Testimony

of

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before the

Subcommittee on Research and Technology
of the House Committee on Science, Space and Technology

Hearing

"Benign by Design: Innovations in Sustainable Chemistry"

2318 Rayburn House Office Building

July 25, 2019

10:00 a.m.

Good morning Chairwoman Stevens, Ranking Member Baird and members of the Research and Technology Subcommittee. Thank you for inviting me to testify this morning about BASF's views on sustainable chemistry and the Sustainable Chemistry Research and Development Act of 2019. I am Mitch Toomey, Director of Sustainability for North America for BASF Corporation.

About BASF Group and BASF Corporation

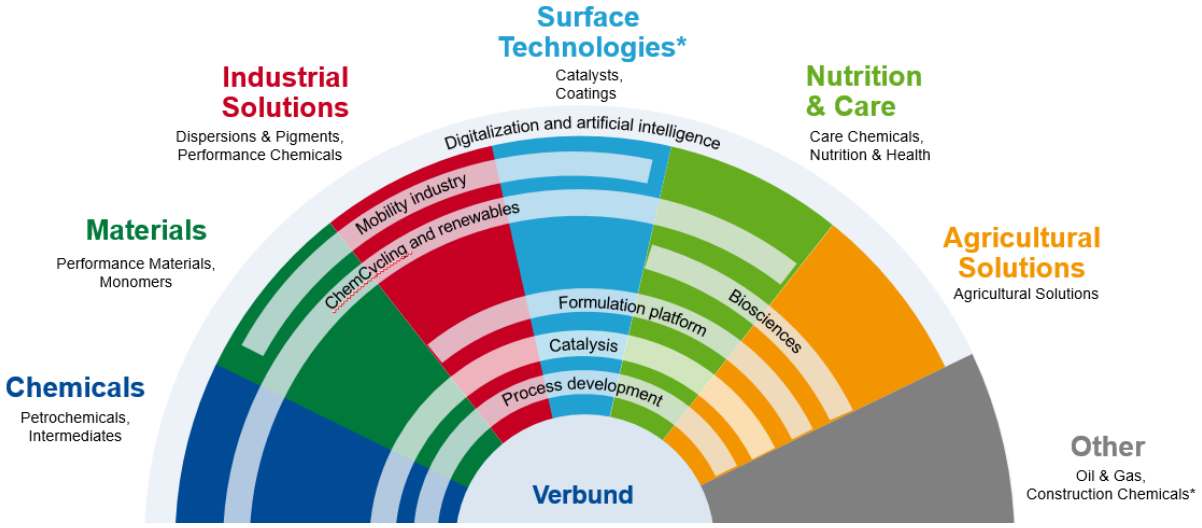
At BASF, we create chemistry for a sustainable future. We combine economic success with environmental protection and social responsibility. The approximately 122,000 employees in the BASF Group work on contributing to the success of our 9,000+ customers in nearly all sectors and almost every country in the world. BASF generated sales of around $70 billion in 2018.

BASF Corporation, headquartered in Florham Park, New Jersey, is the North American affiliate of BASF SE, Ludwigshafen, Germany. BASF has more than 20,000 employees in North America, including more than 16,000 employees in the United States. BASF operates at more than 100 sites in 30 states including Michigan, New Jersey, New York, Illinois, Tennessee, Ohio and California.

BASF Group operates globally six Verbund sites[1] and 355 other production sites, including 100 production and R&D sites in North America. The United States is home to two Verbund sites.

Chemistry plays an essential role in almost every aspect of our daily lives with over 95% of all manufactured products relying on chemistry.[2] As the leading chemical company worldwide, BASF supplies ingredients and solutions that house, feed, drive and care for the world. Our portfolio is organized into six segments: Chemicals, Materials, Industrial Solutions, Surface Technologies, Nutrition & Care and Agricultural Solutions.

BASF Portfolio



*** Target picture, until signing of a transaction agreement Construction Chemicals will be reported under Surface Technologies**

[1] See section on BASF Verbund and the Circular Economy

[2] International Council of Chemical Associations, The Global Chemical Industry: Catalyzing Growth and Addressing Our World's Sustainability Challenges. https://sdg.iisd.org/news/icca-report-highlights-chemical-industrys-contribution-to-global-economy/

BASF Corporate Purpose

Our purpose “We create chemistry for a sustainable future” reflects what we do and why we do it. We want to contribute to a world that provides a viable future with enhanced quality of life for everyone. We do so by creating chemistry for our customers and society and by making the best use of available resources. We live our corporate purpose by: sourcing and producing responsibly, acting as a fair and reliable partner, connecting creative minds to find the best solutions for market needs. For us, this is what successful business is all about.

BASF is only successful if our products, solutions and technologies add value to society. Integrating sustainability deeply into our business models and business conduct secures the long-term success of our company, creates business opportunities and establishes us as a key partner supporting our customers.

At BASF we want to be a thought and action leader in sustainability and we therefore increase the relevance of sustainability in our business decision-making processes.

BASF Market Drivers

At BASF, we understand the challenges for a more livable and sustainable future. Towards 2050, several megatrends will trigger changes in our societal, environmental and economic systems: projected population growth towards 10 billion people, a doubling of per capita income and close to 70% urbanization with more than another billion people moving to cities will drive this unprecedented growth.

Needs and demand for housing, food, mobility and further products and services as a consequence will increase dramatically. As we are already overstepping planetary boundaries, regional and global challenges are imposing themselves: climate change, over-use of resources, elimination of ecosystems as well as commercial and consumer demand for more sustainable chemistry in everyday products.

At BASF we are committed to seizing the innovation challenge and new opportunities of creating chemistry for a sustainable future. We need to transform fast because time is pressing, and sustainable solutions are becoming increasingly imperative.

BASF Corporate Commitments

Business success tomorrow means creating value for the environment, society and business. This is why the highest level of management at BASF, the Board of Executive Directors, oversees sustainability to ensure it is integrated into management and business strategies. BASF Chief Executive Officer, Martin Brudermüller, makes sustainability thought and action leadership a priority. He is a founding member of the CEO-led Alliance to End Plastic Waste and Global Battery Alliance of the World Economic Forum.

Through our corporate commitments we systematically incorporate sustainability into our business. These commitments cover every part of our value chain and operations to deliver long-term business success:

BASF's Verbund and the Circular Economy

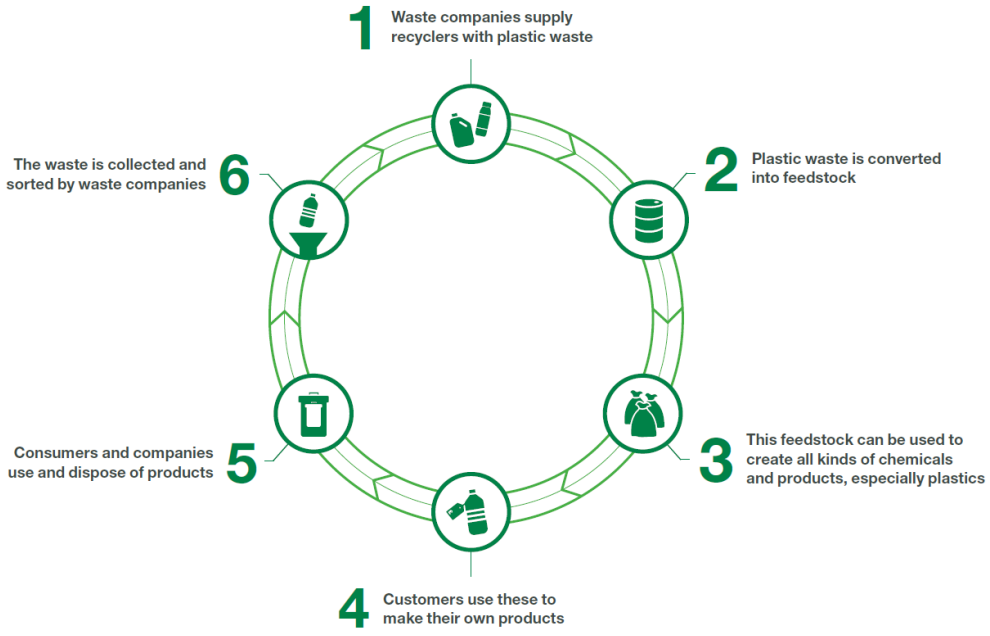
Our unique *Verbund* concept is one of BASF's greatest assets. *Verbund* is a German language term that means a highly integrated and interdependent system. It is an example of our long-term commitment to the circular economy and its underlying objective to design out waste, close cycles and use products and resources in the best way possible across the entire value chain.

The driving principle of the Verbund concept is to add value through the efficient use of resources. Our Verbund system creates efficient value chains from basic chemicals right through to high-value-added products such as coatings and crop protection products. The by-products of one plant are used as raw materials of another. In this system, chemical processes consume less energy, create less waste and therefore conserve resources. BASF operates six Verbund sites which produce more than 50% of our volumes. This is a testament to the importance and strength of the Verbund concept within BASF.

In addition to our Verbund systems, BASF is investing in cutting-edge technologies to speed up the transition to a circular economy. Our biomass balance approach replaces a certain amount of fossil raw materials with renewable feedstock, which is partially derived from waste, as input in chemical processes. This amount can then be allocated to the respective sales products using the novel certification method.

BASF is breaking new ground in the circular economy recycling plastic waste as a source of raw materials in our ChemCycling project. ChemCycling is one example of how BASF is working on innovative technologies that advance the circular economy.

BASF Chemical Recycling: From plastic waste to new chemical products

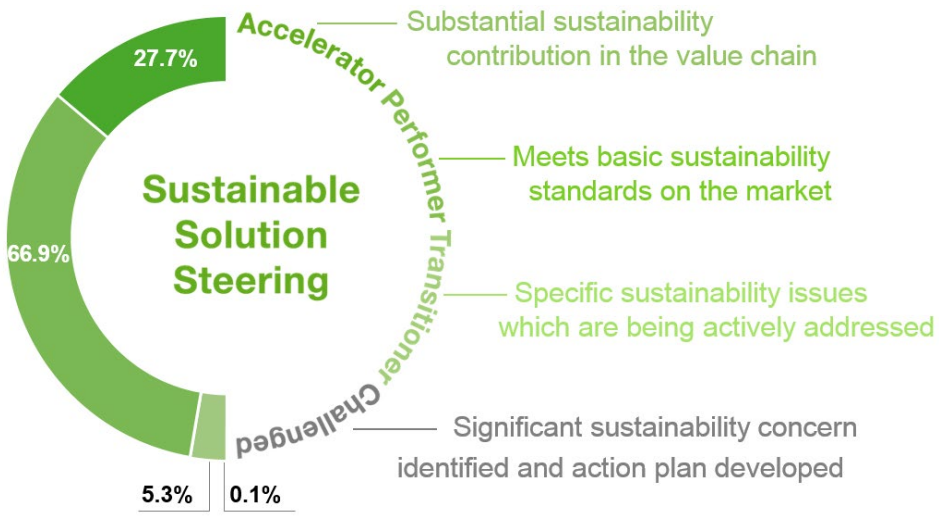


Sustainable Solution Steering

Since 2013, our Sustainable Solution Steering methodology is used to systemically evaluate the sustainability performance of our products. We use this portfolio analysis to assess the sustainability performance of our products taking into consideration the economic, environmental and social impacts of a product and its application in various markets and industries. Products are categorized as Accelerators, Performers or Challengers.

BASF has conducted sustainability assessments and ratings for 96.5% of our entire relevant portfolio of more than 60,000 specific product applications – which account for $63 billion in sales.

In 2025, BASF aims to generate around $24 billion in sales with Accelerator products. These are products that make a substantial sustainability contribution in the value chain. To achieve this goal, we will deeply integrate our sustainability assessments into the R&D pipeline, business strategies and merger and acquisition projects. This demonstrates our belief in our innovation power and our commitment towards more sustainable products.



We identify substantial sustainability concerns for our Challenged products and developing action plans. These action plans include research projects, reformulations or even replacing one product with an alternative product. At the end of 2018, action plans had been created for 100% of Challenged products. To systematically align our portfolio with contributions to sustainability, as of 2018 we will phase out all Challenged products within five years of initial classification as such at the latest.

Because of increasing sustainability requirements on the market, we regularly conduct reassessments of existing product categories as well as of the relevant portfolio.

Examples for Accelerator solutions:

- **ecovio® M 2351** is a certified compostable compound for film extrusion based on our biodegradable copolyester ecoflex® and polylactic acid (PLA). Due to its outstanding mechanical strength ecovio® M2351 offers a great down-gauging potential needed for thin agricultural mulch films. Its full biodegradability allows for direct plowing-in of soil after harvest.
- **Natuphos® E** is a phytase enzyme product, which helps pigs and poultry better utilize phosphorous, bringing a wide range of benefits not only to the animal feed industry. Feed manufacturers and farmers benefit from considerable cost savings. It also contributes to more sustainable feed, helps to reduce water pollution and to care for the environment by making animals generally more efficient at digesting their feed.

  Neopor® GPS is a graphite polystyrene (GPS) rigid foam insulation that gives maximum efficiency, cost-effectiveness and sustainability on construction projects. Thanks to its tiny graphite particles, Neopor® reflects and absorbs infrared radiation and offers up to 20% better insulation than the insulation classic Styropor®, allowing the use of thinner boards.

Carbon Management at BASF

As an energy-intensive company, we are committed to energy efficiency and global climate protection. Since 1990 we have halved our greenhouse gas emissions – while more than doubling our production. Around half of our total annual research and development spending goes toward developing low-carbon products and optimizing our processes. In 2018, the use of BASF climate protection products by our customers prevented 640 million metrics tons CO2 emissions.

Martin Brudermüller, our CEO announced in November 2018 a target of CO2-neutral growth until 2030 for BASF. We will do this through:

- Operational excellence to improve energy and process efficiency
- Using a greater proportion of renewable energies in our power supply
- Developing breakthrough technologies for those basic chemicals which are most energy consuming

Sustainable Cities and Communities

Transportation and Mobility

BASF is the largest supplier to the global automotive industry. Our broad portfolio provides solutions to reduce CO2 emissions in the use phase through lightweight materials, chemistries for cleaner, more efficient engines such as catalysts for the four-way catalytic converters and diesel emissions reduction technologies, as well as battery solutions for e-mobility.

BASF is focused on perfecting the battery materials powering today's electric and hybrid vehicles and developing next-gen technology to meet the anticipated needs of the battery market. Our goal is to be the preferred supplier of battery materials to the automotive industry in the U.S. and globally. We are the first cathode material producer to have a presence in the U.S. with manufacturing facilities in Ohio and Michigan. This proximity to the North America auto industry is a strategic move, enabling us to meet production capacity needs and closely collaborate to solve industry challenges.

Building and Construction

For over 50 years, we have worked closely with industry stakeholders to enable successful sustainable construction projects. With BASF chemistry, buildings can be more durable and require fewer resources for maintenance. Chemistry also makes buildings more energy efficient, thus protecting our environment.

BASF chemistries help make communities safe and resilient. In the building and construction industry, for example, we can build and retrofit stronger and more storm-resistant, climate-resilient homes, buildings and structures with disaster mitigation in mind.

Already well known for its energy efficiency savings in high performance homes and buildings, BASF Spray Polyurethane Foam (SPF) is gaining recognition for its ability to improve the disaster resiliency of homes and businesses. In fact, closed-cell foams are even recommended by FEMA for homes in flood-prone areas.

Sustainable Agriculture

BASF has developed innovations for sustainable farming for food, feed and fiber production for over 100 years now. Sustainable agriculture can protect the environment and conserves resources by using land, water and other natural resources efficiently and effectively.

Our products range from conventional fertilizer and crop protection products to modern biotech solutions and pheromones. We are committed to product responsibility every step of the way – in development, production, use and disposal.

We partner with farmers to help them grow crops efficiently, yet sustainably, providing training to ensure that they use our products correctly. We supply expertise, innovative services and technologies to support farmers, their families and their communities.

Home and Personal Care

We are a global leading supplier for the personal care industry, and the detergents and cleaners industry, and support our customers with innovative and sustainable products, solutions and concepts. We have been presented with the U.S. EPA Safer Choice Partner of the Year award on multiple occasions, an honor which recognizes the leadership contribution and outstanding achievement in the design, manufacture, selection, and use of products with safer chemicals. Additionally, The Natural Products Association awarded BASF for having the largest selection of natural ingredients for cosmetic manufacturers.

As of 2018, BASF only purchases RSPO-certified sustainable palm oil for our personal care specialty customers, a move that transformed the industry. BASF is also leading the way in digitalization and transparency in the beauty sector: the first ingredient supplier to launch an online resource - The Ingredient Insider Tool – that allows formulators to pick from more than 500 BASF products based on their compliance with the various industry lists showing what materials are banned by retailers or consumer groups.

BASF Values Diversity in its Workforce

At BASF, the values of diversity and inclusion are fundamental to how we create chemistry for a sustainable future. We are committed to attracting, developing and retaining great female talent in manufacturing. We value the differences in our workforce. They make us stronger. They are essential to the success of our business. And they help us continue to be a “partner of choice” with key customers. Building an inclusive environment that encompasses diversity of gender, race, experience and

points of view is paramount not only to our future success, but to our ability to attract and retain the best people.

To this end, BASF supports the Equality Act (H.R. 5), which the House of Representatives passed in May. BASF is one of 220 corporate members of the Business Coalition for the Equality Act, who supported the legislation.

In addition, we note that women constitute one of manufacturing's largest pools of untapped talent. Female employees totaled 47 percent of the U.S. labor force in 2018, but only 29 percent of the manufacturing workforce. BASF is addressing areas, such as early outreach, to help young girls appreciate the value of a career in manufacturing.

Innovation at BASF

Innovation has made BASF the leading chemical company worldwide. We develop innovative processes, technologies and products for a sustainable future and drive forward digitalization in research worldwide. This is how we ensure our long-term business success with chemistry-based solutions for our customers in almost all sectors of industry.

We had more than 11,000 employees involved in research and development in 2018. Our three global research divisions are run from our key regions – Europe, Asia Pacific and North America: Process Research & Chemical Engineering (Ludwigshafen, Germany), Advanced Materials & Systems Research (Shanghai, China) and Bioscience Research (Research Triangle Park, North Carolina).

The number and quality of our patents attest to our power of innovation and long-term competitiveness. We filed around 900 new patents worldwide in 2018. In 2018, we once again ranked among the leading companies in the Patent Asset Index, a method that compares patent portfolios industry-wide.

Due to the growing demands from our customers for sustainability, more and more of our innovation initiatives focus on sustainability gains. For example we have partnered with Greentown Labs, the largest clean technology incubator in the United States, to issue an open innovation challenge around the issues of battery recycling, plastics and digital tools (further details available in this press release https://www.greentownlabs.com/news-post/greentown-labs-and-basf-jointly-launch-the-greentown-labs-circularity-challenge-to-advance-innovation-for-a-circular-economy/)

Sustainability Networks

At BASF we understand that sustainability requires dialogue and partnership with stakeholders. We engage in sustainability networks to better understand trends in society as the drivers of our business, help shape measurement and performance standards, and partner for joint contributions to sustainable development.

We are an active member of the Green Chemistry and Commerce Council (GC3) Corporate Member Network. We are a signatory to the GC3's Joint Statement on Using Green Chemistry

and Safer Alternatives and founding member of the Sustainable Chemistry Alliance, which strongly support the Sustainable Chemistry R&D Act.

We have been a member of the U.N. Global Compact since 2000 and hold membership in a number of stakeholder groups including the World Business Council for Sustainable Development, Alliance for Water Stewardship, Global Business Initiative on Human Rights, Circular Economy 100 and Together for Sustainability.

We engage at the highest levels and take leadership roles within our trade associations including the American Chemistry Council on sustainability initiatives, participating in the Sustainability and Market Outreach Committee and work of the Plastics Division. Our CEO, Martin Brudermüller, worked with the ACC and its members to form the Alliance to End Plastic Waste. A BASF colleague also chairs the Sustainability Task Force at the National Association of Manufacturers. Both organizations are supporters of the Sustainable Chemistry R&D Act.

The Sustainable Chemistry Research and Development Act of 2019

As a member of the Green Chemistry and Commerce Council, and a charter member of its Sustainable Chemistry Alliance, BASF proudly supports the Sustainable Chemistry Research and Development Act, H.R. 2051. We are encouraged by the increasing support for this legislation that seeks to coordinate federal activities including research, development, demonstration, commercialization, education and training efforts in sustainable chemistry.

At BASF, we see global market and regulatory drivers for the development and use of more sustainable chemistry throughout the value chain, the challenges companies face in finding suitable sustainable alternatives and the role of innovation in addressing this challenge. By better coordinating and focusing existing relevant federal R&D, H.R. 2051 can help guide researchers, especially in academia and smaller companies, to focus their development activities on sustainable chemistry and generate the innovation that is needed to bring these better chemistries to market faster.

The Role for Government-Supported R&D

The majority of research and development (R&D) in industry is funded by business units with established manufacturing and technology platforms. The result of this is that most R&D is heavily focused on “D” to enable the use of existing platforms and exceptionally little “R.” The utilization of existing assets truncates the timeframe for new products to be manufactured and introduced into the market place. Transformational technological solutions rarely fit in to existing industrial platforms (assets & infrastructure) and often require new manufacturing capabilities involving significant capital expenditures. From a business perspective, this is a high-risk scenario having a questionable probability of success in which industry tends to avoid.

Government support for fundamental research is critical to develop and demonstrate transformational technologies where industry will not invest due to the high risk. Funding of basic research by the government de-risks new technologies and provides industry with a starting pathway to new opportunities. Once proof of concept is demonstrated and perhaps some initial scale up, then industry can engage and help move the technology to the market.

For example, the Advanced Research Projects Agency – Energy ("ARPA-E") plays an essential role in R&D for the energy sector. BASF has been a major sponsor of the ARPA-E Energy Innovation Summit since 2012. Moreover, our President and CEO for North America, Wayne Smith, has been a keynote speaker at ARPA-E for two of the past four conferences. ARPA-E showcases innovative promising technologies across the energy landscape and provides multiple avenues for collaboration to companies like BASF such as venture capital investing, new business development, joint research initiatives and manufacturing support. This model works because of the government and private sector working together to promote innovation.

Furthermore, ARPA-E funding opportunity announcements allow for companies to participate in specific programs where research funding is available that can be used to de-risk new ventures that have a high probability of failure, yet if successful have a tremendous impact.

Conclusion

Thank you again for inviting me to talk about BASF's views on sustainability and sustainable chemistry and the reasons we support the Sustainable Chemistry Research and Development Act. I would be glad to answer any questions you have regarding my testimony.