# REPORT OF THE WORKING GROUP ON FOREST FIRES

## REDUCED VERSION

ANACOM

AUTORIDADE NACIONAL DE COMUNICAÇÕES

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## Measures for the Protection and Resilience of Electronic Communications Infrastructure (ANNEX I)

**"29 May 2018"**

**Executive summary**

## I. Introduction

Following the forest fires which occurred in Portugal on 17 June and 15 October 2017, and given the exposure of electronic communications infrastructure to the risks inherent to these disasters, on 19 October 2017, ANACOM approved a preliminary report – "Forest Fires - Measures for the Protection and Resilience of Electronic Communications Infrastructure" (available on ANACOM's website at: https://www.anacom.pt/render.jsp?contentId=1421363&languageId=1), focusing on electronic communications infrastructure and infrastructure suitable for carrying electronic communications, taking into account the legal regime established by *Lei das Comunicações Eletrónicas* (Electronic Communications Law - Law no. 5/2004 of 10 February) and by Decree-Law no. 123/2009 of 21 May.[1] This preliminary report was based on work carried out on the ground to evaluate radiocommunications stations and posts, cables and aerial routes located in zones affected by fires or in zones of high forest fire hazard designated "High" (class IV) and "Very high" (class V) according to ICNF - Instituto da Conservação da Natureza e das Florestas (Institute for Nature Conservation and Forests). It was also based on the recommendations of ITU-T (Telecommunication Standardization Sector of the International Telecommunication Union) and on best practices employed in other countries.

This report identified a set of measures aimed at improving the security and integrity of public networks and publicly available electronic communications services, aimed also at the preparation, approval and establishment of a new legal and regulatory framework for the planning, construction, reconstruction, reconversion and installation of electronic communications infrastructure and of infrastructure suitable for carrying electronic communications, as well as at the establishment of technical standards and regulations to

[1] It should be noted that this preliminary report as well as the work carried out by the working group concerns public electronic communications networks and services, which should not be confused with security and emergency communications networks and services.

govern the construction and protection of infrastructure, to ensure that it will withstand fire and other natural disasters, in accordance with best practice and recommendations.

Having considered it essential to ensure the involvement and prior consultation of a number of public and private entities, such as the *Assembleia da República* (Assembly of the Republic), the Portuguese Government, municipalities, electronic communications companies, machine manufacturers and installers and universities, and also to ensure potential identification of further measures, ANACOM took the initiative to set up a working group, resulting in the present report. For this purpose, invitations were sent out to several bodies, as shown in ANNEX II.

## II. Working group

On 6 February, the Group held its first meeting with representatives from 18 organisations taking part.

At this meeting, ANACOM presented a set of measures for discussion (as set out in its preliminary report of 19 October) for the protection and resilience of electronic communications infrastructure, and advanced a proposal for the planning of the proceedings of the Working Group, with completion due on 29 May 2018. ANACOM's presentation to this meeting is included in ANNEX III.

The meeting enabled identification of additional measures further to those contained in ANACOM's preliminary report and of the need to carry out an in-depth and thorough discussion of these measures, which (i) should not be restricted to rules and practices governing the construction of electronic communications infrastructure, but also cover coordination procedures and procedures for the rapid replacement of affected infrastructure, and (ii) should target not only ANACOM itself, the Government and electronic communications companies, but also the companies and regulator of the energy sector, the bodies managing communication routes, local authorities, civil protection authorities and other public and private entities - and that it would culminate in the drafting of a report by the Working Group with analysis of the selected measures.

From the outset, and considering that the object of the analysis - as defined by ANACOM - constituted protection and resilience of the Public Electronic Communications Networks, but not of Emergency Communications Networks, there was widespread concern, manifested at various stages of the work and later in the reflection on this work and eventual implementation, as to the boundaries of the scope and of the obligations in respect of Public Networks on the one hand, and Emergency Communications Networks on the other hand.

On 13 March, a workshop was held at FPC - Fundação Portuguesa das Comunicações (Portuguese Communications Foundation), to which various national experts were invited, with the aim of presenting and discussing some of the main aspects and challenges posed by forest fires. The closing session was attended by His Excellency the Secretary of State for Infrastructure - Guilherme W. d'Oliveira Martins. The programme, including the supporting presentations for each of the presentations, is given in ANNEX IV. As a result of the workshop, the vectors were identified by which each measure should be analysed, specifically:

- Applicability of the measure: before, during and after the incident;
- Identification of barriers (including costs) and incentives for their implementation;
- Characterisation of impacts and of short/medium-term effects ;
- Identification of entities involved, including ANACOM's role;
- Use and articulation with GIS (SIIS);
- Legal framework;
- Applicability to other natural disasters;
- Areas requiring further study;
- Schedule of actions to be pursued, and by whom.

On 16 March, the 2nd meeting of the Working Group was held, examining the results of the workshop (ANNEX V). These were organised into an initial set of 44 measures, subdivided into five axes (ANNEX VI) as follows: 5 - radio, 8 - underground routes, 23 - protection or of energy and 8 - procedures. As a result, four working subgroups were set up with coordinators. The final composition of these subgroups is presented in ANNEX VII, organised according to the following themes:

- SGT1 - Radio;
- SGT2 - Underground Routes;
- SGT3 - Energy or Protection;
- SGT4 - Procedures.

In order to systematise and harmonise the work developed by each subgroup, it was decided to create a standard form for the characterisation of each measure according to various attributes, corresponding to the analysis vectors: description of the measure; short, medium

and long-term effectiveness/effects; nature of the measure in terms of prevention, detection and response or mitigation and recovery; applicability/coverage of the measure to various types of disaster; implementation in terms of identification of intervening entities and ANACOM's role, of barriers, of costs (value and type), of incentives, of recurrence/periodicity and of schedule of actions to be developed; articulation with information systems and geographic information systems (GIS); contextualisation in the existing legal framework or framework to be developed; need for further study; as well as a set of indicators related to risk reduction, time to achieve significant effect, applicability/scope, ease of implementation, costs (TCO) and IS/ GIS integration.

Between 16 March and 20 April, a pre-analysis of the 44 initial measures was conducted at the level of each subgroup, resulting in a merger and selection process, taking into account the time available for the work to be completed. This resulted in the selection of a set of 27 measures for characterisation.

On 20 April, a 3rd meeting was held, during which the preliminary conclusions of each subgroup were presented, including, for each of the 27 measures, initial completion of the corresponding form. As a result of this meeting, it was decided at the level of the Working Group what measures would be allocated to each of the subgroups.

## III. Results

A total of 27 measures (ANNEX I) were analysed, using the common evaluation key in the measure assessment forms - this to maintain the objectivity and systematisation of the analyses resulting from the collaboration at the level of each subgroup and from the overall interaction which took place in the context of the working group during the period established, involving the following organisations: ACIST, Altice/MEO, ANACOM, ANPC, APRITEL, DGEG, DSTelecom, EDP Distribuição, ERSE, FIBROGLOBAL, Infraestruturas de Portugal, Instituto de Telecomunicações, NOS, NOWO/ONI, REN and VODAFONE.

Each of the 27 measures is characterised in a form, three of which are related to Radio, four to Underground Routes, twelve to Energy or Protection and eight to Procedures.

The measures were characterised in relation to the attributes indicated above and generically scored. The classified measures have the following designations :

Radio

1. Radio links as an alternative to aerial cable routes;
2. Radio links for redundancy implementation;

3. Satellite links for redundancy implementation.

Underground Routes

4. Installation of electronic communications infrastructure in underground routes;
5. Promotion of conversion of aerial routes into underground routes;
6. Depth of ducts and distance between inspection chambers in underground routes in areas of high forest fire hazard;
7. Legislative and procedural uniformity (authorities, local authorities).

Energy and Protection

8. Creation of paved strips around sites;
9. Protection strip around sites: thinning of treetops;
10. Protection strip around sites: removal of vegetation;
11. Cleaning site interiors;
12. Protection and resilience of cable entry point in stations;
13. Protection strip along aerial routes;
14. Energy resilience at sites;
15. Monitoring of sites with low voltage power supply;
16. Implementation of standby or emergency power at sites;
17. Fuel reserves for sites;
18. Protection of sites against atmospheric discharges;
19. Installation of sensors at sites.

Procedures

20. Articulation with municipal emergency civil protection plans and forest fire defence plans (include communications stations);
21. Preparation of risk maps;
22. Security perimeter management (access and guard);
23. Intersectoral procedures for detection, response and mitigation;
24. Procedures of articulation between authorities and companies;
25. Regulatory articulation procedures (ANACOM, ERSE);
26. National Roaming;
27. Manual of best shared-infrastructure practices.

The report prepared as a result of the actions developed by the Working Group includes, in addition to this executive summary, 27 assessment forms corresponding to each of the

measures as well as the main documents and presentations resulting from the work carried out.

## IV. Conclusions and subsequent steps

A majority of the evaluated measures have restricted and perfectly defined territorial scope corresponding to areas of high and very high fire hazard, as classified by ICNF; as a whole, in essence and in view of the structural nature of the issue, they constitute measures with medium and long-term impact as regards the resilience and protection of infrastructure.

Analysis of these 27 measures can be furthered and priority assigned at aggregate or individual level, giving continuity to the work already completed, mainly from the analyses resulting from discussions between the different working group participants.

The deployment of the 27 identified and characterised measures calls for increased involvement and action from a group of public and private entities, including some not participating in this working group.

It should be noted that implementation of the measures depends, as is clear from the analysis itself, on intervention, co-responsibility and financing by several entities, headed by public entities. It is therefore necessary for the results of this work to be accepted by Assembleia da República (Assembly of the Republic), by the Portuguese Government (MI, MAI, MF, MA), by Local Authorities, as well as by the Regional Governments and other public bodies whose involvement is also decisive to accomplishing the proposed objectives, specifically: ANPC, ERSE, IMT, IPMA, DGEG, ICNF and the newly created AGIF I.P., so that they carry out the necessary actions within the scope of their respective remits.

It is also highlighted that the actions to be undertaken by ANACOM and by electronic communications, energy and transport infrastructure companies, installers and undertakings in possession of infrastructure suitable for carrying electronic communications networks will all be decisive for implementation – likewise, the continuation and extension of cooperation and collaboration between these organisations, of which this report is an example

Finally, it is important to recognise the need to improve knowledge in these areas, for which cooperation with universities and research institutes is essential, as well as for all public and private entities to introduce new technologies in their organisations, specifically to make use of geographic information systems for the joint use of existing physical infrastructure and to make use of new communications networks and technologies.

## List of ANNEXES

ANNEX I: Measures;

ANNEX II: Official invitation and list of invited participants (*);

ANNEX III: Presentation to 1st meeting of the working group (*);

ANNEX IV: Programme and presentations to the Workshop (*);

ANNEX V: Results of the Workshop (*);

ANNEX VI: List of Initial Measures following Workshop (*);

ANNEX VII: Final Constitution of the Working Group and Subgroups (*);

(*) Note: This annex is not included in this reduced version of the Report of the Forest Fires Working Group. The full version of this Report can be found at https://www.anacom.pt/render.jsp?contentId=1436120

# ANNEX I

## MEASURES

## RADIO

### 1. RADIO LINKS AS AN ALTERNATIVE TO AERIAL CABLE ROUTES;

Radio links allow the creation of a transmission/transport network with low risk of being affected by forest fires or other natural disasters. As a technology that offers less capacity compared to optical fibre, this measure has limited scope. Their use may make sense in rural environments of low population density, where access is more difficult and where fire hazard is classified as "High" or "Very High" (ICNF classification). This measure is not intended to replace existing operating routes, but rather expand the network.

### 2. RADIO LINKS FOR REDUNDANCY IMPLEMENTATION;

Radio links allow the creation of a transmission/transport network with low risk of being affected by forest fires or other natural disasters. Bandwidth limitations do not make them suitable for adoption as a primary communication solution. Radio links are indicated as an alternative for the deployment of network redundancy (e.g., optical fibre cable redundancy) with possible reduction of available bandwidth. This redundancy is installed at the outset and activated in the event that the main solution suffers failure. The redundancy solution implies implementation of a traffic priority policy to address the lower available bandwidth, if applicable.

Two distinct alternatives were identified for the implementation of this measure:

- Use of active radio links and automatic traffic switching in case of failure, which, in spectrum terms, implies permanent occupation;
- Use of radio links which are activated only in the event of failure.

### 3. SATELLITE LINKS FOR REDUNDANCY IMPLEMENTATION.

Promotion of use of satellite links for redundancy purposes in areas of high fire hazard. Satellite links have a low risk of being affected by forest fires. They are, however, limited in bandwidth compared to optical fibre and radio links, and as solutions, they are usually costly (as far as routed traffic is concerned). Their use, although limited in scope, may be justified for redundancy deployment in areas where a radio bream solution is not viable due to lack of line of sight.

**UNDERGROUND ROUTES**

## 4. INSTALLATION OF ELECTRONIC COMMUNICATIONS INFRASTRUCTURE IN UNDERGROUND ROUTES;

Establish conditions that promote the construction of infrastructure suitable for carrying electronic communications cables in underground routes through areas of very high and high forest fire hazard:

- When building and upgrading roads within the Municipal, National, or Rail Network, include construction (or upgrade) of a road or rail technical channel suitable for carrying public electronic communications networks;
- Promote a programme to rehabilitate existing road and rail technical channels making them suitable for carrying public electronic communications networks;
- Improvement of procedures and conditions for access to and use of infrastructure suitable for carrying electronic communications networks using the RDAO offer as a reference;
- Improvement of procedures and conditions related to the allocation of rights of way and the construction of private infrastructure in the public domain;
- Timely updating of information in SIIS regarding the construction of infrastructure and announcements of construction projects which involve underground works and which allow synergies/opportunity for the construction of infrastructure suitable for carrying electronic communications networks.

## 5. PROMOTION OF CONVERSION OF AERIAL ROUTES INTO UNDERGROUND ROUTES;

According to the technical-economic option of each operator, promotion of the conversion of aerial routes of existing electronic communications cables into underground routes, in the following situations:

1. Following the destruction of aerial routes of communications cables as a result of forest fires or other disasters, by installing new communications cables in existing underground routes with the following conditions:
    a. using existing roadway and railway technical channels;
    b. using other infrastructure suitable for carrying electronic communications cables available for this purpose;

2. Modification of the aerial routes of existing communications cables into underground routes in areas of very high and high forest fire hazard in order to prevent such effects as may occur:
    a. using existing or planned roadway and railway technical channels, as well as other infrastructure suitable for carrying electronic communications cables available for this purpose;
    b. building new underground routes or expanding existing ones.

**6. DEPTH OF DUCTS AND DISTANCE BETWEEN INSPECTION CHAMBERS IN UNDERGROUND ROUTES IN AREAS OF HIGH FOREST FIRE HAZARD;**

Preparation of a technical specification applicable to underground infrastructure suitable for carrying electronic communications networks in areas of very high and high forest fire hazard (Note: This measure may be included within the scope of the legal framework to be developed in measures 4/2018 and 5/2018).

**7. LEGISLATIVE AND PROCEDURAL UNIFORMITY (AUTHORITIES, LOCAL AUTHORITIES).**

Remove administrative barriers to the construction, maintenance and recovery of communications infrastructure (e.g. legislative uniformity, police force and local authorities).

**<u>POWER OR PROTECTION</u>**

**8. CREATION OF PAVED STRIPS AROUND SITES;**

Creation of a paved strip surrounding the outside of the station with a suitable minimum width of 1-2 metres around the sites

**9. PROTECTION STRIP AROUND SITES: THINNING OF TREETOPS;**

Cutting and thinning treetops and shrubs, establishing a minimum suitable distance from the site of 5m.

**10. PROTECTION STRIP AROUND SITES: REMOVAL OF VEGETATION;**

Clearing land around radiocommunications stations, by cutting back and removing vegetation in a suitable band of 50m.

**11. CLEANING SITE INTERIORS;**

Preparation of a technical specification of procedures to be adopted for the management and removal of biofuel materials in the space inside the perimeter fence of the sites in geographical zones of very high and high risk of forest fire.

**12. PROTECTION AND RESILIENCE OF CABLE ENTRY POINT IN STATIONS;**

Preparation of a technical specification related to cable entry point in radiocommunication stations located in zones of high and very high forest fire hazard (according to ICNF).

**13. PROTECTION STRIP ALONG AERIAL ROUTES;**

Preparation of a technical specification regarding the creation and maintenance of a fire protection strip of adequate width along the aerial routes of communications cables in areas of high and high forest fire hazard (according to ICNF). Possibility of sharing the protection strips with companies in the electricity sector. Development of a possible legal framework for implementation.

**14. ENERGY RESILIENCE AT SITES;**

Preparation of a list of major communications stations with a view to maintaining a minimum service in disaster situations. These points would be considered as priority customers under the ERSE Regulamento da Qualidade de Serviço (Quality of Service Regulation), and will have to be registered as such by the respective distribution system operators, i.e. EDP Distribuição.

**15. MONITORING OF SITES WITH LOW VOLTAGE POWER SUPPLY;**

Preparation of a plan to develop and implement a monitoring system at points of delivery of low voltage power to operators' sites. Study of the possibility of installing smart meters or other devices capable of deploying the smart grid. Monitoring should be possible on an online

platform, indicating the access points assigned to each telecom operator (and visibility for each operator only), as well as indication of service status and restoration times whenever possible.

**16. IMPLEMENTATION OF STANDBY OR EMERGENCY POWER AT SITES;**

Preparation of a technical specification for the implementation of standby power solutions (e.g. batteries) and backup power (e.g. generator group) with possible equipment sharing.

**17. FUEL RESERVES FOR SITES;**

Reservation, storage and resupply of fuel generator-equipped sites in the event of disaster. The aim of this measure is to plan and establish procedures to ensure fuel supply to stations equipped with emergency standby power solutions (generators).

**18. PROTECTION OF SITES AGAINST ATMOSPHERIC DISCHARGES;**

Preparation of a technical specification for the protection of electronic communications infrastructure from atmospheric and transient discharges, taking into account the technical principles defined by the DGEG Lightning Technical Guide and establishing a specific rule of good practices for electronic communications.

**19. INSTALLATION OF SENSORS AT SITES;**

Establishment of conditions for the installation of an automatic fire detection system in the vicinity of sites and subsequent issuance of warning to the competent authorities.

**<u>PROCEDURES</u>**

**20. ARTICULATION WITH MUNICIPAL EMERGENCY CIVIL PROTECTION PLANS AND FOREST FIRE DEFENCE PLANS (INCLUDE COMMUNICATIONS STATIONS);**

Articulation with ANPC in order to establish a procedure for the approval and revision of municipal civil protection emergency plans (PMEPC) and forest fire protection plans (PMDFCI)

for areas with highest levels of forest fire hazard (high and very high) to ensure the improvement of the protection of electronic communications infrastructure comprising infrastructure of operational relevance necessary to ensure essential services in case of emergencies arising from forest fires:

- Identification of electronic communications companies with electronic communications infrastructure in the municipality (via SIIS);
- Establishment of harmonised criteria to characterise infrastructure of operational relevance necessary to ensure essential services in case of emergencies arising from forest fires (ANMP, ANPC, ICNF);
- Application of criteria established for the identification of infrastructure of operational relevance (by the Municipality);
- Identification of electronic communications infrastructure located in areas of high forest fire hazard in order to give priority to protecting such infrastructure and so ensuring continuity of essential services in the event of forest fires (by electronic communications companies);
- Establishment of contact points at municipal authorities and electronic communications companies to be used in case of forest fires (by the Municipality and by the Electronic Communications Companies).

**21. PREPARATION OF RISK MAPS;**

Execution and integration of risk maps for each of the main causes of natural disasters, in addition to those related to forest fires, and their updating. Harmonisation of these maps by ANPC should be made available in digital, geo-referenced format and enable visualisation in a geographical form, if possible with the format already used by the ICNF for risk mapping.

**22. SECURITY PERIMETER MANAGEMENT (ACCESS AND GUARD);**

- Establish a procedure that makes it possible for Electronic Communications companies to ascertain the security areas established within the scope of occurrences of forest fires as well as the moment at which this access becomes permitted.
- Establish a coordination procedure between Electronic Communications companies and ANPC and authorities with civil protection responsibility to authorise access to the infrastructure of these companies where located within restricted access areas, with accompaniment of civil protection agents in risk scenarios, including the appropriate training of personnel comprising company disaster response teams.

- Establish contact points between Electronic Communications Companies and ANPC and the authorities with civil protection responsibility for this purpose.
- Articulation and integration between municipal, district, regional and national emergency civil protection plans.

## 23. INTERSECTORAL PROCEDURES FOR DETECTION, RESPONSE AND MITIGATION;

Establish procedures for cooperation, including exchange of information, between Electronic Communications companies and companies in energy sectors for the purpose of improving effectiveness in forest fire detection, response, mitigation and impact recovery:

- Establishment of cooperation protocols designed to promote communication and coordination between operators (electricity and telecommunications) in order to ensure the rapid restoration of services in fires and other natural disaster scenarios;
- Establishment of prioritisation procedures to restore provision of electronic communications and electricity services and for fuel supply;
- Establishment of information sharing procedures and means of contact to ensure efficient and coordinated action by operators (electricity networks and electronic communications).

## 24. PROCEDURES OF ARTICULATION BETWEEN AUTHORITIES AND COMPANIES;

Establish articulation procedures between authorities and Electronic Communications companies for purposes arising from forest fires:

- Establishment of procedure for provision of information from ANPC to electronic communication companies, through an API, to be agreed on (time line):
    - Information about active fires,
    - Information on the state of roadways,
    - Information on difficulties in accessing telecommunications services for the continuity of critical civil protection services;
- Establishment of procedure for information from IPMA to electronic communications companies,
- Establishment of procedures for the authorization of access to the fuel reserve for the supply of infrastructure powered by generators in the event of a disaster.

## 25. REGULATORY ARTICULATION PROCEDURES (ANACOM, ERSE);

Procedures for articulation between sector regulators (ANACOM, ERSE):

- Articulation between ERSE and ANACOM at the level of the *Regulamento da Qualidade de Serviço do Setor Elétrico e do Setor do Gás Natural* (Quality of Service Regulation for the Electricity Sector and the Natural Gas Sector) and the future Communications Security Regulations;
- Articulation between ERSE, ANACOM and energy and electronic communications companies to establish priority criteria that result in a certain number of sites (i.e. radiocommunication stations) with priority in terms of availability and resilience of networks and services in fire and other natural disaster scenarios, within the scope of the Quality of Service Regulation for the Electricity Sector and the Natural Gas Sector;
- Articulation between ERSE and ANACOM in analysis of high impact incidents for both sectors.

## 26. NATIONAL ROAMING;

Analysis of requirements and technical solutions for the establishment of a programme to develop an emergency communications plan for national roaming in a disaster situation, for example by using a set of cards.

## 27. MANUAL OF BEST SHARED-INFRASTRUCTURE PRACTICES;

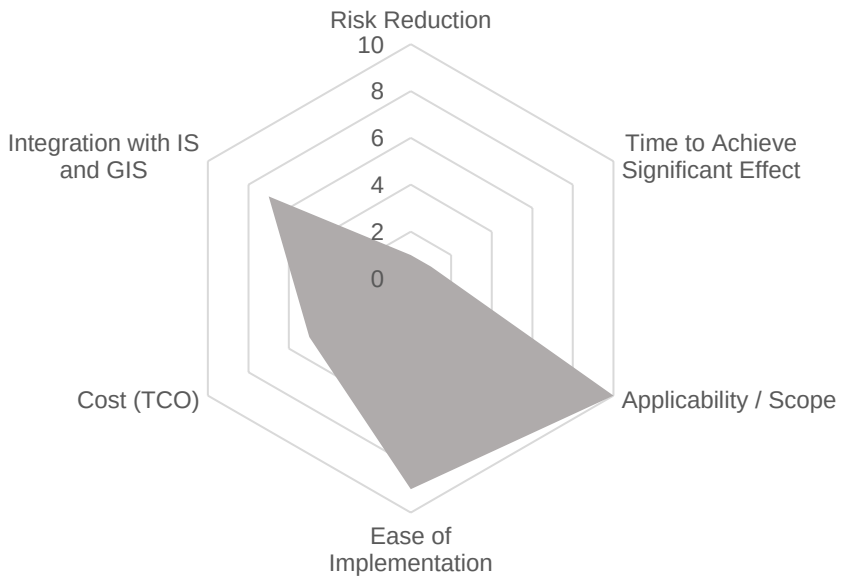
Identification and establishment of good practices for joint management of shared infrastructure:

- Joint management of shared infrastructure based on existing good practices already implemented among operators and optimising coordination in recovery interventions.
- Installation of mobile network base stations and/or radio transmission infrastructure, for example at the top of water tanks, fire towers, and other municipal/state facilities with similar characteristics, as well as access to electricity supply.
- In situations of coverage, sharing of common infrastructure, especially temporary radiant system and power supply infrastructure of Mobile Access Networks between Operators.

- Simplified protocols between Operators and other similar entities on sharing sites for the installation of radiant systems (of the affected Operator), as well as access to electricity supply.

# Measure Assessment Forms

# RADIO LINKS AS AN ALTERNATIVE TO AERIAL CABLE ROUTES

| | |
|---|---|
| **Measure number** | 1/2018 |
| **Type of Measure** | Radio |
| **Description of measure** | Radio links allow the creation of a transmission/transport network with low risk of being affected by forest fires or other natural disasters. As a technology that offers less capacity compared to optical fibre, this measure has limited scope. Their use may make sense in rural environments of low population density , where access is more difficult and where fire hazard is classified as "High" or "Very High" (ICNF classification). This measure is not intended to replace existing operating routes, but rather expand the network. |
| **Indicator graph** |  |

| | | |
|---|---|---|
| **Effectiveness/Effects** | Short term | • This measure, which is incumbent on electronic communications operators, may be initiated immediately within the framework of their network expansion planning, in areas that the ICNF classifies as "High" and "Very High" Fire Hazard. |
| | Medium-term | Similar to short term. |
| | Long term | Similar to short term. |
| | Risk Reduction Indicator<br>(1- smallest reduction, 10 largest reduction) | 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Time to Achieve Significant Effect Indicator<br>(1- long-term effect, 10- immediate effect) | 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

| | | |
|---|---|---|
| **Type of Measure** | Preventive<br>(Before the Incident) | Precautionary measure. |

| | | |
|---|---|---|
| | Detection and Response (During the Incident) | Radio links may be used during the incident to restore communications. |
| | Mitigation and Recovery (After the Incident) | Radio links may be used after an incident pending restoration of the main transmission solution. |

| | | |
|---|---|---|
| **Applicability / Scope** | Natural disasters other than fires (e.g. earthquake, tsunami, cyclone, flood, tornado, volcanic eruption, landslide, etc.) | The measure applies to various natural disasters:<br><br>• Fires: Except for phenomena of propagation in environments of very high temperature or intense smoke that can attenuate the propagation of electromagnetic waves, a wireless solution provides for high availability of service;<br><br>• Earthquakes and landslides: Except in cases where support infrastructure or power supply is affected, the connection maintains integrity;<br><br>• Tsunami and Flooding: Except in cases where support infrastructure or power supply is affected, the connection maintains integrity;<br><br>• Tornadoes, cyclones, and heavy rain: radio links are in their design phase, sized (transmission/reception power, signal modulations, transmission frequencies, ...) in order to have unavailability levels near to 30 minutes per year (according to the standards and rainfall criteria considered for the Portuguese territory). Addition of automatic adaptive modulation functionalities, employing communication channel resilience to safeguard priority traffic. The atmospheric phenomena described here are, however, usually transient and of limited duration; even if they temporarily affect radio link propagation, they do not have a lasting effect on the service. In the case of tornadoes and strong winds (cyclones), except in cases where support infrastructure or power supply is affected, the connection maintains integrity. |
| | Applicability / Scope Indicator (1-only fires, 10- ≥ 5 ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☒ |

| | | |
|---|---|---|
| **Implementation** | Intervening entities | • Electronic communications companies;<br>• Ministry of Agriculture / ICNF - Instituto da Conservação da Natureza e das Florestas (Institute for Nature Conservation and Forests);<br>• IFCN-RAM - Instituto das Florestas e Conservação da Natureza da Região Autónoma da Madeira (Institute for Nature Conservation and Forests of the Autonomous Region of Madeira); |

| | | |
|---|---|---|
| | | • Direção Regional dos Recursos Florestais da Região Autónoma dos Açores (Regional Directorate for Forest Resources of the Autonomous Region of the Azores);<br>• Entities in possession of suitable infrastructure;<br>• Government. |
| | Role of ANACOM | • Timely availability of spectrum resources;<br>• Recommendation of the measure to the Government to amend existing legislation, reducing spectrum usage fees. |
| | Identification of Barriers | • Investment necessary to acquire equipment, infrastructure, installation services;<br>• Lines of sight between technical sites;<br>• Stability and carrying capacity of infrastructure (communications towers, etc.);<br>• Quality of power supply;<br>• Spectrum fee costs; |
| | Ease of Implementation<br>(1 - lesser ease, 10 - greater ease) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☒ 10 ☐ |
| | Costs, value and type (TCO) | • Investment in new radio equipment;<br>• Operation and maintenance of radio equipment and infrastructure;<br>• Spectrum usage fees. |
| | Cost Indicator (TCO)<br>(1-Maximum cost, 10- no cost ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Identification of Incentives | • Study possibility of reducing spectrum usage fees in order to encourage the use of radio links;<br>• Support infrastructure (towers, posts): expedite the availability (possibly unencumbered) of public infrastructure or of other public service entities to support the installation of radio links;<br>• Public financing of investment associated with implementation of this measure. |
| | Recurrence / Periodicity | • Annual addition according to the review of zones classified as "High" and "Very High" fire hazard (according to ICNF). |
| | Actions to be developed and timeline | • Electronic communications companies: provided that the service requirements (bandwidth, latencies, etc.) can be satisfied by the use of radio links, electronic communications operators should consider their use, in view of the costs involved, in areas classified as "High" and "Very High" fire hazard (according to ICNF) ;<br>• ANACOM: promotion of the measure with the Government to reduce spectrum usage fees for the use of radio links by electronic communication companies in areas of high forest fire hazard. |

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|---|---|---|
| **Articulation with IS and GIS** | Description | • Articulation with GIS can be useful in the identification of communications stations located in zones of priority |

| | | |
|---|---|---|
| | | intervention and in the planning necessary for the measure's implementation;<br>• Forest fire hazard maps made available from ICNF (consolidated over the years to support the planning of the installation of radio links) in electronic format for integration into the Information System; |
| | Integration with IS and GIS<br>(1-low, 10-high ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☒ 8 ☐ 9 ☐ 10 ☐ |

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| **Legal framework** | Existing | • Law no. 5/2004 of 10 February - Lei das Comunicações Eletrónicas; (Electronic Communications Law);<br>• Decree-Law no. 151-A/2000 (establishes the regime applicable to the licensing of radiocommunication networks and stations and to oversight of the installation of such stations and of use of the radioelectric spectrum, as well as definition of the principles which apply to radio fees, protection from exposure to electromagnetic radiation and the regime applicable to the sharing of radiocommunications infrastructure) of 20 July.<br>• Administrative Rule no. 1473-B/2008 (approves the fees due for the issue of statements supporting rights, for exercise of the activity of provider of electronic communications networks and services, for the allocation of rights of use of frequencies and numbering, for the use of radio spectrum and other fees due to ICP-ANACOM) of 17 December;<br>• ANACOM Regulation no. 144/2015 - Regulamento do Licenciamento Radioelétrico (Radio Licensing Regulation), establishes the stations categories which, forming part of a radio network, require licensing, and radio licensing procedures - of 25 March;<br>• Decree-Law no. 123/2009 (establishes the legal regime governing the construction of infrastructure suitable for carrying electronic communications networks, the installation of electronic communications networks and the construction of telecommunications infrastructure in housing developments, urban settlements and concentrations of buildings) of 21 May; |
| | To be developed | To be determined as a result of the actions to be developed:<br>• Amendment of the legislation setting the spectrum usage fees. |

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| **Additional study** | No ☒ Yes ☐ What? |

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| **Notes and articulation with other measures** | Notes:<br>• Regarding the cost indicator, it should be noted that the value presented is based on a comparison to the alternative of aerial routes on wooden posts;<br>• Prolonged power failure: the technical installations are usually equipped with systems which guarantee autonomous power for a few hours. While it is possible to deploy generator sets as ad hoc solutions, it is not feasible to consider generator sets in cases of general power outage over a large area affecting dozens of mobile network base stations or exchanges.<br><br>This measure is based on the following measures:<br>• 14/2018: RESILIENCE OF ENERGY ON THE SITES<br>• 16/2018: IMPLEMENTATION OF RESCUE OR EMERGENCY POWER AT SITES;<br>• 17/2018: FUEL RESERVES FOR SITES<br>• 21/2018: PREPARATION OF RISK MAPS |

# RADIO LINKS FOR REDUNDANCY IMPLEMENTATION

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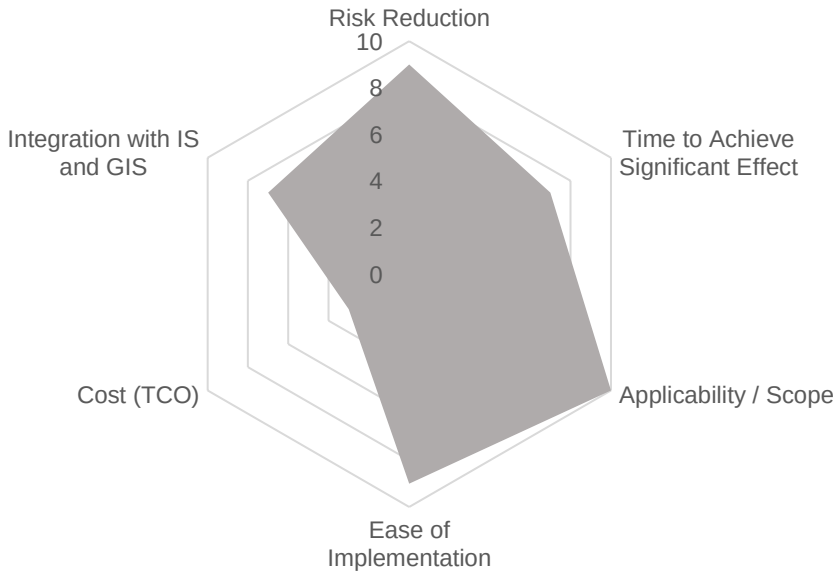
| **Measure number** | 2/2018 |
| **Type of Measure** | Radio |
| **Description of measure** | Radio links allow the creation of a transmission/transport network with low risk of being affected by forest fires or other natural disasters. Bandwidth limitations do not make them suitable for adoption as a primary communication solution. Radio links are indicated as an alternative for the deployment of network redundancy (e.g., optical fibre cable redundancy) with possible reduction of available bandwidth. This redundancy is installed at the outset and activated, in the event that the main solution suffers failure. The redundancy solution implies implementation of a traffic priority policy to address the lower available bandwidth, if applicable.<br>Two distinct alternatives were identified for the implementation of this measure:<br>• Use of active radio links and automatic traffic switching in case of failure, which, in spectrum terms, implies permanent occupation;<br>• Use of radio links which are activated only in the event of failure. |
| **Indicator graph** |  |

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| **Effectiveness / Effects** | Short term | • This measure, which is incumbent on electronic communications operators, may be initiated immediately within the framework of their planning and network resilience, in areas that the ICNF classifies as "High" and "Very High" Fire Hazard. |
| | Medium-term | • The effectiveness of the measure produces greater effects as more redundancy is implemented (greater availability of services). |
| | Long term | Similar to medium term. |
| | Risk Reduction Indicator<br>(1- smallest reduction, 10 largest reduction) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☒ 10 ☐ |

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| | Time to Achieve Significant Effect Indicator<br>(1- long-term effect, 10- immediate effect | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☒ 8 ☐ 9 ☐ 10 ☐ |

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| **Type of Measure** | Preventive<br>(Before the Incident) | Precautionary measure. |
| | Detection and Response<br>(During the Incident) | Radio links may be used during the incident to restore communications. |
| | Mitigation and Recovery<br>(After the Incident) | Radio links may be used after an incident pending restoration of the main transmission solution. |

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| **Applicability / Scope** | Natural disasters other than fires (e.g. earthquake, tsunami, cyclone, flood, tornado, volcanic eruption, landslide, etc.) | The measure applies to various natural disasters:<br><br>• Fires: Except for phenomena of propagation in environments of very high temperature or intense smoke that can attenuate the propagation of electromagnetic waves, a wireless solution provides for high availability of service;<br><br>• Earthquakes and landslides: Except in cases where support infrastructure or power supply is affected, the connection maintains integrity;<br><br>• Tsunami and Flooding: Except in cases where support infrastructure or power supply is affected, the connection maintains integrity;<br><br>• Tornadoes, cyclones, and heavy rain : radio links are in their design phase, sized (transmission/reception power, signal modulations, transmission frequencies, ...) in order to have unavailability levels near to 30 minutes per year (according to the standards and rainfall criteria considered for the Portuguese territory). Addition of automatic adaptive modulation functionalities, employing communication channel resilience to safeguard priority traffic. The atmospheric phenomena described here are, however, usually transient and of limited duration; even if they temporarily affect radio link propagation, they do not have a lasting effect on the service. In the case of tornadoes and strong winds (cyclones), except in cases where support infrastructure or power supply is affected, the connection maintains integrity. |
| | Applicability / Scope Indicator<br>(1-only fires, 10- ≥ 5) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☒ |

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| **Implementation** | Intervening entities | • Electronic communications companies; |

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| | | • Ministry of Agriculture / ICNF - Instituto da Conservação da Natureza e das Florestas (Institute for Nature Conservation and Forests);<br>• IFCN-RAM - Instituto das Florestas e Conservação da Natureza da Região Autónoma da Madeira (Institute for Nature Conservation and Forests of the Autonomous Region of Madeira);<br>• Direção Regional dos Recursos Florestais da Região Autónoma dos Açores (Regional Directorate for Forest Resources of the Autonomous Region of the Azores);<br>• Entities in possession of suitable infrastructure (public and private);<br>• Government. |
| | Role of ANACOM | • Timely availability of spectrum resources;<br>• Promotion of the measures to the Government to amend current legislation, reducing spectrum usage fees. |
| | Identification of Barriers | • Investment necessary to acquire equipment, infrastructure, installation services;<br>• Lines of sight between technical sites;<br>• Stability and carrying capacity of infrastructure (communications towers, etc.);<br>• Quality of power supply;<br>• Spectrum fee costs; |
| | Ease of Implementation Indicator<br>(1 - lesser ease, 10 - greater ease) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☒ 10 ☐ |
| | Costs, value and type (TCO) | • Investment in new radio equipment and support infrastructure;<br>• Operation and maintenance of radio equipment and infrastructure;<br>• Spectrum usage fees (intention to cancel). |
| | Cost Indicator (TCO)<br>(1-Maximum cost, 10- no cost ) | 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Identification of Incentives | • Study possibility of reducing spectrum usage fees in order to encourage the use of radio links as redundancy;<br>• Support infrastructure (towers, posts): expedite the availability (possibly unencumbered) of public infrastructure or of other public service entities to support the installation of radio links;<br>• Public financing of investment associated with implementation of this measure. |
| | Recurrence / Periodicity | • Annual addition according to the review of zones classified as "High" and "Very High" fire hazard (according to ICNF). |
| | Actions to be developed and timeline | • ANACOM and electronic communications companies: technical characterisation of the scenarios for implementation of this measure, e.g. with regard to network topology and its redundancy; |

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| | | • ANACOM: promotion of the measures to the Government to amend current legislation setting the spectrum usage fees;<br><br>• Electronic communication companies:<br>  ○ Survey of radiocommunications stations located in zones classified as "High" and "Very High" fire hazard and eligible for the implementation of radio link redundancy;<br>  ○ Planning implementation of the measure. |

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| **Articulation with IS and GIS** | Description | • Articulation with GIS can be useful in the identification of communications stations located in zones of priority intervention and in the planning necessary for the measure's implementation;<br>• Forest fire hazard maps made available from ICNF (consolidated over the years to support the planning of the installation of radio links) in electronic format for integration into the Information System; |
| | Integration with IS and GIS<br>(1-low, 10-high) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☒ 8 ☐ 9 ☐ 10 ☐ |

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|---|---|---|
| **Legal framework** | Existing | • Law no. 5/2004 of 10 February - Lei das Comunicações Eletrónicas; (Electronic Communications Law);<br><br>• Decree-Law no. 151-A/2000 (establishes the regime applicable to the licensing of radiocommunication networks and stations and to oversight of the installation of such stations and of use of the radioelectric spectrum, as well as definition of the principles which apply to radio fees, protection from exposure to electromagnetic radiation and the regime applicable to the sharing of radiocommunications infrastructure) of 20 July.<br><br>• Administrative Rule no. 1473-B/2008 (approves the fees due for the issue of statements supporting rights, for exercise of the activity of provider of electronic communications networks and services, for the allocation of rights of use of frequencies and numbering, for the use of radio spectrum and other fees due to ICP-ANACOM) of 17 December;<br><br>• ANACOM Regulation no. 144/2015 - Regulamento do Licenciamento Radioelétrico (Radio Licensing Regulation), establishes the stations categories which, forming part of a radio network, require licensing, and radio licensing procedures - of 25 March;<br><br>• Decree-Law no. 123/2009 (establishes the legal regime governing the construction of infrastructure suitable for |

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| | | carrying electronic communications networks, the installation of electronic communications networks and the construction of telecommunications infrastructure in housing developments, urban settlements and concentrations of buildings) of 21 May; |
| | To be developed | To be determined as a result of the actions to be developed:<br>• Amendment of the legislation setting the spectrum usage fees. |

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| **Additional study** | No ☒ Yes ☐ What? |

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| **Notes and articulation with other measures** | Note:<br>• Regarding the cost indicator, it should be noted that the value presented is based on a comparison to the alternative of aerial routes on wooden posts;<br>• Prolonged power failure: the technical installations are usually equipped with systems which guarantee autonomous power for a few hours. While it is possible to deploy generator sets as ad hoc solutions, it is not feasible to consider generator sets in cases of general power outage over a large area affecting dozens of mobile network base stations or exchanges.<br><br>This measure is based on the following measures:<br>• 14/2018: RESILIENCE OF ENERGY ON THE SITES<br>• 16/2018: IMPLEMENTATION OF RESCUE OR EMERGENCY POWER AT SITES;<br>• 17/2018: FUEL RESERVES FOR SITES<br>• 21/2018: PREPARATION OF RISK MAPS |

# SATELLITE LINKS FOR REDUNDANCY IMPLEMENTATION

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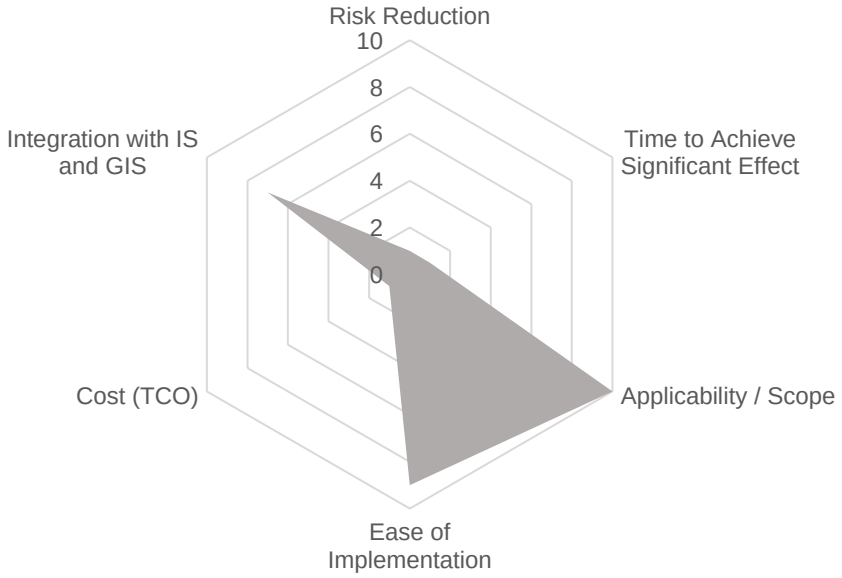
| **Measure number** | 3/2018 |
| **Type of Measure** | Radio |
| **Description of measure** | Promotion of use of satellite links for redundancy purposes in areas of high fire hazard. Satellite links have a low risk of being affected by forest fires. They are, however, limited in bandwidth compared to optical fibre and radio links, and as solutions, they are usually costly (as far as routed traffic is concerned). Their use, although limited in scope, may be justified for redundancy deployment in areas where a radio bream solution is not viable due to lack of line of sight. |
| **Indicator graph** |  |

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| **Effectiveness/Effects** | Short term | • This measure, which is incumbent on electronic communications operators, may be initiated immediately within the framework of their planning and network resilience , in areas that the ICNF classifies as "High" and "Very High" fire hazard. Requires resolution of the barriers identified: primarily the cost of reservation of the satellite segment. |
| | Medium-term | Similar to short term. |
| | Long term | Similar to short term. |
| | Risk Reduction Indicator<br>(1- smallest reduction, 10 largest reduction) | 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Time to Achieve Significant Effect Indicator<br>(1- long-term effect, 10- immediate effect) | 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

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| **Type of Measure** | Preventive<br>(Before the Incident) | Precautionary measure. |

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| | Detection and Response (During the Incident) | Satellite links may be used during the incident to restore communications. |
| | Mitigation and Recovery (After the Incident) | Satellite links may be used after an incident pending restoration of the main transmission solution. |

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| **Applicability / Scope** | Natural disasters other than fires (e.g. earthquake, tsunami, cyclone, flood, tornado, volcanic eruption, landslide, etc.) | The measure applies to various natural disasters:<br><br>• Fires: Except for phenomena of propagation in environments of very high temperature or intense smoke that can attenuate the propagation of electromagnetic waves, a wireless solution provides for high availability of service;<br><br>• Earthquakes and landslides: Except in cases where support infrastructure or power supply is affected, the connection maintains integrity;<br><br>• Tsunami and Flooding: Except in cases where support infrastructure or power supply is affected, the connection maintains integrity;<br><br>• Tornadoes, cyclones, and heavy rain: These atmospheric phenomena, while usually transient and of limited duration, may affect the link; even if they temporarily affect propagation, they do not have a lasting effect on the service. |
| | Applicability / Scope Indicator (1-only fires, 10- ≥ 5 ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☒ |

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| **Implementation** | Intervening entities | • Electronic communications companies;<br>• Ministry of Agriculture / ICNF - Instituto da Conservação da Natureza e das Florestas (Institute for Nature Conservation and Forests);<br>• IFCN-RAM - Instituto das Florestas e Conservação da Natureza da Região Autónoma da Madeira (Institute for Nature Conservation and Forests of the Autonomous Region of Madeira);<br>• Direção Regional dos Recursos Florestais da Região Autónoma dos Açores (Regional Directorate for Forest Resources of the Autonomous Region of the Azores);<br>• Entities in possession of suitable infrastructure (public and private);<br>• Government. |
| | Role of ANACOM | • Promotion of the measures to the Government to amend current legislation, reducing spectrum usage fees. |
| | Identification of Barriers | • Capacity and latency of satellite solutions;<br>• Investment necessary to acquire equipment, infrastructure, installation services; |

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| | | • Quality of power supply;<br>• Costs of use of the space segment;<br>• Spectrum fee costs to the VSATs Hubs. |
| | Ease of Implementation<br>(1 - lesser ease, 10 - greater ease) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☒ 10 ☐ |
| | Costs, value and type (TCO) | • Investment in new satellite equipment;<br>• Operation and maintenance of VSATs and infrastructure;<br>• Cost of using the space segment;<br>• Spectrum usage fees. |
| | Cost Indicator (TCO)<br>(1-Maximum cost, 10- no cost) | 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Identification of Incentives | • Support infrastructure (towers, posts): expedite the availability (possibly unencumbered) of public infrastructure or of other public service entities to support the installation of VSAT equipment;<br>• Study possibility of reducing spectrum usage fees in order to encourage the use of satellite links as redundancy;<br>• Public financing of investment associated with implementation of this measure. |
| | Recurrence / Periodicity | Annual increase according to the review of zones classified as "High" and "Very High" fire hazard (according to ICNF). |
| | Actions to be developed and timeline | • ANACOM and electronic communications companies: technical characterisation of the scenarios for implementation of this measure, e.g. with regard to network topology and its redundancy;<br>• Promotion of the measures to the Government to amend current legislation setting the spectrum usage fees;<br>• Electronic communication companies:<br>  ○ Survey of radiocommunication stations located in zones classified as "High" and "Very High" fire hazard and eligible for the implementation of satellite link redundancy;<br>  ○ Planning implementation of the measure. |

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| **Articulation with IS and GIS** | Description | • Articulation with GIS can be useful in the identification of communications stations located in zones of priority intervention and in the planning necessary for the measure's implementation;<br>• Forest fire hazard maps made available from ICNF (consolidated over the years to support the planning of the installation of radio links), in electronic format for integration into the Information System |
| | Integration with IS and GIS<br>(1-low, 10-high) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☒ 8 ☐ 9 ☐ 10 ☐ |

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| **Legal framework** | Existing | • Law no. 5/2004 of 10 February - Lei das Comunicações Eletrónicas; (Electronic Communications Law);<br><br>• Decree-Law no. 151-A/2000 (establishes the regime applicable to the licensing of radiocommunication networks and stations and to oversight of the installation of such stations and of use of the radioelectric spectrum, as well as definition of the principles which apply to radio fees, protection from exposure to electromagnetic radiation and the regime applicable to the sharing of radiocommunications infrastructure) of 20 July.<br><br>• Administrative Rule no. 1473-B/2008 (approves the fees due for the issue of statements supporting rights, for exercise of the activity of provider of electronic communications networks and services, for the allocation of rights of use of frequencies and numbering, for the use of radio spectrum and other fees due to ICP-ANACOM) of 17 December;<br><br>• ANACOM Regulation no. 144/2015 - Regulamento do Licenciamento Radioelétrico (Radio Licensing Regulation), establishes the stations categories which, forming part of a radio network, require licensing, and radio licensing procedures - of 25 March;<br><br>• Decree-Law no. 123/2009 (establishes the legal regime governing the construction of infrastructure suitable for carrying electronic communications networks, the installation of electronic communications networks and the construction of telecommunications infrastructure in housing developments, urban settlements and concentrations of buildings) of 21 May; |
| | To be developed | To be determined as a result of the actions to be developed:<br>• Amendment of the legislation setting the spectrum usage fees. |

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| **Additional study** | No ☒ Yes ☐ What? |

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| **Notes and articulation with other measures** | Notes:<br>• Regarding the cost indicator, it should be noted that the value presented is based on a comparison to the alternative of aerial routes on wooden posts, whereas satellite links will have to offer a minimum bandwidth and permanent availability;<br>• Prolonged power failure: the technical installations are usually equipped with systems which guarantee autonomous power for a few hours. While it is possible to deploy generator sets as ad hoc solutions, it is not feasible to consider generator sets in cases of general power outage over a large area affecting dozens of mobile network base stations or exchanges. |

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| | • VSAT terminals in the Ka band (29.5-30 GHz) and in the Ku band (14-14-14.5 GHz) fit this type of solution and are exempt from licensing, so that they do not pay spectrum usage fees .<br><br>This measure is based on the following measures:<br>• 14/2018: RESILIENCE OF ENERGY ON THE SITES<br>• 16/2018: IMPLEMENTATION OF RESCUE OR EMERGENCY POWER AT SITES;<br>• 17/2018: FUEL RESERVES FOR SITES<br>• 21/2018: PREPARATION OF RISK MAPS |

# INSTALLATION OF ELECTRONIC COMMUNICATIONS INFRASTRUCTURE IN UNDERGROUND ROUTES;

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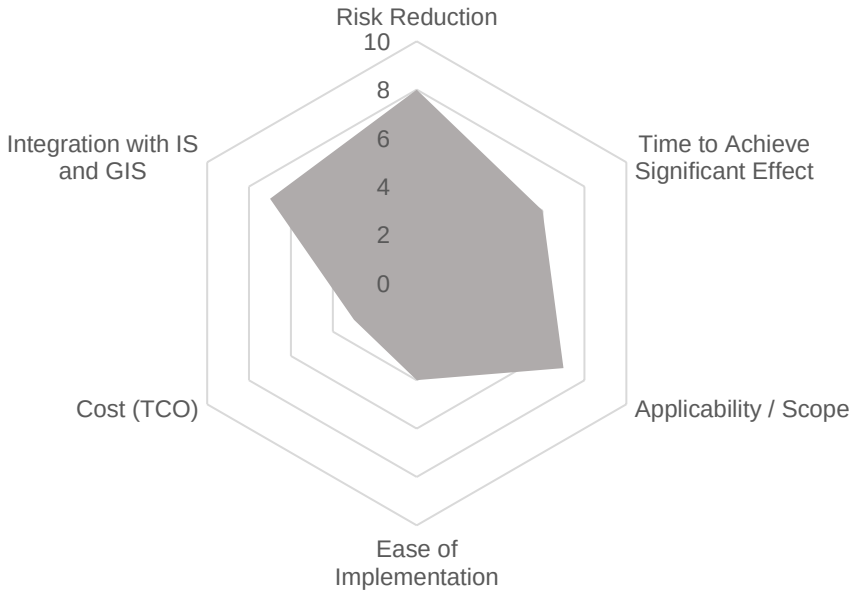
| **Measure number** | 4/2018 |
| **Type of Measure** | Underground Routes - Construction |
| **Description of measure** | Establish conditions that promote the construction of infrastructure suitable for carrying electronic communications cables in underground routes through areas of very high and high forest fire hazard:<br>• When building and upgrading roads within the Municipal, National, or Rail Network, include construction (or upgrade) of a road or rail technical channel suitable for carrying public electronic communications networks;<br>• Promote a programme to rehabilitate existing road and rail technical channels making them suitable for carrying public electronic communications networks;<br>• Improvement of procedures and conditions for access to and use of infrastructure suitable for carrying electronic communications networks using the RDAO offer as a reference;<br>• Improvement of procedures and conditions related to the allocation of rights of way and the construction of private infrastructure in the public domain;<br>• Timely updating of information in SIIS regarding the construction of infrastructure and announcements of construction projects which involve underground works and which allow synergies/opportunity for the construction of infrastructure suitable for carrying electronic communications networks. |
| **Indicator graph** |  |

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| **Effectiveness/Effects** | Short term | • No |
| | Medium-term | • Yes |
| | Long term | • Yes |
| | Risk Reduction Indicator<br>(1- smallest reduction, 10 largest reduction) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☒ 9 ☐ 10 ☐ |

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| | Time to Achieve Significant Effect Indicator<br>(1- long-term effect, 10- immediate effect) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☒ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

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| **Type of Measure** | Preventive<br>(Before the Incident) | • Yes |
| | Detection and Response<br>(During the Incident) | • No |
| | Mitigation and Recovery<br>(After the Incident) | • No |

| | | |
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| **Applicability / Scope** | Natural disasters other than fires (e.g. earthquake, tsunami, cyclone, flood, tornado, volcanic eruption, landslide, pandemics, etc.) | • Yes |
| | Applicability / Scope Indicator<br>(1-fires only, 10- ≥ 5 scenarios with applicability ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☒ 8 ☐ 9 ☐ 10 ☐ |

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| **Implementation** | Intervening entities | • Entities in possession of infrastructure suitable for carrying public electronic communications networks (e.g., Infraestruturas de Portugal (IP), Local Authorities, Water, Sewatge, Gas distribution companies and Energy supply companies), electronic communications companies, Local Authorities, IMT / AMT, ANACOM and Government. |
| | Role of ANACOM | • Regulate National Ducts Offer and Roadway Technical Channels (prices and technical conditions);<br>• Encourage the public investment plan led by IP and Local Authorities to build Roadway Technical Channels;<br>• Promote the application of Decree-Law no. 123/2009 of 21 May as regards infrastructure suitable for carrying electronic communications, remuneration for access to suitable infrastructure and SIIS;<br>• In line with the LCE, promote adoption of technical and organizational measures which are appropriate to the risks affecting the security of electronic networks due to the impacts of forest fires.<br>• Publish hazard maps based on risk maps (measure 21/2018) |
| | Identification of Barriers | • The procedures and conditions governing construction, access to and use of specific infrastructure suitable for carrying electronic communications networks. and the allocation of rights of way for access to the public domain are not expeditious (including road and rail technical channels);<br>• Lack of procedures for publication and for use in synergy/opportunity, in works of a different technical character, |

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| | | where the common element is the trench and the replacement of the earth and pavements;<br>• Hazard maps should be made and maintained on the basis of risk maps (measure 21/2018), and associated with the applicable incentives.<br>• Analysis of current legislation (in particular Decree-Law no. 280/2007 of 7 August) and proposals for amendments. |
| | Ease of Implementation Indicator<br>(1 - lesser ease, 10 - greater ease) | 1 ☐ 2 ☐ 3 ☐ 4 ☒ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Costs, value and type (TCO) | |
| | Cost Indicator (TCO)<br>(1-Maximum cost, 10- no cost) | 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Identification of Incentives | • Encourage the construction of roadway technical channels, improving procedures and the conditions governing access and use in areas classified as high and very high hazard.<br>• Improvement of procedures governing the allocation of rights to construct new private infrastructure and the allocation of rights of way to access the public domain .<br>• Encouragement of the construction of ducts by private entities in public domains, with tax incentives (IRC) proportional to the value of the investment in roadway technical channels.<br>• IP, together with Local Authorities to lead an investment plan for the construction of roadway technical channels approved in Assembleia da Republica (Assembly of the Republic), as occurred with the creation and approval of the various PNR - Planos Rodoviários Nacionais (National Road Plans), especially in the areas with highest levels of hazard. |
| | Recurrence / Periodicity | • In accordance with infrastructure development plans. |
| | Actions to be developed and timeline | • **Companies:** Each operator, in accordance with their own technical and economic criteria, to establish plans for continuous improvement, installing electronic communication cables in suitable underground infrastructure in areas of very high and high forest fire hazard or, alternatively, promote the construction of own infrastructure for this purpose or other mechanisms to share costs and revenues with the entities involved, especially IP and local authorities.<br><br>**ANACOM/IMT/AMT/ERSE/ Local Authorities/Government:**<br>1. Development of legal framework to promote:<br>• The installation of roadway and railway technical channels in the construction and upgrading of roads comprising the National or Municipal Road Network, or of railways comprising the National Railway Network, suitable for carrying public electronic communications networks; |

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| | | • The rehabilitation of existing roadway and railway technical channels with a view to their suitability for carrying public electronic communications networks;<br>• Upgrading the conditions of new infrastructure to ensure suitability for the requirements of carrying electronic communications networks.<br><br>2. Improvement of procedures to expedite the construction of private infrastructure suitable for carrying electronic communications networks in the public domain and creating incentives for these investments;<br><br>• Define and, if applicable, legislate the technical conditions under which roadway technical channels must be constructed, in such a way as to ensure usability by telecommunication operators (in particular as regards entry points (1));<br><br>• **The construction of roadway technical channels** by IP/local authorities to become mandatory, with new legislation required for this purpose. It is recommended that this obligation be applied in New Highways and in works involving substantial upgrading.<br><br>• **The construction of railway technical channels** by IP to become mandatory, with new legislation required for this purpose. It is recommended that this obligation be applied in New Railways and in works involving substantial upgrading. |

| | | |
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| **Articulation with IS and GIS** | Description | • It articulates with SIIS. |
| | Integration with IS and GIS Indicator<br>(1-low, 10-high ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☒ 8 ☐ 9 ☐ 10 ☐ |

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|---|---|---|
| **Legal framework** | Existing | • Decree-Law no. 123/2009 of 21 May, as regards infrastructure suitable for carrying electronic communications and SIIS;<br>• LCE with regard to the adoption of technical and organisational measures which are appropriate to the risks affecting the security of electronic services and networks |
| | To be developed | Yes<br>• Amendment of Law no. 34/2015 of 27 April - Estatuto das Estradas da Rede Rodoviária Nacional (National Road Network Statute)<br>• Promotion of legislative amendments with a view to the implementation of the actions to be developed, as identified above in point 2 (a). |

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| **Additional study** | No ☒ Yes ☐ What? |

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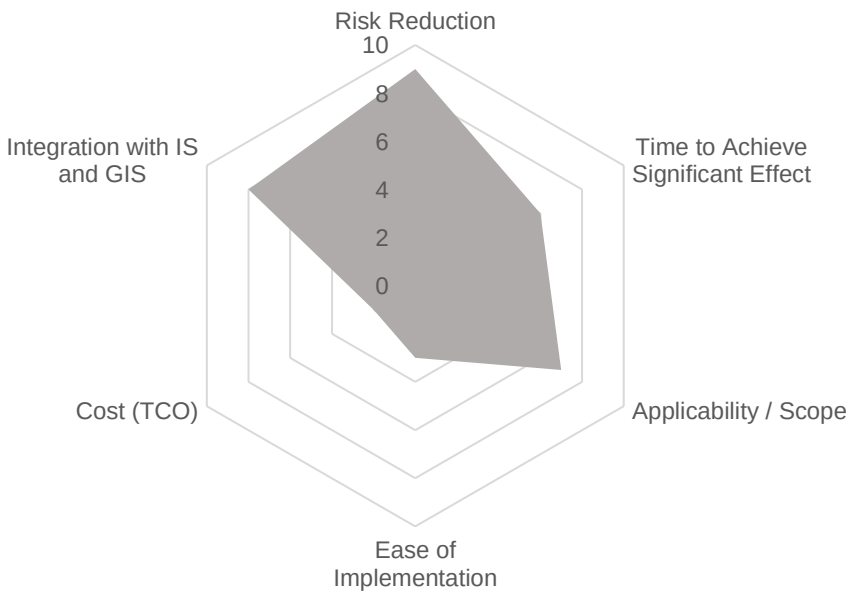
| **Notes and articulation with other measures** | **(1)** Introduce rules that aim to increase the capillarity of the roadway technical channels to be developed. For example, IP's roadway technical channels, when designed, should be expanded to consider additional outgoing extensions for future interconnections with telecommunications infrastructure (inputs/outputs) in strategically defined areas such as Road crossings, upper or lower crossings of roads, as opposed to the current practice in which the roadway technical channels is designed only to meet the needs (immediate and future) of IP itself. This model will apply to any other promoter of duct construction or roadway technical channels, including, IP Concessionaires, SCUT, Local Authorities, Operators, etc.<br><br>**NOTE:** The use of the railway technical channels needs to be carefully analysed taking into account their characteristics.<br><br>• 5/2018: Promotion of conversion of aerial routes into underground routes;<br>• 21/2018: Preparation of risk maps |

# PROMOTION OF CONVERSION OF AERIAL ROUTES INTO UNDERGROUND ROUTES

| | |
|---|---|
| **Measure number** | 5/2018 |
| **Type of Measure** | Underground routes - Installation |
| **Description of measure** | According to the technical-economic option of each operator, promotion of the conversion of aerial routes of existing electronic communications cables into underground routes, in the following situations:<br>1. Following the destruction of overhead routes of communications cables as a result of forest fires or other disasters, by installing new communications cables in existing underground routes with the following conditions:<br>a. using existing roadway and railway technical channels;<br>b. using other infrastructure suitable for carrying electronic communications cables available for this purpose;<br>2. Modification of the aerial routes of existing communications cables into underground routes in areas of very high and high forest fire hazard in order to prevent such effects as may occur:<br>a. using existing or planned roadway and railway technical channels, as well as other infrastructure suitable for carrying electronic communications cables available for this purpose;<br>b. Building new underground routes or expanding existing ones. |
| **Indicator graph** |  |

| | | |
|---|---|---|
| **Effectiveness/Effects** | Short term | • Yes, with regard to the recovery of aerial routes destroyed by forest fires. |
| | Medium-term | • Yes, with regard to execution of plans for the conversion of aerial routes into underground routes. |
| | Long term | • Yes, with regard to the establishment and execution of plans for converting aerial routes into underground routes. |
| | Risk Reduction Indicator<br>(1- smallest reduction, 10 largest reduction ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☒ 10 ☐ |

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| | Time to Achieve Significant Effect Indicator<br>(1- long-term effect, 10- immediate effect ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☒ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

| | | |
|---|---|---|
| **Type of Measure** | Preventive<br>(Before the Incident) | • Yes |
| | Detection and Response<br>(During the Incident) | • No |
| | Mitigation and Recovery<br>(After the Incident) | • Yes |

| | | |
|---|---|---|
| **Applicability/ Scope** | Natural disasters other than fires (e.g. earthquake, tsunami, cyclone, flood, tornado, volcanic eruption, landslide, pandemics, etc.) | • Yes |
| | Applicability / Scope Indicator<br>(1-fires only, 10- ≥ 5 scenarios with applicability) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☒ 8 ☐ 9 ☐ 10 ☐ |

| | | |
|---|---|---|
| **Implementation** | Intervening entities | • Entities in possession of infrastructure suitable for carrying public electronic communications networks, electronic communications companies, Local Authorities, IMT/ AMT, ANACOM and Government. |
| | Role of ANACOM | • Promote the application of Decree-Law no. 123/2009 of 21 May as regards infrastructure suitable for carrying electronic communications and SIIS;<br>• In line with the LCE, promote adoption of technical and organizational measures which are appropriate to the risks affecting the security of electronic communications networks and services due to the impacts of forest fires.<br>• Promote the establishment of favourable incentives for the use of suitable infrastructure owned by the state or its concessionaires in areas of high or very high hazard.<br>• Regulate offers governing access to ducts. To standardise assumptions, regulate the entire offer of access to private ducts and roadway technical channels and public and private infrastructure technical channels in the country, based on MEO's existing regulated offer (RDAO), while promoting improvements and updating the RDAO **(1).** In the case of IP and Motorway Concessionaires, articulation is required with IMT, which regulates and supervises these entities. For this purpose, it is essential that ANACOM approves the regulation governing the methodology for setting prices for the use of suitable infrastructure, materialising the provisions of Decree-Law no. 123/2009. |

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| | | • Publish hazard maps based on risk maps (measure 21/2018) |
| | Identification of Barriers | • The procedures and conditions governing construction, access to and use of specific infrastructure suitable for carrying electronic communications networks. and the allocation of rights of way for access to the public domain are not expeditious (including roadway and railway technical channels); |
| | Ease of Implementation<br>(1 - lesser ease, 10 - greater ease) | 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Costs, value and type (TCO) | |
| | Cost Indicator (TCO)<br>(1-Maximum cost, 10- no cost ) | 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Identification of Incentives | • Encourage the use of roads and railways for the installation of communications routes using technical channels, particularly in terms of financial and legal barriers.<br>• Encourage the upgrading of procedures and conditions governing access to and use of specific infrastructure suitable for carrying electronic communications networks.<br>• Establishment of incentives and favourable conditions for the use of suitable infrastructure in possession of the state or its concessionaires in areas of high or very high hazard, for the installation of cables providing redundancy for existing routes or as replacement of cables destroyed in aerial routes. |
| | Recurrence / Periodicity | • Possibly, as a result of forest fires occurring.<br>• Annual, as a result of changes in the forest fire risk maps issued by ICNF and others that are considered for this purpose. |
| | Actions to be developed and timeline | Measures:<br><u>After destruction:</u><br><br>**ANACOM/Government: Establishment of incentives and favourable conditions for converting aerial routes destroyed by forest fires into new underground routes;**<br><br>Raising awareness among local authorities/IP as regards:<br>• compliance with their obligations and compliance with the law governing access to infrastructure located in public spaces;<br><br>• standardisation of procedures and conditions governing access to the public domain for the allocation of rights of way and access to and use of suitable infrastructure in the municipality.<br><br>Improvement of procedures to expedite the construction of private infrastructure suitable for carrying electronic communications networks in the public domain |

| | | |
|---|---|---|
| **Articulation with IS and GIS** | Description | • Yes, articulation with SIIS. |
| | Integration with IS and GIS (1-low, 10-high) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☒ 9 ☐ 10 ☐ |

| | | |
|---|---|---|
| **Legal framework** | Existing | • Decree-Law no. 123/2009 of 21 May, as regards infrastructure suitable for carrying electronic communications and SIIS;<br>• LCE with regard to the adoption of technical and organizational measures which are appropriate to the risks affecting the security of electronic services and networks;<br>• Definition and standardisation of prices for rental of ducts in Portugal. |
| | To be developed | • Yes, with regard to the creation of incentives. |

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| **Additional study** | No ☒ Yes ☐ What? |

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| **Notes and articulation with other measures** | 1). It is recommended that, in the next review of the RDAO, improvements be considered as regards the operational conditions/processes applicable to use by different owners of electronic communications cables, in terms of the conditions to be observed in interconnection between sections of ducts of various owners.<br>• 4/2018: installation of electronic communications infrastructure in underground routes<br>• 21/2018: Preparation of risk maps |

# DEPTH OF DUCTS AND DISTANCE BETWEEN INSPECTION CHAMBERS IN UNDERGROUND ROUTES IN AREAS OF HIGH FOREST FIRE HAZARD

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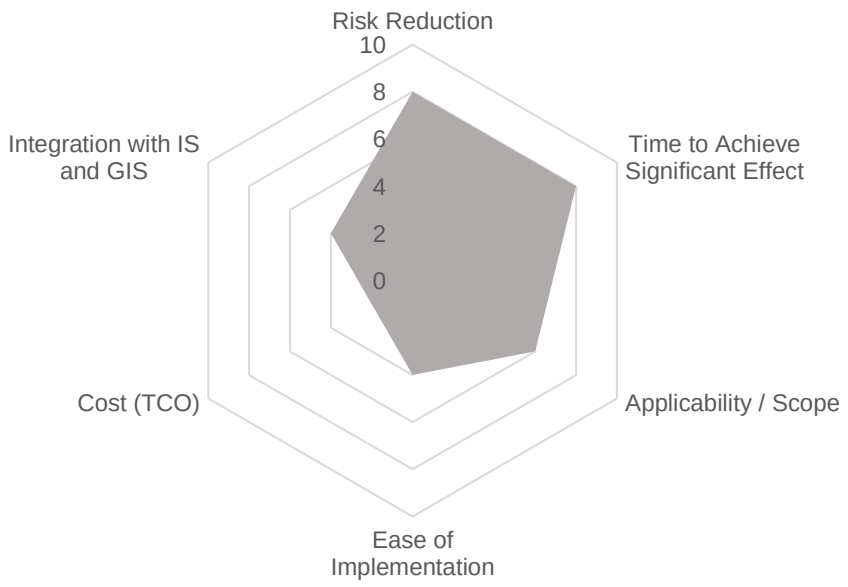
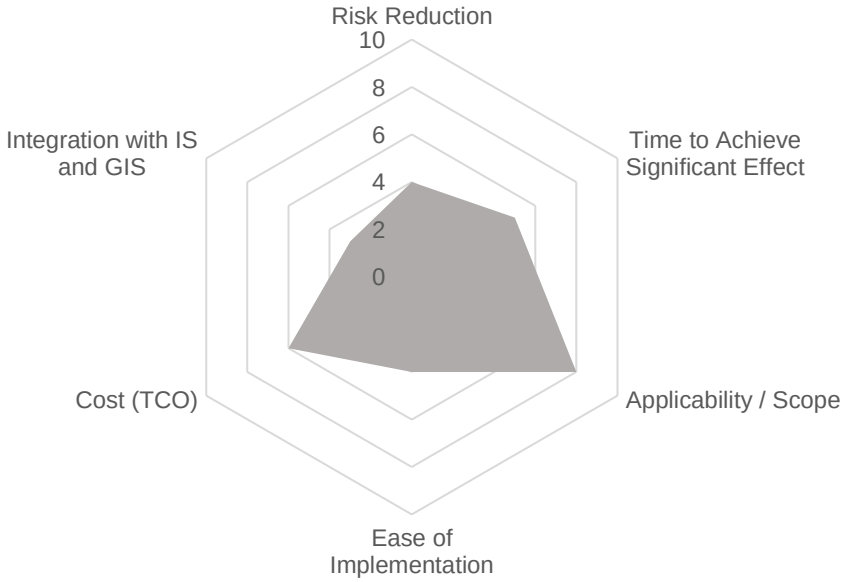
|---|---|
| **Measure number** | 6/2018 |
| **Type of Measure** | UNDERGROUND ROUTES |
| **Description of measure** | Preparation of a technical specification applicable to underground infrastructure suitable for carrying electronic communications networks in areas of very high and high forest fire hazard (Note: This measure may be included within the scope of the legal framework to be developed in measures 4/2018 and 5/2018). |
| **Indicator graph** |  |

| | | |
|---|---|---|
| **Effectiveness/Effects** | Short term | • No |
| | Medium-term | • Yes |
| | Long term | • Yes |
| | Risk Reduction Indicator<br>(1- smallest reduction, 10 largest reduction) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☒ 9 ☐ 10 ☐ |
| | Time to Achieve Significant Effect Indicator<br>(1- long-term effect, 10- immediate effect) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☒ 9 ☐ 10 ☐ |
| **Type of Measure** | Preventive<br>(Before the Incident) | • Yes |
| | Detection and Response<br>(During the Incident) | • No |
| | Mitigation and Recovery | • No |

| | | |
|---|---|---|
| | (After the Incident) | |
| **Applicability/ Scope** | Natural disasters other than fires (e.g. earthquake, tsunami, cyclone, flood, tornado, volcanic eruption, landslide, pandemics, etc.) | • Yes |
| | Applicability / Scope Indicator (1-only fires, 10- ≥ 5 ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☒ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| **Implementation** | Intervening entities | • ANACOM / Electronic Communications Companies / Communications Cable Manufacturers / Installers |
| | Role of ANACOM | • Promote the realization of the study with the participation of the stakeholders. |
| | Identification of Barriers | • Not applicable |
| | Ease of Implementation Indicator (1 - lesser ease, 10 - greater ease ) | 1 ☐ 2 ☐ 3 ☐ 4 ☒ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Costs, value and type (TCO) | • Costs arising from the study to be developed. |
| | Cost Indicator (TCO) (1-Maximum cost, 10- no cost ) | 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Identification of Incentives | • Not applicable |
| | Recurrence / Periodicity | Not applicable |
| | Actions to be developed and timeline | • **ANACOM / Electronic Communications Companies / Communications Cable Manufacturers / Installers -** Promote the performance of a study by an entity with recognized competence for the purpose (e.g. Laboratório de Estudos sobre Incêndios Florestais (Laboratory of Forest Fire Studies), in Lousã). |
| **Articulation with IS and GIS** | Description | • No |
| | Integration with IS and GIS Indicator (1-low, 10-high) | 1 ☐ 2 ☐ 3 ☐ 4 ☒ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| **Legal framework** | Existing | • Decree-Law no. 123/2009 of 21 May<br>• LCE, with regard to the security of networks and services |
| | To be developed | • Yes |
| **Additional study** | No ☐ Yes ☒ What? Development of a technical evaluation study on the protection offered by underground infrastructure suitable for carrying electronic communications networks in terms of resistance of housed network elements to the impacts of forest fires. | |
| **Notes and articulation with other measures** | • 4/2018: Installation of electronic communications infrastructure in underground routes<br>• 5/2018: Promotion of conversion of aerial routes into underground routes | |

# LEGISLATIVE AND PROCEDURAL UNIFORMITY (AUTHORITIES, LOCAL AUTHORITIES).

| | |
|---|---|
| **Measure number** | 7/2018 |
| **Type of Measure** | Underground routes |
| **Description of measure** | Remove administrative barriers to the construction, maintenance and recovery of communications infrastructure (e.g. legislative uniformity, police force and local authorities). |
| **Indicator graph** |  |

| | | |
|---|---|---|
| **Effectiveness/Effects** | Short term | • Yes |
| | Medium-term | • No |
| | Long term | • No |
| | Risk Reduction Indicator<br>(1- smallest reduction, 10 largest reduction ) | 1 ☐ 2 ☐ 3 ☐ 4 ☒ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Time to Achieve Significant Effect Indicator<br>(1- long-term effect, 10- immediate effect ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

| | | |
|---|---|---|
| **Type of Measure** | Preventive<br>(Before the Incident) | • Yes |
| | Detection and Response<br>(During the Incident) | • Yes |
| | Mitigation and Recovery | • Yes |

| | | |
|---|---|---|
| | (After the Incident) | |

| | | |
|---|---|---|
| **Applicability/ Scope** | Natural disasters other than fires (e.g. earthquake, tsunami, cyclone, flood, tornado, volcanic eruption, landslide, pandemics, etc.) | • Yes |
| | Applicability / Scope Indicator (1-fires only, 10- ≥ 5 scenarios with applicability ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☒ 9 ☐ 10 ☐ |

| | | |
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| **Implementation** | Intervening entities | • Municipal Councils, Electronic Communications Companies, energy companies and companies in possession of suitable infrastructure in each municipality, ANMP - Associação Nacional de Municípios Portugueses (National Association of Portuguese Municipalities), ANPC - Autoridade Nacional de Proteção Civil (National Authority for Civil Protection), IP (Infrastructure of Portugal). |
| | Role of ANACOM | • Articulation with Municipalities, National Authorities, concessionaires of public domain. |
| | Identification of Barriers | |
| | Ease of Implementation Indicator (1 - lesser ease, 10 - greater ease ) | 1 ☐ 2 ☐ 3 ☐ 4 ☒ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Costs, value and type (TCO) | |
| | Cost Indicator (TCO) (1-Maximum cost, 10- no cost ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☒ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Identification of Incentives | |
| | Recurrence / Periodicity | |
| | Actions to be developed and timeline | **1**. ANACOM - Necessity for clarification and amendment of Decree-Law no. 123/2009 as follows:<br>a. Amendment of Decree-Law no. 123/2009 in order to provide clarification with express insertion in paragraph 4 of article 7 of Decree-Law 123/2009 that physical access to existing infrastructure is not subject to the administrative control of Municipalities or other entities (specifically IP), whereas, and in cases where it is strictly necessary (when the intervention takes place on the highway or on roads that require pedestrians to be |

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| | | diverted onto the roadway), Operators are only required to ensure safe conditions on the highway.<br><br>**b.** Necessity of making an exception for works performed by electronic communications operators or other entities at their service pursuant to Decree-Law 123/2009 as regards the obligation to submit municipal authorisation or authorisation from IP to the police for occupation/intervention on the public highway that may affect the normal movement of traffic. [subject currently regulated under the following legislation: Dec. Regulam no 2 - A/2005 of 24 March; article 8 to 10 of Código da Estrada (Highway Code); Administrative Rule no. 298/2016 of 29 November (new Administrative Rule of the Remunerated Services Regime).<br><br>**2.** Amendment of legislation applicable to remunerated services making provision that police oversight, where strictly necessary, should be undertaken according to the urgency of the request for oversight made by electronic communications operators or other entities at their service without the need for a license or any municipal or IP authorization; |

| | | |
|---|---|---|
| **Articulation with IS and GIS** | Description | |
| | Integration with IS and GIS Indicator<br>(1-low, 10-high ) | 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

| | | |
|---|---|---|
| **Legal framework** | Existing | • Decree-Law no. 123/2009. |
| | To be developed | • Yes |

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|---|---|
| **Additional study** | No ☒ Yes ☐ What? |

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|---|---|
| **Notes and articulation with other measures** | |

# CREATION OF PAVED STRIPS AROUND SITES

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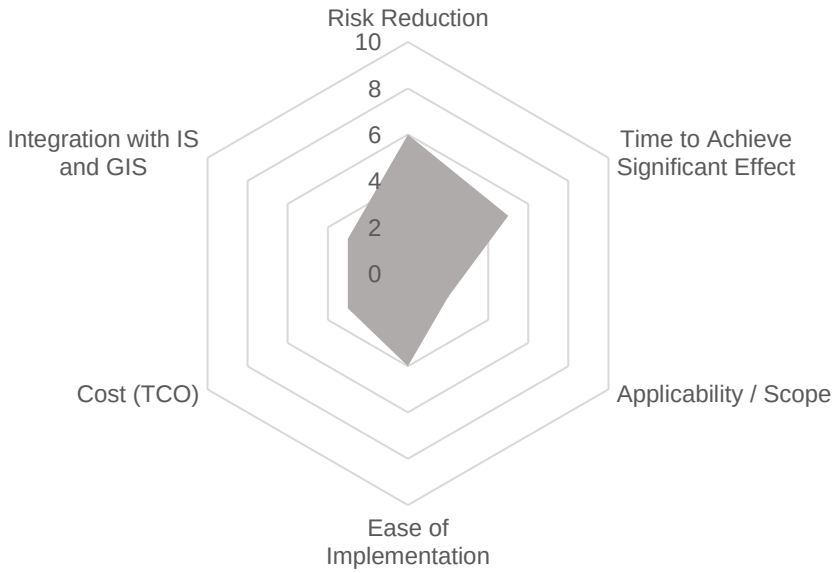
|---|---|
| **Measure number** | 8/2018 |
| **Type of Measure** | Protection |
| **Description of measure** | Creation of a paved strip surrounding the outside of the station with a suitable minimum width of 1-2 metres around the sites |
| **Indicator graph** |  |

| | | |
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| **Effectiveness / Effects** | Short term | • Not an effective short-term measure although it provides additional protection to the fence, container and other infrastructure. |
| | Medium-term | • Effective in the medium term;<br>• Prevents spread of vegetation in this zone, minimising need for deforestation. |
| | Long term | • Effective in the long term;<br>• Prevents spread of vegetation in this zone, minimizing need for deforestation. |
| | Risk Reduction Indicator<br>(1- smallest reduction, 10 largest reduction) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☒ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Time to Achieve Significant Effect Indicator<br>(1- long-term effect, 10- immediate effect) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

| | | |
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| **Type of Measure** | Preventive<br>(Before the Incident) | Precautionary measure. It should be implemented before the critical forest fire season. |
| | Detection and Response<br>(During the Incident) | No. |

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| | Mitigation and Recovery (After the Incident) | No. |

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|---|---|---|
| **Applicability / Scope** | Natural disasters other than fires (e.g. earthquake, tsunami, cyclone, flood, tornado, volcanic eruption, landslide, etc.) | Only impacts forest fires. |
| | Applicability / Scope Indicator (1-only fires, 10- ≥ 5 ) | 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

| | | |
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| **Implementation** | Intervening entities | • Electronic communications companies;<br>• Land owners and owners of adjacent property;<br>• Local Authorities;<br>• Licensing entities;<br>• Service providers;<br>• Ministry of Agriculture / ICNF - Instituto da Conservação da Natureza e das Florestas (Institute for Nature Conservation and Forests); |
| | Role of ANACOM | • Clarification, pursuant to the LCE and Decree-Law no. 123/2009 as to the elements constituting a radiocommunications station;<br>• Articulation with ICNF in the context of Decree-Law no. 124/2006 with regard to radiocommunication stations. |
| | Identification of Barriers | • Difficulties in gaining acceptance from property owners;<br>• Difficulties in access to some stations;<br>• Constraints resulting from terrain orography;<br>• Environmental protection legislation that may limit intervention where vegetation is protected (e.g. cork oak and holm oak);<br>• Inherent contractual/legal constraints, including rental contracts/contracts governing use, etc ... with limited space ($m^2$ ) for the provider to intervene;<br>• Problems in the delimitation of property, since in many cases the sites of electronic communications infrastructure installation are on property limits, so that strips surrounding a station may encroach on several different properties;<br>• Costs arising from the implementation of the measure. |
| | Ease of Implementation Indicator (1 - lesser ease, 10 - greater ease) | 1 ☐ 2 ☐ 3 ☐ 4 ☒ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Costs, value and type (TCO) | • CAPEX: costs arising from the implementation of the measure;<br>• OPEX: increase in rental/rental costs (perpetuity); these costs vary greatly depending on the size of the Site. |
| | Cost Indicator (TCO) (1-Maximum cost, 10- no cost) | 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

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|---|---|---|
| | Identification of Incentives | • Encouragement of property owners and incentives for operators to implement;<br>• Absence of licensing costs;<br>• Potential benefits in equipment protection insurance premiums. |
| | Recurrence / Periodicity | Non-recurring measure. |
| | Actions to be developed and timeline | 1. ANACOM: Articulation with ICNF, under the regime established by Decree-Law no. 124/2006 of 28 June - Sistema Nacional de Defesa da Floresta contra Incêndios (National Forest Fire Protection System), with a view to clarifying the legal regime applicable to electronic communications infrastructure;<br><br>2. ANACOM and electronic communications companies preparation of a technical specification based on good practices;<br><br>3. ANACOM and ICNF: Articulation with local authorities in order to collaborate as facilitators and to raise awareness among property owners. In the case of municipal land this collaboration is all the more important;<br><br>4. Electronic communications companies to construct a paved strip 1 to 2m wide to prevent the growth of vegetation in the area surrounding the site, reducing the risk of any fire propagation to the installed infrastructure. |

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| **Articulation with IS and GIS** | Description | The articulation with GISs can be useful in identifying communications stations located in priority zones of intervention and in the planning necessary for the implementation of the measure. |
| | Integration with IS and GIS Indicator<br>(1-low, 10-high) | 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

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|---|---|---|
| **Legal framework** | Existing | • Law no. 5/2004 of 10 February - Lei das Comunicações Eletrónicas; (Electronic Communications Law);<br>• Decree-Law no. 123/2009 (establishes the legal regime governing the construction of infrastructure suitable for carrying electronic communications networks, the installation of electronic communications networks and the construction of telecommunications infrastructure in housing developments, urban settlements and concentrations of buildings) of 21 May;<br>• Decree-Law no. 124/2006 of 28 June - Sistema Nacional de Defesa da Floresta contra Incêndios (National Forest Fire Protection System). |

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| | To be developed | To be determined as a result of the actions to be developed:<br>• Recommendation of good practices;<br>• Clarification, pursuant to the LCE and Decree-Law no. 123/2009 of elements constituting a radiocommunications station;<br>• Clarification, pursuant to the LCE and Decree-Law no. 124/2006, of the legal regime applicable to electronic communications infrastructure . |

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| **Additional study** | No ☐ Yes ☒ What? Typologies of Sites, types of terrain, orography. |

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| **Notes and articulation with other measures** | Notes:<br>• The intention of this measure is to prevent the growth of vegetation in the area surrounding the site, reducing the risk of any fire propagation to the installed infrastructure.<br>• To allow the circulation of vehicles, a strip 3 m wide should be considered;<br>• Electronic communications companies may negotiate with property owners to establish a "neutral" area (unoccupied /unused) around the sites (built-up area);<br>• The possible equivalence of radiocommunication stations to buildings should not jeopardise siting of stations in zones of the National Road Network, the National Agricultural Reserve and the National Ecological Reserve where building is prohibited.<br><br>This measure is based on the following measures:<br>• 9/2018: PROTECTION STRIP AROUND SITES: REMOVAL OF TREETOPS;<br>• 10/2018: PROTECTION STRIP AROUND SITES: REMOVAL OF VEGETATION;<br>• 11/2018: CLEANING SITE INTERIORS; |

# PROTECTION STRIP AROUND SITES: THINNING OF TREETOPS

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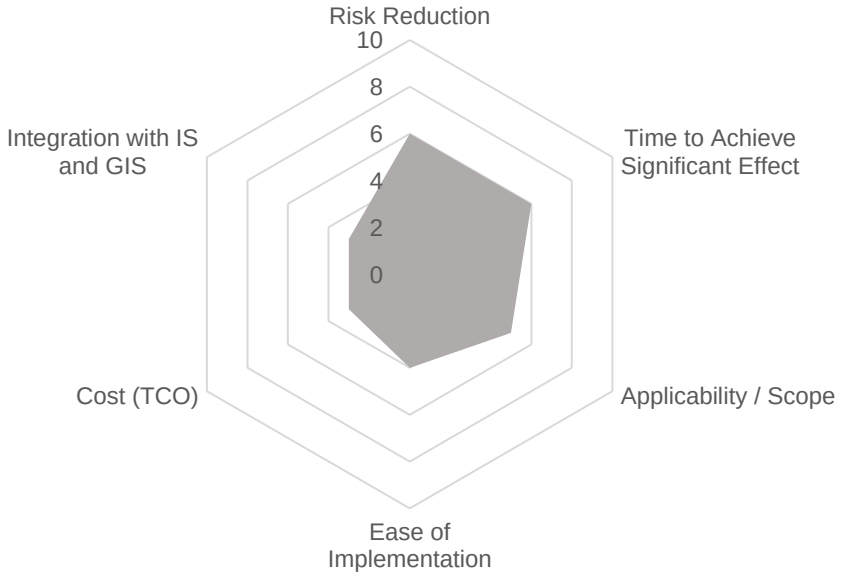
|---|---|
| **Measure number** | 9/2018 |
| **Type of Measure** | Protection |
| **Description of measure** | Cutting and thinning treetops and shrubs, establishing a minimum suitable distance from the site of 5m. |
| **Indicator graph** |  |

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| **Effectiveness/Effects** | Short term | • Effective in the short term;<br>• Provides additional protection to the fence, container and other infrastructure. |
| | Medium-term | • Effective in the medium term with periodic biennial cleaning (every two years). |
| | Long term | • Effective in the long term with periodic biennial cleaning (every two years). |
| | Risk Reduction Indicator<br>(1- smallest reduction, 10 largest reduction ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☒ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Time to Achieve Significant Effect Indicator<br>(1- long-term effect, 10- immediate effect ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☒ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

| | | |
|---|---|---|
| **Type of Measure** | Preventive<br>(Before the Incident) | Precautionary measure. It should be implemented before the critical forest fire season. |
| | Detection and Response<br>(During the Incident) | No. |
| | Mitigation and Recovery<br>(After the Incident) | No. |

| | | |
|---|---|---|
| **Applicability / Scope** | Natural disasters other than fires (e.g. earthquake, tsunami, cyclone, flood, tornado, volcanic eruption, landslide, etc.) | Impact on forest fires, cyclones, tornadoes, earthquakes and landslides. |
| | Applicability / Scope Indicator (1-only fires, 10- ≥ 5 ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

| | | |
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| **Implementation** | Intervening entities | • Electronic communications companies and infrastructure owners;<br>• Service providers;<br>• Owners of property in the vicinity of radiocommunication stations;<br>• Local Authorities;<br>• Ministry of Agriculture / ICNF - Instituto da Conservação da Natureza e das Florestas (Institute for Nature Conservation and Forests); |
| | Role of ANACOM | • Articulation with ICNF, in the context of Decree-Law no. 124/2006, with regard to radiocommunication stations. |
| | Identification of Barriers | • Environmental protection legislation that may limit intervention where vegetation is protected (e.g. cork oaks and holm oaks);<br>• Inherent contractual/legal constraints, including rental contracts/contracts governing use, etc ... with limited space ($m^2$) for the provider to intervene;<br>• Existence of vegetation with commercial value for owners;<br>• Availability of companies that perform this type of services (thinning of trees);<br>• Costs arising from the implementation of the measure. |
| | Ease of Implementation Indicator (1 - lesser ease, 10 - greater ease) | 1 ☐ 2 ☐ 3 ☐ 4 ☒ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Costs, value and type (TCO) | • OPEX: recurring costs for applying this measure. |
| | Cost Indicator (TCO) (1-Maximum cost, 10- no cost) | 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Identification of Incentives | • Encouragement of property owners and incentives for operators to implement;<br>• Lack of costs and exemptions from fees for companies performing this type of services. |
| | Recurrence / Periodicity | Every two years and/or whenever this is justified. |
| | Actions to be developed and timeline | 1. ANACOM: Articulation with ICNF, under the regime established by Decree-Law no. 124/2006 of 28 June - Sistema Nacional de Defesa da Floresta contra Incêndios (National Forest Fire Protection System), with a view to clarifying the legal regime applicable to electronic communications infrastructure; |

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| | | 2. ANACOM and electronic communications companies preparation of a technical specification based on good practice;<br><br>3. ANACOM and ICNF: Articulation with local authorities in order to collaborate as facilitators and to raise awareness among property owners. In the case of municipal land this collaboration is all the more important;<br><br>4. Electronic communications companies to ensure that the landowner around the stations takes appropriate protective measures, such as cutting and clearing tree canopies in order to establish a band of protection and reduce the risk of a possible fire spreading. |

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| **Articulation with IS and GIS** | Description | Articulation with GISs can be useful in identifying communications stations located in priority zones of intervention and in the planning necessary for the implementation of the measure, as well as in identifying the types of vegetation and trees surrounding the site. |
| | Integration with IS and GIS Indicator<br>(1-low, 10-high) | 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

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| **Legal framework** | Existing | • Law no. 5/2004 of 10 February - Lei das Comunicações Eletrónicas; (Electronic Communications Law);<br>• Decree-Law no. 124/2006 of 28 June - Sistema Nacional de Defesa da Floresta contra Incêndios (National Forest Fire Protection System). |
| | To be developed | To be determined as a result of the actions to be developed:<br>• Recommendation of good practices;<br>• Clarification, pursuant to the LCE and Decree-Law no. 124/2006 of the legal regime applicable to electronic communications infrastructure. |

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| **Additional study** | No ☐ Yes ☒ What? Typologies of Sites, types of terrain and surrounding trees, orography. |

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| **Notes and articulation with other measures** | Notes:<br>• This action should be carried out periodically (at least once every two years) in order to ensure maintenance of this security band and so reduce the risk of any fire spreading to installed infrastructure;<br>• The possible equivalence of radiocommunication stations to buildings should not jeopardise siting of stations in zones of the National Road Network, the National Agricultural Reserve and the National Ecological Reserve where building is prohibited.<br><br>This measure is based on the following measures:<br><br>• 8/2018: CREATION OF PAVED STRIPS AROUND SITES |

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| | • 10/2018: PROTECTION STRIP AROUND SITES: REMOVAL OF VEGETATION;<br>• 11/2018: CLEANING SITE INTERIORS; |

# PROTECTION STRIP AROUND SITES: REMOVAL OF VEGETATION

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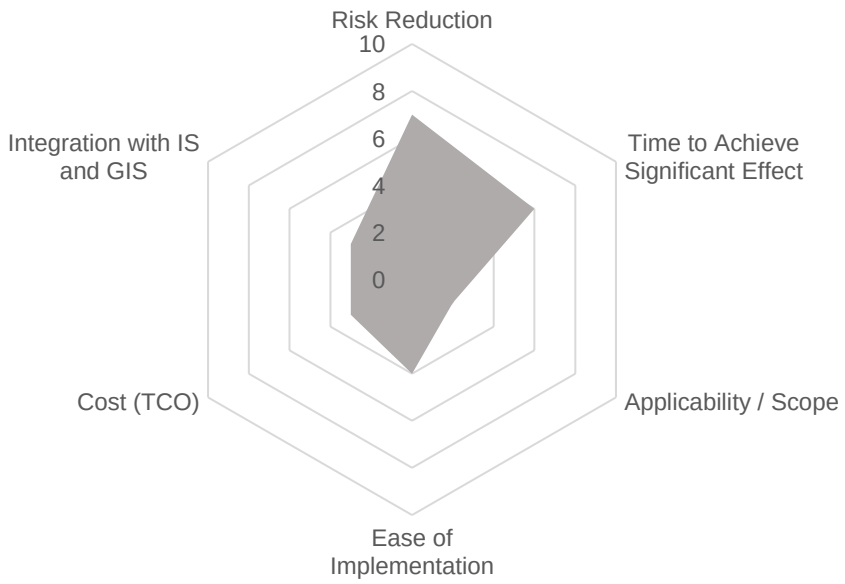
| **Measure number** | 10/2018 |
| **Type of Measure** | Protection |
| **Description of measure** | Clearing land around radiocommunications stations, by cutting back and removing vegetation in a suitable band of 50m. |
| **Indicator graph** |  |

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| **Effectiveness/ Effects** | Short term | • Effective in the short term;<br>• Provides additional protection to the fence, container and other infrastructure;.<br>• Provides additional protection to communications and power cabling infrastructure. |
| | Medium term | • Effective in the medium term through annual cleaning or whenever intervention is warranted. |
| | Long term | • Effective in the long term through annual cleaning or whenever intervention is warranted. |
| | Risk Reduction Indicator<br>(1- smallest reduction, 10 largest reduction ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☒ 8 ☐ 9 ☐ 10 ☐ |
| | Time to Achieve Significant Effect Indicator<br>(1- long-term effect, 10- immediate effect ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☒ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

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| **Type of Measure** | Preventive<br>(Before the Incident) | Precautionary measure. It should be implemented before the critical forest fire season. |
| | Detection and Response<br>(During the Incident) | No. |

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| | Mitigation and Recovery (After the Incident) | No. |

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| **Applicability / Scope** | Natural disasters other than fires (e.g. earthquake, tsunami, cyclone, flood, tornado, volcanic eruption, landslide, etc.) | Only impacts forest fires. |
| | Applicability / Scope Indicator (1-only fires, 10- ≥ 5 ) | 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

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| **Implementation** | Intervening entities | • Electronic communications companies and infrastructure owners;<br>• Service providers;<br>• Owners of property in the vicinity of radiocommunication stations;<br>• Local Authorities;<br>• Ministry of Agriculture / ICNF - Instituto da Conservação da Natureza e das Florestas (Institute for Nature Conservation and Forests); |
| | Role of ANACOM | • Articulation with ICNF, in the context of Decree-Law no. 124/2006 , with regard to radiocommunication stations. |
| | Identification of Barriers | • Environmental protection legislation that may limit intervention where vegetation is protected (e.g. cork oaks and holm oaks);<br>• Inherent contractual/legal constraints, including rental contracts/contracts governing use, etc ... with limited space ($m^2$) for the provider to intervene;<br>• Existence of vegetation with commercial value for owners;<br>• Availability of companies that perform this type of services (thinning of trees);<br>• Costs arising from the implementation of the measure. |
| | Ease of Implementation Indicator (1 - lesser ease, 10 - greater ease) | 1 ☐ 2 ☐ 3 ☐ 4 ☒ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Costs, value and type (TCO) | • OPEX: recurring costs for applying this measure.<br>• The cost of the first intervention will tend to be the most significant - in subsequent interventions, there will no longer be large trees to cut;<br>• The cost varies according to the area to be cleared adjacent to the site. |
| | Cost Indicator (TCO) (1-Maximum cost, 10- no cost ) | 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Identification of Incentives | • Encouragement of property owners and incentives for operators to implement;<br>• Lack of costs and availability of tree thinning companies;<br>• Exemptions from fees for companies performing this type of services. |

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| | Recurrence / Periodicity | Annual and/or whenever justified. |
| | Actions to be developed and timeline | 1. ANACOM: Articulation with ICNF, under the regime established by Decree-Law no. 124/2006 of 28 June - Sistema Nacional de Defesa da Floresta contra Incêndios (National Forest Fire Protection System), with a view to clarifying the legal regime applicable to electronic communications infrastructure;<br><br>2. ANACOM and electronic communications companies: preparation of a technical specification based on good practices;<br><br>3. ANACOM and ICNF: Articulation with local authorities in order to collaborate as facilitators and to raise awareness among property owners. In the case of municipal land this collaboration is all the more important;<br><br>4. Electronic communications companies to ensure that the owner of property around stations take appropriate protective measures, such as clearing vegetation surrounding the communications station in order to establish a band of protection and reduce the risk of a possible fire spreading. |

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| **Articulation with IS and GIS** | Description | Articulation with GISs can be useful in identifying communications stations located in priority zones of intervention and in the planning necessary for the implementation of the measure, as well as in identifying the types of vegetation and trees surrounding the site. |
| | Integration with IS and GIS Indicator<br>(1-low, 10-high ) | 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

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| **Legal framework** | Existing | • Law no. 5/2004 of 10 February - Lei das Comunicações Eletrónicas; (Electronic Communications Law);<br>• Decree-Law no. 124/2006 of 28 June - Sistema Nacional de Defesa da Floresta contra Incêndios (National Forest Fire Protection System). |
| | To be developed | To be determined as a result of the actions to be developed:<br>• Recommendation of good practices;<br>• Clarification, pursuant to the LCE and Decree-Law no. 124/2006 of the legal regime applicable to electronic communications infrastructure . |

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| **Additional study** | No ☒Yes ☒ What? Typologies of Sites, types of terrain and surrounding trees, orography. |

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| **Notes and articulation with other measures** | Notes: |

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| | • This measure is intended to ensure that the land where the radiocommunication stations are sited is kept clear by creating an effective strip to manage flammable material as a passive measure of communications infrastructure protection;<br>• The possible equivalence of radiocommunication stations to buildings should not jeopardise siting of stations in zones of the National Road Network, the National Agricultural Reserve and the National Ecological Reserve where building is prohibited.<br><br>This measure is based on the following measures:<br><br>• 8/2018: CREATION OF A PAVED STRIP AROUND SITES<br>• 9/2018: PROTECTION STRIP AROUND SITES: THINNING OF TREETOPS;<br>• 11/2018: CLEANING SITE INTERIORS; |

# CLEANING SITE INTERIORS

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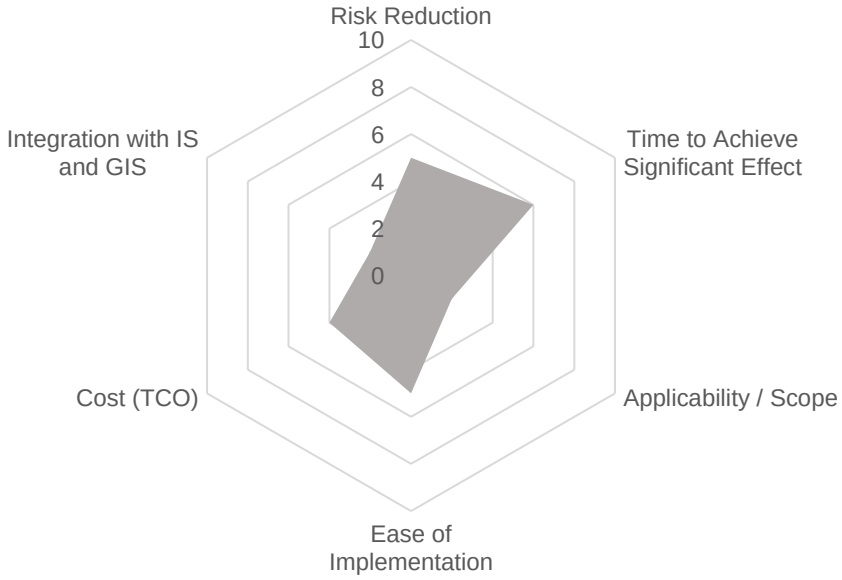
| **Measure number** | 11/2018 |
| **Type of Measure** | Protection |
| **Description of measure** | Preparation of a technical specification of procedures to be adopted for the management and removal of biofuel materials in the space inside the perimeter fence of the sites in geographical zones of very high and high risk of forest fire. |
| **Indicator graph** |  |

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| **Effectiveness / Effects** | Short term | • Effective in the short term;<br>• Provides additional protection to the fence, container and other infrastructure. |
| | Medium term | • Effective in the medium term with periodic biennial cleaning (every two years) and/or whenever justified. |
| | Long term | • Effective in the long term with periodic biennial cleaning (every two years) and/or whenever justified. |
| | Risk Reduction Indicator<br>(1- smallest reduction, 10 largest reduction ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Time to Achieve Significant Effect Indicator<br>(1- long-term effect, 10- immediate effect) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☒ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

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| **Type of Measure** | Preventive<br>(Before the Incident) | Precautionary measure. Should be implemented before the critical forest fire season. |
| | Detection and Response<br>(During the Incident) | No. |
| | Mitigation and Recovery<br>(After the Incident) | No. |

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| **Applicability/ Scope** | Natural disasters other than fires (e.g. earthquake, tsunami, cyclone, flood, tornado, volcanic eruption, landslide, etc.) | Impact on forest fires and others. |
| | Applicability / Scope Indicator (1-only fires, 10- ≥ 5) | 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

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| **Implementation** | Intervening entities | • Electronic communications companies and infrastructure owners;<br>• Service providers. |
| | Role of ANACOM | • Promotion of the measure. |
| | Identification of Barriers | • Costs arising from the implementation of the measure. |
| | Ease of Implementation (1 - lesser ease, 10 - greater ease) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Costs, value and type (TCO) | • OPEX: recurring costs due to application and maintenance of this measure. |
| | Cost Indicator (TCO) (1-Maximum cost, 10- no cost) | 1 ☐ 2 ☐ 3 ☐ 4 ☒ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Identification of Incentives | Not applicable. |
| | Recurrence / Periodicity | Every two years and/or whenever justified. |
| | Actions to be developed and timeline | 1. ANACOM and electronic communications companies : preparation of a technical specification based on good practices;<br>2. Electronic communications companies: Implementation of the procedures included in the technical specification:<br>a. Electronic communications companies and entities in possession of infrastructure to carry out checks and remove combustible material in the area inside radiocommunications station fences.<br>b. This periodic action should be planned by companies in order to give higher priority to overgrown and forested areas, where fire hazard is classed as "High" and "Very High" (classification updated annually by ICNF). |

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| **Articulation with IS and GIS** | Description | • Articulation with GISs can be useful in the identification of communications stations located in zones of priority intervention and in the planning necessary for the measure's implementation; |

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| | | • Identification of the type of pavement in the internal area of the site. |
| | Integration with IS and GIS Indicator<br>(1-low, 10-high) | 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

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| **Legal framework** | Existing | • Law no. 5/2004 of 10 February - Lei das Comunicações Eletrónicas (Electronic Communications Law), in particular article 54-A on the obligations of undertakings concerning security and integrity matters. |
| | To be developed | • Recommendation of good practices. |

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| **Additional study** | No ☒ Yes ☐ What? |

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| **Notes and articulation with other measures** | Notes:<br>• Measure intended to ensure that periodic verification and removal of combustible materials is carried out in the interior spaces of radiocommunications stations;<br>• This measure is more important in rural environments, in overgrown and forested areas, where fire hazard is classed as "High" and "Very High" (ICNF classification).<br><br>This measure is based on the following measures:<br><br>• 8/2018: CREATION OF PAVED STRIPS AROUND SITES<br>• 9/2018: PROTECTION STRIP AROUND SITES: REMOVAL OF TREETOPS<br>• 10/2018: PROTECTION STRIP AROUND SITES: REMOVAL OF VEGETATION |

# PROTECTION AND RESILIENCE OF CABLE ENTRY POINT IN STATIONS

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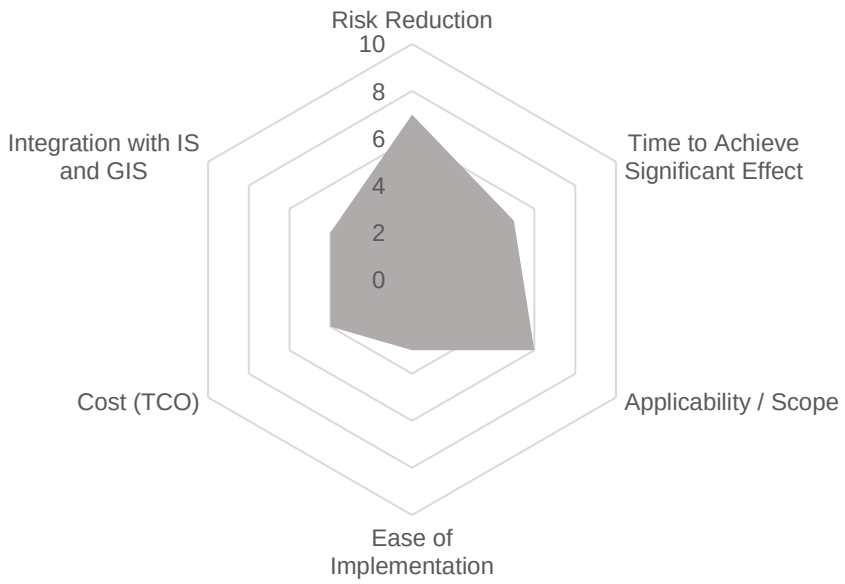
| **Measure number** | 12/2018 |
| **Type of Measure** | Protection |
| **Description of measure** | Preparation of a technical specification related to cable entry point in radiocommunication stations located in zones of high and very high forest fire hazard (according to ICNF). |
| **Indicator graph** |  |

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| **Effectiveness/ Effects** | Short term | • Effective in the short term;<br>• Enhances resilience of communications and power accesses. |
| | Medium term | • Effective in the medium term;<br>• In the most important/critical stations, it may be possible to implement power redundancy by employing different lines in and paths. |
| | Long term | • Effective in the long term;<br>• In some cases, it may be possible to bury branches. |
| | Risk Reduction Indicator<br>(1- smallest reduction, 10 largest reduction ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☒ 8 ☐ 9 ☐ 10 ☐ |
| | Time to Achieve Significant Effect Indicator<br>(1- long-term effect, 10- immediate effect ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

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| **Type of Measure** | Preventive<br>(Before the Incident) | Precautionary measure. |
| | Detection and Response<br>(During the Incident) | This is not a measure applicable to detection and response. |

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| | Mitigation and Recovery (After the Incident) | This is not a measure applicable to mitigation and recovery. |

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| **Applicability / Scope** | Natural disasters other than fires (e.g. earthquake, tsunami, cyclone, flood, tornado, volcanic eruption, landslide, etc.) | This measure can be designed to maximise protection including against other natural disasters as well as against fires. |
| | Applicability / Scope Indicator (1-only fires, 10- ≥ 5 ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☒ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

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| **Implementation** | Intervening entities | • Electronic communications companies;<br>• Installation companies;<br>• Owners of surrounding property;<br>• Licensing entities;<br>• Local Authorities;<br>• EDP Distribuição. |
| | Role of ANACOM | • Promote preparation of technical specifications in cooperation with electronic communications companies and installers;<br>• Clarification, pursuant to the LCE and Decree-Law no. 123/2009, of the elements constituting a radiocommunications station. |
| | Identification of Barriers | • Costs arising from the implementation of the measure.<br>• Measure dependent on various entities: property owners, entities in possession of electronic communications and energy infrastructure and Local Authorities. |
| | Ease of Implementation Indicator (1 - lesser ease, 10 - greater ease) | 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Costs, value and type (TCO) | • CAPEX: costs arising from the implementation. |
| | Cost Indicator (TCO) (1-Maximum cost, 10- no cost) | 1 ☐ 2 ☐ 3 ☐ 4 ☒ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Identification of Incentives | Not applicable. |
| | Recurrence / Periodicity | Non-recurring measure. |
| | Actions to be developed and timeline | • ANACOM and electronic communications companies: Preparation of a technical specification related to cable entry points in radiocommunication stations located in zones of high and very high forest fire hazard (according to ICNF), entailing:<br>  ○ Stakeholder consideration and discussion of technical measures for inclusion in a good practice guide;<br>  ○ Adoption of uniform techniques by electronic communications companies to protect cable entry point in stations interiors. |

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| **Articulation with IS and GIS** | Description | • Articulation with GISs can be useful in the identification of communications stations located in zones of priority intervention and in the planning necessary for the measure's implementation;<br>• Reference to the type of access/electric power line, PT of the associated supplier in the form of an attribute;<br>• Identification of the type of communications access to the interior of the sites in the form of an attribute. |
| | Integration with IS and GIS<br>(1-low, 10-high) | 1 ☐ 2 ☐ 3 ☐ 4 ☒ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

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| **Legal framework** | Existing | • Law no. 5/2004 of 10 February - Lei das Comunicações Eletrónicas; (Electronic Communications Law);<br>• Decree-Law no. 123/2009 (legal regime governing the construction of infrastructure suitable for carrying electronic communications networks, the installation of electronic communications networks and the construction of telecommunications infrastructure in housing developments, urban settlements and concentrations of buildings) of 21 May. |
| | To be developed | To be determined as a result of the actions to be developed:<br>• Recommendation of good practices;<br>• Clarification, pursuant to the LCE and Decree-Law no. 123/2009, of the elements constituting a radiocommunications station. |

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| **Additional study** | No ☒ Yes ☐ What? |

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| **Notes and articulation with other measures** | Notes:<br>• In particular, it is necessary to ensure that the cables are properly protected from physical and biological elements, both at the point where aerial routes enter the station interior and at the point where underground routes enter the station interior.<br>• Harmonisation of techniques to protect cable entry points in stations is required.<br>• In the present context of forest fires, it is important to introduce effective barriers or protection against fire at cable entry points (communications and power supply) into the interior area of stations;<br>• EDP Distribuição has a specification (DMA-C33-201N) that can serve as a basis for the specification of the low voltage cable of the private service of Operators. It can already be considered in low voltage cables of public services through the identification of needs;<br>• For medium voltage power supply, dual supply is possible with arrival at the Network Switching Station, which in turn has output to the customer's PT. In the case of low voltage, it is necessary to verify the feasibility of implementing dual supply at the same consumption point;<br>• Considering the possible installation of a second line of electric power, it should be considered that the costs of connections to the grid are defined by ERSE regulation. In the case of low voltage, and up to 30 meters, the cost is market-based, i.e., if it is an element of exclusive use, the requester can choose who executes the line and EDP Distribuição is not |

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| | required to present a budget. Costs are transferred to other customers where not supported by the customers/requester that gave rise to them. If it is shown that the use of two sources/supplies is a cost-efficient solution when compared to other solutions (e.g. increase in battery autonomy and generator sets), then ERSE considers that support should originate outside the electric sector. It is noted that there are large customers who choose single supply.<br><br>This measure is based on the following measures:<br><br>• 21/2018: PREPARATION OF RISK MAPS<br>• 27/2018: MANUAL OF BEST PRACTICES OF SHARED INFRASTRUCTURE. |

# PROTECTION STRIP ALONG AERIAL ROUTES

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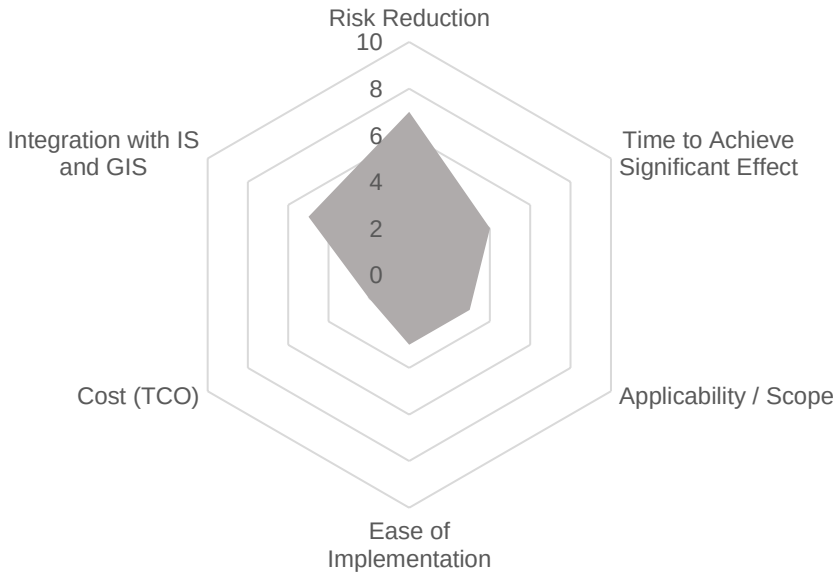
| **Measure number** | 13/2018 |
| **Type of Measure** | Protection |
| **Description of measure** | Preparation of a technical specification regarding the creation and maintenance of a fire protection strip of adequate width along the aerial routes of communications cables in areas of high and high forest fire hazard (according to ICNF). Possibility of sharing the protection strips with companies in the electricity sector. Development of a possible legal framework for implementation. |
| **Indicator graph** |  |

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| **Effectiveness/ Effects** | Short term | • This measure is not effective in the short term. |
| | Medium term | • Measure with some impact in the medium term. |
| | Long term | • Measure has a positive long-term effect, above all giving priority to areas of high and very high forest fire hazard (ICNF classification);<br>• The possibility of deploying communication route redundancy using radio links or satellite links may be considered as a complementary cost-benefit measure. |
| | Risk Reduction Indicator<br>(1- smallest reduction, 10 largest reduction ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☒ 8 ☐ 9 ☐ 10 ☐ |
| | Time to Achieve Significant Effect Indicator<br>(1- long-term effect, 10- immediate effect ) | 1 ☐ 2 ☐ 3 ☐ 4 ☒ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| **Type of Measure** | Preventive<br>(Before the Incident) | • Measure essentially preventive;<br>• Priority may be given to clearing aerial routes which lack redundancy and in areas with highest levels of forest fire |

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| | | hazard (by consulting the cartography made available annually by ICNF). |
| | Detection and Response (During the Incident) | No. |
| | Mitigation and Recovery (After the Incident) | • May reduce the intervention response time of maintenance teams on the ground. |

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| **Applicability / Scope** | Natural disasters other than fires (e.g. earthquake, tsunami, cyclone, flood, tornado, volcanic eruption, landslide, etc.) | May prevent trees falling onto aerial routes due to other natural disasters other than fires. |
| | Applicability / Scope Indicator (1-only fires, 10- ≥ 5 ) | 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

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| **Implementation** | Intervening entities | • Electronic communications companies;<br>• University of Coimbra (Lousã Laboratory);<br>• Local Authorities;<br>• Property owners (rural property owner associations).<br>• Ministry of Agriculture / ICNF - Instituto da Conservação da Natureza e das Florestas (Institute for Nature Conservation and Forests);<br>• EDP Distribuição;<br>• REN. |
| | Role of ANACOM | • Promotion of preparation of technical specifications in collaboration with the electronic communications companies, installers and Universidade de Coimbra (Coimbra University)/Lousã Laboratory;<br>• Promotion of the measure and its implementation, with details reflected in a good practice guide. |
| | Identification of Barriers | • Difficulties in gaining acceptance from property owners;<br>• Aspects related to the characteristics of aerial routes;<br>• Costs arising from the implementation of the measure. |
| | Ease of Implementation (1 - lesser ease, 10 - greater ease) | 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Costs, value and type (TCO) | • OPEX: high recurring costs in application of this measure. |
| | Cost Indicator (TCO) (1-Maximum cost, 10- no cost) | 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Identification of Incentives | • Exemption from fees and taxes for forest cleaning companies. |
| | Recurrence / Periodicity | Every two years and/or whenever this is justified. |

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| | Actions to be developed and timeline | 1. ANACOM: Articulation with ICNF, under the regime established by Decree-Law no. 124/2006 of 28 June - Sistema Nacional de Defesa da Floresta contra Incêndios (National Forest Fire Protection System), with a view to clarifying the legal regime applicable to electronic communications infrastructure ;<br>2. ANACOM, electronic communications companies: Preparation of a technical specification regarding the creation and maintenance of a fire protection strip along the aerial routes of communications cables in areas of high and high forest fire hazard (according to ICNF).<br>3. Electronic communication companies should check their infrastructure periodically and work with competent authorities to ensure that protection strips are maintained as specified in areas identified as having a high level of fire hazard ("High" and " Very High" INCF classification); |

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| **Articulation with IS and GIS** | Description | Articulation with GISs can be useful in identifying communications stations located in priority zones of intervention and in the planning necessary for implementation of the measure, as well as in identifying the types of vegetation and trees surrounding the site. |
| | Integration with IS and GIS (1-low, 10-high) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

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| **Legal framework** | Existing | • Law no. 5/2004 of 10 February - Lei das Comunicações Eletrónicas (Electronic Communications Law), in particular article 54-A on the obligations of undertakings concerning security and integrity.<br>• Decree-Law no. 124/2006 of 28 June - Sistema Nacional de Defesa da Floresta contra Incêndios (National Forest Fire Protection System). |
| | To be developed | To be determined as a result of the actions to be developed:<br>• Recommendation of good practices;<br>• Clarification, pursuant to the LCE and Decree-Law no. 124/2006 of the legal regime applicable to electronic communications infrastructure . |

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| **Additional study** | No ☐ Yes ☒ What?<br>• Determination of the appropriate width of protection bands according to the characteristics of the surrounding vegetation and of the materials used in the construction of the route;<br>• Solutions making use of fire-resistant materials or protection of the bases of posts with C-THERM paint. |

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| **Notes and articulation with other measures** | Notes:<br>• The intention of this measure is to ensure the establishment and maintenance of strips of land where combustible material is managed in line with practices already employed with respect to electricity transmission infrastructure in MAT, AT and MT |

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| | • Priority should be given to backbone routes, routes serving larger centres (e.g. municipal capital towns), nodes or critical stations of electronic communications networks in areas with a high-level forest fire hazard.<br><br>This measure is based on the following measures:<br><br>• 2/2018: RADIO LINKS FOR REDUNDANCY IMPLEMENTATION<br>• 3/2018: SATELLITE LINKS FOR REDUNDANCY IMPLEMENTATION<br>• 21/2018: PREPARATION OF RISK MAPS<br>• 27/2018: MANUAL OF BEST PRACTICES OF SHARED INFRASTRUCTURE. |

# ENERGY RESILIENCE AT SITES

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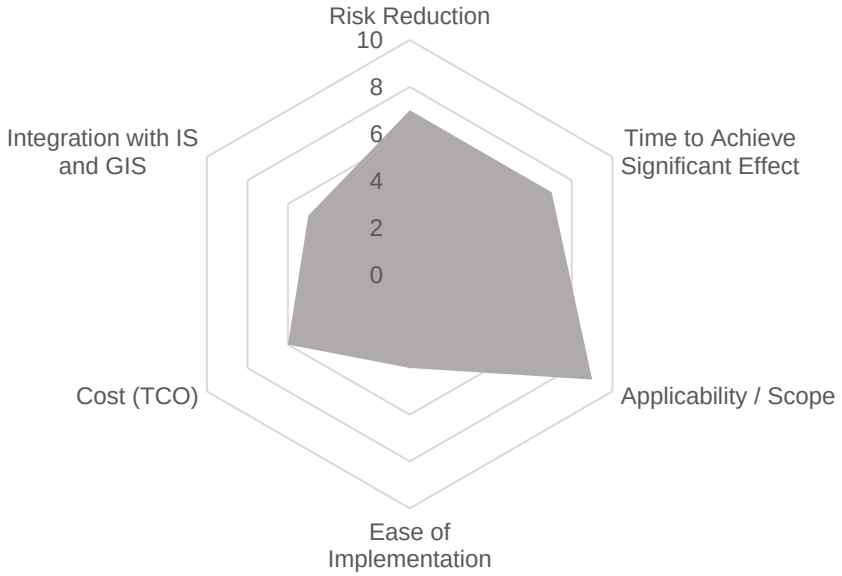
| **Measure number** | 14/2018 |
| **Type of Measure** | Energy |
| **Description of measure** | Preparation of a list of major communications stations with a view to maintaining a minimum service in disaster situations. These points would be considered as priority customers under the ERSE Regulamento da Qualidade de Serviço (Quality of Service Regulation), and will have to be registered as such by the respective distribution system operators, i.e. EDP Distribuição. |
| **Indicator graph** |  |

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| **Effectiveness/ Effects** | Short term | • Enables increased resilience of electric power at sites;<br>• This measure may be implemented with the involvement of electronic communications companies in the POAC - Plano Operacional de Atuação em Crise (Crisis Operations Plan) of EDP Distribuição. |
| | Medium term | • Effective in the medium term by creating a list of priorities and details of sites autonomy to share with EDP Distribuição;<br>• Possible automatic resets in the access lines of operator stations/sites. |
| | Long term | Similar to medium term. |
| | Risk Reduction Indicator<br>(1- smallest reduction, 10 largest reduction ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☒ 8 ☐ 9 ☐ 10 ☐ |
| | Time to Achieve Significant Effect Indicator<br>(1- long-term effect, 10- immediate effect ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☒ 8 ☐ 9 ☐ 10 ☐ |

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| **Type of Measure** | Preventive<br>(Before the Incident) | Yes, by characterising sites and sharing the list with priorities. |

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| | Detection and Response (During the Incident) | Decisive influences on localising, diagnosis and decision-making as regards prioritisation of responses in a disrupted situation. |
| | Mitigation and Recovery (After the Incident) | Reduction of response times and times taken to restore power to sites. |

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| **Applicability / Scope** | Natural disasters other than fires (e.g. earthquake, tsunami, cyclone, flood, tornado, volcanic eruption, landslide, etc.) | Applicable to all types of natural disasters. |
| | Applicability / Scope Indicator (1-only fires, 10- ≥ 5 ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☒ 10 ☐ |

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| **Implementation** | Intervening entities | • Electronic communications companies;<br>• EDP Distribuição;<br>• ERSE;<br>• DGEG. |
| | Role of ANACOM | • Articulation with ERSE and DGEG. |
| | Identification of Barriers | • Electronic communications companies not included as priority customers under Article 103 of the Regulamento da Qualidade de Serviço (Quality of Service Regulation) for the Electricity Sector and Natural Gas Sector;<br>• Difficulties in gaining rapid access to damaged infrastructure. |
| | Ease of Implementation (1 - lesser ease, 10 - greater ease) | 1 ☐ 2 ☐ 3 ☐ 4 ☒ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Costs, value and type (TCO) | To be identified. |
| | Cost Indicator (TCO) (1-Maximum cost, 10- no cost) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☒ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Identification of Incentives | • Create priority accesses or emergency corridors for use by operator or energy supplier technicians. |
| | Recurrence / Periodicity | Non-recurring measure. |
| | Actions to be developed and timeline | 1. ANACOM and ERSE: Articulation in the Regulamento da Qualidade de Serviço (Quality of Service Regulation) for the Electricity Sector and Natural Gas Sector and future Regulamento da Segurança das Comunicações (Security of Communications Regulation);<br><br>2. Electronic communication companies:<br>  ○ to identify stations/sites that they consider to have highest priority in terms of the availability and resilience of their networks and services in a list to be provided to EDP Distribuição; |

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| | | ○ to define interlocutors and channels of communication with the POAC Offices of EDP Distribuição to be used in crisis situations.<br><br>3. EDP Distribution: to take these items into account in its POAC - Plano Operacional de Atuação em Crise (Crisis Operations Plan) |

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| **Articulation with IS and GIS** | Description | Articulation with GISs can be useful in identifying communications stations located in priority zones of intervention and in the planning necessary for the implementation of the measure. It should, however, be safeguarded that this is sensitive information which should not be made available outside this framework. |
| | Integration with SI and GIS<br>(1-low, 10-high) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

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| **Legal framework** | Existing | • Law no. 5/2004 of 10 February - Lei das Comunicações Eletrónicas (Electronic Communications Law);<br>• ERSE Regulation 3/2017- Regulamento da Qualidade de Serviço do Setor Elétrico e do Setor do Gás Natural (Quality of Service Regulation for the Electricity Sector and the Natural Gas Sector) (Articles 103, 104 and 105). |
| | To be developed | To be determined as a result of the actions to be developed:<br>• It should be ensured that electronic communications operators are covered by the conditions foreseen for priority customers in the Regulamento da Qualidade de Serviço do Setor Elétrico e do Setor do Gás Natural (Quality of Service Regulation for the Electricity Sector and the Natural Gas Sector). |

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| Additional study | No ☒ Yes ☐ What? |

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| **Notes and articulation with other measures** | Notes:<br>• So as not to lose the priority character of the measure, and with a view to facilitating selection of the most important communications stations, EDP Distribuição should indicate the maximum number of points which can be considered as priority. The process will be conducted under the supervision of ERSE;<br>• The identification of priority points should be complemented by articulation between the contingency plans of EDP Distribuição and the plans of the various companies with electronic communications infrastructure, enabling better coordination and performance in the theatre of operations;<br>• The purpose of this measure is the recognition of electronic communications infrastructure requiring priority status within the framework of the Regulamento da Qualidade de Serviço do Setor Elétrico e do Setor do Gás Natural (Quality of Service Regulation for the Electricity Sector and the Natural Gas Sector) and benefiting from quicker restoration of power in the event of outages. Radiocommunications stations are normally powered by low voltage and EDP |

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| | Distribuição does not currently distinguish stations from dwellings or common commercial establishments;<br>• For medium voltage power supply, dual supply is possible with arrival at the Network Switching Station, which in turn has output to the customer's PT. In the case of low voltage, it is necessary to verify the feasibility of implementing dual supply at the same consumption point;<br>• Medium voltage resets can be made viable under normal conditions. In a crisis situation there may be safety constraints; the line may be affected which will prevent it from being reset.<br><br>Additional Notes:<br>• EDP Distribuição has provided Mobile Telecommunications Operators with a dedicated contact point for medium voltage installations (Client Manager). It is suggested that this contact is also used for low voltage installations;<br>• This is a matter that is being discussed within the framework of the periodic meetings held between APRITEL and EDP Distribuição, sponsored by ANACOM and ERSE. The measure should therefore be aligned with the conclusions of the works of this group.<br><br>This measure is based on the following measures:<br>• 23/2018: INTERSECTORAL PROCEDURES FOR DETECTION, RESPONSE AND MITIGATION<br>• 25/2018: REGULATORY ARTICULATION PROCEDURES (ANACOM, ERSE) |

# MONITORING OF SITES WITH LOW VOLTAGE POWER SUPPLY

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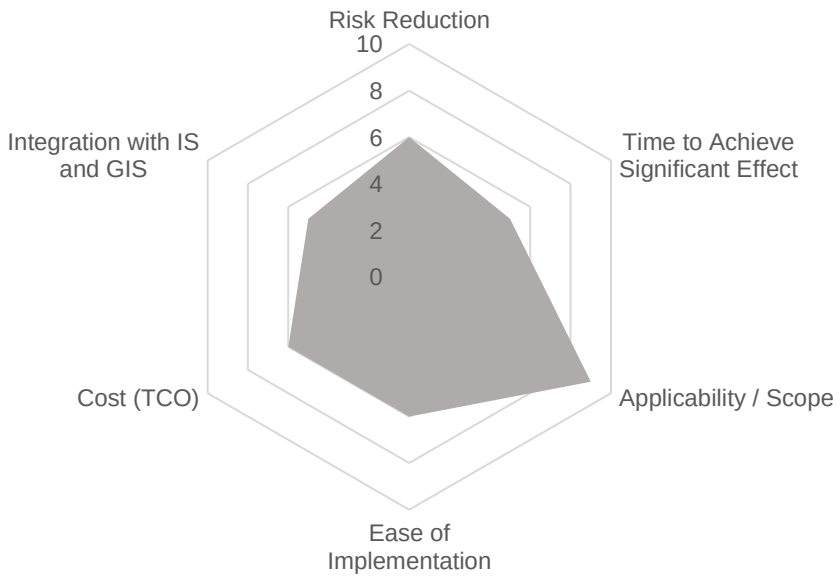
|---|---|
| **Measure number** | 15/2018 |
| **Type of Measure** | Energy |
| **Description of measure** | Preparation of a plan to develop and implement a monitoring system at points of delivery of low voltage power to operators' sites. Study of the possibility of installing smart meters or other devices capable of deploying the smart grid. Monitoring should be possible on an online platform, indicating the access points assigned to each telecom operator (and visibility for each operator only), as well as indication of service status and restoration times whenever possible. . |
| **Indicator graph** |  |

| | | |
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| **Effectiveness/ Effects** | Short term | • Measure difficult to implement in the short term;<br>• Allows identification of sites without power and improves response times in diagnosis and restoration. |
| | Medium term | • Entails installation of smart meters in stations, with direct monitoring for the control room of the power supplier. |
| | Long term | Similar to medium term. |
| | Risk Reduction Indicator<br>(1- smallest reduction, 10 largest reduction ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☒ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Time to Achieve Significant Effect Indicator<br>(1- long-term effect, 10- immediate effect ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

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| **Type of Measure** | Preventive<br>(Before the Incident) | • Enables effective monitoring;<br>• May even enable preventive action by electronic communication companies and an improvement in the quality of the network. |

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| | Detection and Response (During the Incident) | • Enables direct contact with the power supplier for sharing of ETR ("Estimated Time to Repair"). Faster knowledge of the type of occurrence;<br>• May entail sharing of absence of energy alarms that operators already have installed. |
| | Mitigation and Recovery (After the Incident) | Reduction of response times and times taken to restore power to sites. |

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|---|---|---|
| **Applicability / Scope** | Natural disasters other than fires (e.g. earthquake, tsunami, cyclone, flood, tornado, volcanic eruption, landslide, etc.) | Applicable to all types of natural disasters. |
| | Applicability / Scope Indicator (1-only fires, 10- ≥ 5 ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☒ 10 ☐ |

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|---|---|---|
| **Implementation** | Intervening entities | • Electronic communications companies;<br>• EDP Distribuição;<br>• ERSE;<br>• DGEG. |
| | Role of ANACOM | • Promote coordination between electronic communications companies and energy companies, as well as with ERSE and with DGEG. |
| | Identification of Barriers | None identified. |
| | Ease of Implementation (1 - lesser ease, 10 - greater ease) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☒ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Costs, value and type (TCO) | None identified. |
| | Cost Indicator (TCO) (1-Maximum cost, 10- no cost) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☒ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Identification of Incentives | • Create communication channels between operators and power suppliers to monitor delivery points. |
| | Recurrence / Periodicity | Non-recurring measure. |
| | Actions to be developed and timeline | • Electronic communications companies and EDP Distribuição: Preparation of an action plan and subsequent implementation. |

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| **Articulation with IS and GIS** | Description | The articulation with GISs can be useful in identifying communications stations in the planning necessary for implementation of the measure. It should, however, be safeguarded that this is sensitive information which should not be made available outside this framework. |

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| | Integration with IS and GIS<br>(1-low, 10-high) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

| | | |
|---|---|---|
| **Legal framework** | Existing | • Law no. 5/2004 of 10 February - Lei das Comunicações Eletrónicas; (Electronic Communications Law);<br>• ERSE Regulation 3/2017- Regulamento da Qualidade de Serviço do Setor Elétrico e do Setor do Gás Natural (Quality of Service Regulation for the Electricity Sector and the Natural Gas Sector) (Articles 103, 104 and 105). |
| | To be developed | • To be determined as a result of the actions to be developed. |

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| **Additional study** | No ☐ Yes ☒ What? Definition of the type of monitoring applicable to achieve effectiveness at a preventive level. |

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| **Notes and articulation with other measures** | Notes:<br>• EDP Distribuição is carrying out a survey of all power points to antennas of electronic communications companies. Currently these points have Medium Voltage and Low Voltage supplies (majority Low Voltage - a total of about 9000 points);<br>• In the case of Medium Voltage supplies to stations of electronic communications companies, recourse due to lack of power is the responsibility of the client (of the companies). In Medium Voltage installation; the PT/ break switch belongs to the client, while the line is the responsibility of EDP Distribuição. In a power failure scenario, the problem may be in the line and/or the PT, so responsibility in this case may, in certain cases, even be of both entities.<br>• In the case of supplies through the Low Voltage network, when interruption is ongoing, EDP Distribuição analyzes the possibility of installing a generator in the Transformer Station corresponding to the Low Voltage supply. The speed of response depends on the effectiveness of monitoring by electronic communication companies;<br>• It is intended that in a disrupted situation, electronic communications companies are able to access a Client Manager to ascertain the status of network restoration and to express any possible need for a backup supply. |

# IMPLEMENTATION OF STANDBY OR EMERGENCY POWER AT SITES;

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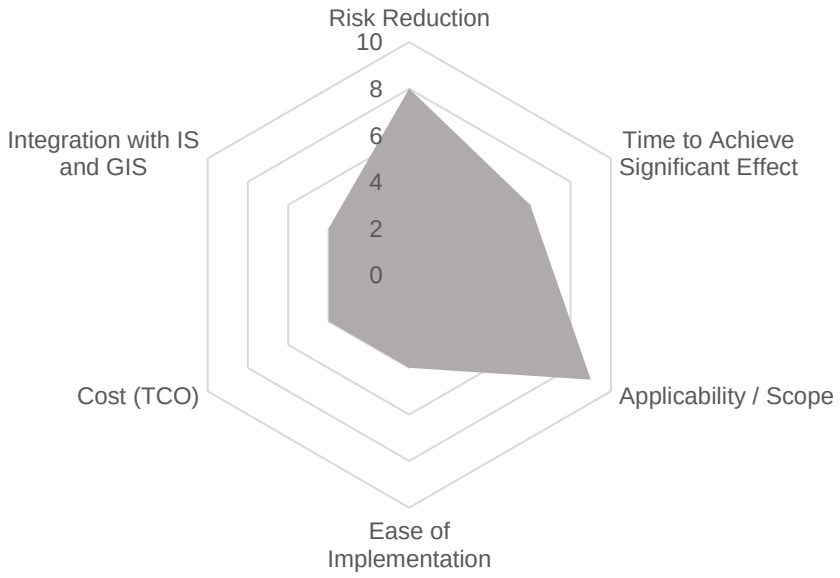
|---|---|
| **Measure number** | 16/2018 |
| **Type of Measure** | Energy |
| **Description of measure** | Preparation of a technical specification for the implementation of standby power solutions (e.g. batteries) and backup power (e.g. generator group) with possible equipment sharing. |
| **Indicator graph** |  |

| | | |
|---|---|---|
| **Effectiveness/ Effects** | Short term | • Effective in the short term.<br>• By characterising sites and solutions already implemented;<br>• Installation of generators at critical points in the network and with sufficient autonomy. |
| | Medium term | Similar to short term. |
| | Long term | Similar to short term. |
| | Risk Reduction Indicator<br>(1- smallest reduction, 10 largest reduction) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☒ 9 ☐ 10 ☐ |
| | Time to Achieve Significant Effect Indicator<br>(1- long-term effect, 10- immediate effect) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☒ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

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| **Type of Measure** | Preventive<br>(Before the Incident) | Yes. |
| | Detection and Response<br>(During the Incident) | • Direct contact with the energy supplier, for ETR (Estimated Time to Repair) sharing; |

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|---|---|---|
| | | • Moving of the mobile emergency generator in cases where no such solution is already installed.<br>• In cases where there are generators are installed, ensure monitoring of diesel reserves during operation;<br>• Prioritise consumption inside the room of non-priority equipment, depending on the level of battery charge or the generator. This significantly increase the autonomy of the room when in self-recovery mode. |
| | Mitigation and Recovery (After the Incident) | Yes. |

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|---|---|---|
| **Applicability / Scope** | Natural disasters other than fires (e.g. earthquake, tsunami, cyclone, flood, tornado, volcanic eruption, landslide, etc.) | Applicable to all types of natural disasters. |
| | Applicability / Scope Indicator (1-only fires, 10- ≥ 5 ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☒ 10 ☐ |

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|---|---|---|
| **Implementation** | Intervening entities | • Electronic communications companies;<br>• Power supplier;<br>• Entities holding pools of mobile generators and stored usable fuel;<br>• Suppliers of regional fuels;<br>• Government;<br>• Assembleia da República (Assembly of the Republic). |
| | The role of ANACOM | • Promote implementation of the measure;<br>• To promote, with the Government and Assembleia da República (Assembly of the Republic), the need to revise the penal framework, in particular the introduction of more serious penalties for theft and vandalism of batteries, fuel and generators in electronic communications infrastructure. |
| | Identification of Barriers | • Theft of batteries, fuel and generators;<br>• Increased CAPEX and OPEX costs. |
| | Ease of Implementation Indicator (1 - lesser ease, 10 - greater ease) | 1 ☐ 2 ☐ 3 ☐ 4 ☒ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Costs, value and type (TCO) | • Acquisition and maintenance costs: equipment, batteries and generators;<br>• Costs of fuel purchases. |
| | Cost Indicator (TCO) (1-Maximum cost, 10- no cost ) | 1 ☐ 2 ☐ 3 ☐ 4 ☒ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

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|---|---|---|
| | Identification of Incentives | • Facilitation in the licensing of fuel generators and tanks;<br>• Lower costs for fuel used in these power providers in emergency situations (as is the case for agricultural diesel);<br>• Financial incentives (national or Community) for the installation of renewable energy systems (solar and/or wind turbines). |
| | Recurrence / Periodicity | Not applicable. |
| | Actions to be developed and timeline | • ANACOM and electronic communications companies: Preparation of a technical specification for the implementation of emergency power solutions (e.g. batteries) and backup power (e.g. generator set) with possible equipment-sharing.<br><br>• Electronic communications companies:<br>  ○ Characterisation of sites and solutions already implemented;<br>  ○ Installation of generators at critical points in the network and with sufficient autonomy. |

| | | |
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| **Articulation with IS and GIS** | Description | Identification in GISs of the recovery solutions in the rooms and the estimated levels of autonomy depending on the solution. It should, however, be safeguarded that this is sensitive information which should not be made available outside this framework. |
| | Integration with IS and GIS Indicator<br>(1-low, 10-high) | 1 ☐ 2 ☐ 3 ☐ 4 ☒ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

| | | |
|---|---|---|
| **Legal framework** | Existing | • Law no. 5/2004 of 10 February - Lei das Comunicações Eletrónicas (Electronic Communications Law);<br>• Decree-Law No. 400/82 (Penal Code) of 23 September, and subsequent amendments, especially as implemented by Law no. 16/2018 of 27 March. |
| | To be developed | • To be determined as a result of the actions to be developed. |

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|---|---|
| **Additional study** | No ☒ Yes ☐ What? |

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| **Notes and articulation with other measures** | This measure is based on the following measures:<br>• 17/2018: FUEL RESERVES FOR SITES<br>• 27/2018: MANUAL OF BEST PRACTICES OF SHARED INFRASTRUCTURE. |

# FUEL RESERVES FOR SITES

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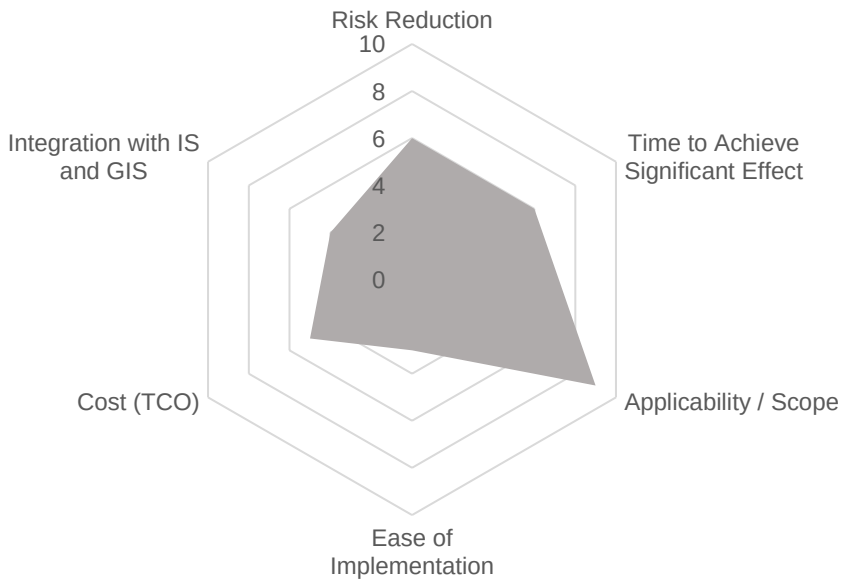
|---|---|
| **Measure number** | 17/2018 |
| **Type of Measure** | Energy |
| **Description of measure** | Reservation, storage and resupply of fuel generator-equipped sites in the event of disaster. The aim of this measure is to plan and establish procedures to ensure fuel supply to stations equipped with emergency standby power solutions (generators). |
| **Indicator graph** |  |

| | | |
|---|---|---|
| **Effectiveness/ Effects** | Short term | • Effective in the short term through the immediate creation of fuel reserves. |
| | Medium term | • Effective in the medium term with enhanced capacity of fuel tanks supplying installed generators. |
| | Long term | Similar to medium term. |
| | Risk Reduction Indicator<br>(1- smallest reduction, 10 largest reduction ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☒ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Time to Achieve Significant Effect Indicator<br>(1- long-term effect, 10- immediate effect ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☒ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

| | | |
|---|---|---|
| **Type of Measure** | Preventive<br>(Before the Incident) | A precautionary measure that requires prior planning. |
| | Detection and Response<br>(During the Incident) | This measure will help ensure the supply of fuel to stations equipped with generators. |
| | Mitigation and Recovery<br>(After the Incident) | No. |

| | | |
|---|---|---|
| **Applicability / Scope** | Natural disasters other than fires (e.g. earthquake, tsunami, cyclone, flood, tornado, volcanic eruption, landslide, etc.) | Applicable to all types of natural disasters. |
| | Applicability / Scope Indicator (1-only fires, 10- ≥ 5) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☒ 10 ☐ |

| | | |
|---|---|---|
| **Implementation** | Intervening entities | • Electronic communications companies;<br>• ANPC;<br>• DGEG;<br>• Municpal Councils;<br>• ANAREC - Associação Nacional de Revendedores de Combustívei (National Fuel Resellers Association). |
| | The role of ANACOM | • Articulation between electronic communications companies, ANPC, DGEG and Municipal Councils to establish a plan for the reservation, storage and fuelling of the sites equipped with generators in the event of a disaster. |
| | Identification of Barriers | • Lack of authorisation for transportation of large quantities of fuel in technical vehicles of the electronic communication companies;<br>• Difficulties in access to sites in emergency situations;<br>• Large number of thefts (fuel, generators and starter batteries). |
| | Ease of Implementation (1 - lesser ease, 10 - greater ease) | 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Costs, value and type (TCO) | • Costs in the acquisition of fuel reserves. |
| | Cost Indicator (TCO) (1-Maximum cost, 10- no cost) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Identification of Incentives | • Access to less expensive fuel (e.g. agricultural diesel). |
| | Recurrence / Periodicity | Non-recurring measure. |
| | Actions to be developed and timeline | 1. ANACOM and DGEG/ANPC: articulation for development of procedures with regard to electronic communications infrastructure;<br>2. Establishment of a plan by ANACOM, DGEG and electronic communications companies that provides for the reservation, storage and fuelling of sites equipped with generators in the event of a disaster.<br>3. Electronic communications companies: implementation of the plan drawn up. |

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| **Articulation with IS and GIS** | Description | Articulation with GISs can be useful in identifying communications stations located in priority zones of intervention and in the planning necessary for the implementation of the measure. It should, however, be safeguarded that this is sensitive information which should not be made available outside this framework. |
| | Integration with IS and GIS (1-low, 10-high ) | 1 ☐ 2 ☐ 3 ☐ 4 ☒ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

| | | |
|---|---|---|
| **Legal framework** | Existing | • Law no. 5/2004 of 10 February - Lei das Comunicações Eletrónicas (Electronic Communications Law);<br>• Law no. 27/2006 - Lei de Bases da Proteção Civil (Basic Civil Protection Law) of 3 July. |
| | To be developed | To be determined as a result of the actions to be developed:<br>• Recommendation of good practices. |

| | |
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| **Additional study** | No ☒ Yes ☐ What? |

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| **Notes and articulation with other measures** | This measure is based on the following measures:<br>• 16/2018: IMPLEMENTATION OF STANDBY OR EMERGENCY POWER AT SITES<br>• 22/2018: SECURITY PERIMETER MANAGEMENT (ACCESS AND GUARD);<br>• 23/2018: INTERSECTORAL PROCEDURES FOR DETECTION, RESPONSE AND MITIGATION<br>• 24/2018: ARTICULATION PROCEDURES BETWEEN AUTHORITIES AND COMPANIES |

# PROTECTION OF SITES AGAINST ATMOSPHERIC DISCHARGES

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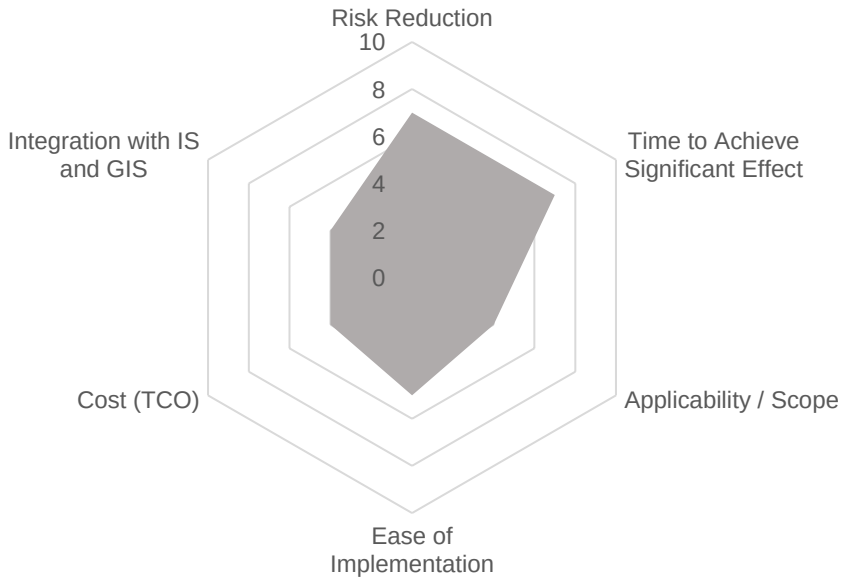
|---|---|
| **Measure number** | 18/2018 |
| **Type of Measure** | Protection |
| **Description of measure** | Preparation of a technical specification for the protection of electronic communications infrastructure from atmospheric and transient discharges, taking into account the technical principles defined by the DGEG Lightning Technical Guide and establishing a specific rule of good practices for electronic communications. |
| **Indicator graph** |  |

| | | |
|---|---|---|
| **Effectiveness/ Effects** | Short term | • No. |
| | Medium term | • Yes, after installation of protection systems. |
| | Long term | Similar to medium term. |
| | Risk Reduction Indicator<br>(1- smallest reduction, 10 largest reduction ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☒ 8 ☐ 9 ☐ 10 ☐ |
| | Time to Achieve Significant Effect Indicator<br>(1- long-term effect, 10- immediate effect ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☒ 8 ☐ 9 ☐ 10 ☐ |

| | | |
|---|---|---|
| **Type of Measure** | Preventive<br>(Before the Incident) | Precautionary measure. |
| | Detection and Response<br>(During the Incident) | No. |
| | Mitigation and Recovery<br>(After the Incident) | No. |

| | | |
|---|---|---|
| **Applicability / Scope** | Natural disasters other than fires (e.g. earthquake, tsunami, cyclone, flood, tornado, volcanic eruption, landslide, etc.) | This measure covers various types of natural disasters. |
| | Applicability / Scope Indicator (1-only fires, 10- ≥ 5 ) | 1 ☐ 2 ☐ 3 ☐ 4 ☒ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

| | | |
|---|---|---|
| **Implementation** | Intervening entities | • Electronic communications companies;<br>• Installers;<br>• Ordem dos Engenheiros (Order of Engineers). |
| | The role of ANACOM | • Promotion of the measure. |
| | Identification of Barriers | • Theft of copper from sites;<br>• Lack of periodic preventive maintenance. |
| | Ease of Implementation Indicator (1 - lesser ease, 10 - greater ease) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Costs, value and type (TCO) | Not significant. |
| | Cost Indicator (TCO) (1-Maximum cost, 10- no cost) | 1 ☐ 2 ☐ 3 ☐ 4 ☒ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Identification of Incentives | Not applicable. |
| | Recurrence / Periodicity | This measure requires periodic maintenance. |
| | Actions to be developed and timeline | Electronic communications companies/ANACOM :<br>• Survey of the technical characteristics of the integrated systems used by companies protecting against network transients and atmospheric discharges;<br>• Identification of good practices for these systems at national and international level;<br>• Development of good practice rule to be used by electronic communications companies and installers, including preventive maintenance and periodic inspection of all parameters of the system of protecting against network transients and atmospheric discharges. |

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| **Articulation with IS and GIS** | Description | Articulation with GIS may be useful in the planning necessary for the implementation of the measure. |
| | Integration with IS and GIS (1-low, 10-high) | 1 ☐ 2 ☐ 3 ☐ 4 ☒ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

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|---|---|---|
| **Legal framework** | Existing | • Law no. 5/2004 of 10 February - Lei das Comunicações Eletrónicas; (Electronic Communications Law); |
| | To be developed | No. |

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| **Additional study** | No ☒ Yes ☐ What? |

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| **Notes and articulation with other measures** | |

# INSTALLATION OF SENSORS AT SITES

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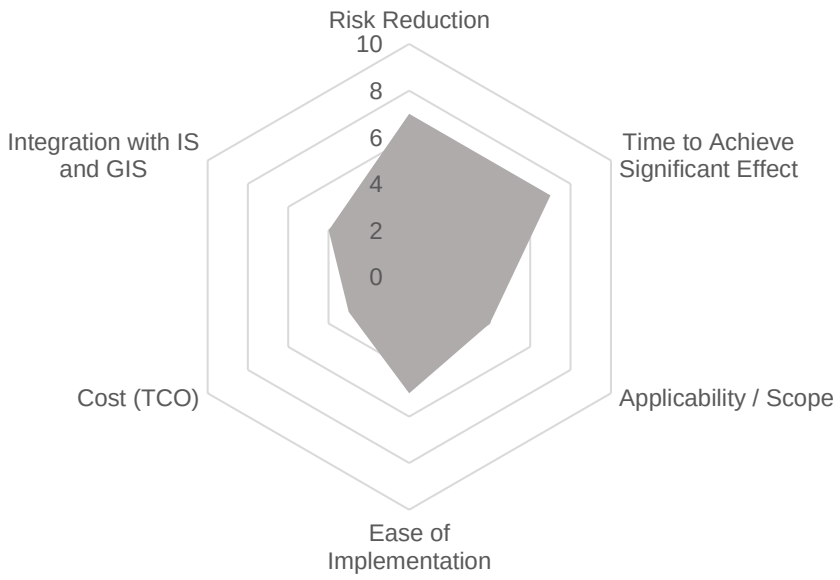
|---|---|
| **Measure number** | 19/2018 |
| **Type of Measure** | Protection |
| **Description of measure** | Establishment of conditions for the installation of an automatic fire detection system in the vicinity of sites and subsequent issuance of warning to the competent authorities. |
| **Indicator graph** |  |

| | | |
|---|---|---|
| **Effectiveness/ Effects** | Short term | • Effective in the short term with the installation of thermal cameras (thermographic recording capacity), anemometers and other sensors;<br>• Improved detection and response to forest fires occurring in proximity to sites. |
| | Medium term | • Yes. |
| | Long term | • Yes. |
| | Risk Reduction Indicator<br>(1- smallest reduction, 10 largest reduction) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☒ 8 ☐ 9 ☐ 10 ☐ |
| | Time to Achieve Significant Effect Indicator<br>(1- long-term effect, 10- immediate effect) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☒ 8 ☐ 9 ☐ 10 ☐ |

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| **Type of Measure** | Preventive<br>(Before the Incident) | Preventive measure. |
| | Detection and Response<br>(During the Incident) | • This measure makes it possible to detect forest fires more quickly; |

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| | | • It also allows monitoring of the progress of fire fronts by authorities involved in tackling them and sends alerts to other entities (such as electronic communications companies and electricity supply companies). |
| | Mitigation and Recovery (After the Incident) | No. |

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| **Applicability / Scope** | Natural disasters other than fires (e.g. earthquake, tsunami, cyclone, flood, tornado, volcanic eruption, landslide, etc.) | Applicable to all types of natural disasters. |
| | Applicability / Scope Indicator (1-only fires, 10- ≥ 5 ) | 1 ☐ 2 ☐ 3 ☐ 4 ☒ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

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|---|---|---|
| **Implementation** | Intervening entities | • Electronic communications companies;<br>• MAI;<br>• IPMA. |
| | The role of ANACOM | • Articulation with MAI and IPMA to analyse and confirm interest in the implementation of this system. |
| | Identification of Barriers | • Cost associated with system installation. |
| | Ease of Implementation Indicator (1 - lesser ease, 10 - greater ease) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☒ |
| | Costs, value and type (TCO) | • The system must be supported by the competent authorities. |
| | Cost Indicator (TCO) (1-Maximum cost, 10- no cost) | 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Identification of Incentives | • Send electronic communications companies reports of verified ignitions and geographic coordinates;<br>• In the occurrence of larger events, alerts on the progress of fire fronts;<br>• Provision by electronic communications companies, of the infrastructure (e.g. towers) and energy for the operation of the system. |
| | Recurrence / Periodicity | Non-recurring measure. |
| | Actions to be developed and timeline | 1. ANACOM: Articulation with MAI and IPMA to analyse and confirm interest in the implementation of this system;<br>2. ANACOM, electronic communications companies and competent entities: analysis and elaboration of a technical specification of the functionalities and architecture of the system to be implemented, as well as identification of the |

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| | | intervening entities and of their articulation for the purpose of operating the system. |

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| **Articulation with IS and GIS** | Description | Articulation with GISs may be useful in the planning necessary for implementation of the measure. It should, however, be safeguarded that this is sensitive information which should not be made available outside this framework. |
| | Integration with IS and GIS Indicator<br>(1-low, 10-high ) | 1 ☐ 2 ☐ 3 ☐ 4 ☒ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

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| **Legal framework** | Existing | Not applicable. |
| | To be developed | Not applicable. |

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| **Additional study** | No ☒ Yes ☐ What? |

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| **Notes and articulation with other measures** | Notes:<br>• This measure entails:<br>  ○ Analysis of the use of environmental and security sensors for real-time data collection and possible launch of "early warning" alerts by detection of fire outbreaks in proximity to sites;<br>  ○ Creation of an Automatic Forest Fire Detection System, to be installed in existing and/or new infrastructure, such as for example communications towers, surveillance towers, wind farms, water tanks, etc.;<br>  ○ The system would be composed of a rotating base to affix thermal sensors. The system would have an approximate range of up to 15 km, and would conduct 360° horizontal scanning and vertical scanning with adjustable and programmable tilts. |

# ARTICULATION WITH MUNICIPAL EMERGENCY CIVIL PROTECTION PLANS AND FOREST FIRE DEFENCE PLANS (INCLUDING COMMUNICATIONS STATIONS)

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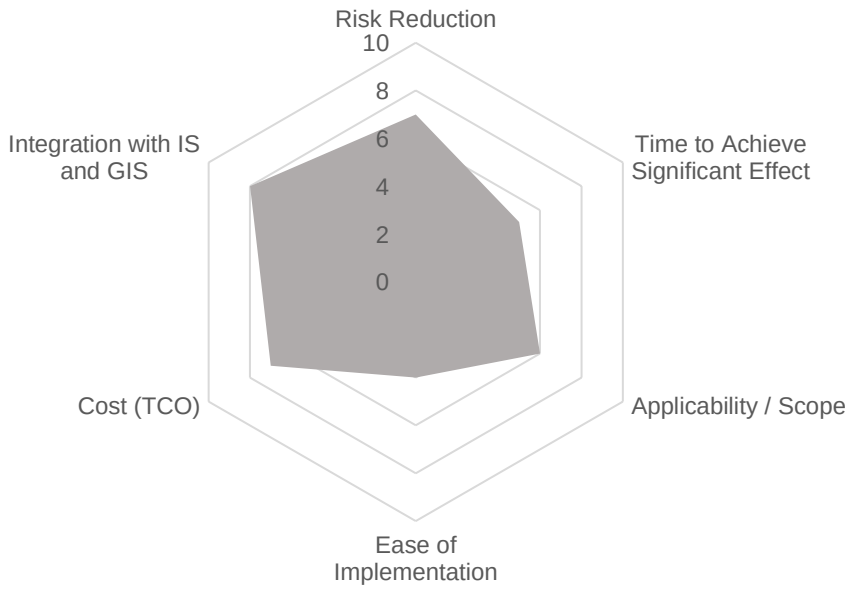
| **Measure number** | 20/2018 |
| **Type of Measure** | PROCEDURES |
| **Description of measure** | Articulation with ANPC in order to establish a procedure for the approval and revision of municipal civil protection emergency plans (PMEPC) and forest fire protection plans (PMDFCI) for areas with highest levels of forest fire hazard (high and very high) to ensure the improvement of the protection of electronic communications infrastructure comprising infrastructure of operational relevance necessary to ensure essential services in case of emergencies arising from forest fires:<br>• Identification of electronic communications companies with electronic communications infrastructure in the municipality (via SIIS);<br>• Establishment of harmonised criteria to characterise infrastructure of operational relevance necessary to ensure essential services in case of emergencies arising from forest fires (ANMP, ANPC, ICNF);<br>• Application of criteria established for the identification of infrastructure of operational relevance (by the Municipality);<br>• Identification of electronic communications infrastructure located in areas of high forest fire hazard in order to give priority to protecting such infrastructure and so ensuring continuity of essential services in the event of forest fires (by electronic communications companies);<br>• Establishment of contact points at municipal authorities and electronic communications companies to be used in case of forest fires (by the Municipality and by the Electronic Communications Companies). |
| **Indicator graph** |  |

| | | |
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| **Effectiveness/ Effects** | Short term | • So that Civil Protection structures commanding and coordinating fire-fighting forces know which communications infrastructure they should protect as a priority during (e.g. priority access to the site, logistic resources of air/ground |

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| | | transportation of equipment, if necessary) and after (e.g. improvement of preventive action plan) the incident. |
| | Medium term | • Improved implementation of municipal emergency civil protection plans and forest fire defence plans as regards electronic communications infrastructure.<br>• Enhanced continuity in the operation of electronic communications networks and services, with a view to reducing impact on users, in particular by minimising interruption to service in case of serious occurrences (including interruption to resources used by Civil Protection itself in coordinating firefighting actions) reducing security breaches and losses of integrity caused by natural disaster or other cause. |
| | Long term | • Reinforcement / identical to Medium Term. |
| | Risk Reduction Indicator<br>(1- smallest reduction, 10 largest reduction) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☒ 8 ☐ 9 ☐ 10 ☐ |
| | Time to Achieve Significant Effect Indicator<br>(1- long-term effect, 10- immediate effect) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

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| **Type of Measure** | Preventive<br>(Before the Incident) | • Yes |
| | Detection and Response<br>(During the Incident) | • Yes |
| | Mitigation and Recovery<br>(After the Incident) | • Yes |

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| **Applicability/ Scope** | Natural disasters other than fires (e.g. earthquake, tsunami, cyclone, flood, tornado, volcanic eruption, landslide, pandemics, etc.) | • Yes |
| | Applicability / Scope Indicator<br>(1-fires only, 10- ≥ 5 scenarios with applicability ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☒ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

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| **Implementation** | Intervening entities | • Municipalities, electronic communications and energy companies and entities in possession of suitable infrastructure in each municipality, ANMP, ANPC - Autoridade Nacional de Proteção Civil (National Authority for Civil Protection), MAI (police, fire service), ICNF. |

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| | The role of ANACOM | • Articulation with ANPC and between each Municipal Council and electronic communications companies or other entities in possession of infrastructure in the municipality.<br>• Ensure the establishment of contact points between electronic communications operators and the various entities involved. |
| | Identification of Barriers | • High number of municipalities (308) and their geographical dispersion. Lack of harmonised municipal procedures at national level.<br>• The need for constant updating of components, in line with the updating of PME - Plano Municipal de Emergência (Municipal Emergency Plans) and the development of the networks of electronic communications operators.<br>• Necessary to ensure compliance with the security requirements as regards information on this infrastructure, in particular for access to information and for its dissemination. |
| | Ease of Implementation Indicator<br>(1 - lesser ease, 10 - greater ease ) | 1 ☐ 2 ☐ 3 ☐ 4 ☒ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Costs, value and type (TCO) | • Administrative and logistical costs.<br>• Where it is considered necessary to adapt infrastructure and systems or create redundancy, this must be undertaken as part of the commercial relations between the Municipalities and electronic communications companies, since costs may be significant. |
| | Cost Indicator (TCO)<br>(1-Maximum cost, 10- no cost ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☒ 8 ☐ 9 ☐ 10 ☐ |
| | Identification of Incentives | • Development and approval of methodology by ANPC and ICNF.<br>• Speed in the updating and digital scanning of Risk Maps. |
| | Recurrence / Periodicity | Yes, in line with the updating of municipal plans. |
| | Actions to be developed and timeline | • Articulation between ANACOM and ANPC to update the technical guidelines supporting preparation of civil protection emergency plans, pursuant to paragraph 8 of article 5. of the Annex to CNPC Resolution no. 30/2015 with respect to electronic communications infrastructure.<br>• Articulation between ANACOM and the ICNF to analyse the updating of municipal plans for the protection of forests against fire in respect of electronic communications infrastructure. |

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| **Articulation with IS and GIS** | Description | • Evaluate whether the measure can be supported by development of the SIIS (Suitable Infrastructure Information System) in terms of registered objects metadata, with incorporation of new attributes, including for the transfer of this layer of information to the ANPC platform. |

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| | | • Alternatively, evaluate the development of an autonomous interface with ANPC.<br>• Likewise, with ICNF.<br>• Safeguard, in any case, the confidentiality of the information given its critical nature. |
| | Integration with IS and GIS<br>(1-low, 10-high) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☒ 9 ☐ 10 ☐ |

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|---|---|---|
| **Legal framework** | Existing | • Law no. 27/2006 - Lei de Bases da Proteção Civil (Basic Civil Protection Law) of 3 July;<br>• Resolution no. 30/2015 of 5 December 2014 published in *Diário da República* (Official Journal), 2nd series - no. 88 – of 7 May 2015;<br>• Decree-Law no. 124/2006 of 28 June, amended and republished by Law no. 76/2017 of 17 August (measures and actions to be pursued within the scope of the National Forest Fire Protection System);<br>• Order no. 443-A /2018 of 5 January, published in *Diário da República* (Official Journal), 2nd series, of 9 January;<br>• Order no. 1222-B/2018 of 1 February, published in *Diário da República* (Official Journal), 2nd series, of 2 February ;<br>• Decree-Law no. 123/2009 (legal regime governing the construction of infrastructure suitable for carrying electronic communications networks, the installation of electronic communications networks and the construction of telecommunications infrastructure in housing developments, urban settlements and concentrations of buildings) of 21 May. |
| | To be developed | • To be determined as a result of the articulation to be developed between ANACOM and ANPC, as well as with ICNF. |

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| **Additional study** | No ☐ Yes ☒ What? Information Systems to be used and/or developed. |

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| **Notes and articulation with other measures** | • For this infrastructure, priority should also be given to the restoration of electricity (alignment with 14/2018).<br>• Implementation of this measure depends on the completion of 21/2018 (Updating and digital scanning of risk maps for each of the major causes of natural disaster). |

# PREPARATION OF RISK MAPS

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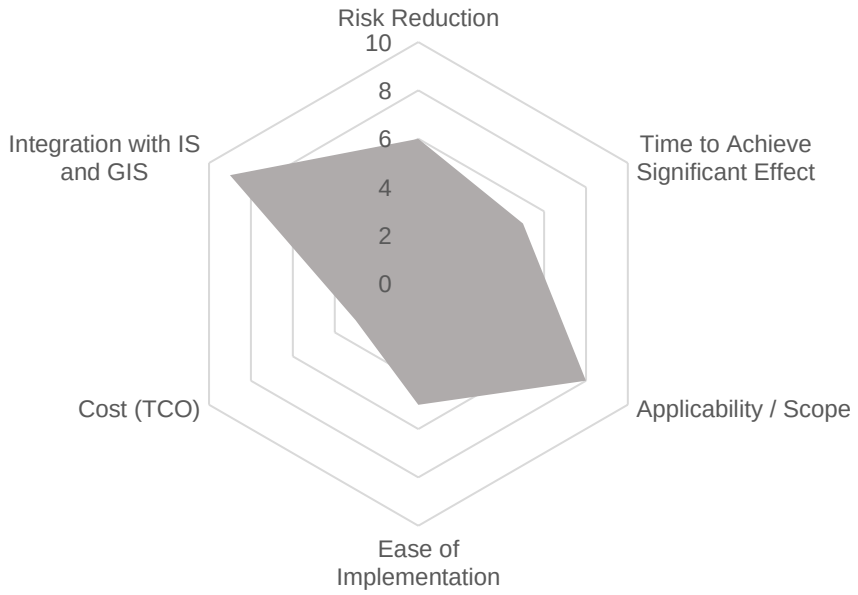
|---|---|
| **Measure number** | 21/2018 |
| **Type of Measure** | PROCEDURES |
| **Description of measure** | Execution and integration of risk maps for each of the main causes of natural disasters, in addition to those related to forest fires, and their updating. Harmonisation of these maps by ANPC should be made available in digital, geo-referenced format and enable visualization in a geographical form, if possible with the format already used by the ICNF for risk mapping |
| **Indicator graph** |  |

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| **Effectiveness/ Effects** | Short term | • Enables implementation of measure 20/2018 (Identifying electronic communications infrastructure in areas with highest levels of hazard).<br>• Adequacy of infrastructure protection measures. |
| | Medium term | • In the medium and long term, the existence of these risk maps could be a factor in helping to better plan the networks, as well as in the adoption of protection measures that are most appropriate to the location of the installation. |
| | Long term | • Allows complete classification of a given area according to all existing risks.<br>• In this context, these risk maps could be a factor in helping to improve network planning and for the adoption of protection measures most appropriate to the installation site.<br>• Risk maps may assist in ensuring that measures to protect electronic communications infrastructure are in line with estimated trends in climate change impact. |
| | Risk Reduction Indicator<br>(1- smallest reduction, 10 largest reduction ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☒ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

| | | |
|---|---|---|
| | Time to Achieve Significant Effect Indicator<br>(1- long-term effect, 10- immediate effect) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

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|---|---|---|
| **Type of Measure** | Preventive<br>(Before the Incident) | • In terms iof direct impact, measure essentially preventive;<br>• Contingency processes can be adjusted to the new scale of integrated risk. |
| | Detection and Response<br>(During the Incident) | • In terms of indirect impact, risk maps allow the adoption of detection and response measures. |
| | Mitigation and Recovery<br>(After the Incident) | • In terms of indirect impact, risk maps allow the adoption of mitigation and recovery measures. |

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|---|---|---|
| **Applicability/ Scope** | Natural disasters other than fires (e.g. earthquake, tsunami, cyclone, flood, tornado, volcanic eruption, landslide, pandemics, etc.) | • This measure covers various types of natural disasters. |
| | Applicability / Scope Indicator<br>(1-fires only, 10- ≥ 5 scenarios with applicability) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☒ 9 ☐ 10 ☐ |

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|---|---|---|
| **Implementation** | Intervening entities | • ANPC (coordinator of this measure), ICNF, IPMA, APA, DG Território, Municipal Councils, user companies and entities in possession of infrastructure in the electronic communications, energy and transport sectors. |
| | The role of ANACOM | • Articulation with ANPC for the preparation of risk mapping for each of the principal natural disaster causes, in addition to those related to forest fires, if possible with the format already used by ICNF for risk mapping |
| | Identification of Barriers | • In terms of obtaining information - Lack of risk information by cause of natural disaster.<br>• In terms of information integration - Lack of harmonisation and interoperability of existing information.<br>• Technical complexity of data normalisation indexed to geographical references.<br>• Involvement and coordination of different entities responsible for the production of information |
| | Ease of Implementation Indicator<br>(1 - lesser ease, 10 - greater ease ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Costs, value and type (TCO) | • Possible need to upgrade existing information systems in order to ensure interoperability. |
| | Cost Indicator (TCO)<br>(1-Maximum cost, 10- no cost ) | 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

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|---|---|---|
| | Identification of Incentives | • Articulation with PNPOT - Programa Nacional de Planeamento e Ordenamento do Território (National Program for Territorial Planning and Management). |
| | Recurrence / Periodicity | • Update every three years. |
| | Actions to be developed and timeline | • Entities should apply to ANPC for access to current risk mapping in the national risk assessment in vector format.<br>• Articulation between ANACOM and ANPC to update the technical guidelines supporting preparation of risk maps (based on the example of formats made available by ICNF, http://www2.icnf.pt/portal/florestas/dfci/inc/cartografia/freg-prioritarias-interv-dfci-2018). |

| | | |
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| **Articulation with IS and GIS** | Description | • Yes. A measure that can be automated using GIS - SIIS can support its availability. |
| | Integration with IS and GIS Indicator<br>(1-low, 10-high) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☒ 10 ☐ |

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| **Legal framework** | Existing | • Decree-Law no. 73/2013 of 31May - Lei Orgânica da Autoridade Nacional de Proteção Civil (Organic Law of the National Civil Protection Authority).<br>• Decree-Law no. 123/2009 (legal regime governing the construction of infrastructure suitable for carrying electronic communications networks, the installation of electronic communications networks and the construction of telecommunications infrastructure in housing developments, urban settlements and concentrations of buildings ) of 21 May.<br>• Decree-Law no. 380/99 (legal regime governing territorial management instruments) of 22 September. |
| | To be developed | • To be determined, *inter alia*, as a result of developing articulation between ANACOM and ANPC and the need to make use of the SIIS (Suitable Infrastructure Information System). |

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| **Additional study** | No ☒ Yes ☐ What? |

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| **Notes and articulation with other measures** | • ANPC - National Risk Assessment:<br>http://www.prociv.pt/bk/RISCOSPREV/AVALIACAONACIONALRISCO/Documents/2016_Avaliacao_Nacional_Riscos.pdf<br>• Articulation with measure 20/2018. |

# SECURITY PERIMETER MANAGEMENT (ACCESS AND GUARD);

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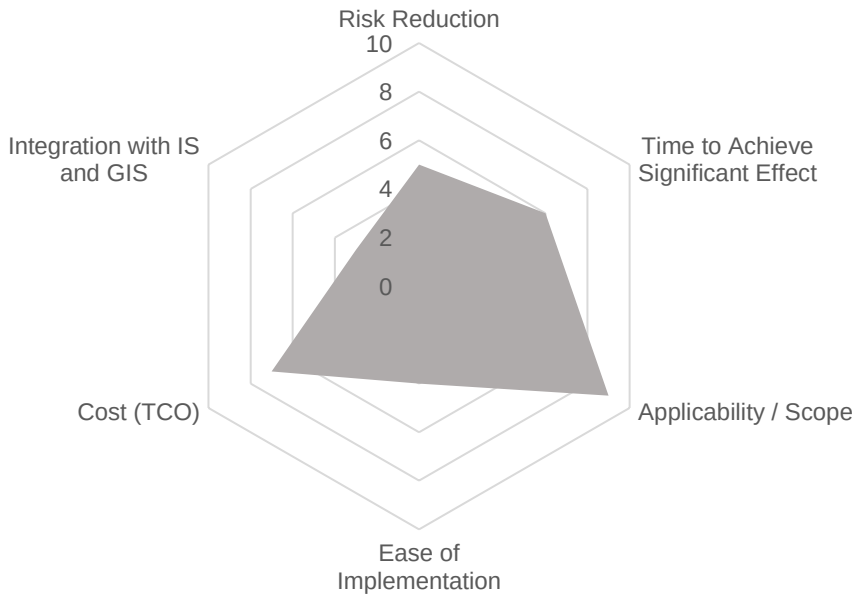
| **Measure number** | 22/2018 |
| **Type of Measure** | PROCEDURES |
| **Description of measure** | • Establish a procedure that makes it possible for Electronic Communications companies to ascertain the security areas established within the scope of occurrences of forest fires as well as the moment at which this access becomes permitted.<br>• Establish a coordination procedure between Electronic Communications companies and ANPC and authorities with civil protection responsibility to authorise access to the infrastructure of these companies where located within restricted access areas, with accompaniment of civil protection agents in risk scenarios, including the appropriate training of personnel comprising company disaster response teams.<br>• Establish contact points between Electronic Communications companies and ANPC and the authorities with civil protection responsibility for this purpose.<br>• Articulation and integration between municipal, district, regional and national emergency civil protection plans. |
| **Indicator graph** |  |

| | | |
|---|---|---|
| **Effectiveness/ Effects** | Short term | • Reduction in time taken to assign technical teams and in time taken to restore operation of infrastructure of electronic communications networks and services affected by the impacts of the fires.<br>• Enhanced continuity in the operation of electronic communications networks and services, with a view to reducing the impact on users resulting from security breaches and losses of integrity caused by natural disaster or other cause. |
| | Medium term | • As Short Term. |
| | Long term | • As Short Term. |

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| | Risk Reduction Indicator<br>(1- smallest reduction, 10 largest reduction ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Time to Achieve Significant Effect Indicator<br>(1- long-term effect, 10- immediate effect ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☒ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

| | | |
|---|---|---|
| **Type of Measure** | Preventive<br>(Before the Incident) | • No |
| | Detection and Response<br>(During the Incident) | • Yes (sometimes necessary to check the status of infrastructure during incidents).<br>• Depends on incident and degree of severity.<br>• Enables an update of the type of occurrence and articulation with local organisations for access to infrastructure. |
| | Mitigation and Recovery<br>(After the Incident) | • Yes, enables minimisation of service recovery times. |

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|---|---|---|
| **Applicability/ Scope** | Natural disasters other than fires (e.g. earthquake, tsunami, cyclone, flood, tornado, volcanic eruption, landslide, etc.) | • Yes |
| | Applicability / Scope Indicator<br>(1-fires only, 10- ≥ 5 scenarios with applicability ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☒ 10 ☐ |

| | | |
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| **Implementation** | Intervening entities | • ANPC - Autoridade Nacional de Proteção Civil (National Civil Protection Authority), Municipal Councils and other authorities with responsibility for civil protection, Electronic Communications companies, energy companies, transport companies and other companies with suitable infrastructure in each municipality. |
| | The role of ANACOM | • Articulation between ANACOM and ANPC and with authorities with civil protection responsibilities<br>• Promotion of articulation between each authority responsible for emergency planning and electronic communications companies and other entities with infrastructure in affected geographical areas.<br>• Promotion of the measure among the entities involved. |
| | Identification of Barriers | • Ensure that this access is provided while guaranteeing the safety of personnel and goods.<br>• Inadequacy of emergency plans<br>• Scalability of the measure, whereby the criteria of prioritisation must be well defined.<br>• Availability of civil protection authorities to monitor the technicians of electronic commutations companies in scenarios of some risk. |

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| | Ease of Implementation Indicator<br>(1 - lesser ease, 10 - greater ease ) | 1 ☐ 2 ☐ 3 ☐ 4 ☒ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Costs, value and type (TCO) | • No additional costs are identified, since field teams are already ready to intervene in cases where secure access to infrastructure is guaranteed, except in the assignment of resources by civil protection authorities to monitor technicians of electronic commutations companies in scenarios of some risk. |
| | Cost Indicator (TCO)<br>(1-Maximum cost, 10- no cost ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☒ 8 ☐ 9 ☐ 10 ☐ |
| | Identification of Incentives | • Development and approval of methodology by CNPC - Comissão Nacional de Proteção Civil (National Civil Protection Commission) at the level of SIOPS - Sistema Integrado de Operações de Proteção e Socorro (Integrated System of Protection and Relief Operations) and at the level of emergency plans |
| | Recurrence / Periodicity | • Review every three years. |
| | Actions to be developed and timeline | 1. Articulation between ANACOM and ANPC for the development of procedures with regard to electronic communications infrastructure;<br>2. Provision of a list of contacts to be used by electronic communications companies and their partners in disaster scenarios to obtain authorisations and/or information related to the disaster and to facilitate management and mobilization of resources on the ground;<br>3. Simulation of a disaster scenario involving the entities identified in this measure, providing an understanding of how to undertake coordination and to gauge points of improvement. List ways to address these points. |

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|---|---|---|
| **Articulation with IS and GIS** | Description | • To be evaluated |
| | Integration with IS and GIS<br>(1-low, 10-high) | 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

| | | |
|---|---|---|
| **Legal framework** | Existing | • Law no. 27/2006 - Lei de Bases da Proteção Civil (Basic Civil Protection Law) of 3 July;<br>LCE |
| | To be developed | • To be determined as a result of the actions to be developed: |

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|---|---|
| **Additional study** | No ☐ Yes ☒ What? |

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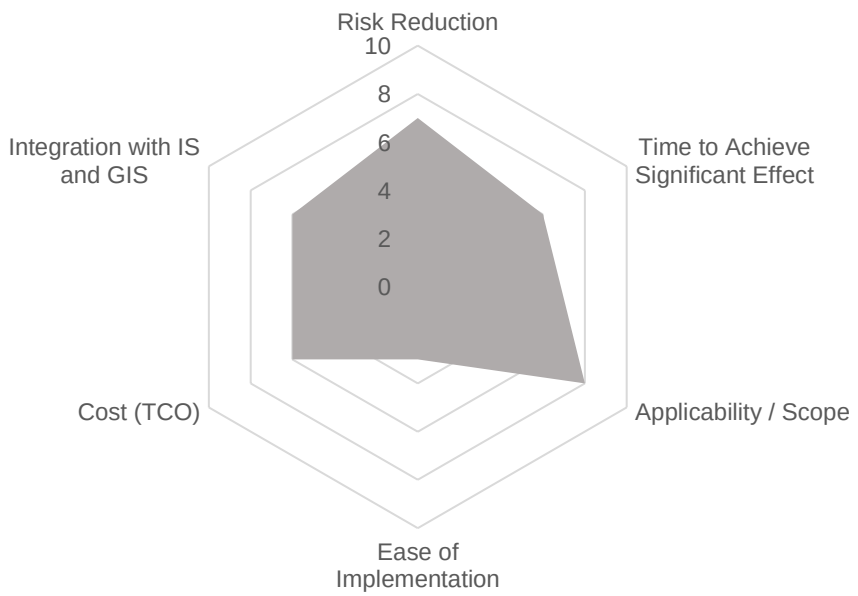
| **Notes and articulation with other measures** | • Alignment with measure 24/2018. |

# INTERSECTORAL PROCEDURES FOR DETECTION, RESPONSE AND MITIGATION

| | |
|---|---|
| **Measure number** | 23/2018 |
| **Type of Measure** | PROCEDURES |
| **Description of measure** | Establish procedures for cooperation, including exchange of information, between Electronic Communications companies and companies in energy sectors for the purpose of improving effectiveness in forest fire detection, response, mitigation and impact recovery:<br>• Establishment of cooperation protocols designed to promote communication and coordination between operators (electricity and telecommunications) in order to ensure the rapid restoration of services in fires and other natural disaster scenarios;<br>• Establishment of prioritisation procedures to restore provision of electronic communications and electricity services and for fuel supply;<br>• Establishment of information sharing procedures and means of contact to ensure efficient and coordinated action by operators (electricity networks and electronic communications). |
| **Indicator graph** |  |

| | | |
|---|---|---|
| **Effectiveness/ Effects** | Short term | • Increased speed with which to recover services supporting populations such as those arising from the proper functioning of electronic communications and energy infrastructure.<br>• Enables a reduction in the risks associated with operations in disaster scenarios. |
| | Medium term | • As Short Term. |
| | Long term | • As Short Term.<br>• The creation of a Coordination/Evaluation Centre for risk prevention/assessment with capacity to manage resources in disaster scenarios enables improved management of resources with a consequent reduction in costs. |
| | Risk Reduction Indicator<br>(1- smallest reduction, 10 largest reduction) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☒ 8 ☐ 9 ☐ 10 ☐ |
| | Time to Achieve Significant Effect Indicator | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☒ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

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|---|---|---|
| | (1- long-term effect, 10- immediate effect ) | |

| | | |
|---|---|---|
| **Type of Measure** | Preventive<br>(Before the Incident) | • Yes |
| | Detection and Response<br>(During the Incident) | • Improve resource management.<br>• Improves channel of communication between the various stakeholders. |
| | Mitigation and Recovery<br>(After the Incident) | • Streamline the recovery of infrastructure and services. |

| | | |
|---|---|---|
| **Applicability/ Scope** | Natural disasters other than fires (e.g. earthquake, tsunami, cyclone, flood, tornado, volcanic eruption, landslide, pandemics, etc.) | • Yes |
| | Applicability / Scope Indicator<br>(1-fires only, 10- ≥ 5 scenarios with applicability ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☒ 9 ☐ 10 ☐ |

| | | |
|---|---|---|
| **Implementation** | Intervening entities | • Electronic communications and energy companies, ERSE - Entidade Reguladora dos Serviços Energéticos (Energy Services Regulatory Authority), DGEG - Direção Geral de Energia e Geologia (Directorate General for Energy and Geology), ANACOM - Autoridade Nacional de Comunicações (National Communications Authority), APRITEL - Associação dos Operadores de Comunicações Eletrónicas (Association of Telecommunications Operators), and transport companies, ANPC - Autoridade Nacional de Proteção Civil (National Civil Protection Authority). |
| | The role of ANACOM | • Promote cooperation between electronic communications companies and energy and transport companies in coordination with ERSE - Entidade Reguladora dos Serviços Energéticos (Energy Services Regulatory Authority), DGEG - Direção Geral de Energia e Geologia (Directorate General for Energy and Geology) and ANPC - Autoridade Nacional de Proteção Civil (National Civil Protection Authority). |
| | Identification of Barriers | • The need to improve coordination between entities in possession of infrastructure in the electronic communications and energy sectors and user companies.<br>• Geographic dispersion.<br>• Electronic communications companies not included as priority customers under Article 103 of Regulamento da Qualidade de Serviço do Setor Elétrico e do Setor do Gás Natural (Quality of Service Regulation for the Electricity Sector and the Natural Gas Sector). |

| | | |
|---|---|---|
| | Ease of Implementation Indicator<br>(1 - lesser ease, 10 - greater ease ) | 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Costs, value and type (TCO) | • Alterations to implemented processes (learning time and adaptation of processes). |
| | Cost Indicator (TCO)<br>(1-Maximum cost, 10- no cost) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☒ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Identification of Incentives | • Reduction in time taken to restore operation of infrastructure of electronic communications networks and services affected, including the services which Energy Companies require to operate their teams on the ground.<br>• Reduction in time taken to restore operation of impacted energy infrastructure |
| | Recurrence / Periodicity | • Review every three years. |
| | Actions to be developed and timeline | • Raise awareness among companies responsible for the supply of electricity and electronic communications services as to the need to provide differential treatment in the restoration of service associated with support infrastructure;<br>• Definition of the prioritisation to be given to this type of infrastructure, and of the treatment to be applied;<br>• Alignment of the points raised in this measure with the working group created by ANACOM, in another scope, to combat the "constraints on the supply of electricity to telecommunications operators". |

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| **Articulation with IS and GIS** | Description | • Yes. A measure that can be based on GIS; SIIS can support its implementation. |
| | Integration with IS and GIS<br>(1-low, 10-high) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☒ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

| | | |
|---|---|---|
| **Legal framework** | Existing | • No |
| | To be developed | • Yes |

| | |
|---|---|
| **Additional study** | No ☒ Yes ☐ What? |

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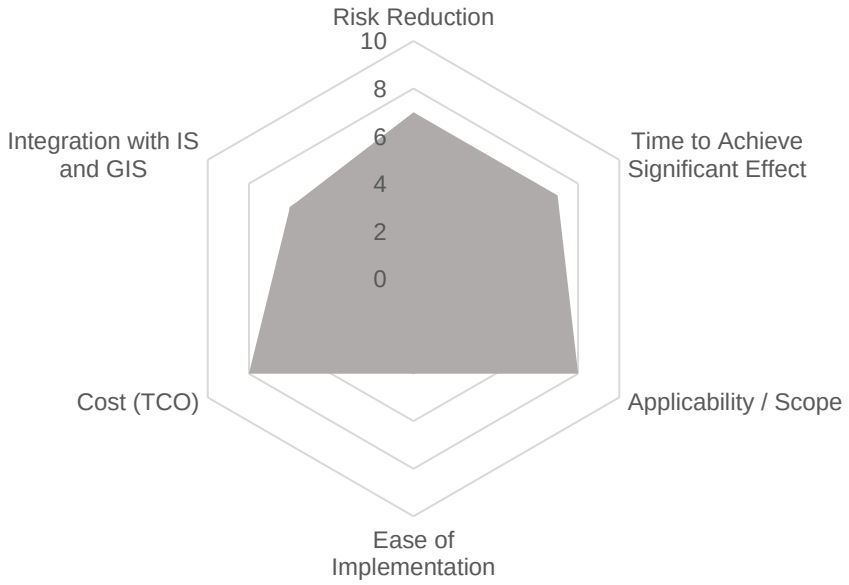
|---|---|
| **Notes and articulation with other measures** | - Alignment with measure 19/2018 (analysis of the use of environmental and security sensors for real-time data collection and possible launch of "early warning" alerts), associated with the availability of space in the infrastructure of SCE providers, so that stakeholders may install systems for risk and natural disaster detection.<br>- Alignment with measure 20/2018: Articulation with municipal emergency civil protection plans and forest fire defence plans) (Include Communications Stations);<br>- Alignment with measure 14/2018: Resilience of Energy on the Sites |

# ARTICULATION PROCEDURES BETWEEN AUTHORITIES AND COMPANIES

| | |
|---|---|
| **Measure number** | 24/2018 |
| **Type of Measure** | PROCEDURES |
| **Description of measure** | Establish articulation procedures between authorities and Electronic Communications companies for purposes arising from forest fires:<br>• Establishment of procedure for provision of information from ANPC to electronic communication companies, through an API, to be agreed on (time line):<br>  ○ Information about active fires,<br>  ○ Information on the state of roadways,<br>  ○ Information on difficulties in accessing telecommunications services for the continuity of critical civil protection services;<br>• Establishment of procedure for information from IPMA to electronic communications companies,<br>• Establishment of procedures for the authorization of access to the fuel reserve for the supply of infrastructure powered by generators in the event of a disaster. |
| **Indicator graph** |  |

| | | |
|---|---|---|
| **Effectiveness/ Effects** | Short term | • Speeding up of response times in restoring services supported by electronic communications infrastructure.<br>• Access to the ANPC time line will enable electronic companies to manage their teams on the ground more efficiently (e.g. blocked roads), mitigate possible impacts on networks/services (for example, which will be affected by the fires), etc.<br>• Access to information on current weather status and forecasting will enable preventive action and improve the management of resources and teams of electronic communications companies, in a format that allows integration with the operators' information systems (e.g., digital streaming).<br>• Improving communication channels will make it easier for companies to respond quickly to incidents. |

| | | |
|---|---|---|
| | | • Raising awareness as to the importance of electronic communications infrastructure will ensure enhanced precaution in terms of their inviolability. |
| | Medium term | • As Short Term. |
| | Long term | • As Short Term. |
| | Risk Reduction Indicator<br>(1- smallest reduction, 10 largest reduction) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☒ 8 ☐ 9 ☐ 10 ☐ |
| | Time to Achieve Significant Effect Indicator<br>(1- long-term effect, 10- immediate effect ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☒ 8 ☐ 9 ☐ 10 ☐ |

| | | |
|---|---|---|
| **Type of Measure** | Preventive<br>(Before the Incident) | • Yes |
| | Detection and Response<br>(During the Incident) | • Yes |
| | Mitigation and Recovery<br>(After the Incident) | • Yes |

| | | |
|---|---|---|
| **Applicability/ Scope** | Natural disasters other than fires (e.g. earthquake, tsunami, cyclone, flood, tornado, volcanic eruption, landslide, pandemics, etc.) | • Yes |
| | Applicability / Scope Indicator<br>(1-fires only, 10- ≥ 5 scenarios with applicability ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☒ 9 ☐ 10 ☐ |

| | | |
|---|---|---|
| **Implementation** | Intervening entities | • ANPC, DGEG, electronic communications companies and IPMA |
| | The role of ANACOM | • Articulation between electronic communications companies, ANPC, DGEG and IPMA. |
| | Identification of Barriers | • None identified |
| | Ease of Implementation Indicator<br>(1 - lesser ease, 10 - greater ease) | 1 ☐ 2 ☐ 3 ☐ 4 ☒ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Costs, value and type (TCO) | • Contract costs. |
| | Cost Indicator (TCO)<br>(1-Maximum cost, 10- no cost) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☒ 9 ☐ 10 ☐ |

| | | |
|---|---|---|
| | Identification of Incentives | • Establishment of a service contract with IPMA for the preparation and dissemination of information which is useful for electronic communications |
| | Recurrence / Periodicity | • Every three years. |
| | Actions to be developed and timeline | • Electronic communications companies - Appointment of liaison officers with ANPC;<br>• ANPC - Indication by ANPC of the information to be disclosed to the liaison officers of electronic communications companies;<br>• DGEG/Municipalities - Indication of procedures and conditions for access to fuel reserves in crisis situations;<br>• ANACOM - Articulation with IPMA to characterise information that is useful to electronic communications companies and the conditions applicable to access and disclosure of this information to electronic communications companies. |

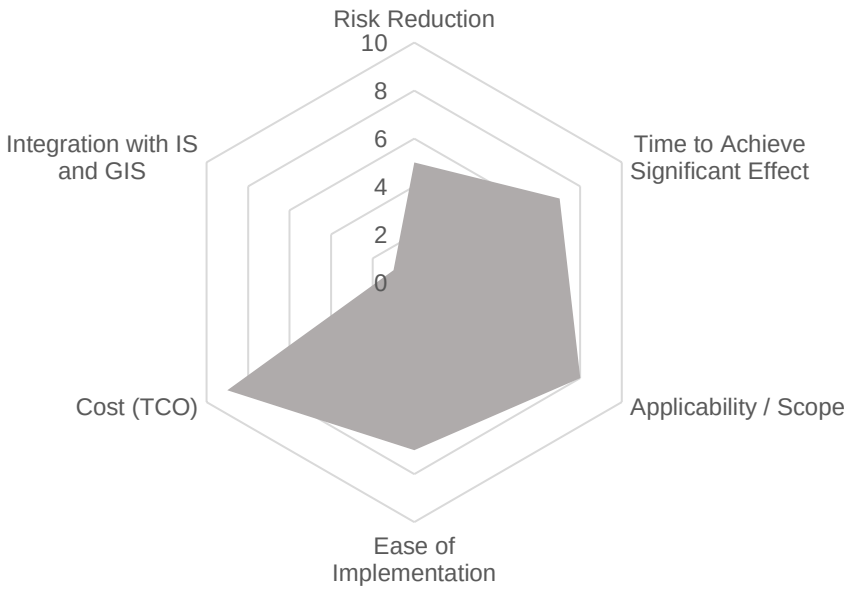
| | | |
|---|---|---|
| **Articulation with IS and GIS** | Description | • Integrate the information to be sent by ANPC with the GIS in order to facilitate the planning of mobilisation routes for teams on the ground, and possibly the planning of alternative transmission redundancy solutions. |
| | Integration with IS and GIS<br>(1-low, 10-high ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☒ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

| | | |
|---|---|---|
| **Legal framework** | Existing | • Law no. 27/2006 - Lei de Bases da Proteção Civil (Basic Civil Protection Law) of 3 July<br>• Decree-Law no. 68/2012 of 20 March |
| | To be developed | • To be determined as a result of the actions to be developed: |

| | |
|---|---|
| **Additional study** | No ☒ Yes ☐ What? |

| | |
|---|---|
| **Notes and articulation with other measures** | • Integrates measure 22/2018.<br>• Alignment with measures 20/2018 and 21/2018. |

# REGULATORY ARTICULATION PROCEDURES
# (ANACOM, ERSE)

| | |
|---|---|
| **Measure number** | 25/2018 |
| **Type of Measure** | PROCEDURES |
| **Description of measure** | Procedures for articulation between sector regulators (ANACOM, ERSE):<br>• Articulation between ERSE and ANACOM at the level of the *Regulamento da Qualidade de Serviço do Setor Elétrico e do Setor do Gás Natural* (Quality of Service Regulation for the Electricity Sector and the Natural Gas Sector) and the future Communications Security Regulations;<br>• Articulation between ERSE, ANACOM and energy and electronic communications companies to establish priority criteria that result in a certain number of sites (i.e. radiocommunication stations) with priority in terms of availability and resilience of networks and services in fire and other natural disaster scenarios, within the scope of the Quality of Service Regulation for the Electricity Sector and the Natural Gas Sector;<br>• Articulation between ERSE and ANACOM in analysis of high impact incidents for both sectors. |
| **Indicator graph** |  |

| | | |
|---|---|---|
| **Effectiveness/ Effects** | Short term | • Yes |
| | Medium term | • Yes |
| | Long term | • Yes |
| | Risk Reduction Indicator<br>(1- smallest reduction, 10 largest reduction ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Time to Achieve Significant Effect Indicator<br>(1- long-term effect, 10- immediate effect ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☒ 8 ☐ 9 ☐ 10 ☐ |

| | | |
|---|---|---|
| **Type of Measure** | Preventive<br>(Before the Incident) | • Yes |
| | Detection and Response<br>(During the Incident) | • Yes |
| | Mitigation and Recovery<br>(After the Incident) | • Yes |

| | | |
|---|---|---|
| **Applicability/ Scope** | Natural disasters other than fires (e.g. earthquake, tsunami, cyclone, flood, tornado, volcanic eruption, landslide, pandemics, etc.) | • Yes |
| | Applicability / Scope Indicator<br>(1-fires only, 10- ≥ 5 scenarios with applicability ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☒ 9 ☐ 10 ☐ |

| | | |
|---|---|---|
| **Implementation** | Intervening entities | • ERSE, DGEG, ANACOM and electronic communications and energy companies |
| | The role of ANACOM | • Articulation with ERSE and DGEG to promote this measure |
| | Identification of Barriers | • Not significant, |
| | Ease of Implementation Indicator<br>(1 - lesser ease, 10 - greater ease ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☒ 8 ☐ 9 ☐ 10 ☐ |
| | Costs, value and type (TCO) | • Not significant |
| | Cost Indicator (TCO)<br>(1-Maximum cost, 10- no cost ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☒ 10 ☐ |
| | Identification of Incentives | • Not significant |
| | Recurrence / Periodicity | • By event or every 3 years |
| | Actions to be developed and timeline | • ANACOM, ERSE and electronic communications companies proceed to the identification of a set of sites (i.e. radiocommunication stations) considered more important in terms of the availability and resilience of the networks and services of electronic communications companies within the scope of the *Regulamento da Qualidade de Serviço do Setor Elétrico e do Setor do Gás Natural* (Quality of Service Regulation for the Electricity Sector and the Natural Gas Sector).<br>• ERSE and ANACOM share information and articulate in the analysis of high impact incidents. |

| | | |
|---|---|---|
| | | • Articulation between ERSE and ANACOM at the level of the *Regulamento da Qualidade de Serviço do Setor Elétrico e do Setor do Gás Natural* (Quality of Service Regulation for the Electricity Sector and the Natural Gas Sector), in particular so that electronic communications companies may be considered providers of critical services, and at the level of the future Regulation on Communications Security |

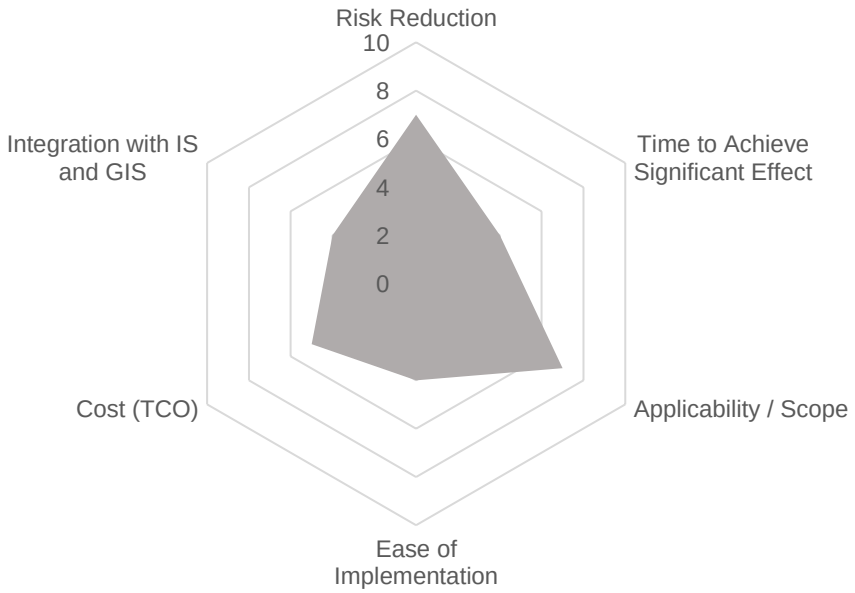
| | | |
|---|---|---|
| **Articulation with IS and GIS** | Description | Not applicable |
| | Integration with IS and GIS Indicator (1-low, 10-high ) | 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

| | | |
|---|---|---|
| **Legal framework** | Existing | • Law no. 5/2004 of 10 February - Lei das Comunicações Eletrónicas (Electronic Communications Law);<br>• Decree-Law no. 215-A/201, of 8 October;<br>• Decree-Law no. 215-B/2012 of 8 October;<br>• ERSE Regulation 3/2017- *Regulamento da Qualidade de Serviço do Setor Elétrico e do Setor do Gás Natural* (Quality of Service Regulation for the Electricity Sector and the Natural Gas Sector) (Articles 103, 104 and 105). |
| | To be developed | • To be determined as a result of the actions to be developed: |

| | |
|---|---|
| **Additional study** | No ☒ Yes ☐ What? |

| | |
|---|---|
| **Notes and articulation with other measures** | Articulates with measure 14/2018: Energy Resilience at Sites.<br>Articulates with measure 23/2018: Intersectoral Procedures for Detection, Response and Mitigation |

# NATIONAL ROAMING

| | |
|---|---|
| **Measure number** | 26/2018 |
| **Type of Measure** | PROCEDURES |
| **Description of measure** | Analysis of requirements and technical solutions for the establishment of a programme to develop an emergency communications plan for national roaming in a disaster situation, for example by using a set of cards. |
| **Indicator graph** |  |

| | | |
|---|---|---|
| **Effectiveness/ Effects** | Short term | • Increase the likelihood that entities with responsibilities in the development of public interest actions in disaster situations retain access to electronic communications services in such situations. |
| | Medium term | • As Short Term. |
| | Long term | • As Short Term. |
| | Risk Reduction Indicator<br>(1- smallest reduction, 10 largest reduction ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☒ 8 ☐ 9 ☐ 10 ☐ |
| | Time to Achieve Significant Effect Indicator<br>(1- long-term effect, 10- immediate effect ) | 1 ☐ 2 ☐ 3 ☐ 4 ☒ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

| | | |
|---|---|---|
| **Type of Measure** | Preventive<br>(Before the Incident) | • No |
| | Detection and Response<br>(During the Incident) | • Yes |

| | | |
|---|---|---|
| | Mitigation and Recovery (After the Incident) | • Yes |

| | | |
|---|---|---|
| **Applicability/ Scope** | Natural disasters other than fires (e.g. earthquake, tsunami, cyclone, flood, tornado, volcanic eruption, landslide, pandemics, etc.) | • Yes |
| | Applicability / Scope Indicator (1-fires only, 10- ≥ 5 scenarios with applicability ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☒ 8 ☐ 9 ☐ 10 ☐ |

| | | |
|---|---|---|
| **Implementation** | Intervening entities | • Electronic communications companies, ANPC/MAI, companies with infrastructure on the ground, other entities with incident response functions |
| | The role of ANACOM | • To analyse and characterise, together with electronic communications companies and MAI/ANPC, the establishment of a plan for the development and implementation of a national roaming solution in cases of disaster. |
| | Identification of Barriers | • Regarding the potential solution of a set of cards: identification of the cards for specific treatment, possible limitations by type of technology and included services.<br>• Other solutions require in-depth study and may have disproportionate impacts on national mobile networks, which may mean altering the network architecture, as well as other constraints, including in terms of capacity of access and core networks to continue operating in the case of a substantial increase in the number of registered users. |
| | Ease of Implementation Indicator (1 - lesser ease, 10 - greater ease) | 1 ☐ 2 ☐ 3 ☐ 4 ☒ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Costs, value and type (TCO) | • Yes |
| | Cost Indicator (TCO) (1-Maximum cost, 10- no cost) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Identification of Incentives | • Identification of funding sources. |
| | Recurrence / Periodicity | • Not applicable |
| | Actions to be developed and timeline | ANACOM/MA/ANPC/Electronic Communications Companies:<br>• Analyse possible solutions and costs;<br>• Assess the real need and opportunity for development of an in-depth study on the requirements and impacts of implementing national or regional roaming;<br>• Choice of technical solution to be adopted; |

| | | |
|---|---|---|
| | | • Establishment of agreements between electronic communications companies, if necessary, and programming of cards and networks;<br>• Establishment of procedures by intervening entities;<br>• … |

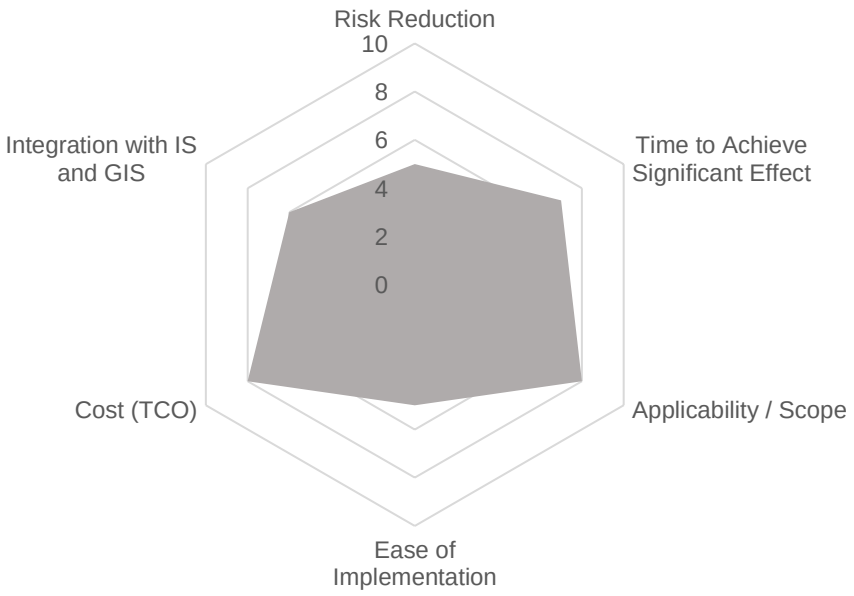
| | | |
|---|---|---|
| **Articulation with IS and GIS** | Description | • May involve programming in the IS of electronic communications companies. |
| | Integration with SI and GIS<br>(1-low, 10-high) | 1 ☐ 2 ☐ 3 ☐ 4 ☒ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

| | | |
|---|---|---|
| **Legal framework** | Existing | • Law no 5/2004 of 10 February - Lei das Comunicações Eletrónicas (Electronic Communications Law) |
| | To be developed | • To be determined as a result of the actions to be developed. |

| | |
|---|---|
| **Additional study** | No ☐ Yes ☒ What? Solution/configuration to be adopted. |

| | |
|---|---|
| **Notes and articulation with other measures** | • This measure is integrated in solutions used in emergency civil protection plans and civil emergency planning |

# MANUAL OF BEST SHARED-INFRASTRUCTURE PRACTICES

| | |
|---|---|
| **Measure number** | 27/2018 |
| **Type of Measure** | PROCEDURES |
| **Description of measure** | Identification and establishment of good practices for joint management of shared infrastructure:<br>• Joint management of shared infrastructure based on existing good practices already implemented among operators, and optimising coordination in recovery interventions.<br>• Installation of mobile network base stations and/or radio transmission infrastructure, for example at the top of water tanks, fire towers, and other municipal/state facilities with similar characteristics, as well as access to electricity supply.<br>• In situations of coverage, sharing of common infrastructure, especially temporary radiant system and power supply infrastructure of Mobile Access Networks between Operators.<br>• Simplified protocols between Operators and other similar entities on sharing sites for the installation of radiant systems (of the affected Operator), as well as access to electricity supply. |
| **Indicator graph** |  |

| | | |
|---|---|---|
| **Effectiveness/ Effects** | Short term | • Reduction in time taken to restore operation of infrastructure of electronic communications networks and services affected by the impacts of the fires or other incidents. |
| | Medium term | • Harmonisation of procedures to be followed in work resulting from restoration and/or access to shared infrastructure.<br>• Reduction in time taken to restore operation of infrastructure of electronic communications networks and services affected by the impacts of the fires or other incidents. |
| | Long term | • As Medium Term. |

| | | |
|---|---|---|
| | Risk Reduction Indicator<br>(1- smallest reduction, 10 largest reduction ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Time to Achieve Significant Effect Indicator<br>(1- long-term effect, 10- immediate effect ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☒ 8 ☐ 9 ☐ 10 ☐ |

| | | |
|---|---|---|
| **Type of Measure** | Preventive<br>(Before the Incident) | • Yes |
| | Detection and Response<br>(During the Incident) | • Yes |
| | Mitigation and Recovery<br>(After the Incident) | • Yes |

| | | |
|---|---|---|
| **Applicability/ Scope** | Natural disasters other than fires (e.g. earthquake, tsunami, cyclone, flood, tornado, volcanic eruption, landslide, pandemics, etc.) | • Yes |
| | Applicability / Scope Indicator<br>(1-fires only, 10- ≥ 5 scenarios with applicability ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☒ 9 ☐ 10 ☐ |

| | | |
|---|---|---|
| **Implementation** | Intervening entities | • Electronic communications companies, Municipal Councils, user companies and entities in possession of infrastructure in electronic communications, energy, transport, public sectors (e.g. Fire-fighting, Police, Local Radios). |
| | The role of ANACOM | • Facilitate interactions between stakeholders |
| | Identification of Barriers | • High number of actors, disparities in procedures<br>• Lack of capacity/availability of existing infrastructure.<br>• Lack of georeferenced registers of existing infrastructure. |
| | Ease of Implementation Indicator<br>(1 - lesser ease, 10 - greater ease ) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |
| | Costs, value and type (TCO) | |
| | Cost Indicator (TCO)<br>(1-Maximum cost, 10- no cost) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☒ 9 ☐ 10 ☐ |

| | | |
|---|---|---|
| | Identification of Incentives | • Reduction of costs and potential minimisation of periods of service interruption. |
| | Recurrence / Periodicity | • Not applicable |
| | Actions to be developed and timeline | • Identification of existing challenges in management of shared infrastructure<br>• Definition of the necessary changes to be applied in the management and operation of shared infrastructure. |

| | | |
|---|---|---|
| **Articulation with IS and GIS** | Description | • Register all suitable infrastructure.<br>• Measure that can be facilitated through of GIS, supported by SIIS. |
| | Integration with IS and GIS (1-low, 10-high) | 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☒ 7 ☐ 8 ☐ 9 ☐ 10 ☐ |

| | | |
|---|---|---|
| **Legal framework** | Existing | • Law no. 5/2004 of 10 February<br>• Decree-Law no. 123/2009 of 21 May |
| | To be developed | • To be determined as a result of the actions to be developed: |

| | |
|---|---|
| **Additional study** | No ☒ Yes ☐ What? |

| | |
|---|---|
| **Notes and articulation with other measures** | • To be determined |

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