

*Archive*

THE PURPOSE AND ROLE OF PRODUCT STANDARDS  
IN THE COMMERCIALIZATION OF NEW ENERGY  
TECHNOLOGIES: A PRELIMINARY ANALYSIS

DREW J. BOTTARO

October 1978

MIT ENERGY LABORATORY REPORT - MIT-EL-78-023WP

## PREFACE

This working paper presents a preliminary synthesis of ideas concerning the function which product standards serve in markets. The ideas are presented in summary, unreferenced fashion and are a distillation of ongoing research. They are presented now in order to facilitate discussion concerning them while work continues.

The framework being developed here is part of the Analysis and Evaluation of Performance Criteria Task of the project entitled "Planning and Analysis for Development of Photovoltaic Energy Conversion Systems" supported at the M.I.T. Energy Laboratory by the U.S. Department of Energy. The project is under the overall leadership of Richard D. Tabors.

Drew J. Bottaro is the principal investigator on the task. The analysis presented below was supported by research (as yet unpublished) by Andrea L. Mobilia and James P. Leape; Richard D. Tabors advised on the organization of the working paper.

## ABSTRACT

This paper discusses the role of product standards in a commercialization program. The usefulness of standards is explained as arising from the existence of transaction costs and other market failures in the operation of markets, and the effects of standards upon market operation are broadly discussed. The role of standards in a commercialization program is then explored and is seen as justified by the existence of market failures and the lack of suitable options other than standards available for remedying certain particulars of the situation. A description of the voluntary standards system follows to show how its use in a commercialization program may modify the governmental role.

## PRODUCT STANDARDS AND COMMERCIALIZATION

The purpose of standards activities in a commercialization program is to produce those socially beneficial effects, produced better by standards than by other alternatives, which would not occur absent those standards activities. The need for standards arises from practical problems in the operation of markets.

In a theoretically ideal market there would be no need for standards. Transactions between buyers and sellers in the market place would not incur any costs, i.e., they would not take time or expense and the information necessary for completing the transaction would be free. But transactions do have associated costs in real market situations, and methods for simplifying market transactions are therefore socially advantageous.

Product standards provide one method for lubricating the market

place and mitigating the costs of transactions.\* They benefit the market in one of two principal ways; they provide information to those in the marketplace, whether they be buyers, sellers, or potential investors, or they represent agreements among those in the marketplace. Examples of agreements include agreements as to sizes, terminology, product grades, and minimum quality. Most standards contain elements of both benefits. For example, standards on lumber sizes (such as the dimensions of a 2X4) provide not only information on the product's size and quality but also represent an agreement as to what sizes will be produced (and hence bought and sold in the marketplace). Standards provide these twin benefits of information and agreement in a manner applicable to whole classes of transactions, thus saving the need in many circumstances for individual, i.e., contractual, agreement and information exchange between a particular buyer and a particular seller on many details of the transaction at hand. By substituting a single rule of general application for transaction-specific rules which, while individually less costly than a generally applicable rule, are more costly in the aggregate, standards produce their benefits to society.

Standards can have both positive and negative effects upon the industry to which they apply. These effects can be grouped into three

---

\* Other ways, such as increased R&D, regulation and taxes and tax credits, to name a few, may be more or less effective than standards in achieving particular results. Hence these other options must be considered when designing a commercialization strategy; those effects for which standards are best suited to remedy should be the aim of standardization efforts in a commercialization context.

basic categories: effects which affect the product's cost, effects which expand the demand for the product, and effects upon the competitive nature of the standardized product's industry. Each group of effects will be discussed below.

First, standards can affect the cost of the industry's product. This can occur in one of several ways. "Unnecessary" grades or product lines can be eliminated, thus permitting greater economies of scale than would occur absent the standards. Interchangeability of parts can reduce the costs of assembling the product, can reduce the levels of inventory required to transact business, and can also reduce repair and maintenance costs arising during the product's use. Interchangeability may also result in increased technological competition, thus reducing unit costs. The standards created may also be a means of transmitting information regarding the technology. Some negative effects upon cost may also result. Emphasis of certain product attributes by the product standards might cause other product attributes to be overlooked or given inadequate attention. New designs may be judged by old standards, thus making radical design departures difficult.

Second, standards can, if properly designed, expand the demand for the industry's product. They can make the industry's product interchangeable with existing technology, thereby allowing the new product to be substituted more readily for existing technology. For example, standardizing the screw threads for a new design of fluorescent bulb so that it fits incandescent bulb sockets will clearly make the new bulb more desirable. Product standardization may provide information

concerning the product and may facilitate comparison shopping with substitutes for the product; an increased ability to compare will help a new technology gain entry to established markets. The existence of a standardized product also tends to assure purchasers of a secure supply of the product because the purchaser is not forced to rely upon a single producer; this consideration is particularly important for intermediate goods which are purchased as inputs to the purchaser's manufacturing process. Consumer confidence in the product may rise with the existence of minimum quality standards for the product, thus increasing the product's demand. If improperly designed, however, standards can work against any of these effects and thus actually reduce demand for the product.

Third, standards can have effects upon the competitive nature of the standardized product's industry. While in some cases standards only reinforce the existing industrial behavior by making a competitive industry more competitive and an uncompetitive industry less so, they can also counter existing circumstances; they do not necessarily mirror market conditions. Product standardization can reduce product differentiation, thus making a market more competitive. Similarly, it might reduce the effects of brand names, thus lowering barriers to entry into the industry. If product standardization results in increased interchangeability of products, markets for the product will widen as sellers' capture of particular submarkets weakens; further lowering of barriers to entry may result. The effects are not all positive; the economies of scale derived from variety reduction and other effects of

standards may result in raised barriers to entry. Furthermore, standardization by its very nature facilitates coordination among the suppliers of a product; such coordination might result in monopolistic activities such as price-fixing and could result in legal (anti-trust) problems.

Hence standards have a role in most markets; economic incentives exist to try to bring about the effects discussed above, whether those effects be socially desirable or not. Hence they will have a role in a commercialization program. In the commercialization context a standards effort should be aimed to encourage standard which 1) are desirable socially but which 2) would not be forthcoming in a timely fashion or with the most socially desirable content if left solely to the private sector.\* Stated differently, a governmental standards effort should select those standardization efforts whose social benefits exceed their social costs and which would not occur without governmental intervention because private costs exceeded private benefits or because associated transaction costs prevented their occurrence.

The above may be summarized as follows: The role of standardization activities in a commercialization effort is defined by the market failures present in the new technology's industry and the suitability of standards versus other options for attacking those market failures. Once

---

\* For further discussion of the aims of commercialization programs, see M.I.T. Energy Laboratory Policy Study Group, "Government Support for the Commercialization of New Energy Technologies", MIT-EL 76-009, November 1976.



that role is defined and (hence) the effects which the standardization activity aims to alleviate are made explicit, the types of standards to be developed may be selected by the types of effects they are likely to produce.

The specific strategy by which the selected types of standards are to become effective is somewhat constrained, however. Because the only standards-setting "authority" DOE has extends only to requirements for procurements and grants, DOE must use the voluntary standards system to produce the effects it desires. The operation of that system, the incentives for its members' behavior, and the way the system is structured must therefore enter into DOE plans for involvement in the system. A short though simplified explanation of the system will indicate the complications which must enter into DOE planning.

Ordinarily standards are produced by an organization which coordinates the activities of those wishing to create standards. Upon "consensus" of those participating, the standards become official in the sense that the standards organization adopts them as having resulted from compliance with the organization's procedures. Consensus generally does not mean unanimity but a large majority with no "substantial" objections.

Use of the standards is voluntary; failure to use the standards results in only the sanctions of the marketplace. To the extent that being out of step with those in the industry using the standards is costly, incentives for using the standards exist.

While internal (producer only) use of standards is often in itself beneficial, frequently producers desire to communicate compliance with a

standard or standards to potential buyers. The producer may simply assert compliance with the standards; however, in order to add credibility to the producer's claim the tests are performed by testing laboratories and the results certified by an umbrella organization such as a trade association. While the standards organization, the certifying organization, and the testing laboratory are most credible when the three functions are separate, they need not be so; one organization could perform all three functions. How the functions are divided up depends upon the value of the added credibility.

Thus planning commercialization efforts in the standards area must identify circumstances in which socially desirable standards activities would not arise from the private sector, identify which situations are most suitable for a solution of standards, and interact constructively with the voluntary standards system.