



Risk Engineering Services

Fire sprinklers and environmental sustainability

Automatic sprinklers have a proven track record, reducing property damage, improving life safety and providing increased business resilience from the peril of fire. As well as making good business sense, they can also provide environmental benefits by limiting fire losses and damage to the environment, reducing carbon emissions, reducing the use of firefighting water and help avoid costly restoration of buildings and equipment. The installation of sprinklers is, therefore, an environmentally sustainable business option.

Background

Fire continues to be a key source of loss in both homes and businesses across the world. The National Fire Protection Association (NFPA) report that in 2018, US fire departments responded to over 1.3 million fire calls with around 1/2 million of these occurring in structures. This was roughly one call every minute. The Business Sprinkler Alliance report one in five warehouses will have a fire requiring attendance of fire fighters in its lifetime.

Every fire can present a potential threat to life, damage to property and for commercial enterprises, the possibility of interruption to business. Fire is destructive, with not just the thermal effects of fire, but also the toxic and corrosive effects of smoke and the environmental effects of fire water from the resulting firefighting activities. The potential impacts from a large fire include:

- Fire damage to the building, equipment and stock
- Smoke damage to both the immediate and potentially wider area
- Potential impact to life
- Carbon dioxide (CO₂) and other greenhouse gases released from both the fire and from the restoration activities for building, contents and stock
- Water use for the fire-fighting and potential for fire water run-off to ground or water courses



- Loss of business activities and revenue
- Potential loss of employment
- Potential reputation and shareholder impact

In summary, fire can impact business, supply chains, employment, the local community and the environment. A study in the UK, reported the total cost of commercial fire claims in one year alone was £865 million, with a further £150 million of business interruption.

Fortunately, fire sprinklers can provide an effective solution to reduce fire losses and its consequences, including the impact of fire on the environment. Sprinklers, activated by heat, are designed to control or suppress a fire in its early stages. As a result, most fires are controlled by a small number of sprinkler heads with only the sprinklers close to the fire being activated. This enables the responding fire brigade time to set up and conduct final extinguishment. Sprinklers have a good track record,

with NFPA reporting sprinklers effective at controlling the fire in 96% of fires in which they operated. The average fire loss in a sprinklered building is around one sixth the size of a non-sprinklered building.

Understanding the benefits

Sprinklers are a long-term investment which is realised over the lifetime of a facility. The value is most apparent in the event of a fire, when the sprinklers save most of the building and contents, with limited disruption to the business. There is, of course, some initial and ongoing investment to design, install and maintain the fire protection systems, however, if considered earlier in the design, the overall cost to a building project can be limited. Not only does this investment significantly improve resilience to fire, but it can also demonstrate good fire safety management to other stakeholders such as suppliers, customers, shareholders and insurers.

Studies by FM Global and Building Research Establishment have sought to quantify some of the environmental benefits of sprinklers. These studies present some interesting findings:

- Investment: The whole life costs from warehouses with sprinklers are smaller than those without sprinklers. For warehouses larger than 2000 m², (~22,000 ft²) the whole life cost is around 3.5 times lower for warehouses with sprinklers.

In the event of a fire, the use of sprinklers:

- Reduces greenhouse gas emissions up to 98%
- Reduces water uses by 50% to 91%

Warehouse Fire – Costs for buildings without sprinklers versus buildings with sprinklers			
Warehouse	No Sprinklers Total Cost	Sprinkler Total Cost	Ratio
Medium 2000–10,000 m ² (~22,000–110,000 ft ²)	£1,751,983 (~\$2,200,000)	£61,457 (~\$76,000)	28.5 : 1
Large >10,000 m ² (~>110,000 ft ²)	£2,097,849 (~\$2,600,000)	£63,612 (~\$78,000)	33 : 1

From BRE Global Report “An Environmental Impact and Cost Benefit Analysis for Fire Sprinklers in Warehouse Buildings”. Values quoted in 2010 prices considering cost of total area damaged, injuries, fatalities, CO₂ released, CO₂ embodied in replacement and rebuild, water used in firefighting, and un-employment. Averaged results.

Warehouse Buildings – Whole life costs with and without sprinklers			
Warehouse	No Sprinklers Whole life costs	Sprinkler Whole life costs	Ratio
Medium 2000–10,000 m ² (~22,000–110,000 ft ²)	£984,669 (~\$1,200,000)	£276,448 (~\$340,000)	3.6 : 1
Large >10,000 m ² (~>110,000 ft ²)	£4,547,661 (~\$5,600,000)	£1,224,454 (~\$1,500,000)	3.7 : 1

From BRE Global Report “An Environmental Impact and Cost Benefit Analysis for Fire Sprinklers in Warehouse Buildings”. Values quoted in 2010 prices and consider total cost of fire, insurance and sprinklers. Averaged results.

Loss Lesson – Sprinkler Save

A fire occurred in the UK at a large storage facility of around 63,000 m² (678,000 ft²) and 16m high (53 ft). The fire occurred in a 10m (33ft) high picking tower. The fire was controlled by 4 sprinkler heads which contained the fire and prevented horizontal spread, enabling the fire brigade to extinguish the fire with only two hose reels.

Loss Lesson – Fire Loss

A fire occurred at a UK textile mill. Fire fighters from eight towns attended with ten fire engines and two aerial appliances. The building was not sprinklered. The fire spread rapidly and quickly involved the whole property. The mill was in danger of collapse and residents were evacuated from nearby properties.

Managing the risk

Sprinklers provide a wide range of benefits to life, property and the environment, controlling fire losses and allowing the impacts to be quickly mitigated and business to resume. When designing new facilities, conducting changes to existing facilities or when reviewing risk assessments and business continuity plans, consider the installation of sprinklers or other suitable fixed fire protection systems in liaison with your property risk engineering service provider.

Further information

If you require further information, please contact your local Swiss Re Corporate Solutions Risk Engineer, insurance underwriter or insurance broker.

References:

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Business Sprinkler Alliance, Map of fires and sprinkler saves, <https://www.business-sprinkler-alliance.org/about-sprinklers/map-fires-saves/> Web site accessed 28 April 2020

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Fraser-Mitchell, J, Abbe, O, Williams, C, An Environmental Impact and Cost Benefit Analysis for Fire Sprinklers in Warehouse Buildings. BRE Global, December 2013

Wieczorek, C, Ditch, B, Bill, R, Environmental Impact of Automatic Sprinkler Sprinklers, FM Global Research Technical Report, March 2010

Exchange rate: GBP 1 = USD 1.23 (17 June 2020)

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