performance carbon materials and engineered polymers that purify, protect, and enhance the world around us.

For more information visit: www.ingevity.com.



In 2018, PPG embedded additional sustainable practices into its operations, introduced new sustainably advantaged products for customers, achieved a record low in injury cases across the company, advanced its global community engagement initiatives, and launched a new set of sustainability goals, guiding the company to further embed sustainability into its day-to-day operations and measure its progress. Preserving and protecting the environment: PPG is committed to using resources efficiently and driving sustainability throughout its entire value chain to preserve and protect the environment in which the company operates.

- 32% of sales from sustainably advantaged products and processes, such as its low-cure automotive paint process that allows customers to use 39% less energy;

Before we introduced our new low-cure paint technology in 2018, approximately 70 percent of total energy consumption at an automotive assembly facility took place in the paint shop. The new technology uses up to 39 percent less energy through a next-generation clearcoat that cures at about 175 F (80 C) compared to nearly 285 F (140 C) for current systems. Added benefits include a simplified manufacturing process and smaller paint shop footprint.

- 29% of manufacturing and research and development locations with zero waste to landfill;
- 28% improvement in the spills and releases rate;
- 7% reduction in water intensity;
- 6% reduction in waste disposal intensity.

Beautify our communities: PPG and the PPG Foundation collaborate and engage with employees, community partners and other stakeholders to make the company's vision of bringing color and brightness to communities a reality. In 2018, PPG and the PPG Foundation:

Completed over 235 COLORFUL COMMUNITIES project since the program's launch in 2015 – a significant milestone that allowed the company to impact more than 5.3 million people in 36 countries; Donated more than \$9 million globally; and Logged nearly 25,000 employee volunteer hours.

SABIC is a global leader in chemicals

From making cars and planes more fuel-efficient, to contributing towards water conservation, and helping enable colourful smartphone cases, we find solutions to the challenges of today to help our customers achieve their ambitions and build a better tomorrow.

11 可持续 城市和社区



Supplying waste heat for homes

SABIC's plant in Geleen in the Netherlands, is running an innovative project to deliver captured waste heat to the local district utility provider with benefits for all involved. Capturing the waste heat delivers an energy efficient heating solution for the neighboring community, replacing the need for natural gas and so reducing greenhouse gas emission.

12 负责任 消费和生产



Bio-based feedstock in the Netherlands

SABIC is able to crack bio-based feedstock in our naphtha crackers, to make polymers based on renewable feedstock. This alternative raw material reduces the use of fossil-based feedstock up to 80% and sequesters up to 2 kilos of CO2 per kilo of manufactured polyolefin.

14 水下生物



Innovative fertilizers

In conjunction with some of the world's major food producers, SABIC has developed pioneering agri-nutrient solutions to improve crop yield while reducing impact on the environment. SABIC recently developed innovative fertilizers that reduce run-off from fields, so aiding greater protection of our waterways. Incorporating a new process which coats the urea in a fully biodegradable plastic, the fertilizers contain similar efficacious levels of nitrogen as standard urea but lasts 50% longer. SABIC, in association with manufacturing partners SAFCO and SABTANK have been awarded the "Protect and Sustain" certification from the International Fertilizer Association for its product stewardship in the agri-nutrients industry.

One of the biggest challenges Trinseo face as a company in the plastics industry is the global issue of waste, litter, and the environmental impact of plastics. In addition to Trinseo operational efforts, and their mission to provide innovative, sustainable solutions to their customers, Trinseo see an increasing need to find innovative solutions to these issues that have great significance to the environment and in communities across the globe.

Trinseo Innovative Styrenics Circular Solutions

Trinseo supports proactively advancing polystyrene recycling solutions to help address the issue of plastics waste, and is helping to lead an industry initiative to work toward an objective, technology-based strategy and vision for the plastics and packaging industry, guided by circular economy principles.

Styrenics Circular Solutions (SCS) is a joint industry initiative formed by a group of leading styrenics manufacturers in Europe, incorporated in 2018. The SCS members are united by the common goal of transforming the styrenics industry by maximizing polystyrene's value as a fully and infinitely recyclable material.

In polystyrene, Trinseo recognize an opportunity to truly close the loop: full recycling back to the monomer and virgin polystyrene is possible.



The prevention and limitation of pellet, flake, and powder loss is a priority in the plastics industry, and a critical issue for our environment. Spilled pellets, flakes, and powder can move into local waterways and eventually into estuaries and oceans. Beyond being a litter issue, these pellets, flakes, and powders can harm birds or marine animals.

Trinseo have signed the "Pledge to Prevent Resin Pellet Loss," and are conducting in-depth assessments of each facility's level of implementation of the OCS program.

During 2018, Trinseo facilities did not have any spill events that released significant or reportable amounts of plastic pellets or flakes into the environment.

AICM MEMBER COMPANIES



*截止2019年11月底



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