

White Paper

Early warning with outdoor sirens

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ONE OF THE most important tasks in disaster and risk management, and a responsibility of governments and administrations around the world, is to take preventive measures for the protection of people in case of catastrophes and emergencies. Natural catastrophes are increasing, industrial accidents occur unpredictably, and other human-induced disasters, such as acts of terrorism, happen suddenly, creating nightmares for humanity. All these incidents create fear which in turn increases the desire for civil protection and public safety. On any such occasion, everyone must be efficiently warned and informed in time, to protect human life, property and the environment.

Civil protection starts with carefully considered warning and information systems, a reason that the requirements and expectations for such systems have evolved over the years. Advanced technology provides a wide range of warning systems, from conventional outdoor sirens to complex integrated state-of-the-art warning and information systems.

Every inhabited area subjected to catastrophe risk needs a custom-tailored solution for civil protection, which must be adapted to individual conditions. With warning and information systems available and in place, governments and administrations can act in time, enabling those threatened to react in time. The value represented by saving life and property will not only justify a favourable decision for the implementation of such systems, but will also far outweigh costs associated with procurement, operation and service of the systems and equipment.

Irrespective of the nature and cause of the catastrophe and particularly regarding unforeseen conditions, a basic concept and technical solutions are adaptable. Specific criteria and requirements must nevertheless be applicable for both the standalone product and the comprehensive system structure. Products and systems for outdoor warning and information are designed to activate a variety of different alerting signals, pre-stored messages and public address announcements, which are broadcast with high reliability and audibility.

The nature and impacts of catastrophes affect those design requirements. For example, one of the first consequences in many disasters is that electric power lines are disrupted, impeding most possibilities for obtaining information from mass media devices such as non-battery operated televisions and radios. Land-line and mobile telephone networks can also become inoperable resulting in vital information no longer reaching those in need.

Therefore, outdoor warning and information systems must operate independently from public utilities including electricity and public telephone networks. Large-capacity batteries and a radio communication link guarantee that alert signals, pre-stored messages and public address announcements can be remotely initiated by a control centre to inform the population in affected areas efficiently through outdoor sirens. People can first be alerted about the imminent risk or existence of an emergency situation. Then, they will be informed about necessary measures to take, which under extreme conditions can be directives for evacuation.



Main control centre



Electronic Siren ECN 1800



Electronic Siren ECN 1200



Electronic Siren ECN 2400

Independence from public utilities and the reliance on the outdoor warning and information systems' own power resources and communication links mean that such systems have to be permanently monitored to ensure their readiness and overall condition. Therefore, detailed diagnosis procedures and test routines must be incorporated into the design. For the standalone product, such information can be obtained at the installation location. For other systems, information regarding the technical condition of each sub-system can be obtained at the corresponding control centre.

Overall, the modern outdoor warning and information system comprises a computer-supported control centre, a radio communication network and electronic sirens of various acoustic output power which are responsible for providing warning information. A radio signal with data and voice is transmitted from the control centre to the electronic sirens, activating alert signals or pre-stored messages and broadcasting public address announcements. Data is also transmitted by radio signal from the electronic sirens to the control centre, providing information on the technical condition of the electronic sirens. Every event or any change of technical condition can be monitored by the control centre, with the information recorded and saved.

Although the systems are continually operated for monitoring, testing and potential activation, they are cost-efficient, requiring minimal maintenance. Despite commonalities among all such systems, specific primary dedication and the use of individual systems lead to various specific titles which include public, flood, or plant emergency warning systems.

A case study from the Czech Republic illustrates a system in operation. In the 1990s, the Czech Republic's authority responsible for civil protection defined requirements for a flood warning system in the capital, Prague. The primary aims were to warn the public, by means of specified alert signals propagated by outdoor electronic sirens, and to inform them by radio announcements also propagated by the sirens. The focus was on rising water levels on the river Moldau and the imminent risk of floods in the area; however, the use of the flood warning system for other emergencies and disasters was considered and approved.



Electronic Siren ECN 1200

The system deployed comprised a computer-supported control centre, radio repeater stations and more than 160 electronic sirens; all built over several years. During the 2002 floods in Prague, it was used extensively. Residents of affected areas were awakened by the alert signals from the outdoor electronic sirens, and warned before being flooded. Despite widespread power cuts and telephone outages, the inhabitants could follow information and instructions given from the system. Evacuations were announced and initiated thanks to the flood warning system. The system met expectations.

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