

**U.S. House of Representatives, Subcommittee on Energy  
Committee on Energy and Commerce**

**Hearing Entitled: *“Building a 100 Percent Clean Economy: Solutions for  
the U.S. Building Sector”***

**Testimony by Curtis Zimmermann, PhD, J.D. on behalf of  
BASF Corporation**

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Chairman Rush, Ranking Member Upton and members of the Subcommittee, my name is Curtis Zimmermann. I am Manager and Government Liaison for BASF Corporation. BASF Corporation is the largest subsidiary of BASF SE, the world’s largest chemical company. BASF Corporation operates over 100 sites in 30 states and employs 20,000 people in North America. Many of our sites are in states represented by the distinguished members of this Subcommittee, so we appreciate the opportunity to testify today.

At BASF, we create chemistry for a sustainable future. Chemistry is an enabler for many solutions across all sectors of our economy. We are pleased to be able to share with you today some of those solutions for the U.S. building sector where our products and materials are delivering efficiency, energy savings, and resiliency in residential, commercial, and infrastructure applications. Importantly, we are using them in our own buildings, as well.

My current role at BASF Corporation includes working across many of our business platforms to support technology deployment and innovation. In my 30-year career, I have managed research teams for over 20 of them and worked in both Europe and the U.S. I hold a PhD in chemistry, a law degree where I am licensed to practice in New York, and I personally hold more than 20 patents on commercial products. Technology and innovation are critical pieces to solving the challenges facing our world, which, by 2050, is projected to hold nine billion people who will need food, water, and shelter.

I would like to highlight three key areas in this testimony. First, I would like to share what BASF Corporation is doing to make sure our own buildings and assets have improved efficiency and resiliency. Next, I would like to share about what we offer our customers and how our customers use our products and solutions. Lastly, I would like to share how we are working with the government, about our optimism for the future, and how maintaining a commitment to ongoing innovation across the energy sector, including in buildings that use energy, is critically important.

## **BASF's Internal Efforts to Support Sustainable Construction**

The quickest and most cost-effective way to extend energy resources is to make facilities more energy efficient and utilize renewable energy sources. One very important way that BASF maintains its commitment to sustainability is to ensure that our own buildings and assets are built, upgraded, and operated efficiently. With a product portfolio of over 600 different materials and technologies in 75 product categories, coupled with expert employees trained in building science, BASF leverages its own expertise to deliver high-performance solutions for our built environment. This is an important way to demonstrate that we believe in the sustainability, durability, and efficiency delivered by our own products and solutions. As such, I would like to provide a few examples:

### **1. BASF Corporate Headquarters – Florham Park, New Jersey**

In May 2012, BASF Corporation officially inaugurated its new corporate headquarters building in Florham Park, New Jersey. Our building was designed to achieve Leadership in Energy and Environmental Design (LEED®) Platinum standards and features a variety of BASF-enabled construction products that lower energy consumption and increase the building's life cycle. The 325,000 square foot building is one of the largest sustainable structures in New Jersey. The building utilizes water-saving features that reduce indoor water use by 40%, incorporates native and non-invasive plants that require 85% less water to survive, and collects rainwater that is filtered, cleaned, and reused for both irrigation and toilets. The building also features a superior ventilation system, which is 30% higher than in conventionally-designed buildings and incorporates natural daylight that illuminates 75% of the interior.

Nonetheless, optimizing energy performance was the top priority for BASF. In that manner, the building features a strategic orientation, situated on the longest axis from east to west, which minimizes exposure from the sun while optimizing daylight. Additionally, the building uses energy-efficient air handling units, glass, lighting, and office equipment, which consume 20% less energy than a conventionally-designed building.

BASF will install its first large-scale solar project at our headquarters this year. In Spring 2020, BASF will host a ribbon cutting for our solar carport project that features 5,904 solar panels covering 60% of the parking lot. The project will offset the equivalent GHG emissions of 5.5 million passenger car miles and provide 55% of the electricity for our site. Excess solar power generation, managed by net metering, will be exported back to the grid.

### **2. Lighting and Environmental Stewardship – Huntsville, Alabama**

BASF's Huntsville, Alabama facility, a site that produces three-way catalysts, is a site that walks the talk of environmental stewardship. All 600 employees are actively engaged in not only producing sustainable solutions for the automotive industry, but also ensuring their own facility

is just as sustainable. In 2018, the site was certified as Platinum Level Zero Waste Validation from UL, achieving 100 percent Landfill Diversion with 5 percent incineration with energy recovery. The BASF Huntsville facility is the first BASF facility and the only manufacturing facility in the Southeast currently validated to UL's Zero Waste to Landfill standard. This marks the second year that BASF Catalysts have achieved Zero Waste to Landfill Validation from UL and is the first year they achieved 100 percent diversion. Over the last year, the facility reduced trash by over 67 tons, diverted an additional 114 tons of waste from going to a landfill, increased recycling by 113 tons, and increased the direct reuse of waste materials by over 106 tons. Additionally, a new cooling water tower reduces the facility's water consumption by 200,000 gallons a year. Lastly, this is the second year that the city of Huntsville awarded the site the Air Pollution Control Achievement Award. In 2017, the site-wide LED conversion lighting project saved more than 1,000,000 kilowatt-hours per year of electricity (a 57% reduction) and reduced GHG emissions by more than 730 metric tons.

### 3. Site Roofing Upgrades – Alabama, New Jersey, New York

Each of BASF's facilities in McIntosh, Alabama, Iselin, New Jersey, East Setauket, New York and Tarrytown, New York have been retrofitted with our SKYTITE® closed-cell spray polyurethane foam (SPF) roofing system. This roofing system reduces energy consumption by having the highest aged R-value per inch at 6.3 of any insulation. The system also has the highest wind-uplift resistance providing substantial resilience, which is incredibly important in coastal areas experiencing severe weather events. Additional significant advantages of SPF include zero ozone-depleting, seamlessness and monolithic covering, i.e., it is self-fleshing and helps eliminate water intrusion. Also, because the system does not require any mechanical fasteners, which cause heat and cooling loss, there is no thermal bridging. SPF is lightweight and can be recoated indefinitely extending service life. SKYTITE® has also met the stringent Miami Dade County and Florida building code approvals.

### 4. Energy Service Upgrades – Tarrytown, NY

Our Tarrytown R&D site has embarked upon an aggressive energy efficiency program that includes a combination of newer energy efficient technologies e.g. HVAC, lighting, insulation and solar, in an effort to reduce energy consumption by more than 25%.

BASF is supportive of additional energy efficiency tools such as energy savings performance contracts (ESPC's) as offered by energy service companies (ESCO's) that provide a broad range of energy solutions including designs and implementation of energy savings projects, energy conservation, retrofitting, power generation and energy supply, and risk management. The savings in energy costs are often used to pay back the capital investment of the project. Energy Savings Performance Contracting, for example, has been growing at 13% per year and is very effective in quickly addressing the emissions from federal and other public buildings, allowing the retention of public monies for mission specific activities.

## **BASF's Commitments to Our Building & Construction Customers**

A key pillar of BASF's sustainability strategy is economic success. Like many large industrial companies, BASF operates in a globally-competitive industry and must compete to profitably make and sell our products and solutions. This means that in addition to leveraging the efficiencies that we can deliver in our own buildings and assets, we must also work to make sure our solutions deliver the same, if not more, efficiency, durability and cost-savings for our customers, as well. I would like to share a few examples of the solutions our customers are using:

### **1. HP+ Wall System for Residential Construction**

In 2015, BASF launched a new wall system for residential construction that maximizes efficiency, saves energy, and reduces the time it takes to construct a typical wall. This new wall system is called the HP+ Wall and features two types of insulating foams – spray polyurethane foam and graphite-enhanced polystyrene foam (NEOPOR®). This wall system is highly efficient and durable, but also substantially reduces the amount of lumber that would otherwise be required in typical home construction, up to 25%. This is a major cost savings for builders, who typically face some other their highest costs on lumber and labor.

Most importantly, however, is the insulating performance delivered by this system, which has allowed our customers, i.e., builders, to guarantee energy savings to their customers, i.e., homebuyers, of 30% better than code. Additionally, the design capacity of the HP+ Wall is up to 130% greater than the design capacity of a wall built with standard framing and OSB with full sheathing, making the HP+ Wall stronger than walls on a typical home. As such, equipping builders and consumers with solutions like HP+ Wall could not only improve the basic means for shelter in the event of unexpected weather disasters, but also allows homeowners to save on operational costs and energy bills along the way. BASF has continued to develop a series of HP+ Building Enclosure solutions, including vented and unvented attic assemblies, that significantly contribute to whole home performance.

### **2. NEOPOR® for Commercial Buildings**

BASF's graphite-enhanced polystyrene foam, NEOPOR®, a rigid foam board insulation, is used in a variety of commercial applications. NEOPOR® has the lowest embodied carbon of any available rigid insulation in North America and is used in hospitals, schools, office buildings and mixed-use retail to name a few. NEOPOR® would be considered a “workhorse insulation” for its use in several commercial construction applications including exterior insulation and finish system (EIFS), wall cavities, precast concrete panels, commercial roofing, and perimeter insulation. In addition to its energy performance, NEOPOR® does not trap moisture and will not perpetuate mold growth, making is a desirable material for resilient construction.

NEOPOR® foam is manufactured in over 25 locations across the United States employing hundreds who manufacture and distribute it. This foam is also GREENGUARD Gold certified for indoor air quality making it desirable for children in schools. Based on its chemistry and supported by a third-party environmental product declaration (EPD), NEOPOR® uses the fewest raw materials by weight to achieve a set thermal performance.

### 3. Green Sense® Concrete for Infrastructure

Our Green Sense® concrete is another example of a ubiquitous building material that has been improved from conventional concrete manufacturing. It is more than just a product, rather a philosophy around sustainable concrete formulations. Green Sense® formulations are developed to use local ingredients and advanced polymer technology which reduces the energy utilization, water consumption and CO<sub>2</sub> emissions during manufacturing. The substantial sustainable contributions of Green Sense® typically include a replacement of up to 70% of cement with recycled materials, 25% less energy needed for formulation and application, 45% of CO<sub>2</sub> emissions saved and 10% of batch water saved.

Additional sustainability enhancements of Green Sense® could also be achieved if adopted for 3D printing of concrete. The DOD and NASA are advancing 3D concrete printing technology for Automated Construction of Expeditionary Structures (ACES). According to ACES, 3D printing of concrete structures “reduces cost by 40 percent, construction time by 50 percent and the use of concrete materials by 44 percent. Additionally, it more than doubles the strength of walls, improves thermal energy performance by 10 times, reduces manpower by 50 percent and reduces the overall need for hard labor.”<sup>1</sup> It is inevitable that these developments will be leveraged to the public good for providing highly functional and aesthetically pleasing affordable housing.

#### A. One World Trade Center

BASF’s Green Sense Concrete® was widely used in rebuilding One World Trade Center, previously dubbed Freedom Tower, in lower Manhattan, New York City. The soaring structure at 1,776 feet with 2.6 million square feet of office space is a marvel of design and engineering. Green Sense® Concrete was able to meet both the sustainable construction requirements, as well as the structural requirements, from the Port Authority of New York. According to BASF’s Eco-Efficiency Analysis, 15,838,267 kg of CO<sub>2</sub> were prevented in the construction of the building’s first 40 floors.

#### B. Tappan Zee Bridge

Green Sense® Concrete was able to provide formulations that met the tests for compressive strength, permeability, durability, flowability, shrinkage, slump and consistency to help the new Tappan Zee Bridge meet its 100-year service life requirements.

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<sup>1</sup> Official website of the United States Marine Corps. <https://marines.mil/News/News-Display/Article/1943919/marines-engineers-conduct-a-first-of-its-kind-3d-printing-exercise>. Accessed 9/16/2019

## **BASF's Collaboration with Government and Commitment to Innovation**

Another area where BASF has worked on providing solutions is with the government. As the largest landlord in the U.S., the federal government owns and operates 376.9 million square feet in 9,600 buildings across 2,200 communities.<sup>2</sup> This fact alone should compel the government to lead by example for the rest of the private sector. There are a few ways that BASF has already engaged with government and we look forward to more collaboration in the future. BASF has already provided more than 100 million square feet of federal roofing formulations installed in the U.S. alone, including buildings for NASA, Navy, Army Corp of Engineers, Department of Energy, Department of Defense and many other agencies.

For example, BASF's WALLTITE® commercial insulating air barrier system, which is low VOC and zero ozone depleting, is installed in the U.S. Department of Defense's BRAC 133 at Mark Center Office Complex in Alexandria, Virginia, and the U.S. Department of Homeland Security's, St. Elizabeths West Campus, right here in Washington, D.C. This product is ideal for existing building projects as it can protect the original exterior design and prolong the life of the structure all while delivering exceptional energy efficiency. BASF will continue to support these efforts for new and retrofit construction in the future and partner with the government on other projects as well.

### **Disaster Durable Solutions®**

According to the National Oceanic and Atmospheric Administration (NOAA), the U.S. has sustained 250 weather and climate disasters since 1980 where overall damages/costs reached or exceeded \$1 billion (including CPI adjustment to 2019). The total cost of these 250 events exceeds \$1.7 trillion.<sup>3</sup> In an effort to provide solutions, BASF created Disaster Durable Solutions® in response to the growing frequency and severity of natural disasters. Utilizing BASF's closed-cell spray polyurethane foam (ccSPF) and trained contractors, this solution can dramatically improve the durability of a home in a major weather event. For example, the effects on residential wind uplift performance using ccSPF were recently evaluated by the University of Florida Gainesville's International Research Center and the test results showed for a typical residential roof there was a 220% performance increase with three inches of ccSPF uniformly applied on the entire underside of the roof deck and a 124% performance increase with ccSPF applied at the joints between the rafters and the roof deck. In addition to spray foam's ability to deliver energy efficiency and prevent air infiltration, ccSPF also helps prevent water and

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<sup>2</sup> General Services Administration. [www.gsa.gov/real-estate/gsa-properties](http://www.gsa.gov/real-estate/gsa-properties). Accessed 9/14/2019

<sup>3</sup> National Oceanic and Atmospheric Administration. <https://www.ncdc.noaa.gov/billions/overview>. Accessed 9/18/2019

moisture from permeating the home by creating an integral vapor retarder, which is critically important in major weather events.

### Future Innovations

Continuing innovation will be needed in building technologies to achieve maximum energy efficiency, sustainability and resilience. Improvements in the way we build structures that save energy and resources will need to be developed. This must couple with advancements in integration of the built environment between equipment within buildings, between buildings and ultimately the energy infrastructure to bring us closer to a clean energy economy. The DOE will play a critical role in advancing building technologies through the Building Technologies Office (BTO) Emerging Technologies (ET) Program, the Advanced Research Projects Agency-Energy (ARPA-E) and other DOE offices, as well as our National Laboratories. BASF will continue to develop innovative and sustainable solutions to support the demand for new materials for the future of the built environment.

### Conclusion

In conclusion, BASF Corporation is committed to providing energy-saving and emission-reducing solutions for the built environment – for our own buildings, for our customers, and even for the government. There are many ways to foster greater adoption and utilization of these chemistry-enabled solutions and technologies. BASF balances our sustainability commitments and practices with economic success and environmental protection. There is no reason this same approach cannot be adopted across the buildings sector, as well.

Some of the actions BASF is taking with our own assets are applicable to other large industrial companies, like ours, or with government buildings, e.g., energy savings performance contracts. Yet, the commitment to innovation and technology deployment needs consistent support. Process efficiency and new technologies coupled with building science advancements are important drivers that should be fostered. We at BASF are optimistic about the future and the solutions we are providing for the buildings sector.

BASF encourages the federal government to take a leadership role in supporting innovation and technology deployment by utilizing these solutions in its own buildings and helping to demonstrate how those solutions can be important business drivers in our economy, as well. As the distinguished leaders on this Subcommittee are fully aware, sustainability is not a far-fetched impossibility and businesses, like ours, are embracing new opportunities to continue to profitably grow, create jobs, and deliver chemistry-enabled solutions across the value chain. The building sector is not and should not be exempt from innovation and technology advancement and we are pleased to be able to help push the envelope, literally, to perform in a manner that serves both the market and the environment.