# Case study

This case study describes the procedure for the evaluation of the risk from lightning for a country house. The loss of human life, loss of power service, loss of telecommunication service and economic loss are relevant for this structure.

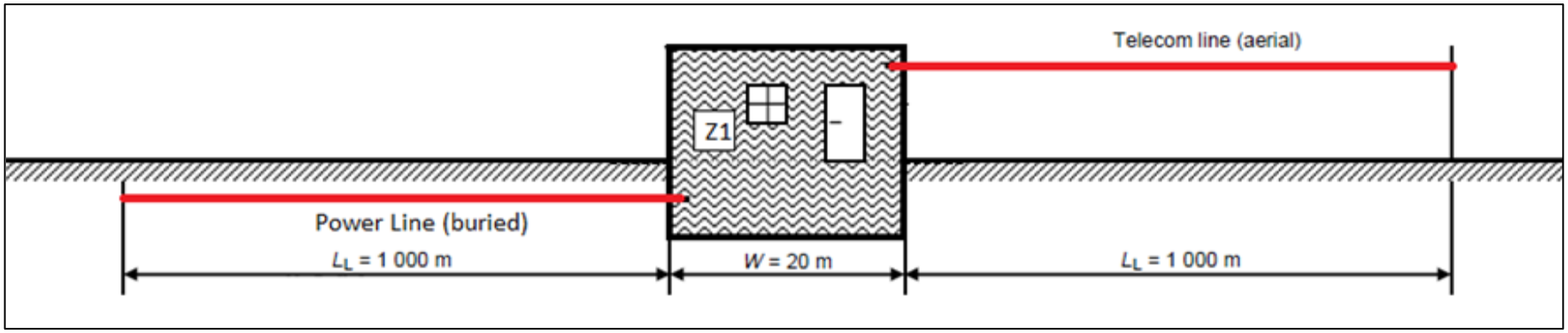
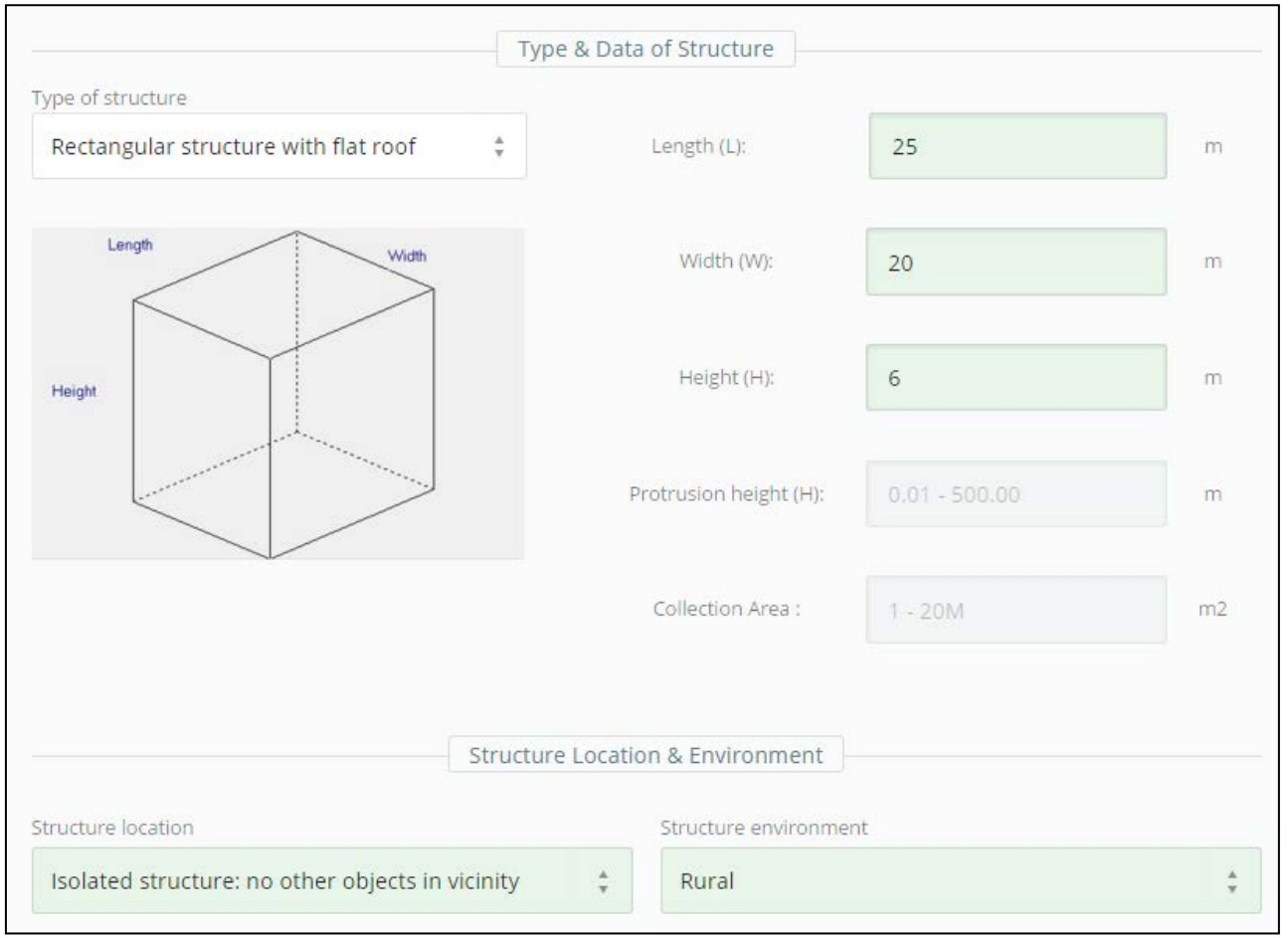



***fig1. country house***

## Relevant data and characteristics for the country house (unprotected).

**Step1: General properties.**

The country house is a rectangular structure with flat roof located in a flat rural territory without neighboring structures. The dimensions of the structure are (L=25m, W=20m, H=6).

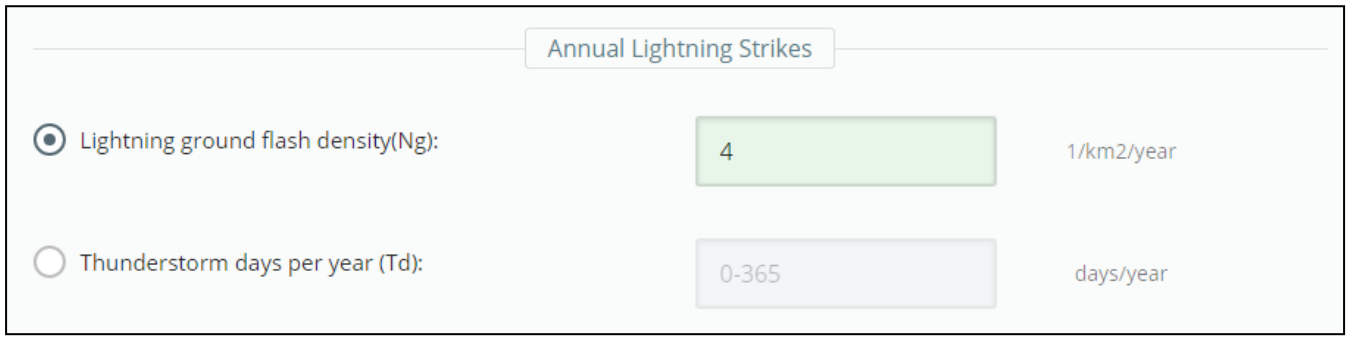


There are no lightning protection measures.

- None external lightning protection system (LPS).
- None surge protection devices (SPDs).
- None external spatial shield.


The lightning flash density of the region is 4 flashes per km$^2$ per year.

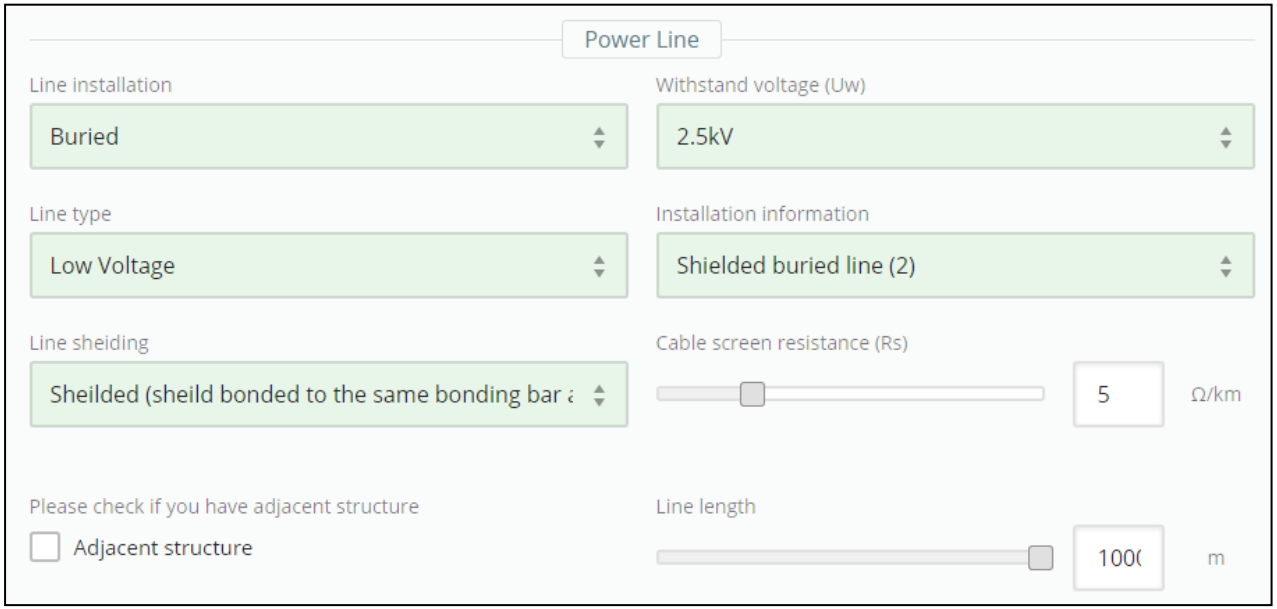
Note: If the lightning flash density of the region is not available, alternatively the user could import the number of thunderstorm days per where which can be obtain from isokeraunic maps.



## Step 2: Connected Services.

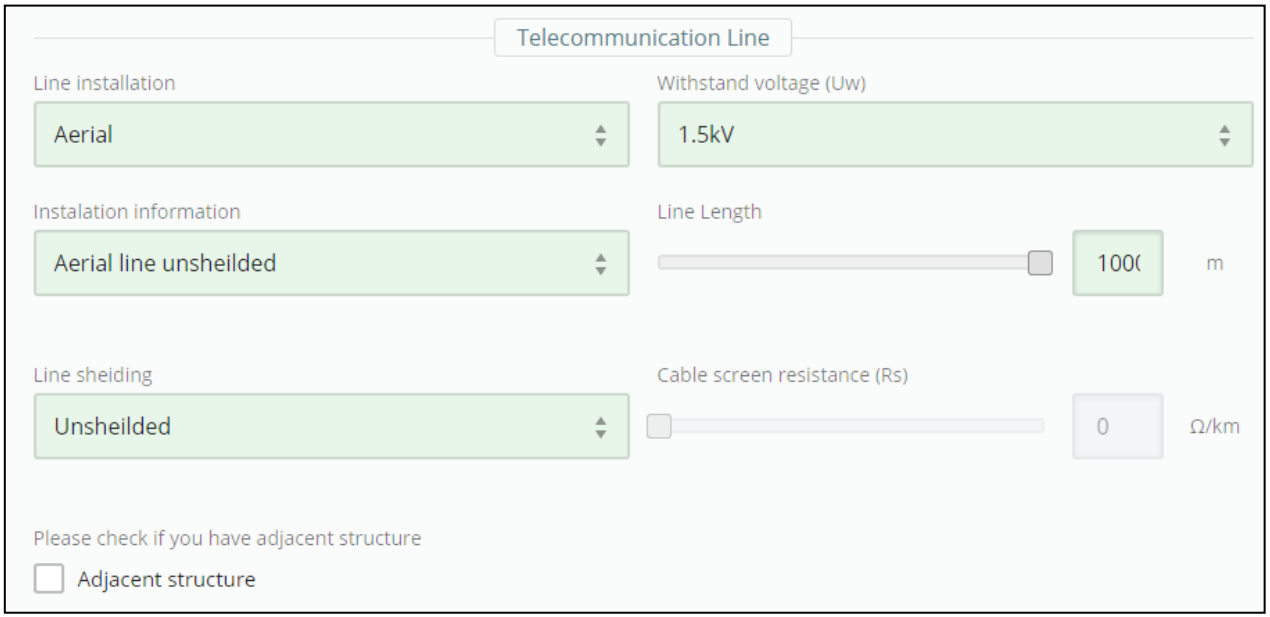
Power line parameters

| Power line parameter | Description |
|---|---|
| Line installation | Buried |
| Line type | Low Voltage |
| Line shielding | Unshielded |
| Adjacent structure | None |
| Withstand voltage | 2,5 kV |
| Installation information | Buried line shielded (shield bonded to the same bonding bar as equipment) |
| Cable screen resistance | 5 Ω/km |
| Line length | 1000m |



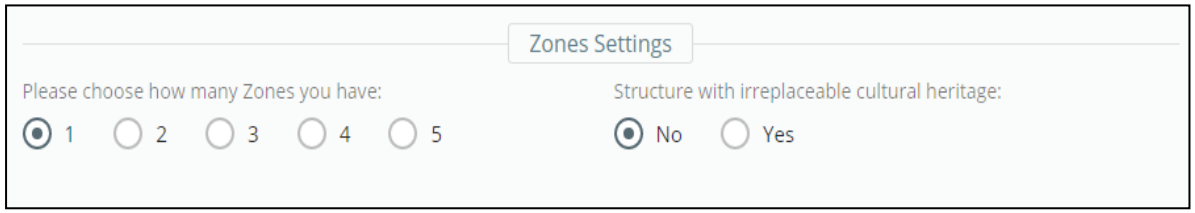

Telecommunication line parameters

| Power line parameter | Description |
|---|---|
| Line installation | Aerial |
| Line shielding | Unshielded |
| Adjacent structure | None |
| Withstand voltage | 1,5 kV |
| Installation information | Aerial line unshielded |
| Cable screen resistance | - |
| Line length | 1000m |



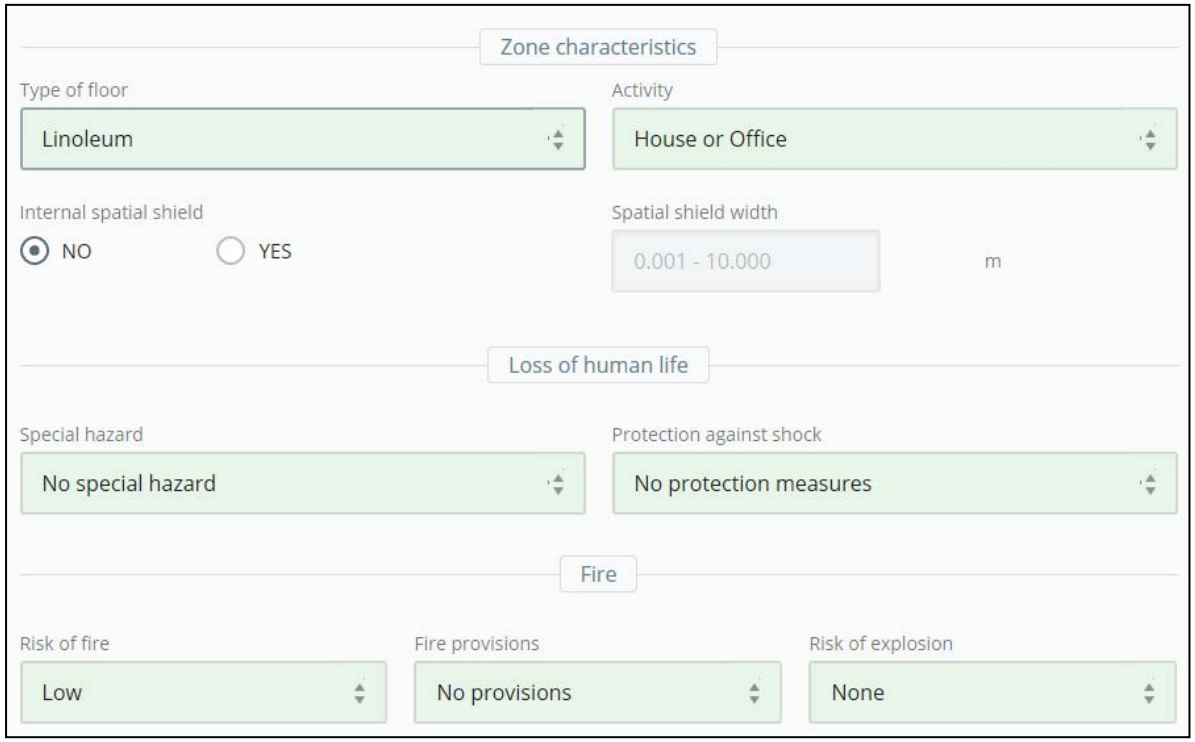
## Step 3: Zones

The house is examined as a single zone structure because of the homogeneous characteristics of its spaces. However a structure could be divided in zones according the paragraph 6.7 IEC 62305-2. There is no irreplaceable cultural heritage in the structure.

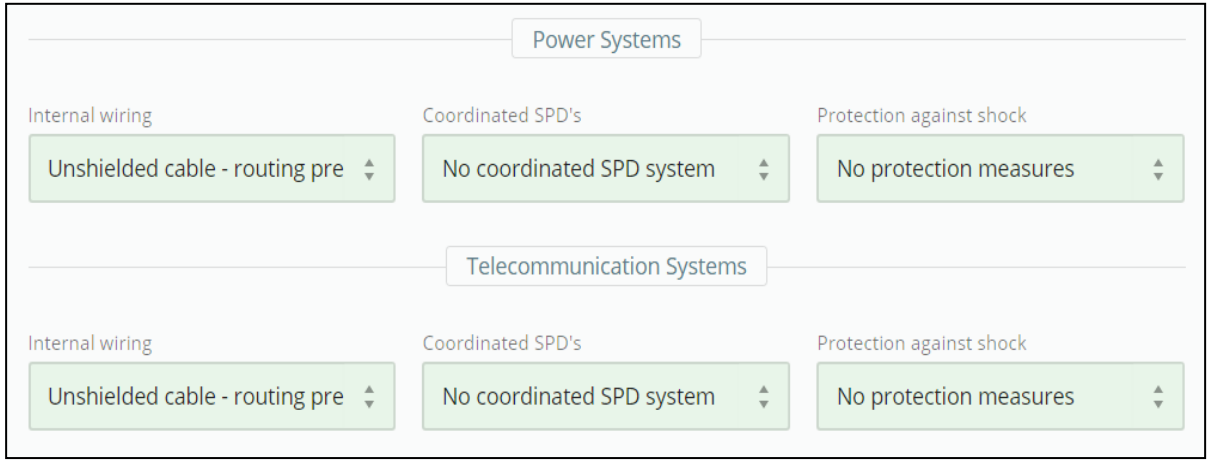



***Zone's Parameters.***

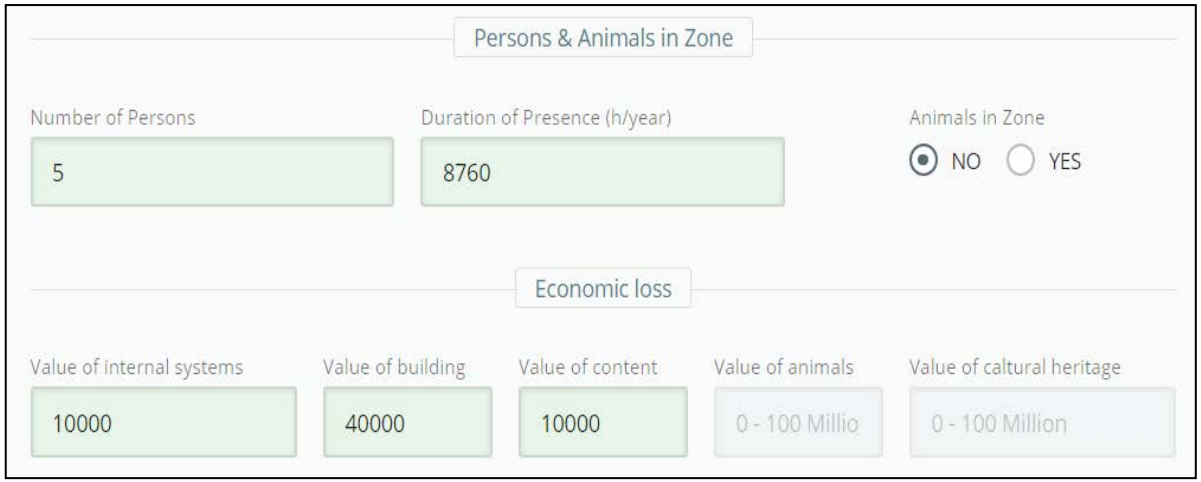
| Parameter | Description |
|---|---|
| Type of floor | Linoleum |
| Internal spatial shield | None |
| Activity | House |
| Special hazard (1) | No special hazard |
| Protection against shock (Due to a flash to the structure) | No protection measures |
| Risk of fire(2) | Low |
| Fire provisions | No provisions |
| Risk of explosion(3) | None |
| For more details<br>(1): Table C.6 IEC 62305-2<br>(2): Table C.5 IEC 62305-2<br>(3): Table C.5 IEC 62305-2 | |



| Parameter | | Description |
|---|---|---|
| Power systems | internal wiring | Unshielded (routing precautions in order to avoid large loops >10m²) |
| | Coordinated SPD's | None |
| | Protection against shock | None |
| Telecommunication system | internal wiring | Unshielded (routing precautions in order to avoid large loops >10m²) |
| | Coordinated SPD's | None |
| | Protection against shock | None |




| Parameter | Description |
|---|---|
| Number of persons | 5 |
| Duration of presence (average) | 8760 h/year |
| Animals in zone | - |
| Value of internal systems | 10 000 € |
| Value of building | 40 000 € |
| Value of content | 10 000 € |
| Value of animals | - |
| Value of cultural heritage | - |

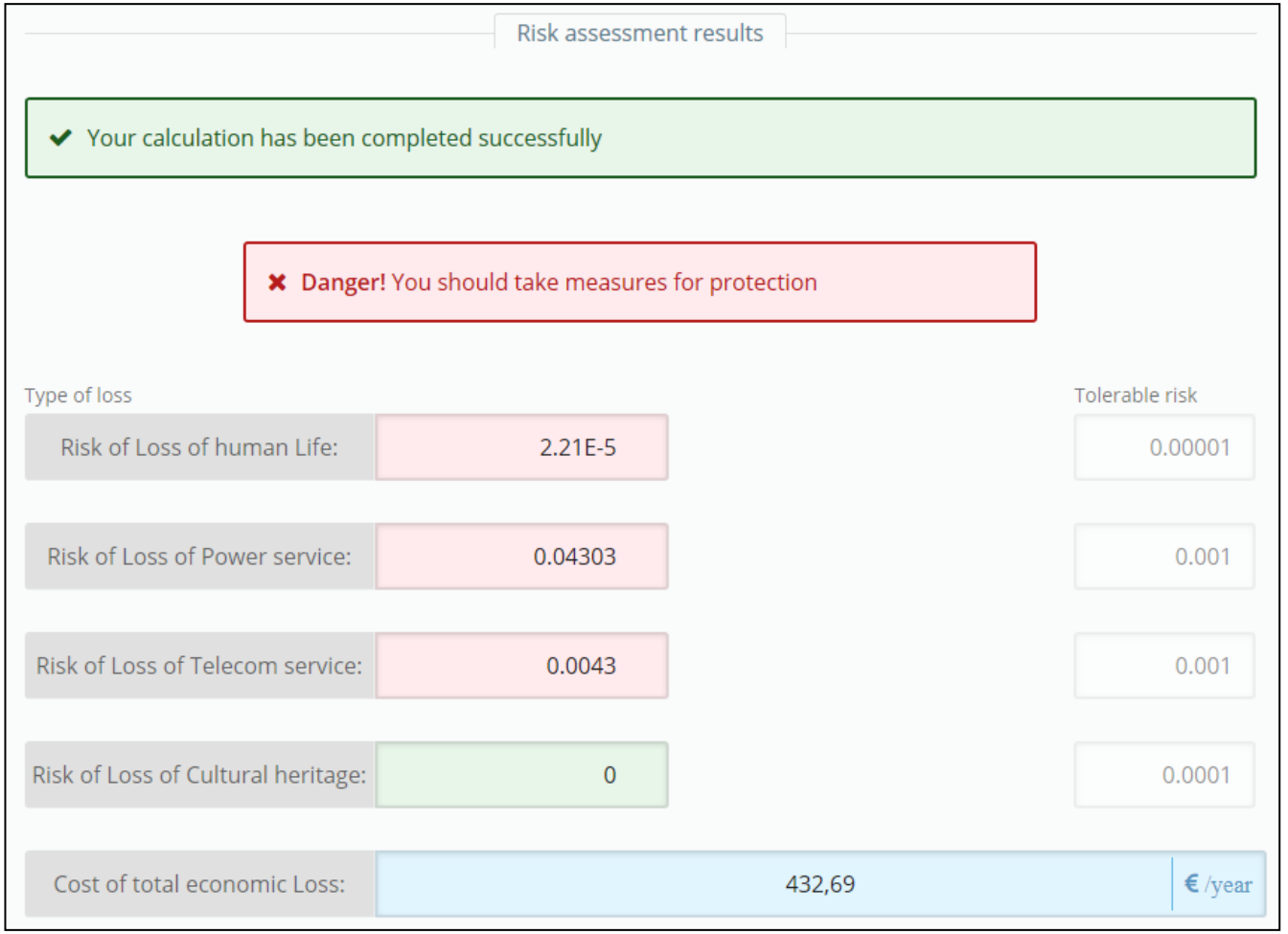


## Step 4: Results

As shown from the calculations, the values of:

- Risk of Loss of human Life
- Risk of Loss of Power service
- Risk of Loss of Telecom service

exceed the tolerable levels defined in IEC 62305-2. Furthermore there is an annual cost of economic loss Ct=430€.



To reduce the risk components to a tolerable value the following protection measures are selected:

1. Installation of an LPS class II.
2. Installation of equipotential bonding SPDs LPL II.
3. Installation of coordinated SPDs for power systems.
4. Installation of coordinated SPDs for telecommunication systems.