Subcommittee on Energy Hearing on "Building a 100 Percent Clean Economy: Solutions for the U.S. Building Sector" September 20, 2019

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The Honorable Fred Upton (R-MI):

- 1. BASF makes many different products, such as insulation, that help to improve building performance. Thank you for pointing out some of these in your written testimony.
 - a. How important is the "payback" period?

RESPONSE:

The "payback" period for energy codes is one way to determine cost-effectiveness of various efficiency measures used in residential and commercial buildings. Because there is no existing requirement to consider a specific type of payback period, there are multiple ways to consider it. Generally, it is used to characterize the value of a particular code or efficiency improvement and can be framed as a period of time (years) or cash flow (money) or even performance (percent improvement) versus earlier editions of codes or performance metrics.

For many years, the U.S. Department of Energy (DOE) did not undertake analysis on payback periods for energy codes, as it is not a requirement in the existing statute (42 U.S. Code § 6836 – *Support for Voluntary Building Codes*). However, due to requests from certain stakeholder groups, the DOE began voluntarily publishing its cost-effectiveness analysis, including its methodology, for calculating payback for energy codes beginning with the 2009 edition of the International Energy Conservation Code (IECC). This analysis covered both the model code and individual state outcomes. Initially, the DOE examined the payback period on the basis of life-cycle cost, but eventually expanded its analysis to include simple payback and cash-flow analysis. The most recent residential analysis can be found on DOE's website at this address: https://www.energycodes.gov/residential-energy-cost-savings-analysis

Per DOE, the definitions of the various payback periods which DOE analyzes include:

1) Life Cycle Cost (LCC) - the primary metric used by DOE to determine the cost-effectiveness of the overall code or specific code changes. LCC is the

total consumer cost of owning a home for a single homeowner calculated over a 30-year period. The economic analysis assumes that initial costs are mortgaged, that homeowners take advantage of the mortgage interest deductions, and that long-lived efficiency measures retain a residual value after the 30-year analysis period.

- 2) Simple Payback a measure of cost-effectiveness defined as the number of years required for the sum of the annual return on an investment to equal the original investment. Simple payback does not take into consideration any financing of the initial costs through a mortgage or favored tax treatment of mortgages. In other words, simple payback is the ratio of the incremental cost of construction and the first-year energy cost savings.
- 3) Cash Flow Analysis considers the fact that most homes are financed and includes the financial implications of buying a home constructed to meet the provisions of the current code compared to the provisions of the previous code(s). As mortgages spread the payment for the cost of a house or an apartment over a long period of time, the cash flow analysis clearly depicts the impact of mortgages.

Based on DOE's definitions, the different types of payback periods can render different outcomes in determining cost effectiveness, especially if it is used as the only criterion. In this manner, it is important to realize that homes and buildings, although constructed by builders and developers, are paid for by consumers and tenants. The payback period not only helps to frame costs or cost-effectiveness, but also long-term benefits of energy efficiency. For example, using a simple payback scheme could be detrimental for consumers who live in and operate the home or building long after the initial period. This approach may incentivize using the cheapest upfront cost considerations with the shortest payback, which ultimately may obscure the best value or benefits for consumers and tenants. A more robust view of payback is important for understanding true costeffectiveness for consumers, who ultimately pay for, and similarly benefit from, the efficiency that will accrue over the decades during which most homes and buildings operationally exist. This approach could potentially save thousands of dollars in retrofit costs for consumers and avoid energy inefficiencies at the outset.

Additionally, the relative lack of consideration or disclosure of energy efficiency for appraisal and home valuations can also affect the payback. Although some builders and real estate professionals provide information about efficiency features in a home, it is not a standard requirement and there is not a specific tool or metric used across the industry that effectively informs consumers about costs and payback. For example, survey data published by the National Association of Home Builders (NAHB) has shown that homebuyers are willing to pay more upfront for long-term efficiency, but it is challenging for builders to get those considerations built into the existing home valuation and appraisal process in a nationally-consistent manner. If efficiency, performance and operational cost information became a standard disclosure during the homebuying process, consumers could more accurately determine value and affordability and then make more informed decisions about upfront costs and payback.

b. What other factors, including Federal programs such as building energy codes, contribute to the cost-effectives of BASF products?

RESPONSE:

Federal programs that support energy efficiency, sustainability and resilience for homes and buildings can help provide a robust cost-effectiveness framework for residential and commercial construction in the U.S. While building energy codes are one important aspect, cost-effectiveness is not limited to energy efficiency alone. Sustainability, resiliency, and speed of construction are also some important co-benefits beyond saving energy – i.e., comfort, durability, etc. Recognition of these important features of building performance by federal programs, either within DOE or within other federal programs, e.g., Federal Housing Administration, could help provide consumers with additional protection from risk in natural disasters, e.g., hurricanes. Cost-effectiveness considerations should include energy efficiency performance, but also should recognize the important additionalities of sustainability and resilience. In this manner, it is much more cost-effective for consumers to make minor repairs to a home that stayed intact and potentially avoid rebuilding from scratch in major weather events. Any federal incentives to support greater consideration of this type of sustainability and resiliency for homes and buildings could further help protect what is often the largest store of personal wealth for most Americans, i.e., their home.

Regarding building energy codes specifically, BASF's products, like many of our peers and competitors, are evaluated on the basis of energy efficiency performance for compliance with energy codes. BASF's products, like insulation, help achieve both efficiency and comfort in residential and commercial construction. BASF's products also help builders achieve or exceed compliance with the model codes, which are developed through a consensus process that features builders, but also includes other stakeholders. The government recognizes this code development process because it draws on the expertise of the community which is directly affected by the codes. Because it is consensus-based, the process allows for thorough consideration of proposals to improve efficiency that is considerate of both costs and benefits. Importantly, building energy codes do not mandate specific products, but rather are developed in a manner that considers a number of factors contributing to the overall performance of the building envelope. As a material and product supplier to the efficiency value

chain, BASF supports the code development process and other measures to encourage greater efficiency in homes and buildings, which consume nearly 40% of all the energy used in the United States. BASF's products help deliver efficiency and that improves the cost-effectiveness for consumers who must pay for the energy used to heat and cool our nation's homes and buildings.