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# **High Rise Buildings with Combustible Exterior Wall Assemblies: Fire Risk Assessment Tool**

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**EXECUTIVE SUMMARY FOR REPORT BY:**

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Founded in 1896, NFPA is a global, nonprofit organization devoted to eliminating death, injury, property and economic loss due to fire, electrical and related hazards. The association delivers information and knowledge through more than 300 consensus codes and standards, research, training, education, outreach and advocacy; and by partnering with others who share an interest in furthering the NFPA mission.



[All NFPA codes and standards can be viewed online for free.](#)

NFPA's [membership](#) totals more than 65,000 individuals around the world.

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## **PROJECT SPONSOR**





## **EXECUTIVE SUMMARY**

Based on a number of recent fires in high rise buildings clad with combustible wall insulation systems, global enforcement authorities are revisiting their existing building inventories to assess potential risks. The goal of this project was to develop and make available a fire risk assessment methodology (FRA) to assist global authorities to assess the fire risks and prioritize inspection/remediation efforts for the high-rise building inventory in their jurisdiction with exterior wall assemblies containing combustible components. In support of this overall effort, three key deliverables were put forth including (1) a baseline report; (2) an online electronic fire risk assessment (FRA) tool (i.e., EFFECT™); and (3) a user guide. This executive summary provides an overview of these deliverables – which can be found along with other supporting information at [www.nfpa.org/exteriorwalls](http://www.nfpa.org/exteriorwalls).

The following exemplifies the approach used by this project and addressed in detail in the baseline report. There are a number of risk factors which may impact the level of risk and the consequent priority for inspection and/or remediation of high rise buildings with combustible exterior façade assemblies. Authorities are seeking a means to make these assessments and decisions based on a risk informed methodology.

Risk is a function of the likelihood of a fire hazard and the consequence of that fire hazard occurring. Risk assessment tools have previously been defined for other fire scenarios but none have been adapted to address the potential of fire spreading on the outside of the building with fire breaking in on multiple floor levels. Based on a literature review of available risk assessment tools from diverse industries, an analysis of how to weigh variables in risk ranking tools and a global survey of high rise fire safety provisions it was decided to use a qualitative methodology. Through engineering judgement, the risk of high-rise buildings with combustible exterior wall assemblies may be qualitatively defined on the basis of their respective hazards and anticipated consequences.

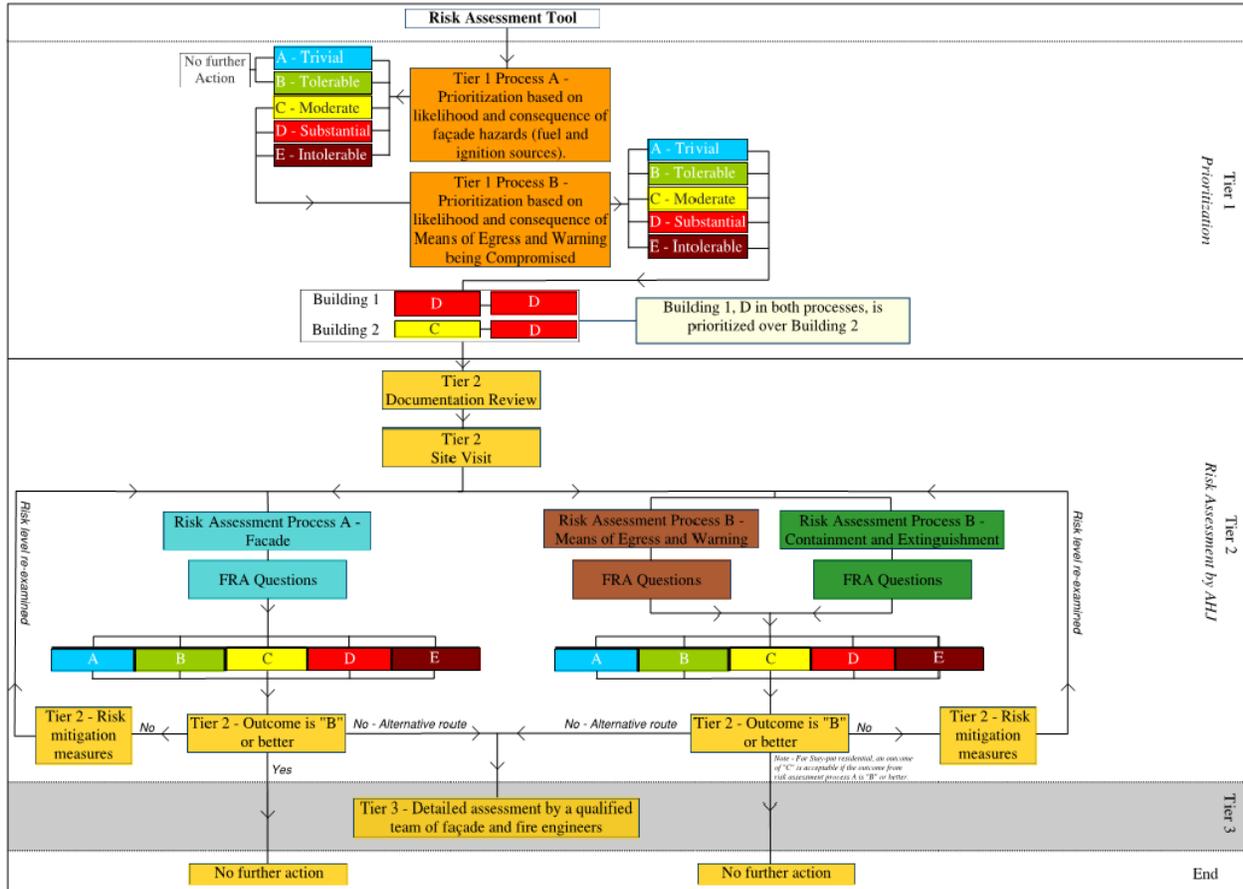
The variables affecting the fire risk of the façade was identified focusing on the façade system itself and potential ignition sources such as fire spreading from inside of the building, fire in a vehicle or trash container next to the façade or a fire on a balcony. Additionally other variables associated with fire safety in high rise buildings such as building characteristics, means of escape, warning, containment and extinguishment was included. The relative importance of the variables was weighted using an analytical hierarchy process (AHP), a survey of Arup/Jensen Hughes global research team, and input from the Research Foundation Project Panel.

A FRA methodology was adopted to help the global authorities refine the necessity of an inspection when confronted with large building portfolios. This FRA methodology consists of a two-tier process:

- Tier 1 – Desktop study of an inventory of buildings to establish a priority ranking for further assessment. A small number of questions with clearly pre-defined answers are posed of the users for the Tier 1 assessment to inform the ranking of buildings that then require further detailed assessments. Some questions pertain to the combustibility of the insulation and façade cladding, presence of sprinklers, potential ignition sources and type of alarm system.
- Tier 2 – A FRA evaluation by the AHJ, prioritized by the ranking established in Tier 1, involving onsite inspections, review of as built information and maintenance records, sampling and laboratory testing of unknown façade materials. In some instances, the Tier

2 assessment will highlight the need for a more detailed risk assessment by a qualified engineering team of façade and fire engineers.

The figure below depicts the FRA methodology used to evaluate combustible exterior façade assemblies on high-rise buildings. For further details please refer to the full baseline report, available at [www.nfpa.org/exteriorwalls](http://www.nfpa.org/exteriorwalls).



Source: Figure 22 High Rise Buildings with Combustible Exterior Wall Assemblies: Fire Risk Assessment Tool, January 2018.

The FRA methodology shown above sets the framework for NFPA’s EFFECT™ (Exterior Façade Fire Evaluation & Comparison Tool). This tool was developed in response to many recent fires in high rise buildings clad with combustible façade systems. Global enforcement authorities have been lacking a tool to assess the fire risk of such buildings – EFFECT™ is intended to fill this void for existing buildings with possible combustible exterior façade assemblies.

In general, the FRA tool (i.e., EFFECT™) is intended to be used by AHJ’s to assess a portfolio of buildings throughout a city where there is a concern that the exterior façade systems are built-up from combustible materials. This tool is intended to provide a framework to aid the AHJ to prioritize buildings in their jurisdiction and to conduct initial fire risk assessments of each building, assessing the highest priority buildings first. The method does not recommend specific mitigation measures, but rather prioritizes the need for mitigation based on risk factors.

The methodology of the FRA tool and the theoretical underpinnings of the outputs are outlined in the baseline report. An overall user guide has also been prepared to accompany the tool. The

user's guide is intended to clearly and simply explain the variables chosen and how the tool is proposed to be used, along with its limitations.

The deliverables of this project including (1) the baseline report; (2) the online electronic fire risk assessment (FRA) tool (i.e., EFFECT™); (3) the user's guide and other supporting information are available at [www.nfpa.org/exteriorwalls](http://www.nfpa.org/exteriorwalls).

**For more information, see [www.nfpa.org/exteriorwalls](http://www.nfpa.org/exteriorwalls)**