



# Paints

# and Coatings

## In Step with the Green Building Movement

By **Cynthia Challenger**, CoatingsTech Contributing Writer

The concept of green building has been open to many different interpretations. Despite this—and even though coatings only count for a very small fraction of the materials used in any type of building construction—the green building movement has had a significant influence on the paint and coatings industry. Coatings formulators and their suppliers have developed products and processes designed to meet the standards of the many groups that certify construction materials and/or the buildings made with them. These specifications continue to develop, and have moved beyond the initial focus on volatile organic compounds (VOCs). This evolution is expected to continue, and the hope is that some consolidation of the various certification requirements will occur as well.

A number of raw materials and coatings manufacturers spoke with *JCT CoatingsTech* about how the green building movement has influenced both the industry in general and their specific product development and manufacturing activities. Their thoughts follow.

### **CT:** How is the green building movement affecting the coatings industry?

*Duan (Valspar):* The coating industry has been an integral part of the green building movement. “Green” coatings can be achieved by offering one or all of the following: (a) products with significantly lower VOC emissions; (b) products that provide barrier properties for reducing building energy consumption, either by reflecting sunlight off the exterior of the building or by insulating the interior surfaces to prevent energy loss; (c) coatings (or packaging) that are made with renewable resources; and (d) coatings prepared via manufacturing processes that have a lower carbon footprint (green chemistry processes, which are rarely discussed and hard to quantify). We have seen a proliferation of products in the coating industry.

*Ruckle (Siltco):* The green building movement drives us to buildings with minimal impact on the environment. The largest of these impacts are expressed in terms of energy efficiency, water conservation, and waste generation; in other words, impacts that occur over the whole life of the building.

*Hosotte (PPG):* Green building standards aim at minimizing the environmental impact of buildings, and following the requirements can affect decorative paints. Specifically, they recognize and encourage the use of construction materials with a low environmental impact (including embodied carbon) over the full life cycle of the building and a healthy internal environment through the specification and installation of appropriate ventilation, equipment, and finishes.

*Romano (Evonik):* Certifications specific to buildings are pushing coatings into new directions. Formulators and their suppliers are starting to really focus on the overall carbon footprint of their products, and as a result, life cycle analysis is becoming more prevalent.

*Reinsadtler (Bayer MaterialScience):* The green building movement is creating certain preferred sustainability drivers leading to ever-lower VOC standards, lower solvent and odor thresholds, and higher durability expectations, which means longer service life for applied coatings. We see VOC as an environmental issue, low odor as more a personnel issue, and longer service life as a carbon footprint issue. Together, they are driving the industry to create fewer but better coatings, and as a result, create less CO<sub>2</sub> and waste.

*Hummel (BASF):* The attention on the environmental impact of materials has accelerated the speed of innovation for waterborne solutions and has created the need for higher-performance polymers to extend the life of the end coating. It has also increased the performance of materials—for example, allowing higher filling levels or better asphalt bleed resistance in asphaltic coatings. The green building movement has created the need to focus on environmental issues, such as the heat island effect that white roof coating systems help to address in densely populated areas. The green building push, moreover, will lead to an increased demand for higher-performance finish coats for EIFS (Exterior Insulating Finishing System) wall systems. All of these increase building insulation value and boost energy efficiencies.

*Kaufman (Arkema):* The impact of the green building movement is somewhat different from other environmental initiatives, especially those targeted at lowering VOC emissions. Because the green building initiative focuses, in part, on reducing energy consumption in commercial buildings, coatings formulators and raw material suppliers must look at products and technologies that help improve the energy performance of the building envelope. That is significantly different from simply lowering VOC.

*Sweeney (Celanese):* The green building movement has had a huge impact on every aspect of the built environment, in general, and most certainly on the coatings industry. An ever-increasing consumer demand for measurable and substantial change has been the catalyst for coating manufacturers and raw material manufacturers alike to compete for share of mind in this space. The result has been nothing less than real and

## Participants

**Air Products & Chemicals**—Sophia Boujnah, marketing manager for Civil Engineering In Europe, the Middle East, and Africa

**AkzoNobel**—Fred Van Beuningen, corporate director of Innovation

**Arkema Coating Resins**—Michael C. Kaufman, global coatings application development leader

**Axalta Coating Systems**—Frank De Cock, Architectural & Furniture segment leader, EMEA Powder Coatings business

**BASF Corporation, North American Dispersions & Pigments Division**—Andrew Stokes, product marketing manager for Architectural Coatings, and Chris Hummel, product marketing manager for Polymer Dispersions for Construction

**Bayer MaterialScience LLC**—Steven Reinsadtler, construction marketing manager for Coatings and Sustainability Initiatives

**Behr Process Corporation**—Morgan Greenwood, environmental administrator, and Peter Gaeta, business development/sales

**Benjamin Moore**—Carl Minchew, vice president of Color Innovation & Design

**Celanese Emulsions**—Marly Sweeney, market development manager

**DSM Resins & Functional Materials**—Rehner Grimbergen, sustainability director

**Evonik Coating Resins**—Andy Romano, market manager

**OMNOVA**—Jamey Gaston, senior applications engineer, Floor Care division

**PPG Industries**—Philippe Hosotte, global technical director for architectural coatings and Calum Munro, global technical director for industrial coatings

**Sittech**—Robert Ruckle, global marketing and sales manager

**Valspar Corporation**—Robert Duan, global technical director for Consumer Business; James R. Hazen, technical director for the North American Wood Coatings Group; and Rick Afton, global technical director

meaningful change. What's more, as the green building movement continues to evolve, it continues to drive innovation through an economic, social, and environmental lens. Why is this different than 10 years ago? Because rather than Industry vs. Environmentalist, it is Industry as Environmentalist.

*Minchew (Benjamin Moore):* The coatings industry in general, with Benjamin Moore included, has always considered the types of materials used, the efficiency of operations, etc. With the green building movement, those efforts have become more organized and systematized. As a result, we see the green building movement as an evolution of where we were already headed.

*Gaeta (Behr):* On a larger scale, the entire building and building products industry—including coatings companies—is being impacted by a transition we've observed in recent years, as many of the voluntary green building programs are being adopted as—or integrated into—government-mandated building codes at both the state and local levels. Furthermore, the government has served as a driving force behind the adoption of green building certifications by preferring or requiring green building certification for a variety of government-owned buildings. Many of the criteria associated with the U.S. Green Building Council's LEED credit categories are being woven into building codes all general contractors have to follow.

*Gaston (OMNOVA):* Trends towards third-party-certified floor polishes have increased as a result of the green building movement. The largest category increase over the past decade in the floor polish sector has been in the area of finishes that offer an environmental claim.

*Hazen (Valspar):* With respect to the North American OEM wood coatings business, the green building movement had a stronger impact a few years ago on a broader base than it does now. We have actually seen some pull-back and less interest. The typically higher cost of green has not been well received, particularly in current business environments. What we have seen is very specialized areas continuing to adopt green technology, and not with regulations solely driving the change; these OEM end-use markets include office furniture, children's furniture, hospitality, and hospitals and schools. Architects working on commercial projects are also more likely to ask for green solutions. In the Chinese wood coatings market, however, interest remains strong,

largely due to the hard push from the government to develop a green building focus (solar energy, water recycling, CO<sub>2</sub> emission reductions) that also includes the use of more environmentally friendly coatings such as one-component (1K) waterborne systems instead of solventborne nitrocellulose and 2K waterborne, waterborne ultraviolet (UV), and 100% solids UV cure coatings to replace solventborne polyurethanes and acrylics.

#### **CT: What has been the role of the various certification systems/programs/groups?**

*Van Beuningen (AkzoNobel):* Coatings can play a key role in helping buildings to achieve accreditation. Valuable and respected international certifications, such as BREEAM and LEED, not only help raise building standards, but can also be drivers for innovation. Labels that can provide relevant information concerning the environmental performance of a building are increasingly being paid attention by potential buyers and owners who recognize the influence that environmental accreditations can have on the future value of the property.

*Greenwood (Behr):* There are several green building programs such as LEED, the Collaborative for High Performance Schools (CHPS), the National Green Building Standard (NGBS), and the International Green Construction Code (IGCC). Of these, LEED is the dominant green building rating system and offers a variety of certifications for different types of commercial and residential projects. Although LEED, CHPS, and NGBS are project certifications—not product certifications—these green building certifications still have a substantial impact on the coatings industry, as coatings companies have had to evolve to incorporate additional product qualities or certifications that are considered in project evaluations on the front end.

With factors such as minimized VOC levels, environmentally conscious materials, and resources and product certifications (such as GREENGUARD Certification Program and Green Seal) being considered during the LEED certification process, companies within the coatings industry have had to hold themselves to the same standards in order to remain competitive.

From a product certification standpoint, the standards issued by the Master Painters Institute (MPI), including Green Performance<sup>®</sup> 1 and 2 and MPI Extreme Green™ ("X-Green"), GreenGuard, and Green Seal are all nationally recognized. It is important to note that, for both product and project certification systems, we're seeing the scope of a green product expand from VOC content limits to include requirements for product emissions testing and performance.

*Munro (PPG):* The four main green building labels in the U.S. and Europe are: BREEAM (U.K., Germany, Netherlands, Spain, Sweden, Poland); LEED (U.S., France, Italy, Spain, Scandinavia, Poland, Russia,



Turkey); HQE (France, International); and DGNB (Germany, Austria, Denmark, Poland, Hungary, Bulgaria, Switzerland). While LEED remains the primary green building certification system in the U.S., we are finding that the "Red List" or Living Building Challenge is becoming increasingly prevalent with architects, and that is presenting new challenges for the coatings industry. Nevertheless, the different certification systems have sufficient commonality that we can focus on creating the key features, benefits, and attributes that address the core opportunities to support our customers in meeting their sustainability goals within the varying regional frameworks and certification systems that exist. All provide welcome guidance.

*Minchew (Benjamin Moore):* In addition to the more common programs such as LEED, GreenGuard, Green Seal, and MPI, there are others that are gaining attention and have very challenging requirements, such as the Pharos Project and the Good Housekeeping Green Certification. While some of these various programs refer to one another, others are completely independent from the rest. In addition, many certification groups have lists of materials of concern. They don't all agree, and in addition, some have specified quantities while others don't. The industry is grappling with how to deal with this issue in a manner that will satisfy all stakeholders. Further complicating the situation is the fact that some standards focus only on which ingredients are in a formulation and at what level, and they aren't concerned with the efficacy of coatings, while others look at what is emitted, not what is in the paint, and may or may not also consider performance. The result is a complex set of challenges with many different requirements.

*Sweeney (Celanese):* There is a labyrinth of green building certifications and to give all of them equal weight would be imprudent. With that said, credible, objective, and meaningful independent third-party certifications are a leading tenet of the green building movement. Green building certifications minimize greenwashing, allow stakeholders to make informed decisions, and serve as important "innovation targets" for building materials.

*Duan (Valspar):* All of these various certification groups have, for the most part, been focused on reducing the VOC content in paint. Because applying for each label costs money, we make business decisions on which to apply for based on whether or not they can bring value to a given product.

*Reinstadler (Bayer MaterialScience):* MPI and SSPC are both creating new standards that address new sustainability targets. While the new standards dictate higher performance standards and lower acceptable VOC levels for coatings, they also acknowledge the greener-than-standard coatings that boast VOC levels already lower than dictated by the new standards—for instance, the MPI Green Performance and Extreme Green Standards for coatings that not only meet the higher performance criteria, but also exceed VOC standards. The



SSPC has also recently formed its Commercial Coatings Committee to develop high-performance standards that address the migration of industrial maintenance coatings into commercial/architectural applications.

*Romano (Evonik):* A number of different green building ideas are being codified in the IGCC. We expect that in the U.S., these codes will soon go into state and local building codes. We all see Title 24 in California, the 100 Cool Cities Initiative in the U.S., and the Global Cool Cities Alliance as representative of the trend requiring that all new buildings incorporate cool roof technology (including coil coatings containing infrared-reflective pigments on metal roofing for sloped roofs and white elastomeric coatings on flat roofs) into their structures.

*Afton (Valspar):* In addition to California's Title 24, there are several different certifications and other programs for cool roof coatings that are relevant in the U.S., including those from the Department of Energy (Energy Star), the Cool Roof Rating Council (CRRC), the American Society of Heating Refrigeration and Air Conditioning (ASHRAE), LEED, and the International Energy Conservation Code (IECC).

*Hazen (Valspar):* The North American wood coatings business has mainly seen OEMs needing GreenGuard indoor air quality certification or GreenGuard certification for indoor air quality (specific requirements for total VOCs, formaldehyde, and total aldehydes). In China, for wood coatings, there are specific standards, including GB T/50378-2006, the Evaluation Standard for Green Buildings, and GB HJ/T 201-2005, Technical Requirements for Environmental Labeling of Products, in particular, waterborne coatings.

*De Cock (Axalta):* For powder coatings, the Qualicote system in Europe, ME, Africa, and Asia has had a significant impact on the adoption of powder coatings for the protection of aluminum-studded cladding over the last 15–20 years. Importantly, longer outdoor durability has become a requirement for Class II systems (similar to the American Architectural Manufacturers Association's [AAMA] 2604 standard), that are now required to meet more demanding UV-resistance specifications. As a result, powder coatings are currently used on 90% of aluminum profiles in these regions, compared to only a few percent in the U.S. Qualicote requires third-party verification that

formulations meet both performance and environmental requirements, which has given architects and designers confidence in powder coatings for this application. In the U.S., the AAMA standards are voluntary specifications, and no third-party verification is involved. Thus, there is not as much awareness about the benefits of using powder coatings in these applications. It should be noted that, in addition to protection, powder coatings offer the advantages of a much, much greater color choice, more texture options, and a wider range of gloss levels.

**CT:** Other than VOC content, what properties of paints and coatings are considered (durability, renewable content, use of green chemistry processes, etc.)?

*Grimbergen (DSM):* The concept of a circular economy is increasingly receiving attention. Considering a product's life cycle from raw material sourcing through manufacturing and customer use to recycling will be an important issue in the future. Coatings will need to be developed that not only have safer and renewable ingredients (such as waterborne alkyls) and help improve indoor air quality, but are also more durable, and that at the end of their useful life, do not interfere with the recyclability of the substrate.

*Minchew (Benjamin Moore):* In addition to the typical performance requirements and other raw material-related issues, we are also beginning to see requirements related to social concerns. For example, California has passed a law that requires companies to disclose whether or not they take any steps to ensure that materials they purchase are produced using fair labor practices. As a result of this law, many manufacturers that do business in the state are taking a closer look at this aspect of the purchasing process.

*Sweeney (Celanese):* Each category of building material provides a balance of benefits to the built environment with its impact on people and natural resources. In paints and coatings, it begins with raw material extraction, innovative green and sustainable chemistry, durability, and VOC emissions, which need to be considered during both application and occupancy.

*Munro (PPG):* PPG considers seven categories when assessing the impact of its coatings offerings on the sustainability goals of customers and end-use markets. These categories pertain to our building products, but apply equally across our entire offering, and include energy, natural resources, emissions and waste, useful lifetime, toxicity and health, risk, and the welfare of people and the planet.

Energy covers energy use, recovered energy, and renewable energy. With natural resources, we look at the reduction of the use of materials, particularly those resources that are not rapidly renewable, as well as the increased use of rapidly renewable and recycled content. Emissions and waste can be viewed on multiple levels,

with the obvious VOC content reduction, but active exterior coatings that can help transform harmful pollutants into less noxious compounds are notable as well. The durability of a coating is considered in terms of its ability to extend the lifetime of a building (protecting underlying building materials) and to extend the desirable decorative appeal of a structure. Toxicity and health clearly relate to appropriate choice of ingredients with minimum impact. Our consideration of risk goes beyond flammability to include various aspects of personal and national risk mitigation. Finally, we consider the impact of our products on individual and societal wellness and welfare, such as in terms of allergenic behavior and impact on internal air quality.

*Afton (Valspar):* Properties that are now considered for green building applications include the biorenewable content, green chemistries, such as higher solids and water-based systems, solar reflective pigmentation for improved energy usage, reduction and elimination of heavy metal pigments where possible, and the resulting effect on durability and overall performance.

*Gaeta (Behr):* The all encompassing standards imposed by the building industry today have helped to push the coatings industry to go beyond minimized VOC levels by evaluating the entire life cycle of coatings—which is where product performance really comes into play. At Behr, we've worked to integrate the same standards into each step of a product development—from the raw materials state all the way through disposal. We've collaborated with our suppliers to come up with materials and solutions that will better meet green and performance expectations. Raw material selection will become increasingly important for all coatings manufacturers as other features like biobased, biodegradable, water soluble, and recycled content become preferred. From a performance perspective, coatings that demonstrate extreme durability and excellent coverage (and thus a reduced need for additional coats) optimize material efficiency and offer a "do more with less" solution to customers.

*Greenwood (Behr):* The move toward green building and product development has also garnered more transparency from manufacture to end of life, including transport. We realize, as part of the life cycle, we may be asked to share a variety of information from raw material sourcing location to product distribution method. Also, to improve end-of-life management, the American Coatings Association (ACA) has involved the entire industry in its efforts to make waste paint drop-off more efficient by allowing both contractors and residents in certain states to drop unused coatings off at various depots through its PaintCare<sup>®</sup> program. After being dropped off, the waste is re-used, recycled, or put through a process that allows for energy recovery.

*Van Beurlingen (AkzoNobel):* Low-emitting paints and embedded energy are important elements of eco product offerings. Increasingly, coatings are making a positive contribution to energy use reduction, protection



of materials and durability, and a healthy indoor climate. Moreover, the aesthetic elements of paints contribute to a comfortable environment and can promote well-being. While not all of these attributes are recognized by the green labels, they are nevertheless important to architects and specifiers.

*Reinstadtler (Bayer MaterialScience):* Interestingly, the industry is starting to recognize that there is a difference between odor and VOC content. For instance, a zero-VOC coating can still have high odor due to the presence of VOC-exempt solvents or additives. Therefore, multiple points in the value chain are demanding low VOC and low odor.

*Stokes (BASF):* Carbon footprint is becoming a concern. BASF has developed polymers that enable customers to reduce  $\text{TiO}_2$  consumption by up to 25% of traditional formulated paints, which greatly reduces the carbon footprint, because the production of  $\text{TiO}_2$  is a very energy-intensive process.

*Duan (Valspar):* Durability—lasting longer—is certainly an important feature, particularly for exterior coatings. In many parts of Asia, the dirt-pickup (DPU) resistance is a very important coating product attribute, because the buildings are surrounded by heavy traffic and other industrial pollutants. In Australia and New Zealand, a coating's ability to withstand harsh sunlight (UV) exposure is very important to prolonging its life.

*Kaufman (Arkema):* Looking at the exterior of a building, one of the most important properties is dirt-pickup resistance. For example, elastomeric roof and wall coatings that are designed to reflect heat from the building's exterior surfaces need to stay white to provide maximum reflectance and to contribute to the energy efficiency of the building. Coatings that have enhanced dirt-pickup resistance theoretically provide better performance over time.

*Hummel (BASF):* In the flexible roof coating market, BASF is working with customers in several areas, including higher-performance polymers, to: extend the life of the coating, reduce asphalt bleed through to help maintain reflectivity performance, provide more effective and earlier rain resistance, and widen the application window to lower temperatures and higher-humidity situations. In EIFS, BASF has developed polymers that reduce wash-off concerns in high humidity areas and reduce dirt pickup in urban or high-traffic areas. Both of these products help builders and building owners enjoy lower installation and reduced upkeep costs.

*Hazen (Valspar):* In the North American wood coatings market, other components that are considered include formaldehyde, HAPs, heavy metals, and phthalates. Durability must be equal to or better than current conventional systems. Renewable content is starting to see some movement, but interest remains minimal at the present. OEM flooring, kitchen cabinet, and some building product manufacturers are beginning to ask questions about renewable content in the entire coating process, from raw material selection through shipment. Meanwhile, in the Chinese wood coatings market, exterior wood coatings are typically waterborne systems with good durability, and recyclability is an issue. With decorative coatings, the use of vegetable oils and other natural oils is increasing.

*Boujenah (Air Products):* From an Air Products perspective, we see durability as a key component. In flooring systems, floor longevity is also important when considering sustainable systems. Floor longevity can be achieved through improved resistance to chemical, mechanical, and thermal exposures.

*Gaston (OMNOVA):* In floor polishes, removal of certain metal crosslinkers such as zinc, and the use of other ingredients, such as surfactants, that are readily biodegradable are important factors. Each ingredient used in the manufacture of a green coating is evaluated, and if there is a more environmentally safe choice, the formulator should show that this material cannot be substituted. There are instances where an ingredient may not have the best environmental profile, but is of critical importance to the performance of the final product. In this case, this material may be accepted, but it is flagged so that if an alternative ever presents itself in the market, this new material can be substituted.

**CT:** What influence does the green building movement have on the development of raw materials and formulated products?

*Gaston (OMNOVA):* The green movement now guides most development work at all levels. Formulators and marketers know that if they can offer a high-performance product that also has a green component, this type of product will bring a premium because of the demand for new buildings and contractors to use green products.

*Reinstadtler (Bayer MaterialScience):* Architects and spec writers are the main drivers for introducing new

products in green building because they are often designing a building with LEED certification in mind. Their primary sources of information on sustainable products are the Green Building organizations, such as the U.S. Green Building Council (USGBC) and the Green Building Alliance (GBA).

*Hummel (BASF):* There are several drivers based in the green building movement that are flowing through to be forces in developing new products. For BASF, sustainability is one of the key drivers. Polymer design is addressing pressures to lower VOCs and increase recyclable content. The end polymer performance in the field also needs to help reduce energy consumption through its physical properties or ease of use.

*Munro (PPG):* The green building qualification requirements align well with our sustainable product goals and overall sustainability vision and are a natural extension of our thought processes when developing new products. Nevertheless, green building qualification requirements are pushing us to continually refine and improve our formulations to meet evolving standards.

Beyond new requirements for LEED, the Living Building Initiative is presenting us with difficult challenges. This certification system prohibits coatings containing solvents, phthalates, lead, chrome, and other substances from being used in qualifying projects, and currently there are few solutions available to meet these demands. Powder coatings are an option, but they are not available for coil applications and do not have the same appearance properties that liquid coatings possess, such as metallic and mica finishes, which limits the design options available to architects.

*Hazen (Valspar):* The biggest movement in the North American wood coatings market has been in the area of formaldehyde emissions, and new raw materials are becoming increasingly available, particularly new cross-linker technologies. Resin manufacturers have also been spurred to develop new chemistries in the areas of waterborne self-crosslinking systems and water-based UV curable products for OEM manufacturers. We are also beginning to see alternative bio-based resin binder and additive solutions that give similar performance. For the Chinese wood coatings market, waterborne acrylics, polyurethane acrylates, polyurethane dispersion, and 1.00% UV systems are being developed for use on doors, furniture, and cabinets. Lower-odor and lower-total VOCs are key points to achieve for green building certifications.

*Afton (Valspar):* For coil-coated products, one of the largest drivers is in the area of pigment choice and the improvement of solar reflectivity and solar emissivity. As many products as possible are being formulated with special pigment chemistries that enhance reflectivity

and remittance properties. Many pigment suppliers have active programs targeted at next-generation chemistries to address this aspect of their products.

### **CT: What are formulators and raw materials suppliers doing to meet these requirements?**

*Van Beuningen (AkzoNobel):* This type of innovation clearly needs collaboration across the entire value chain. For example, the World Business Council for Sustainable Development set up a chemical industry initiative to look at three different value chains to identify and eliminate obstacles to the market introduction of more sustainable products and solutions.

*Sweeney (Celanese):* This environment of evolving and improving building products has had an interesting benefit. Raw material suppliers and formulators no longer live in a comfort zone simply because a product meets industry needs today. On the contrary, there is a general understanding that continuous improvement and innovation is essential to even short-term success because everybody in the value chain recognizes the advantage of partnering with like-minded, innovative companies. This means that raw material suppliers and formulators are developing new products that address the evolving requirements of the green building movement.

*Duan (Valspar):* Raw material suppliers are reducing the residual monomer content in their resins, eliminating the use of lead-based pigments, removing APEO from their products, and developing resins with lower minimum film-forming temperatures (MFFT) so that paints and coatings can be formulated without coalescent solvents and with zero VOC options. Formulators are, in turn, reducing the use of solvents (minimizing the use of any kinds of solvents), developing waterborne systems with performance properties equal to those of solventborne systems, reformulating with APEO-free surfactants, and generally paying a lot more attention to VOC requirements.

*Hasoffe (PPG):* Coating manufacturers are developing products with a lower environmental impact over the full life cycle of the building. As an example, the technical performance of coatings over the entire life cycle is being improved, i.e., the maintenance interval is being extended from three to five years. In addition, formulators are using raw materials with reduced environmental impacts but similar technical performance.

*Boujenah (Air Products):* Raw materials suppliers are working on supplying systems that are free of solvents for improved applicator safety and for improved indoor air quality to provide an enhanced living and working environment.



*Reinhardt (Bayer MaterialScience):* Market demand drives innovation. As green building organizations, architects, and the market further define their green or sustainability preferences, raw materials suppliers quickly adapt their production process and product lines to meet those demands. For example, Bayer developed a new proprietary process for creating ultra-low-VOC polyurethane dispersions (PUDs) via a patented acetone recovery process that allows paint manufacturers to formulate with resins that are already low-VOC.

*Hummel (BASF):* As a supplier, BASF is committed to offering low- and zero-VOC products and APEO- and formaldehyde-free products to our customers. We are working with roof coating formulators in many areas, from improving the polymer performance to making products that are easier and faster to use. BASF helps by addressing specific needs, such as designing polymers that give the latitude to remove zinc from a manufacturer's roof-coating formulation to helping add desired functionality that a specialty coating may need.

**CT: Where is the green building movement going? Will it have more influence in the future, and if so, why and how?**

*Hosotte (PPG):* The green building market is growing very fast. The European green building market is expected to reach 687 million square meters by 2016, according to Pike Research. Meanwhile, the new, nonresidential U.S. green building market is predicted to total \$145 billion in 2015, according to the *McGraw-Hill Construction Report*. In addition, according to the *World Business Council for Sustainable Development*, in 2009, buildings accounted for up to 40% of energy use in most countries, contributing to significant amounts of carbon dioxide emissions. To address those issues, many governments are advancing green building, such as with the EU 20-20-20 policy, which aims by 2020 to have all new buildings designed to achieve "nearly zero-energy" results, with energy sources coming primarily from renewables.<sup>1</sup>

*Boujenah (Air Products):* Sustainability is a long-term trend, and the influence of the green building movement will only become more important in the future. The increasing demand for safer products without performance compromise is leading to the development of new industry standards.

*Romano (Evonik):* There will be increasing numbers of requirements, most of which will be driven by cost rewards, but some will be driven by perception of the benefits. The trend toward smart buildings will also provide opportunities for smart coatings.

*Kaufman (Arkema):* We believe the green building movement will continue to grow in importance, particu-

larly in the commercial building segment. By focusing on improved energy efficiency, building owners can lower operating costs, and in some cases get the added benefit of lower maintenance costs. We expect similar initiatives will continue to be important globally, as well.

*Hazen (Valspar):* Beyond the areas already noted, we expect regulations that continue to limit formaldehyde emissions and heavy metals in building components. There will also be further reductions in VOCs and HAPs relating to indoor air quality and stricter regulations on emissions in OEM manufacturing facilities, which will lead to further movement toward waterborne and radiation-cure technologies and continued acceptance of powder by OEM manufacturers.

If there is a "green" solution that costs less and continues to have optimum performance, our customers will buy it. Right now what people want are products with optimized performance at a lower price point—more so than paying for a green solution. It will be the responsibility of raw material vendors and coatings manufacturers to step up with solutions balancing the value of green materials, cost, and performance. In China, we believe that the government, in response to the continued poor environmental conditions, will pursue an aggressive strategy for reducing the use of solvent-based wood coatings.

*Gaston (OMNOVA):* The green building movement will continue to grow, in my opinion, especially as we devote more time to developing high performing products that use ingredients that are safer for the environment and the users of the products. The challenge that is facing manufacturers is how much more the end user will be willing to pay for the environmentally preferred product. If the product does not perform as well and yet still costs more, then green products are at a serious disadvantage. A balance has to be found; the more it is mandated by building owners and developers that green products must be used to maintain buildings, the more important it will be to have products that perform well and meet the definition of green.

*Duan (Valspar):* When we talk about "green" and "sustainability," it is very difficult to clearly define what these terms actually mean. I personally believe that we need to build a culture of awareness of green and sustainability in our industry. Traditionally, we have formulated based on cost and performance. We now need to also be looking at how green our new formulations are. Without being specific, Valspar is definitely working toward that goal.

*Gaeta (Behr):* While it's difficult to pinpoint exactly what changes we'll see next, we do think an increasing number of voluntary certification criteria will become mandatory codes, particularly given the government's leadership position within the green building movement (27% of LEED-certified projects are public buildings, according to the American Coating Association).

<sup>1</sup>Source: [http://ec.europa.eu/clima/policies/package/index\\_en.htm](http://ec.europa.eu/clima/policies/package/index_en.htm)

*Greenwood (Behr):* Per the product life cycle analysis trends we see within our industry and without, environmental product declarations (EPD) are gaining momentum. An EPD provides detailed information on the life cycle impacts of a product, including specific amounts of raw materials, water, and energy used in production and corresponding

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emissions to air and water and waste generated. An EPD can be thought of as a nutrition label for a product featuring its environmental impact. With some European countries already adopting this approach, we anticipate it may be leveraged in the United States in the coming years.

*Reinstadtler (Bayer MaterialScience):* I believe that sustainability is here to stay. Sustainability isn't something that you put on a pedestal and simply observe. Sustainability must be woven into the way a company does business, and become part of the company's DNA. And it must become a consideration like any of the other traditional drivers when developing a new raw material or product—economics, logistics, production, and performance.

*Sweeney (Celanese):* The future of the green building movement may be difficult to predict, but it almost certainly will continue to have a profound effect on the buildings in which we live and work. Generations to come may not recognize what they do as green building, but rather see it as business as usual.

*Van Beuningen (AkzoNobel):* Green buildings are key to a more sustainable future, as is sustainable transport and water usage in cities. Increasingly, cities are taking a more holistic and long-term view of sustainable development. Green labels will continue to drive the building market into a sustainable direction, increasingly also in the in-use phase. If finances can be made available, a wave of retrofitting can be unlocked in Europe, while in Asia the focus will be on more sustainable new buildings. As the investment case for green buildings becomes clearer, so investors will also push for more stringent certifications. The endgame could well be buildings contributing to energy supply ("every building a power plant") for the electrification of the harvest, transport, and use of rainwater.

Over time, the coatings industry will introduce more functional products that bring a sustainability advantage for customers. Going forward, the challenge is to make the claims and positive benefits of these solutions properly verified. 