



# Resilience to climate change:

Telecom networks and software for early warnings for all

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This paper reflects the need to better align climate adaptation efforts with the public safety interest by accelerating the deployment of mobile public warning systems (PWS), in synergy with the roles of telecom operators and software providers.

It argues how public-private partnerships provide ample opportunity to support governments' climate adaptation agendas to meet the UN sustainable development goals (SDG).



This opportunity requires connecting the dots between four aspects:

- Governments' demand for extension of mobile-cellular and broadband coverage.
- The industry's investments in networks and services.
- Multilateral development assistance financial support to disadvantaged people and regions around the world to acquire the system.
- The commercial and technical implementation skills of private telecom operators and mobile alerts software providers.

With adapted regulatory frameworks and multilateral financial support for emerging economies and least developed countries (LDCs), the climate adaptation impact of using mobile networks for nationwide public warning can be massively beneficial, and at great benefits for global sustainability.

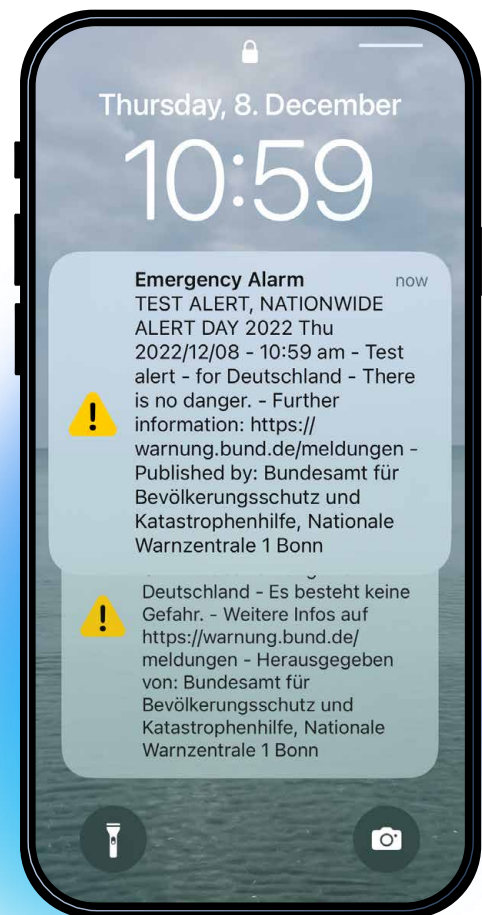


Figure 1 By Shisma - Own work, CC0, <https://commons.wikimedia.org/w/index.php?curid=126443285>

# Mobile telecom operators' impact on SDG13 via public warning

Mobile Telecom Operators (MNOs) deserve recognition for having supported numerous countries around the world in implementing Public Warning Systems (PWS) in the last ten years. They increasingly have a key role to play in climate adaptation efforts, in line with the SENDAI Framework for Disaster Risk Reduction and the Sustainable Development Goals, and their importance is highlighted by the 2018 European Union Electronic Telecommunications Code (Art.110) as a regulatory blueprint for mandatory nation-wide public warning provision.

Mobile infrastructure is proving to be the most effective way to disseminate early warnings, crafted by meteorological offices' sophisticated advance forecasting activity, to the population and emergency responders. As highlighted by International Telecommunications Union, 95 per cent of the world's population today has access to mobile broadband networks, and the majority of people own mobile handsets. In the event of crises, mobile alerts, using the extensive availability of mobile networks and services, growth in infrastructure, mobile subscriptions, and handsets, are the most inclusive ways to reach everyone in seconds.

Until recently the definition of early warning system (EWS) did not focus on covering the so-called "last-mile", largely ignoring the delivery of the alert message to the ultimate beneficiary, the

citizen. Alerting focused primarily on the capacity of meteorological offices to collect geospatial (and other) data and model it to forecast and alert other government bodies of imminent hydrogeological threats. Crucial to this effort has been the contribution of the common alerting protocol (CAP<sup>1</sup>), enabling government authorities and meteorological offices to have a common language. Other standardization bodies like 3GPP - The Mobile Broadband Standards Body<sup>2</sup>, ETSI - The global standards body for ICT systems<sup>3</sup>, and ATIS - The Alliance for Telecommunications Industry Solutions<sup>4</sup>, facilitated the interface between telecom and IT in making the diffusion of alert messages to the public possible on multiple digital devices.

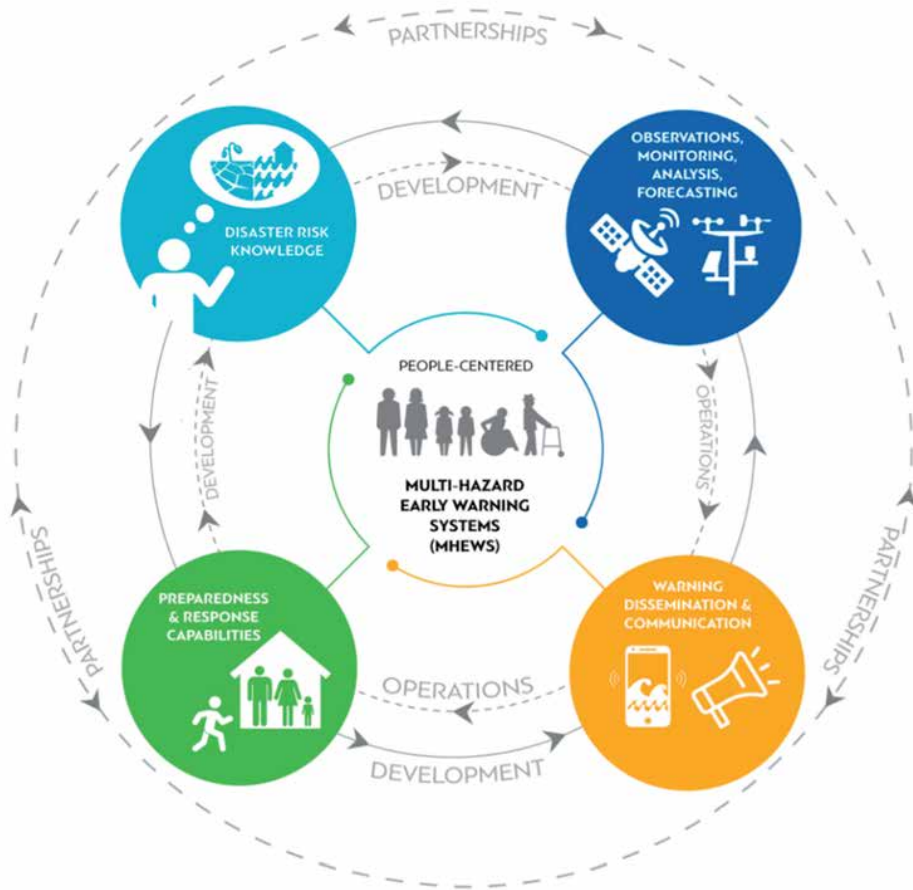
On March 23rd, 2022, UN Secretary-General, António Guterres, announced the United Nations would spearhead Early Warnings for All, a 5-years action to ensure every person is protected by early warning systems within five years. This fits into the overall development context within the Sustainable Development Goal 13 (climate change), the Sendai framework for disaster risk reduction, and the general development efforts carried out by multilateral development banks to make societies more resilient to risk and enabling new digital opportunities.

<sup>1</sup> The Common Alerting Protocol (CAP), an ITU Recommendation (ITU-T X.1303), is a simple but general format for exchanging all-hazard emergency alerts and public warnings over all kinds of networks. CAP allows a consistent warning message to be disseminated simultaneously over many different warning systems, thus increasing warning effectiveness while simplifying the warning task

<sup>2</sup> 3GPP - <https://www.3gpp.org/>

<sup>3</sup> ETSI - <https://www.etsi.org/>

<sup>4</sup> ATIS - <https://www.atis.org/>



"In the event of crises, mobile alerts are the most inclusive ways to reach everyone in seconds" <sup>5</sup>

**Vanessa Gray**  
 In Everbridge's Global Public Safety Conversation Series

The UN Global Early Warning for All initiative explicitly notes the need for “integration of early warning into disaster risk reduction planning and climate change adaptation strategies,” which includes “warning and informing’ dissemination systems and ‘last mile’ communication mechanisms”. With a newly defined action plan, ITU took the lead on the Multi-hazard Early Warning System (MHEWS) pillar on “Warning Dissemination and Communication”. Along the regulatory and policy guidances, private sector partnerships can facilitate the timely implementation of multichannel dissemination alerting including “implementation of geo-located mobile early warning services using cell-broadcast and/or location-based SMS”.

The pillar also focuses on “promoting a regulatory approach, based on the model adopted by several countries including the EU, which has mandated the use nationwide, in all the European Union Member States, of geo-located alerts using mobile networks”, and engaging the private sector to implement mobile EWS systems. This demonstrates how the function of public warning systems (PWS) to effectively broadcast an alert to reach the population has become embedded in the MHEWS definition. Development organizations and governments should now prioritize the last mile multi-channel communication to the public, as it demonstrates a high return on investment in terms of lives saved, avoided loss, and damage

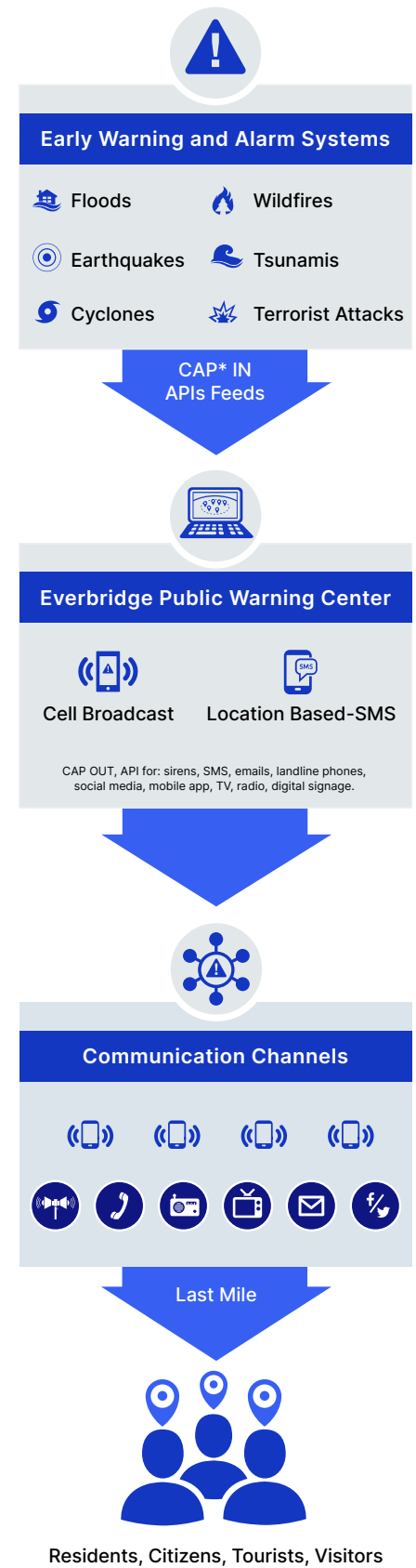
Figure 2 United Nations: Multi-Hazard Early Warning System



to infrastructures<sup>5</sup>. In addition, as a clear contribution to the SDG 13 it could be capitalized by MNOs in their sustainability reporting narrative, annually mapped through the GSMA mobile industry SDG impact report.

In 2013, Everbridge contributed to the GSMA Disaster Response report on “The Mobile Network Public Warning Systems, Rise of Cell Broadcast” through its One2many division. Ten years later, a new GSMA report confirms the nation-wide government adoption of mobile alerting, with a predominance of cell-broadcast technology “Despite being in the early stages of widespread implementation, the role of mobile in creating modern, effective PWS service is evident. Although IP messaging services may offer increased flexibility and potential when disaster strikes, Cell Broadcast Service is still currently the most effective and reliable medium for the rapid delivery of warning messages, to as many subscribers as possible (GSMA, 2013.)”

Since then, Everbridge has also been granted a series of patents for the integration between the cell broadcast and location-based alerting, thereby expanding the impact mobile networks can provide in public safety. The patent obtained for the Public Warning Center has allowed two previously competing technologies to be integrated in a single platform. This expands governments capacity to take advantage of both technologies with a single-entry point.



<sup>5</sup> <https://www.everbridge.com/global-public-safety-conversation-series/>  
<sup>6</sup> WMO, UN GLOBAL EARLY WARNING/ADAPTATION INITIATIVE, DRAFT RESOLUTION; Draft Resolution 4(2)/1 (EC-75), June 22 Figure1: Goal 13 | Department of Economic and Social Affairs. (n.d.). <https://sdgs.un.org/goals/goal13>

\*CAP: Common Alerting Protocol

Figure 3: Everbridge Public Warning Center

## Economic considerations of public warning as a public good

Early Warning Systems save lives and contribute to public safety, especially when they reach the majority of citizens, covering the last mile, guiding them to shelter and allowing them to secure key assets ahead of a disaster. They are a prime tool for adapting to the increased frequency and severity of climate-induced risk. To that end, in 2005 the European Telecommunication Standards Institute (ETSI) laid the basis for the European Union Electronic Telecommunications Code, which established a regulatory obligation for having a nation-wide public warning system in 2018, with the EU Directive 2018/1972.

The private sector is essential in helping governments connect the dots between what exists, implementation expertise, alerting practices, and development finance. Only through the involvement of private organizations can governments accelerate the climate adaptation impact that mobile infrastructure and software technology can produce, as confirmed by its pre-existing reach and global footprint.

As a practitioner of communicating alerts on a nation-wide scale for 20 years, Everbridge has come to realize that the benefits of warnings systems have the greatest impact when the end-to-end value chain is effectively covering the population. For an effective safety provision to the population an integrated, multi-disciplinary approach is needed, combining meteorological forecasting, common alerting protocols, and multichannel communication standards through telecom and IT networks. The return on investment is estimated to be between 23-35% per year<sup>7</sup> with the primary benefits of protecting lives, livelihoods, and livestock, reducing loss and damage to infrastructure, and overall lessening the fiscal impact on governments' budgets. The risks of climate change are no longer debatable, neither are the returns from avoided losses.

While multilateral donors have shown an increasing focus on 'green' and digital initiatives, early warning using the existing infrastructure of private commercial partners is a low-hanging fruit that could rapidly generate considerable

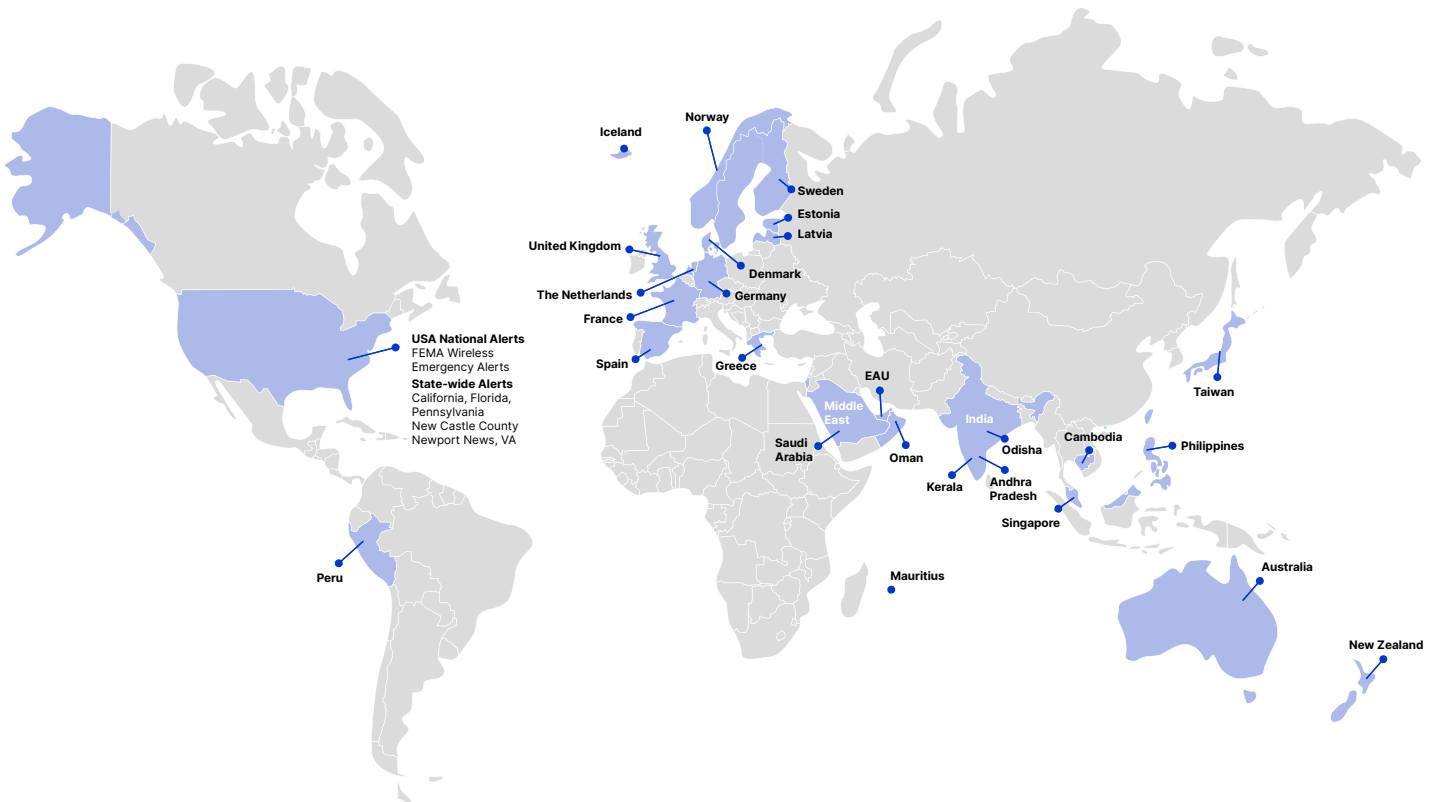


<sup>7</sup> Alliance for Hydromet Development, Hydromet Gap Report 2021, 2021

public benefits. The perception of vendor lock-in risk for governments when the alert service is provided by private industry partners is misplaced, it instead is a guarantee of service continuity, proficiency, and performance in the long-run for the public sector. Regulating the desired performance criteria upfront and selecting with competitive and transparent procurement processes is what ensures quality of service.

In addition, the fixed duration of contracts established with private suppliers guarantees governments the freedom to review performance on a regular basis and change suppliers if the quality of service falls short of expectations. Countries already offer their citizens mobile coverage through a variety of licensed operators, who have invested heavily in network infrastructure and services. Operators have a prime commercial interest in the optimal functioning and coverage of a network, since it ensures their competitiveness and survival, while public warning suppliers can ensure the implementation, managed service, and regular update and upgrade of the software, performed in close cooperation with government authorities.

"Early warnings should be included in climate proofing infrastructure efforts and national telecom regulatory frameworks." <sup>8</sup>



Everbridge, country-wide, federal, and local US states implementation, September 2022

8 <https://gca.org/bringing-the-pieces-of-the-early-warning-puzzle-together-for-climate-smart-economies/>

Going forward, there could be an opportunity to link 5G mobile broadband expansion and MHEWS, designing incentives to provide what effectively is a public service through private infrastructure, supporting operators' balance sheets in expanding and maintaining the network. Multiple initiatives point in this direction. The UN Sendai Framework for Disaster Risk Reduction (SFDRR) (UN, 2015) sets targets to reduce disaster-related losses and economic impacts by 2030, requiring their thorough financial and economic evaluation. Enhancing physical and digital resilience to disasters in an increasingly climate-vulnerable and digitally reliant world can generate social, economic, and environmental co-benefits, even in the absence of disasters. The recent Triple Dividend Framework for cost-benefit analysis will justify € trillions of Disaster Risk Management (DRM) investments funded through EU programs, national funds, and international financial institutions<sup>9</sup>. The responsibility of both telecom infrastructure (broadband) provision and public safety relies on governments, but the costs are largely borne by operators.

Through appropriate regulation, alternative use of broadband mobile networks can provide early warnings to alert the population on multiple channels, mitigating risks in case of natural hazards, disruptions, critical events. This translate in an immediate cost-saving climate adaptation measure for which incentives such as concessional finance or in some cases, grants, could be provided.

Allocating public budget to offer Public Warning services over mobile networks is justified for this type of emergency communication: Public Warning being free of charge, is not commercially interesting for MNOs, but an important element for sustainable fiscal management of public resources in the medium and long run.



<sup>9</sup> WBG-ECHO, Economics for Disaster Prevention and Preparedness, [Investment in Disaster Risk Management in Europe Makes Economic Sense](#), April 2021



## The european union regulatory approach as a blueprint

“In the European Union (EU), during the period from 1980 to 2020, natural disasters affected nearly 50 million people and caused on average an economic loss of roughly €12 billion per year”<sup>10</sup>. The introduction of public warning systems is expected to reduce this loss significantly in the years to come. Via an extensive public consultation, including the Board of European Telecom Regulators (BEREC), operators, and users, it has mapped the effectiveness, availability and accessibility features this PW service should have within the EU, such as being able to reach the majority of its citizens in seconds<sup>11</sup>. In 2018, the European Electronic Communications Code, gave EU Governments a four year time frame to deliver this service.

The approach taken by the European Union (EU) as a legislator is exemplary in this regards and could be used as a blueprint for other regional geographies or single countries. Considering the economic loss estimates produced by climate risk, the EU has imposed to its member states the obligation of providing free-of-charge nation-wide Public Warning Service and provided incentives, through its Next-Generation EU program, to implement it.

Encouraging countries to consider a regulatory approach such as the one adopted in the EU is recognizing that regulation is an efficient way to quickly implement public warning system for all. While this may not be the only way, it proved an effective way to accelerate the uptake of public warning systems across the EU member states, with the support of Mobile Network Operators, incentivized by the financial incentives of the Next Generation EU blended finance instrument.



# 50 million

people got affected by natural disasters during the period from 1980 to 2020<sup>12</sup>

<sup>10</sup> Economics for Disaster Prevention and Preparedness in Europe, paragraph 1, 4 June 2021

<sup>11</sup> EU Directive 2018/1972, European Electronic Communication Code, Art. 110

<sup>12</sup> [https://civil-protection-humanitarian-aid.ec.europa.eu/what/civil-protection/european-disaster-risk-management\\_en](https://civil-protection-humanitarian-aid.ec.europa.eu/what/civil-protection/european-disaster-risk-management_en)

## Conclusion: the public good nature of mobile public warning

Early Warning Systems are defined as an integrated system working on hazard monitoring, forecasting and prediction, warning dissemination, and preparedness that enables individuals, communities, governments, businesses, and others to take timely actions to reduce disaster risks in advance of and during hazardous events.

Through direct experience in 24 nation-wide implementations across the world since 2012, with Everbridge Public Warning Center as the most diffused Public Warning System, and in collaboration with the major MNOs, we help governments to react faster if risky events occur, and to coordinate their public intervention response more efficiently. Communicating the critical event to the last mile, reaching the citizen, is a key part of an integrated, end-to-end, Early Warning System. Public Warning Systems are not a revenue generating service for the operator, but are most effectively deployed through mobile telecommunication infrastructure in terms of reach and cost per capita; thus being considered a public good.

Public goods are both non-excludable and non-rivalrous. For utilities like MNOs, users cannot be barred from accessing and/or using the service (“non-excludable”) for failing to pay for it, so it is commercially uninteresting. Also, use by one

person neither prevents access of other people nor does it reduce availability to others (“non-rivalrous”). Commercially, it only creates obligations for the MNO. Therefore, providing the appropriate regulatory environment to make it more diffused, and governments’ fiscal or financial incentives for its implementation could contribute to its rollout.

Effective public alerting within an MHEWS is, in our view, an essential service for climate adaptation in environments in which climate change vulnerabilities and reliance on ICT increase, in national economies heavily exposed and dependent on multiple interconnected sectors and on the systems contributing to their functioning. This is in line with the conclusion of the 2022 UN CC Conf COP27, pushing for implementation of climate adaptation and mitigation commitments, especially reducing loss and damage in most vulnerable nations and the associated donor pledges for the implementation of the Early Warnings for All initiative.