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Property Loss Prevention: Building Resilience in the NFPA Fire and Life Safety Ecosystem

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### Consider a Bad Day...

Fire & Life Safety:
Protecting People
Create safe environment
Prevent injuries

Property Loss Prevention:

Protecting Livelihoods
Reduce societal impact
Minimize economic losses



# The Basics of Property Loss Prevention



- Lost Revenue
- Market Share
- Reputation
- Other??

#### Underwriting

- Transfer Risk
- Protect Value

#### Engineering

- Assess Risk
- Prevent / Mitigate Loss

#### Research

- Understand Hazards
- Develop Solutions

#### Supply Chain Disruption

(1)



#### INVESTMENT IN SAFETY

Investing in safety should be everyone's priority. We all must take a vested interest in the safety of the public and work together to allocate resources to reduce losses from fire and related hazards. If decisions are based solely on financial gains, tragedies can occur.

> Property insurers play a key role in promoting the investment in safety, and protecting people's livehoods.

If it can't be insured, it won't exist.

# Shared Goals and Responsibilities









# 1. Risk Exposure - How exposed is a facility?

# 2. Risk Quality - How protected is a facility?

#### What is Risk?





#### Definition of risk (Entry 1 of 2)

- 1 : possibility of loss or injury : <u>PERIL</u>
- 2 : someone or something that creates or suggests a hazard
- **3** a : the chance of loss or the perils to the subject matter of an insurance contract
   *also*: the degree of probability of such loss
  - **b** : a person or thing that is a specified hazard to an insurer
  - c : an insurance hazard from a specified cause or source // war *risk*

Loss Prevention Definition  $Risk = probability \times consequence$ frequency of Property a loss event Damage + Time Element



Environment, Social, Governance



#### **Emerging Technologies**

#### **Technology Often Outpaces Code Adoption**



Case 1: Storage



Top-loading Automatic Storage and Retrieval Systems

#### Case 2: Renewable Energy



Lithium-ion Batteries + Energy Storage Systems

#### **Case 3: Construction**



#### Mass Engineered Timber



#### **Top Loading Automatic Storage and Retrieval Systems (TL-ASRS)**

#### Unique fire risks

- Extremely dense storage
- No aisle spaces for firefighter entry
- Battery operated robots

- New cyber risks
  - Fully automated robotic systems
  - Wireless control systems
  - Computing and data storage







**Traditional Warehouse** 

Automated Warehouse

Significant increase in storage density Potential for very long fire events No access for *manual* fire fighting efforts

VS

#### **Traditional Fire Protection Strategy**



1. Sprinkler system to suppress the fire



2. Fire Service to extinguish the fire



#### **NEW Fire Protection Goal**



1. Sprinkler system to suppress the fire





NEW Challenge: Extremely dense storage with minimal access areas

Final Extinguishment

2. Fire Service to extinguish the fire



#### 40 ft (12.2 m) ceiling

#### 25 ft (7.6 m) ceiling



#### **Cyber and Other Risks**





- Ensure reliable and secure control systems
  - Robust algorithms
  - Redundant hardware
  - Control centers away from fire areas
- Robotics present new risks
  - Ignition sources, e.g., batteries
  - Charging stations
  - Impediment to firefighter response

#### **Lithium-ion Batteries and Energy Storage Systems**





**BATTERY STORAGE** 

- Aligns with sustainable energy sources
  - High energy density, long life, powerful
  - Financial incentives often available
- Wide range of applications
  - Consumer electronics
  - Electric vehicles
  - Backup power in data centers
  - Industrial/grid scale applications

#### **Sources of Economic Loss**





**BATTERY STORAGE** 

Property Damage \$\$

- Physical damage to equipment
- Collateral damage to surroundings
- Overhaul
- Time Element



- Lost revenue (recommissioning)
- Reduced energy capacity
- Damaged reputation

# LFP @ 83 kWh

Lithium iron phosphate

# Water damage area

3

### - Fire damage



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**Sprinkler Protection** 

Response: 1 sprinkler Damage area ~ 15 ft diameter 20 ESS racks @ \$100K/each Loss = \$2MM (equipment only)

Other sources of property damage Smoke Overhaul Water infiltration Building structure

#### What is the path forward?

#### **New Opportunities for Loss Prevention**

- Layers of Protection to Reduce the Risk of Loss
  - Prevention, detection, abuse mitigation
  - Active and passive protection
  - Facility or equipment layouts
- Expedite loss prevention recommendations
  - Experimentally derived guidance adopted in codes
  - Best practices for new technologies

#### **FM Global Research Approach**





#### **Extending Experimental Knowledge**





#### **Layers of Protection**





Fire Incident Response







Reduced Loss Expectancy

#### **Mass Timber**





- Renewable sources
- Prefabrication
- Expedited construction
- Looks nice!
- Combustible
- Limited building codes
- Very limited loss history

#### **Still an Emerging Market**



- 1. Cross laminated timber (CLT)
- 2. Nail laminated timber (NLT)
- 3. Glue laminated timber (Glulam)
- 4. Laminated veneer lumber (LVL)



#### **Identified Knowledge Gaps**





#### 1. Material-of-Construction



2. Damage Scenarios (fire / water)



3. Construction Details (connections)



4. Repairability

**Does Mass** Timber pose greater economic risks than other construction methods?

#### **Building Resilience into the Ecosystem**

FM GLOBAL PROPERTY LOSS PREVENTION DATA SHEETS

FM Global Property Loss Prevention Data Sheets are engineering guidelines written to help reduce the chance of property loss due to fire, weather conditions, or failure of electrical or mechanical equipment, and incorporate loss



#### Everyone Plays a Role

- Design
- Educate
- Communicate

#### Think about Tomorrow

- Enable transition to sustainable materials and energy sources
- Support code adoption that keeps pace with new technologies

# Shared Goals and Responsibilities

- Life safety to protect people
- Property loss prevention to protect livelihoods



# Thank you. Any questions?

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