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Feature

Standards Enable… Regulation

Part 4 of a Series

Standards and the standards development process inform and enable workable and successful regulation and legislation.

by Alan R. Earls

Samuel Johnson, the brilliant 18th century English writer, claimed that "the law is the last result of human wisdom acting upon human experience for the benefit of the public." These days, when it comes to laws and lawmaking, most people take a more cynical view, and many see laws and regulations as more flawed.

In part that's a result of complexity. In today's world, governments and regulatory authorities are constantly trying to catch up with changing technologies and changing society, crafting hundreds of new laws and regulations each year in a process that is frequently hasty and often freighted with political considerations. Indeed, as one wit once observed, "Laws are like sausages. It's better not to see them being made."

The results of this imperfect process can be cumbrous, unworkable and sometimes unfair. Fortunately, there are instances where law and regulation emerge from a more thoughtful process, producing results closer to the ideal described by Johnson. Increasingly, federal and state governments, and many international regulators, have found that the process of making laws and regulations can be informed, supported and enabled through engagement with open, rational consensus-based standards development processes like that long practiced by ASTM International.

The standards development process itself does not create legislation, but it can provide a forum for discussing ideas and exchanging information needed to define and manage a vast range of technical topics that ultimately impact the public.

In fact, ASTM standards are regularly cited in regulations. (See "Not Playing Around," for a consumer-related example of citing a standard in law.) In this way, voluntary standards in effect become law by being cited in legislation or in the vast bodies of regulation that government produces. The most important thing about the ASTM International process — which makes it unlike sausage making — is that it works best by being visible; the process engages all parties in a way that is focused on consensus. Likewise, the ingredients are all apparent and all the "cooks" have an equal share in the outcome. Through the ASTM process, all parties share in the value of developing standards, and each can advocate as forcefully as necessary for a particular viewpoint.

In the United States, the inherent attractiveness of the voluntary consensus process has been further enhanced by a government mandate favoring the role of ASTM International and other consensus-based organizations. In

the 1990s, Public Law 104-113, the National Technology Transfer and Advancement Act, was enacted, and included was a requirement that the federal government coordinate the use of private sector standards by federal agencies, emphasizing where possible the use of standards developed by private, consensus organizations.

Sport Aircraft

With this extra boost, standards have been taking on a growing role in society. For example, the consensus approach has turned out to be the perfect mechanism for bringing much needed change to the aircraft industry. For years, the regulations surrounding the design, manufacture and operation of small private aircraft had been pretty much the same as those applied to corporate jets costing millions of dollars. The added complexity implied by the regulations meant that small aircraft began to grow more costly and, in fact, had gone out of the price range of most people. To skirt these costly regulations, some manufacturers of smaller aircraft resorted to selling their products as kits — thereby allowing those few consumers able or willing to assemble their own aircraft to acquire a flying machine more affordably. But that still excluded a huge number of potential flyers. Something needed to be done, but what, and by whom, was not clear.

In the 1990s, the Experimental Aircraft Association, based in Oshkosh, Wis., had been working with the U.S. Federal Aviation Administration on developing and defining a new category of plane dubbed light sport aircraft that would provide high standards of safety but with a less bureaucratic, less complex regulatory structure. Unfortunately, due to FAA resource constraints and uncertainty about how to engage the wide range of interested parties, the process hadn't really taken off.

Meanwhile, Earl Lawrence, vice president of industry and regulatory affairs at EAA, had gotten his first exposure to ASTM International through service on Committee D02 on Petroleum Products and Lubricants. He says that experience opened his eyes to the potential of the consensus process and eventually led to a solution. "By participating in the D02 committee I had an appreciation of what ASTM could bring to the table, so for me it was a matter of educating and developing consensus within the rest of the community to go with ASTM," says Lawrence. The result was the formation of ASTM Committee F37 on Light Sport Aircraft.

"What was really critical to our success was that the process for creating this 'entry level' section of aviation be open to nontechnical individuals. Although I am one of many engineers in this community, there wouldn't have been an acceptance of the process if it had excluded non-engineers," says Lawrence. In addition to the openness ASTM International offered, the organization also provided a process that was superior to other processes — and lower in cost, says Lawrence. ASTM also offered technology, particularly in its Web-based collaboration tools. That was important because it made it possible for the worldwide community to participate without incurring heavy travel costs.

"We were looking for a world standard from day one. ASTM wanted to make sure all the right people were involved; then they were willing to say, now you are in charge — go become leaders — but within their well-established processes and sets of rules," explains Lawrence.

"It was a wide community of engineers and entrepreneurs, and they all understood that by coming together through this committee they were making history," says Lawrence. Ultimately the FAA agreed that the group had addressed the issues. And, because the standards weren't developed by the FAA but independently, there was more willingness by other global aviation authorities to join in their adoption. "Having industry develop standards that are then accepted by governments has been a real winner," says Lawrence. The work of the committee has now enabled a new light sport aircraft industry to develop globally around one shared suite of standards.

Earth-Friendly Plastics

Rule makers have also been getting a boost in their efforts to make polymer products an even better

environmental story thanks to ASTM International standards promulgated by Committee D20 on Plastics, which are now utilized in regulation by the U.S. Department of Agriculture.

Ramani Narayan, Ph.D., is the university distinguished professor in the department of chemical engineering and material sciences at Michigan State University, East Lansing, Mich., as well as chairman of Subcommittee D20.96 on Environmentally Degradable Plastics and Biobased Products. “Many major resin manufacturers and brand owners have introduced or are researching biobased resins and products in which the carbon comes from a biorenewable feedstock as opposed to a petro/fossil carbon feedstock. However, without standards that can identify and quantify biobased carbon content, no one can verify or validate the claims or what claims to trust,” he explains. On the other hand, with the development of standards, Narayan says companies can communicate the value of their renewable products, and consumers can identify and quantify carbon reduction impacts using the standards.

Critically, these standards have also acquired legal force. For instance, the U.S. Congress has passed a law that requires the federal government to buy biobased products. The U.S. Department of Agriculture is implementing this under the BioPreferred program, and ASTM D6866, Test Methods for Determining the Biobased Content of Solid, Liquid and Gaseous Samples Using Radiocarbon Analysis, forms the basis for determining biobased content of a given product. “ASTM always prides itself on developing the best, technically sound, reproducible and verifiable standards. In Europe and Asia, the ASTM D6866 standard is used for calculating and reporting biobased carbon content — this has become the de facto international standard,” says Narayan.

Composting provides an environmentally sound end-of-life option for single use disposable packaging and plastic products in conjunction with organic wastes like food and lawn-leaf wastes. ASTM D6400, Specification for Compostable Plastics, and D6868, Specification for Biodegradable Plastics Used as Coatings on Paper and Other Compostable Substrates, are comprehensive standards for quantifying the biodegradability and compostability of products under industrial aerobic conditions. “This is a specifications standard, which establishes a pass-fail criteria and is adopted in the states of California and Minnesota, and the BioPreferred program of the federal government; we expect it will be adopted by more states,” Narayan says. In fact, the Biodegradable Products Institute now offers a certification program based on these two standards, and both the state of California and the city of San Francisco actually require products to meet the standard if they are to be sold as compostable.

While Narayan has focused on some of the leading-edge aspects of recycling, others at ASTM are helping to give a boost to one of the more venerable tools in the market, the familiar chasing-arrows recycling codes first introduced in the 1980s. Barry Eisenberg, director of communications and marketing at the Society of the Plastics Industry in Washington, D.C., says his organization introduced its familiar resin coding system in 1988 at the urging of recyclers. A growing number of communities were implementing recycling programs in an effort to decrease the volume of waste going to landfills. The SPI code was developed to meet recyclers’ needs while providing manufacturers with a uniform national system.

By the mid 1990s, 39 states had adopted legislation regarding the use of the resin identification codes. However, many of the states that adopted the SPI codes also altered them in a variety of ways to suit their own goals. As individual state laws, they were really not the SPI code anymore, says Eisenberg. Furthermore, by 2007, codes had been developed in the United Kingdom and China that were similar to the SPI codes but not completely compatible. Meanwhile, in recent years there had been broad interest in expanding the codes to new resins and end uses.

“SPI’s main mission, of course, is to serve its members and the plastics industry,” says Eisenberg. So, rather than trying to untangle and amend the existing codes, SPI decided to engage ASTM International, thinking that this approach would better facilitate participation by all stakeholders while ensuring legal compliance, including antitrust requirements and the U.S. Federal Trade Commission’s guidelines on environmental advertising, explains Eisenberg.

"It was hoped that an ASTM standard on resin identification codes could harmonize the different coding systems, so they could be used in the U.S. and on an international basis," adds Eisenberg.

A proposed new ASTM International standard, WK20632, Practice for Coding Plastic Manufactured Articles for Resin Identification, is in the works, based on the original SPI work. The proposed standard is being developed by Subcommittee D20.95 on Recycled Plastics, part of ASTM International Committee D20 on Plastics. Tom Pecorini, technology fellow at Eastman Chemical, Kingsport, Tenn., and a member of D20.95, says, "The aim is to converge the old SPI system with ASTM format and then continue to update it to make it more relevant to the 21st century."

Pecorini says the committee's first order of business is to confirm the language of the new ASTM format. Efforts to expand the codes are also under study. "On their own, some people have added numbers to the system — say, for ABS [acrylonitrile butadiene styrene] or nylon — so we are working to standardize this so that there aren't three different kinds of plastic associated with, say, the number eight," he says. Furthermore, Pecorini says plastic products have tended to become more complicated since the 1980s, with more resin combinations. "It makes it harder to define which plastic should be assigned to a given code, and it also makes recycling more complicated," he explains.

Some of the codes will take longer to update than others, he predicts. But the bigger challenge will be working with the governments that have learned to rely on the SPI codes. Once ASTM International has a basic standard in the works, Pecorini says they will start to work with the states to encourage them to reference the new standards. "That will convert the codes into a living version that ASTM will maintain and will be easier to use," he adds.

Emerging Biofuels

Another rapidly evolving area, biofuel, is also gaining ground via the consensus process. Kristy A. Moore spent more than a dozen years in industry helping to produce ethanol before becoming technical director of the Renewable Fuels Association in Washington, D.C. "For a long time I was a user of ASTM standards. They provided the true baseline for our commercial activities. Whether it was in trade or characterizing fuels, ASTM standards were and are the basis for all our activities," says Moore. Nowadays, Moore is focusing on work with Committees D02 and E48 on Biotechnology. "We hope to capture any standards needed for biomass conversion for processing from field to plant, whether it is the method for picking up grass clippings or what test methods we need to employ to help identify possible yield improvements and maintain fuel characteristics. Then there will be a lot of new product processes developed depending on what material the processing plant uses," she says.

Currently, Moore says, the ethanol industry is hoping to bring additional ethanol blended fuels on to the market, so a key goal is to provide a standard to describe mid-level blends. "We started the process with a sort of straw man, and as the standards process evolves and you get all the stakeholders involved with their own perspectives, we start to aggregate those views into a tangible final product," she says.

Steven Westbrook is chairman of ASTM International Subcommittee D02.E0 on Burner, Diesel, Non-Aviation Gas Turbine and Marine Fuels. According to Westbrook, the subcommittee has been working on the development of biodiesel specifications for more than 10 years. Although similar to petroleum-based diesel in many respects, Westbrook says the biobased version has many characteristics that are dissimilar, which has required the subcommittee to carefully weigh which properties to include in the various specifications. For example, biodiesel can contain small amounts of glycerin and glycerides, as well as trace amounts of methanol. There is also an oxidation stabilization requirement for biofuels based on a rancidity test used in edible fats and oils. None of these concerns are applicable to petroleum diesel fuel, thus there are differences between the specifications.

The impact of ASTM D6751, Specification for Biodiesel Fuel Blend Stock (B100) for Middle Distillate Fuels, has

been substantial and wide ranging. It is used in whole or in part in Brazil, Malaysia, Greece, Singapore and the Philippines; at least 35 U.S. states have inked requirements that biodiesel fuel conform to ASTM standards, and the U.S. government has given it a starring role. For instance, the Energy Independence and Security Act of 2007 mandates that fuel producers use at least 36 billion gallons of renewable fuel a year by 2022 and specifies the use of D6751 in the handling of such fuels. Any biodiesel that does not meet the version of ASTM D6751 in effect at the time of registration with EPA will be considered an unregistered fuel subject to the penalty provisions in 40 CFR 79.8 (civil penalties of up to $32,500 per day per violation).

Westbrook says the work of the subcommittee has become more critical because of incentives and mandates built into state, local or federal regulations to encourage biodiesel as a component in road vehicle fuel and home heating oil. But regulations depend, in turn, on the definitional work provided through ASTM International. “When the government puts a regulation in place, it is often there forever, and making changes as new technology comes in becomes very difficult,” says Westbrook. Thus, for the most part, the government has been content to let ASTM do what it does best — generate workable, respected and usable standards. And that work, accomplished with careful input from government, holds the promise of helping to make regulation and legislation better, more responsive to evolving needs and ultimately more effective.

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See the November/December 2009, March/April 2010, and May/June 2010 *SN* issues for the earlier articles in the “Standards Enable” series.