

# **PUBLIC SAFETY IS NOT ENOUGH!**

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## **Abstract**

FM Global is a large property and business interruption insurer that provides all peril coverage worldwide. We are unique among property insurers because we believe the majority of loss is preventable. We support this belief with scientifically-investigated, technically sound engineering information, including our own installation and occupancy standards and our own product/material Approval tests for performance and reliability. The installation and occupancy standards that we develop typically are performance-based (to find the optimal solution) and prescriptively written (to assure consistency of application worldwide). It is noteworthy that with this philosophy and approach, FM Global has become the largest provider of property protection and business interruption insurance in the world.

In the area of fire and explosion peril, we at FM Global Research are proponents and advocates of working toward the use of computer models as the means for assessing performance in fire situations. We cooperate with others who are developing such models, and are conducting a significant amount of our own research to develop and validate such models.

Performance-based codes are being promulgated, with the use of fire computer models as a tool for meeting specified fire safety/protection criteria. The most frequent criterion used or promoted is that of life or public safety. From my perspective, it seems clear that 1) most computer models are not yet ready to address most fire situations, and 2) more significantly, the criterion of public safety is not enough! This paper discusses what I believe are better criteria for performance-based fire safety regulation.

## **About FM Global**

FM Global is a large global insurance company who provides coverage in the areas of property damage and business interruption. We are unconventional among property insurers because we believe the majority of loss is preventable. We are a mutual company (our insureds are our owners), and our approach is to partner with our customers to help protect the value of their

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business. We do this by engaging them with a combination of technically sound protection solutions and a management commitment to loss prevention. We have used this approach for almost 170 years, since our founding in 1835.

Our customer base is also unique. We provide coverage to virtually all types of properties and occupancies, including chemical plants, pharmaceuticals, semiconductor fab facilities, pulp & paper companies, utilities; manufacturing, storage, warehouses, transportation; retail stores, malls, hotels, resorts; municipalities, universities, hospitals; sports arenas, convention centers, amusement parks, and on. Hence, we cover everything from complex industrial facilities to light hazard residential occupancies. Our customers include many Fortune 500 companies.

In today's markets, we apply this approach by providing coverage using scientifically-based, technically sound engineering information, coupled with prudent underwriting. We do not use actuarial information, and employ no actuaries among our 4000 worldwide employees.

We support an active and significant scientific research effort to support and advance our engineering loss prevention knowledge. We develop our own installation and occupancy standards, and do our own product/material Approval tests for performance and reliability. And we have a force of 1400 trained engineers in the field worldwide to deliver this information to our insureds. The installation and occupancy standards that we develop (and usually share with public organizations) are performance-based to find the optimal solution and prescriptively written to assure consistency of application.

There is no other insurance company with this philosophy or approach. We have had a history of innovation, and it is noteworthy that FM Global is the largest provider of property protection and business interruption insurance in the world. Further, I believe the FM Global approach provides a workable model for the reliable implementation of performance-based regulation in society.

### **About FM Global Research**

FM Global Research is responsible for conducting scientific and mathematical research to produce information for accurately understanding hazards, for assessing risk and for delivering practical, timely, cost-effective solutions. We have invested significantly in highly skilled scientists and specialized facilities in order to understand loss phenomena, develop and demonstrate loss prevention technologies and investigate immediate solutions to real problems.

For the long term, however, we are proponents and advocates of working toward the use of end-use computer models as the means for assessing fire situations. We cooperate with others who are developing such models, and are conducting a significant amount of our own research to develop and validate such models and produce the appropriate data for input to these models. We believe that validated end-use models, using reliable material property measurements, constitute the best approach for the next generation of fire codes and standards.

### **Performance-Based Regulation**

Performance-based codes are now being promulgated, and several countries already use them for regulation. Promoters of performance-based design argue that this approach allows consideration of more options, which can result in safer facilities at lower costs to owners. This can indeed happen when the analyses are adequately validated and the criteria are wisely chosen.

Currently, many of these analyses for fire hazards are conducted using fire computer models. Some of the models available today are considered proven while others are still under development. Whatever the claims on the adequacy and validity of these models, they are the principal vehicle for practitioners to deliver performance-based design.

Fire researchers generally feel that many of these models and the data used with them are not yet ready to be used reliably in performance-based design. Proponents argue that they are used only for limited and justified comparisons. With this situation, the quality of evaluations is subject to the skill, knowledge, experience and interpretation of practitioners... and also their ignorance. Safety factors are applied to provide margins of safety, but it is difficult, expensive and impractical to validate each application.

### **Criteria for Performance-Based Design**

In today's performance-based design applications, the most frequent criterion used or promoted is life or public safety. In most such applications, the criterion is usually interpreted as life safety for the building occupants, and the design is performed to provide enough time for occupant evacuation. This approach can introduce additional variability, and even if the design is adequate, such designs can still be inadequate in the larger picture. For example, we have found performance-based designed facilities, using occupant safety as a criterion and accepted by authorities having jurisdiction, to be uninsurable, mostly because of inadequate water supplies.

In addition, such designs do nothing for first responders or for loss events that can involve more than a single building. The message that is emerging is: Public safety is not enough! Our goal ought to be public well-being.

### **Suggested Criteria**

In fact, there are many cases when the desired outcome may not be related to public safety, per se. Listed below are a number of possible outcomes, most of which have been used in some form of performance-based design. This list is not intended to be comprehensive, but rather to illustrate that a coordinated approach among key stakeholders may produce overall better results.

#### Possible Fire Safety Design Outcomes

- life safety
- safety for room-of-origin occupants
- safety for building occupants
- safety for general public
- public security
- protection for building of origin
- protection for neighboring structures
- protection for historical buildings
- protection for firefighters
- protection for first responders
- protection for infrastructure
- facility operability

As we have seen with recent natural catastrophes, protecting people and recovering from a disaster usually depend on more than a scheme that looks at people only. A viable economy and infrastructure (food, water, shelter, medical care, electricity, supplies, transportation, jobs, etc.) can be equally significant for short and long term recovery. If the above list of outcomes is rearranged as shown below, perhaps many desired outcomes can be achieved, including overall public security, by focusing on a certain few.

#### Grouped Fire Safety Design Outcomes

- protection for building of origin
  - life safety
  - safety for room-of-origin occupants
  - safety for building occupants
  - safety for general public

- protection for neighboring structures
- protection for historical buildings
- protection for firefighters
- protection for first responders
- protection for infrastructure
  - livelihood supplies
  - communications
  - utilities
  - transportation systems
  - electronics and computer systems
  - facility operability
  - building stock

In this way, using what is already known (e.g., the FM Global model) and modifying it slightly for broader application can focus the use of resources and provide greater benefit to society. By focusing on two outcomes for which much work has already been done, many other outcomes besides life safety can be achieved with relatively modest additional investments. Note that the intent is in no way to diminish the importance of life safety; rather it is to show that other desired outcomes are also achievable with a broader view. Again, a dialogue among key stakeholders could produce the focus, understanding and decision-making necessary to achieve this kind of benefit. The key stakeholders should at least include regulators, the fire service, product manufacturers, product users, facility owners, designers/practitioners, researchers, the insurance industry and the construction industry.

## **Summary**

In summary, performance-based regulation in the fire field has thus far achieved mixed results and received mixed support. It can be made significantly more effective and reliable by focusing on a few limited criteria that allow other desired outcomes to be concomitantly achieved. What are needed are 1) recognition that the overall goal ought to be public well-being rather than only life or public safety, and 2) a stakeholder organization committed to the planning for and implementation of the steps to achieve that goal.