Atmos Plus X1

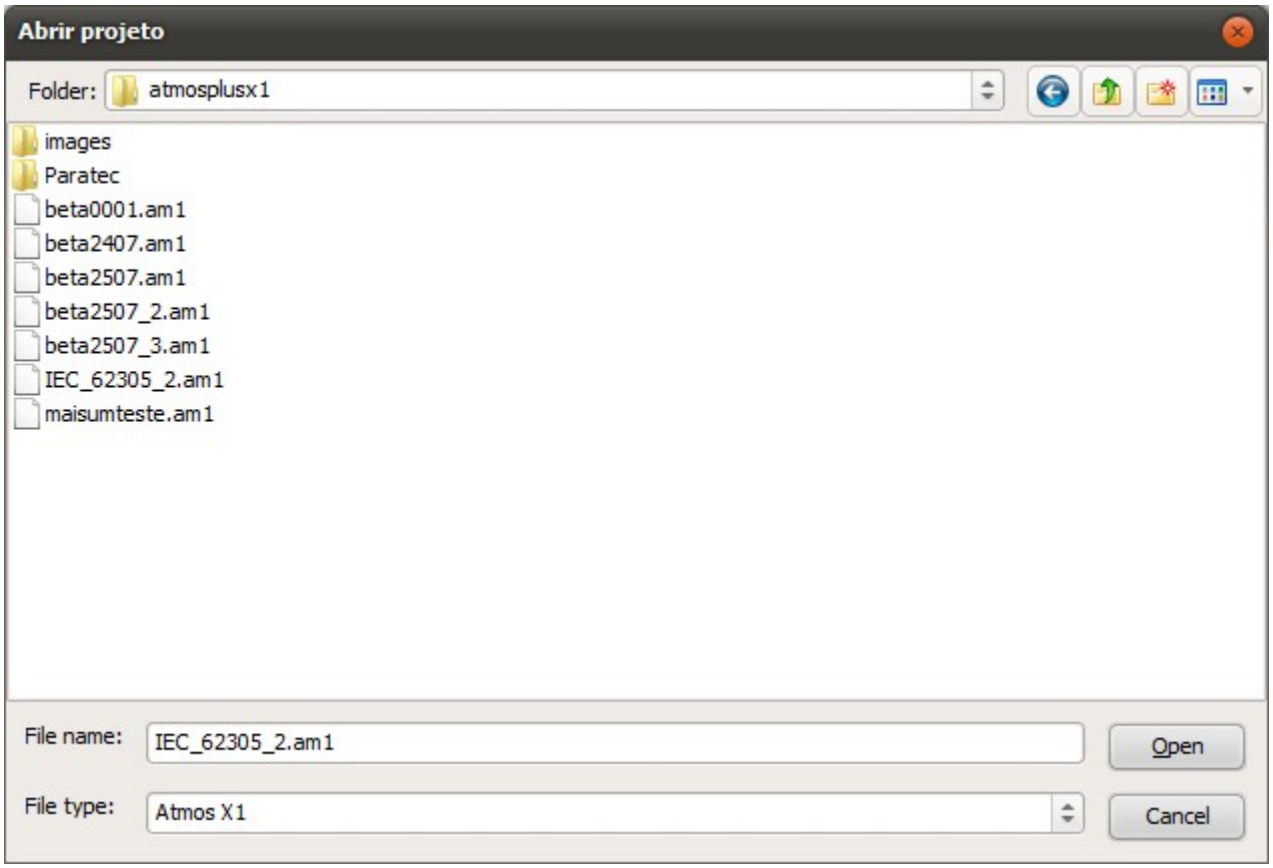
Tutorial - Risk Assessment (Complete)
www.voltsandbolts.com
ex.1 - NBR-5419:2015 / IEC62305-2:2010
Rural House
Rev. 1 - 10/02/2016
(first ed. 14/08/2015)

Contents:

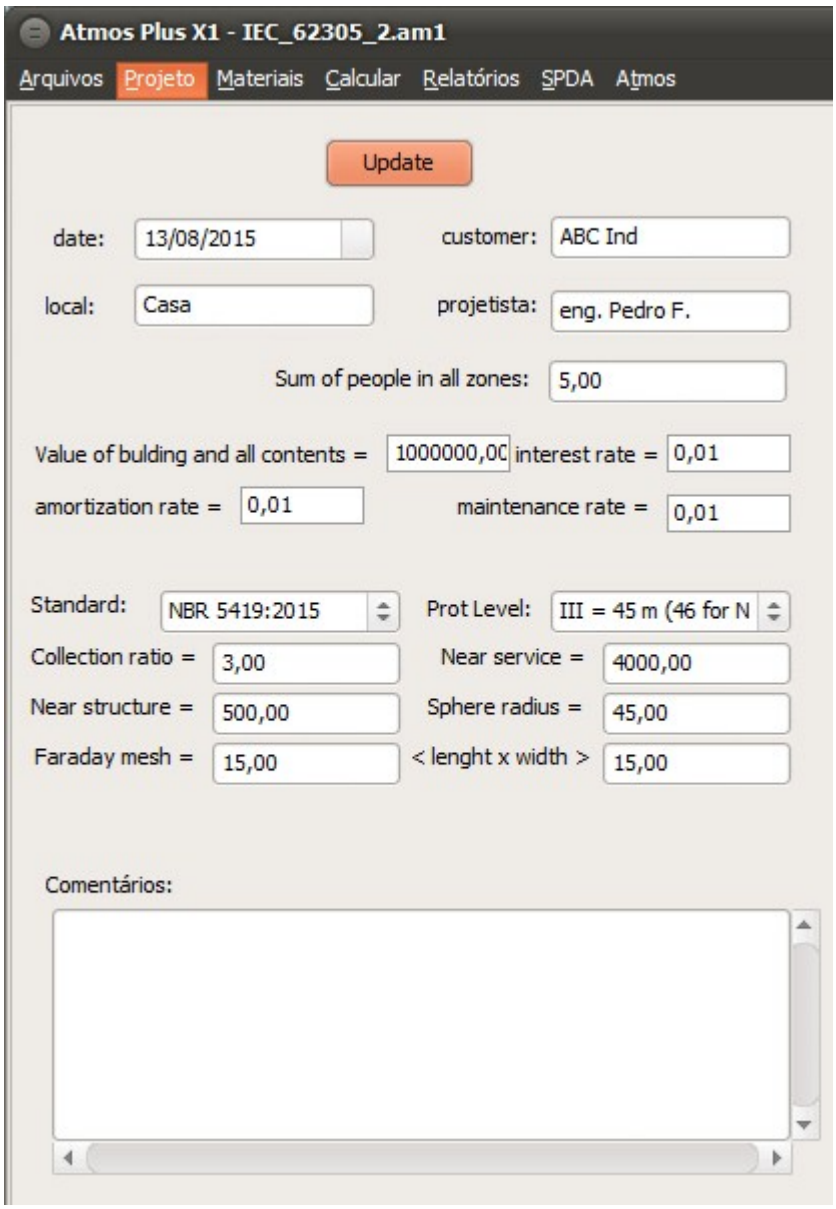
1. Creating a new Master file

Note: see manual for details and the interface tutorial for step by step instructions.

At the Menu bar, select File / New Master:

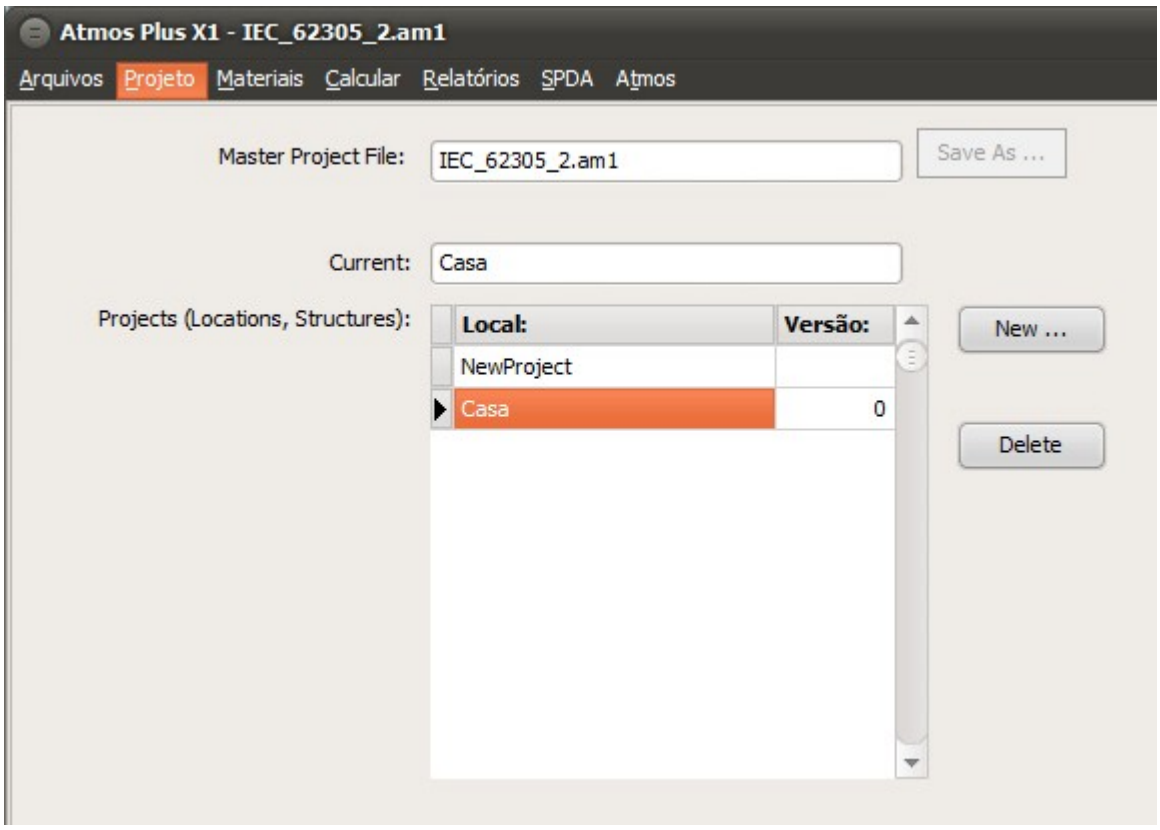


em seguida, temos a tela com a tabela de locais contendo somente um Local default; no menu, selecione Projeto / Dados do Local:



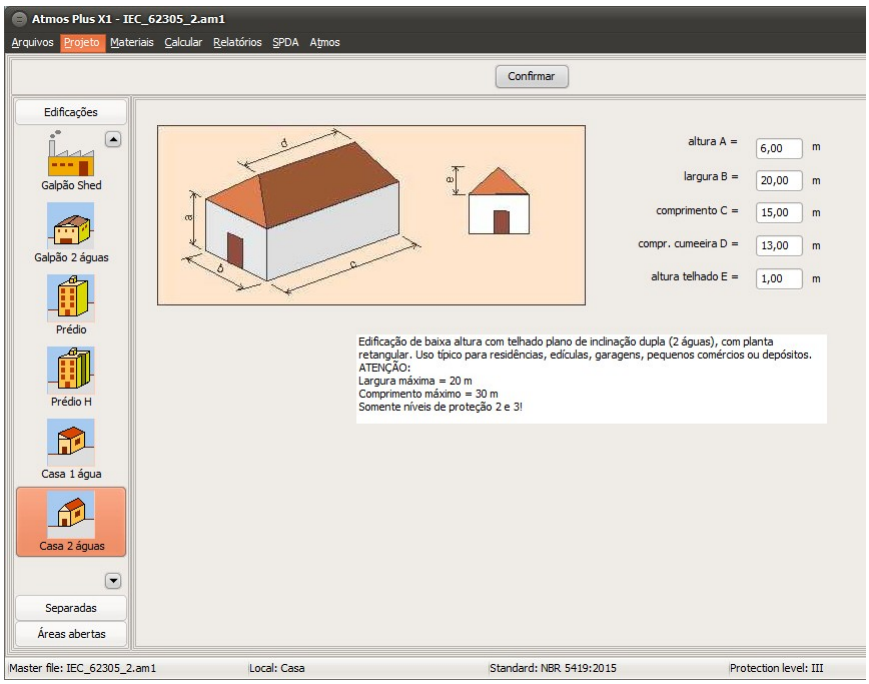
Entre o valor de 5 pessoas habitando a casa, conforme o exemplo da norma; podemos entrar aqui a norma desejada e o nível de proteção, mas ainda não temos as informações necessárias para a escolha - é para isso, afinal, que vamos analisar os riscos da estrutura!

Clique em Atualizar e retorne para Projetos / Master:



2. Modelo

Vamos escolher um Modelo de estrutura que melhor se adapte ao nosso exemplo, selecione Projeto / Modelo:



We'll chose the Model "House with two slopes" ; enter the dimentions and click on Update. No exemplo da norma é fornecida a altura da casa sem o telhado, mas a figura indica um telhado com pouca inclinação; na tela acima, ajustamos isso para um telhado com inclinação mais realista - isso não muda o cálculo, pois a altura total é a mesma.

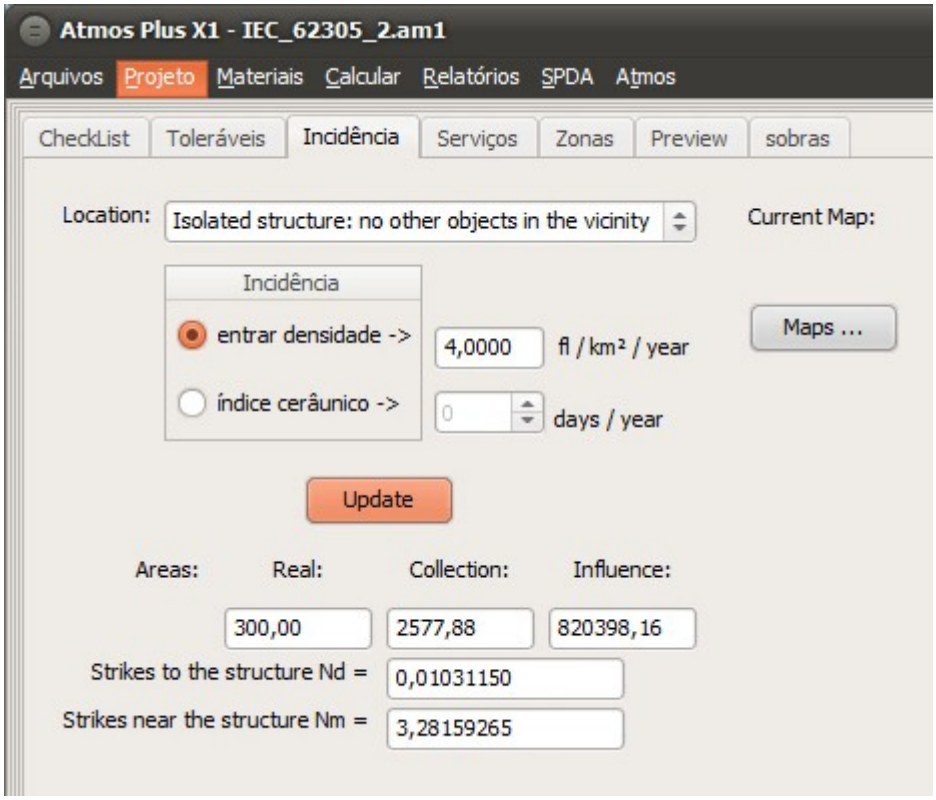
3. Tolerable Risks

Select Project / Risk Complete and the Tab "Tolerable":

Enter the desired data or click on Standard to set the values as recommended by the standard previously selected - NFPA 780:2014 has different values than IEC 62305-2:2010, and the NFPA 780:2017, as of this writing, has the same values for R1 and R2 as IEC, but different for R3.

4. Incidence:

Select the Incidence tab:



Following the IEC example, we have as isolated structure and an incidence of 4 flashes / km² / year. Click at Update to get the areas: real (construction), collection and influence, as well as the expected number of events for the Location and its surroundings.

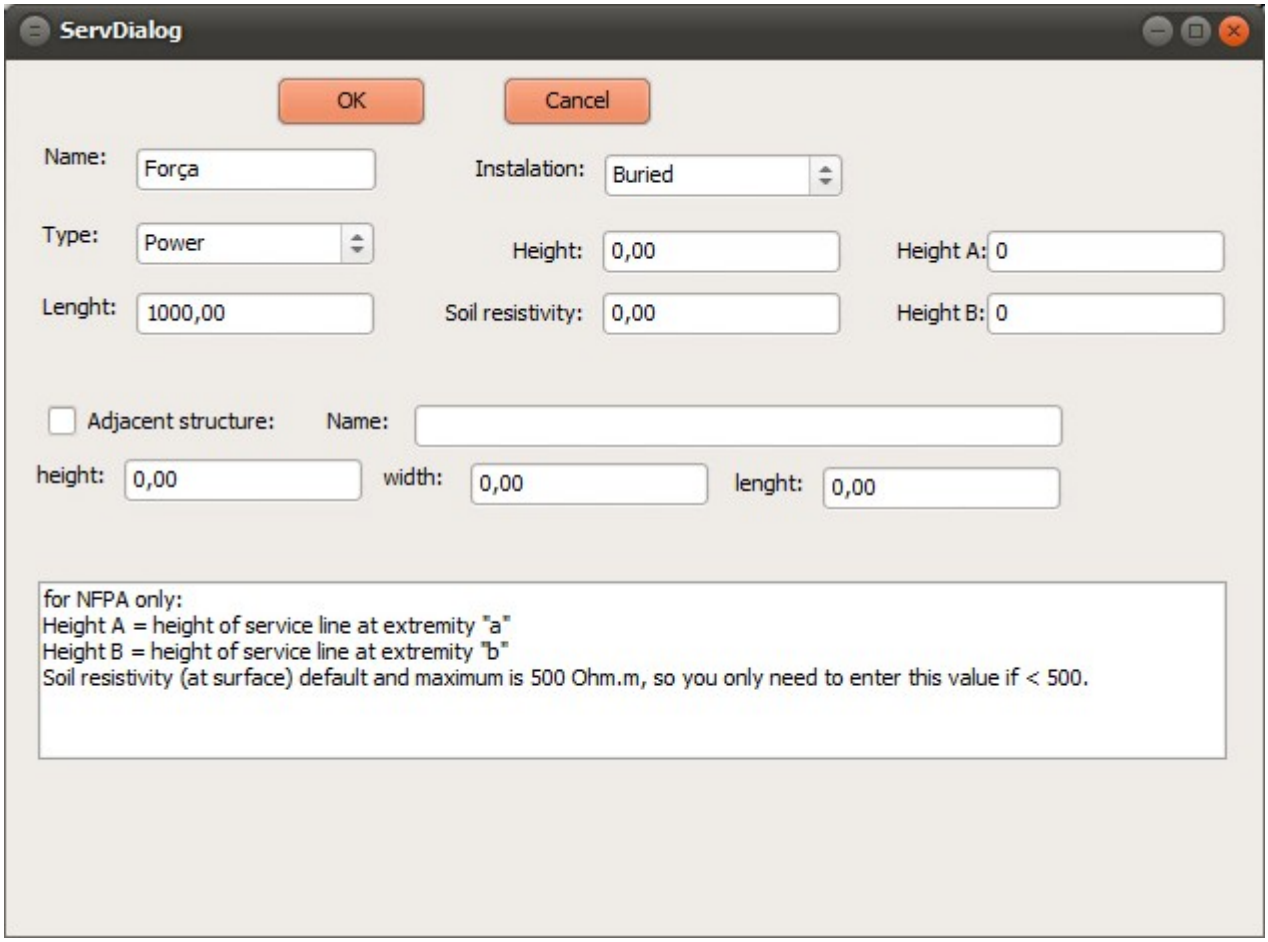
Atmos has a database of incidence and isokeraunic maps we managed to get online - you can consult them (and add new ones) clicking at Maps button.

5. Service Lines

Atmos Plus X1 can have up to 16 Service lines, Atmos Pro and Atmos LE only two.

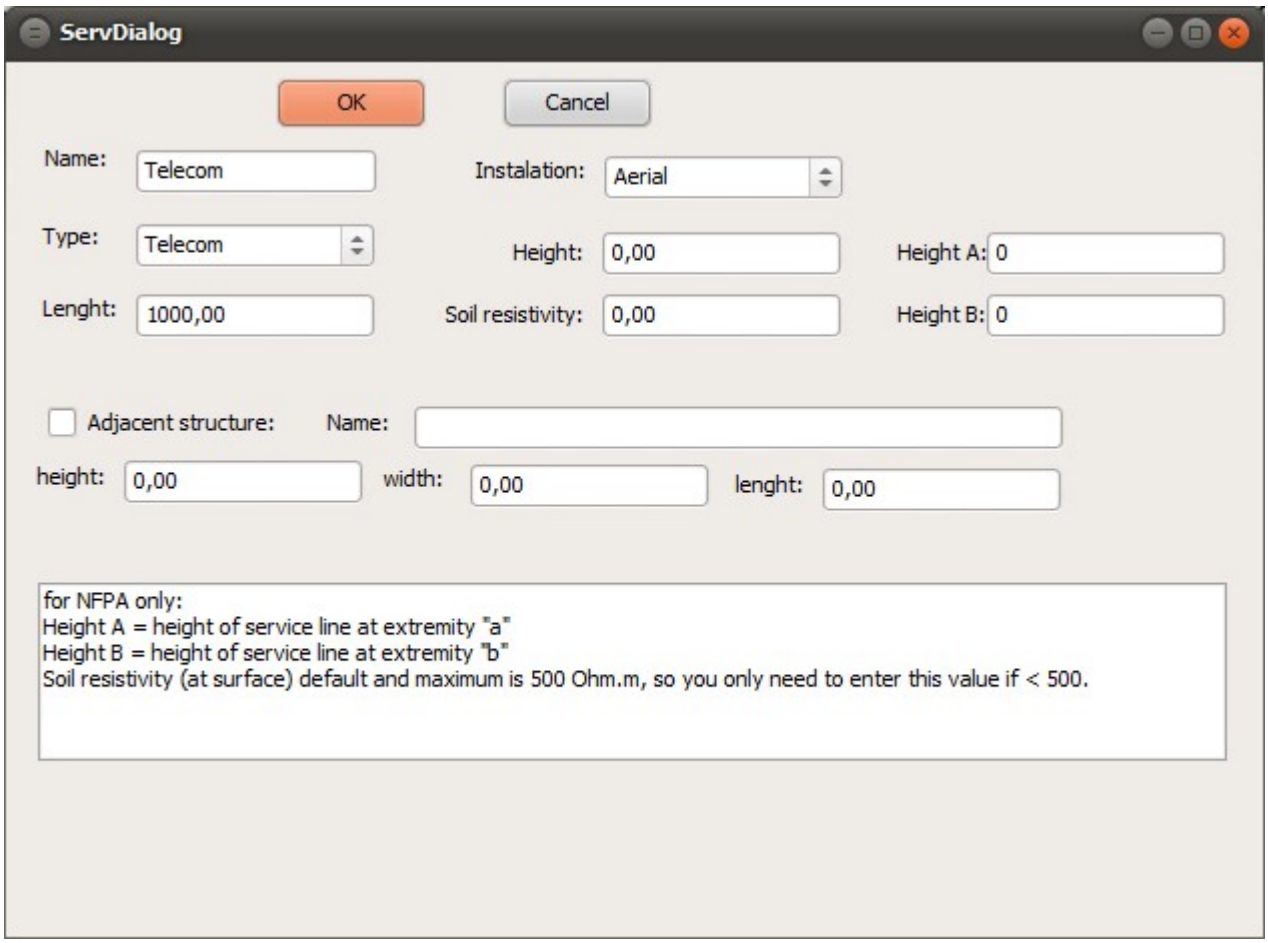
On this example we have two lines, one Energy (buried) and one Telecom (aerial). Later on, if SPD or other measures are needed, we can go back here and create new lines while preserving these.

Click at New to enter the energy line data:

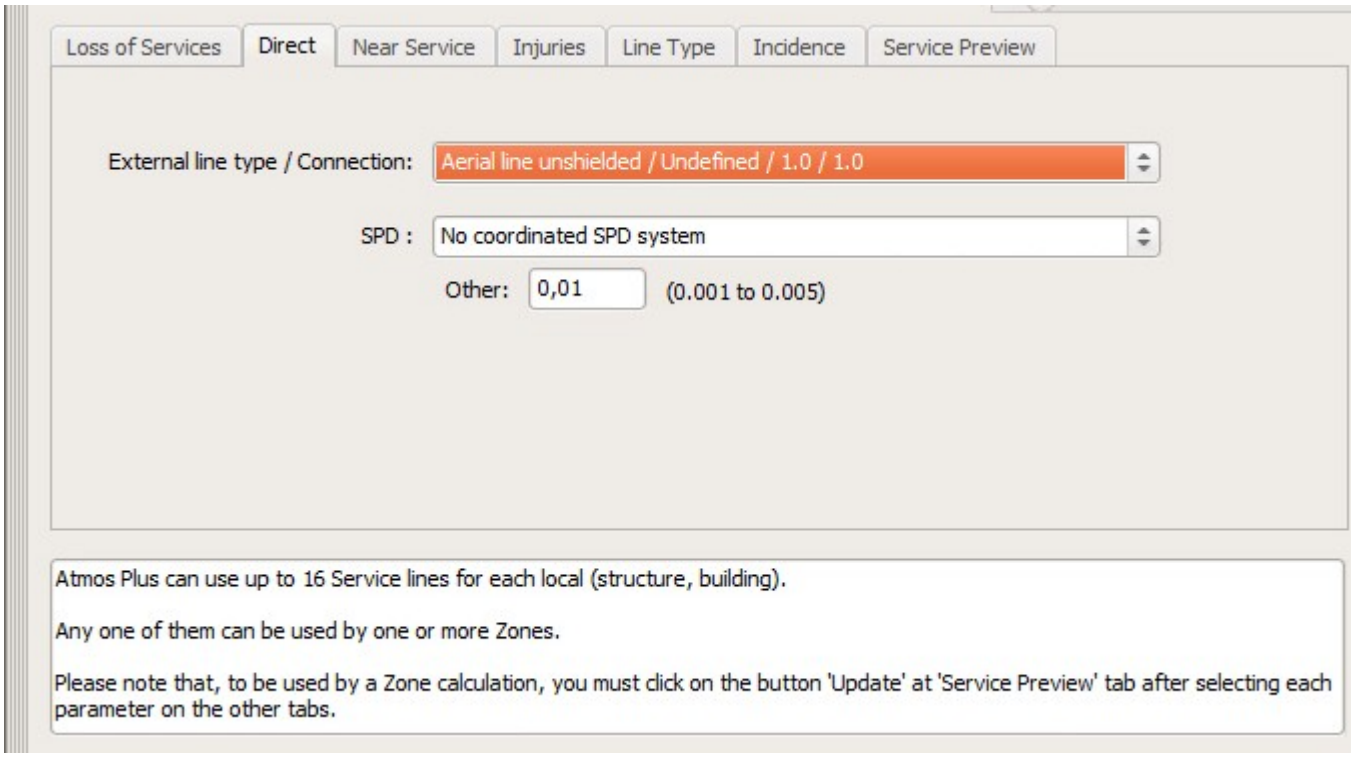


The essential data are Name, Installation, Type and Length; if there's an adjacent structure, check the corresponding box and enter its name and dimensions - note that the other data are used only by the NFPA 780 calculation, while the IEC adopts some fixed values.

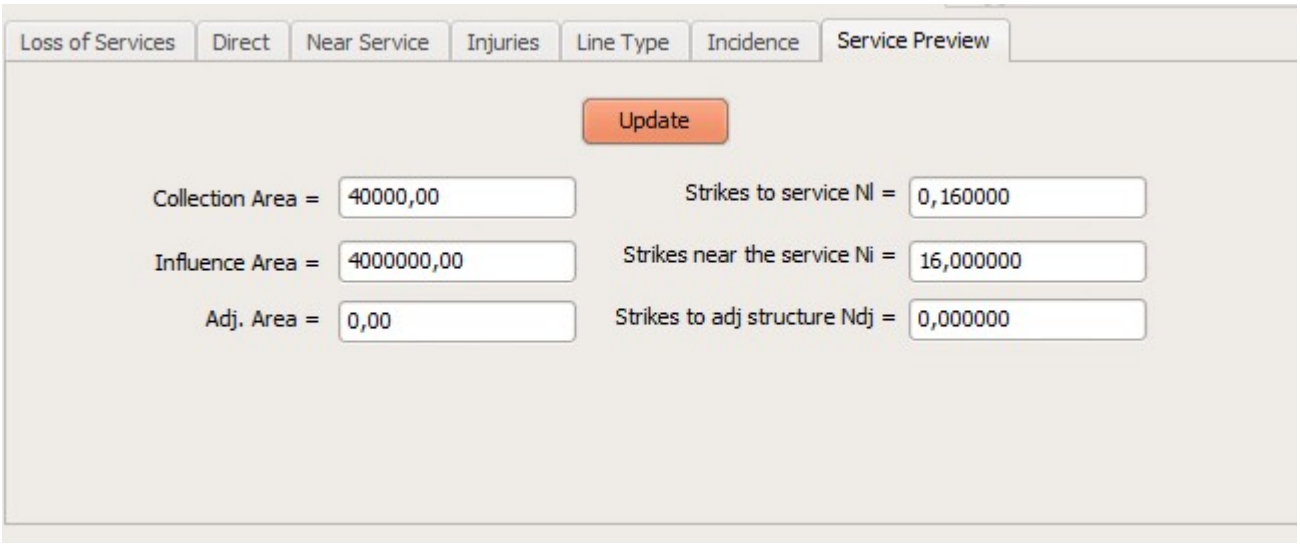
Click on OK to confirm and again in New to enter the telecom line data:



Now select each of the lines on the table and set its relevant parameters:



After that, click on Update to get the values of areas and incidence:



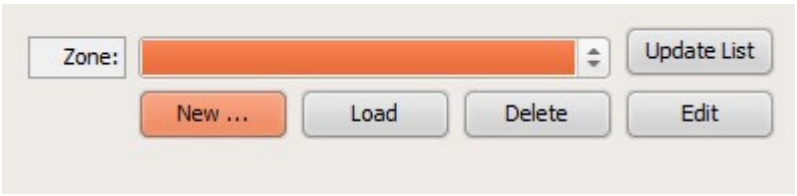
- Service line collection area [m²]
- Influence area [m²]
- Adjacent structure collection area [m²]
- Flashes to the Service line [flashes / year]
- Flashes near the Service line [flashes / year]
- Flashes to the adjacent structure [flashes / year]

6. Zones

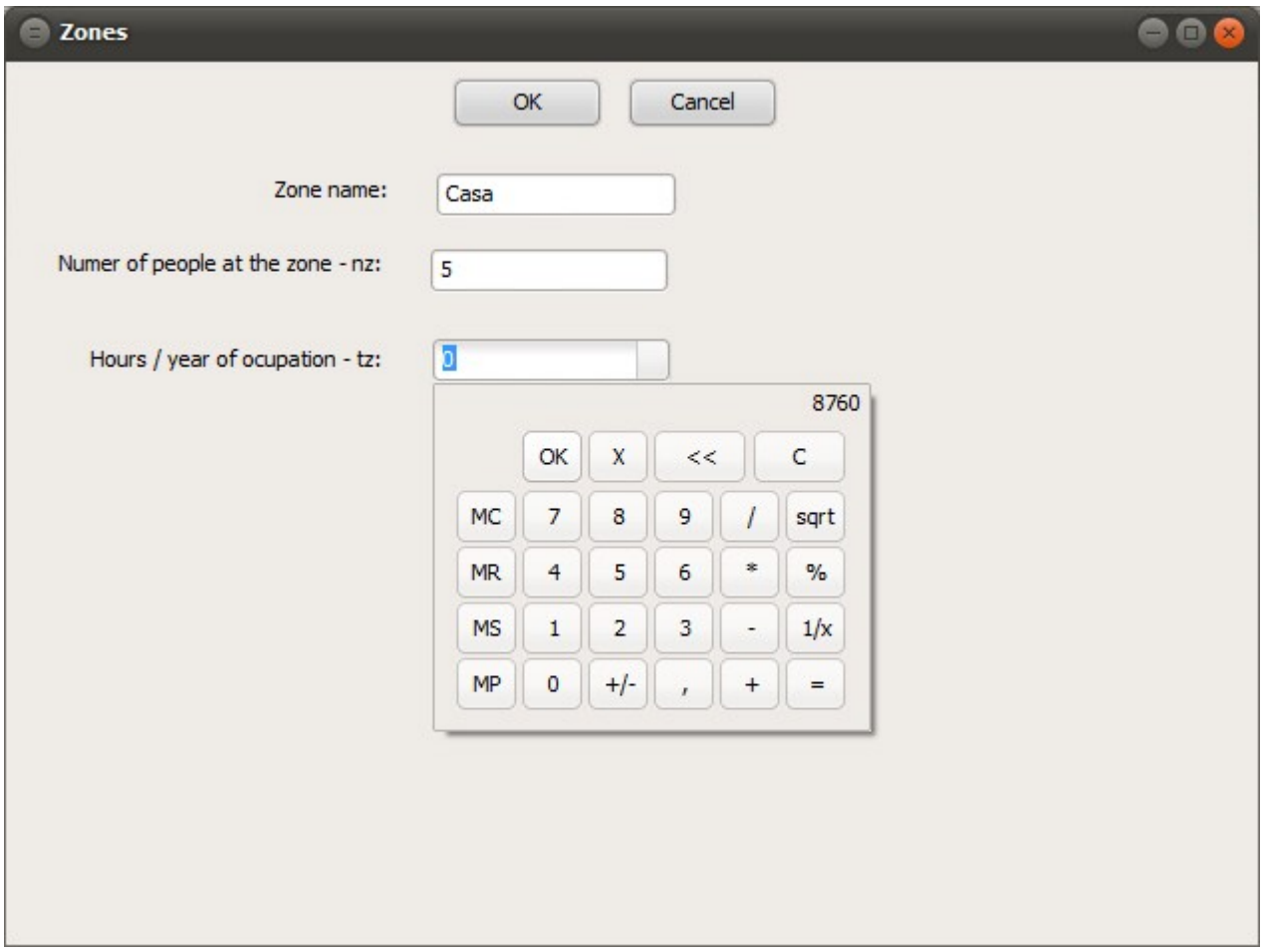
Atmos Plus X1 allows the use up to 16 zones at each Location, Atmos Pro 2 and LE only one.

On the IEC example, the Location was divided in two Zones: the house itself and the external area; as no people will stay at the external area during a storm, we can focus on one Zone for the House structure.

At the Zones tab, click at New:

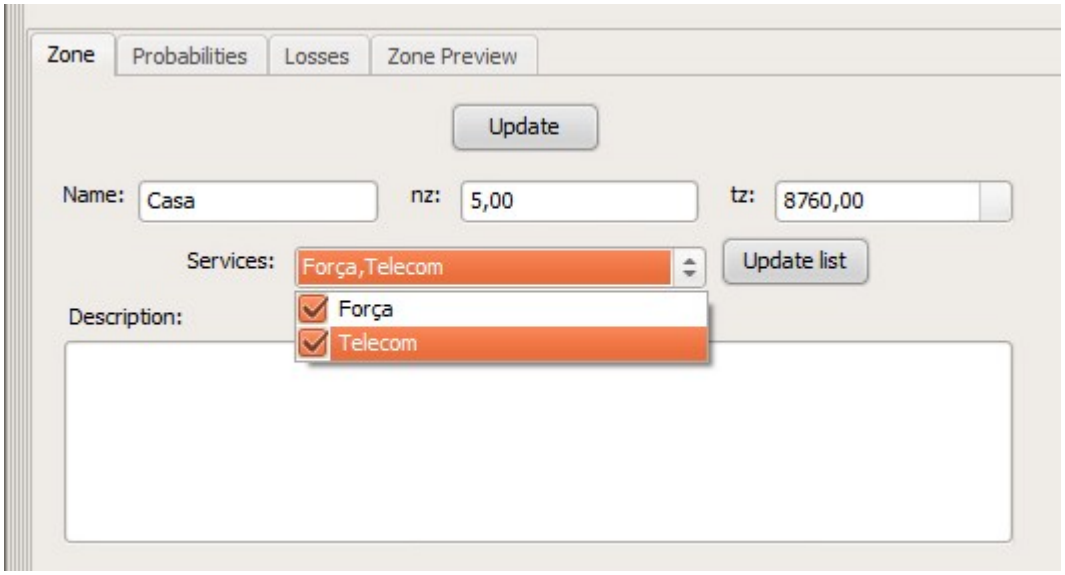


On the New Zone dialog, enter the example data: 5 people at the house all the time, that is, 365 x 24 = 8760 hours:

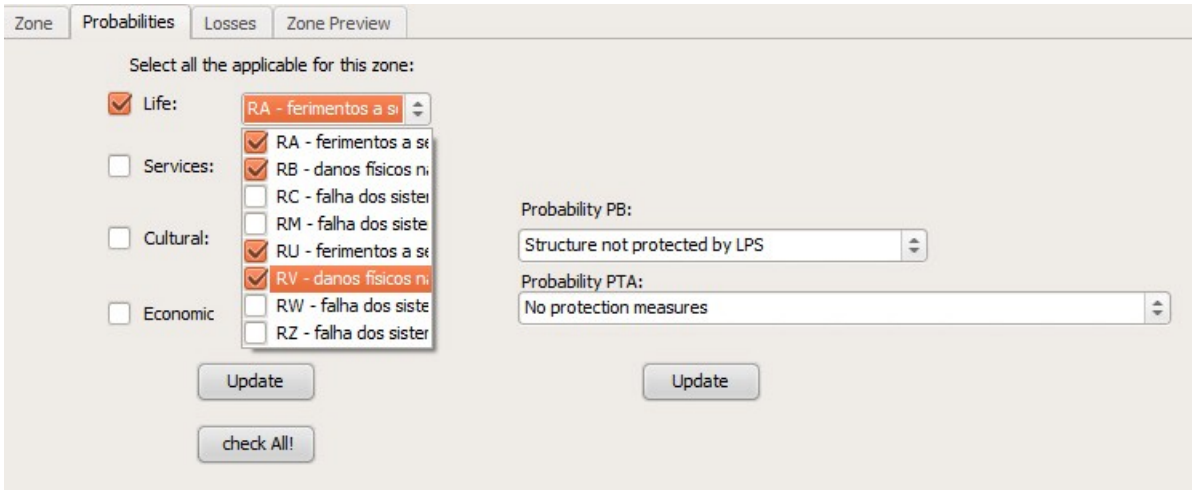


Note that you can enter directly the number of hours or click on the small button to the right to get access to a small calculator.

Click at OK, and now let's enter the Zone data; for the general data, access the Zone tab, click on the button UpdateList to get the list of Service lines of the Location, select both, then click on Update:



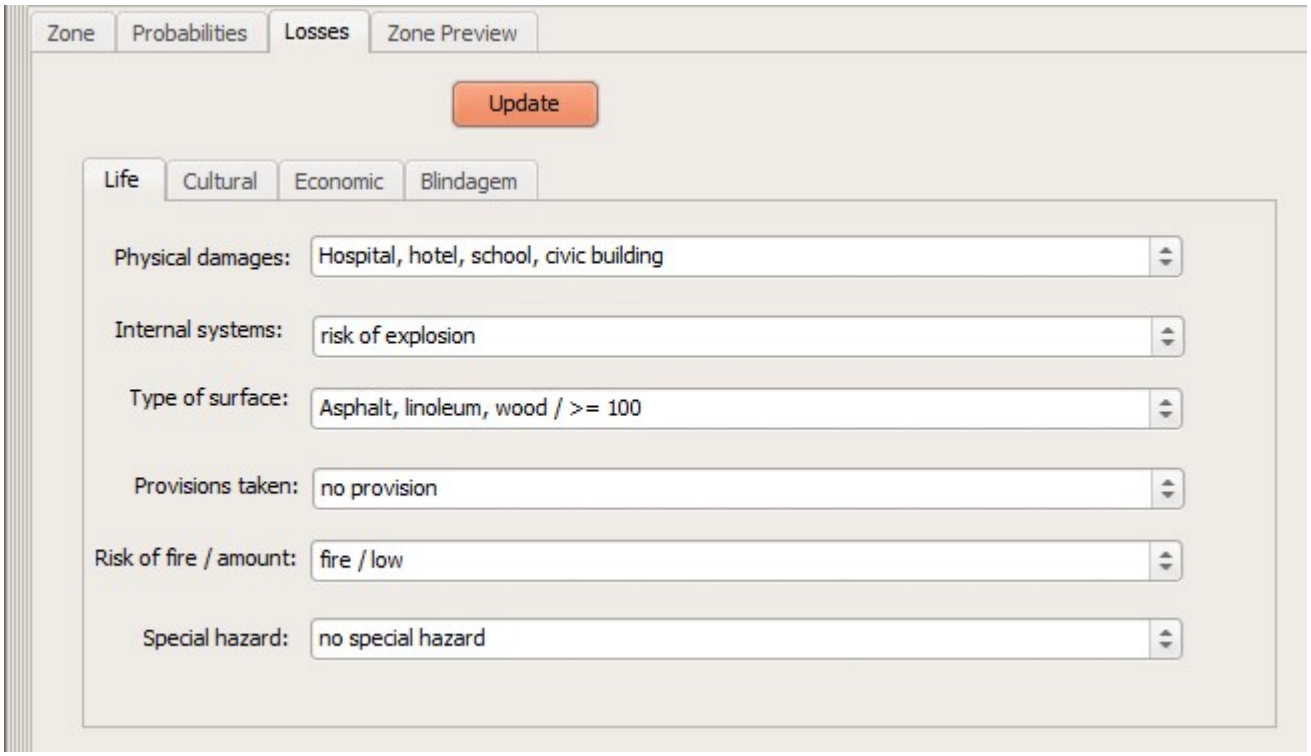
Now select the Probabilities tab:



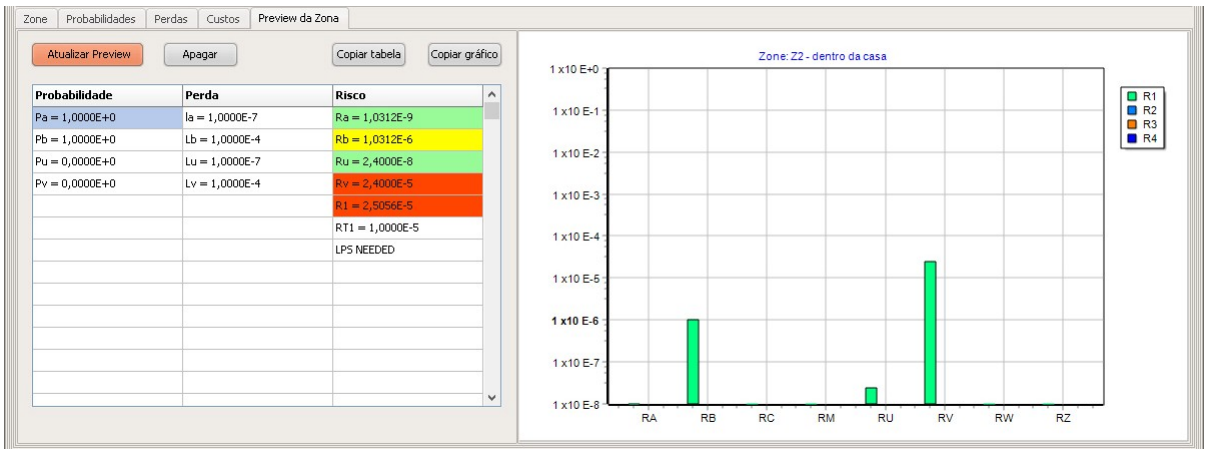
At this example, we have only the Risk R1 (Life) and the Risk components Ra, Rb, Ru e Rv; Atmos Plus has the calculations for the four areas: R1-Life, R2-Services, R3-Cultural and R4-Economic, Atmos Pro calculates risks R1 and R2, and Atmos LE only R1.

For the Protection, we select initially “Not protected” and, for the Protection Measures, select “No protection measures” - we do this to verify the Risks of the original Location, before installing any protection, then we will later run another Option for this Location applying protection and measures so we can compare with the original construction.

On the tab Losses, enter the parameters for the Losses related to Risk componentes for the Life:



At the Preview tab, click on Update to get the results in the table and the chart:



As the total Risk R1 is bigger than the Tolerable Risk Rt1, the installation of an external LPS and or SPD will be needed.

The procedure now is iterative: we start a new Option and, this time, select a LPS level III or manual fire extinguishers, or we can create new Service lines with SPDs, until we get one or more Options with overall Risk R1 < 1E-5. If several Options give satisfactory protection, the selection between them can be done by the price or convenience to install and operate.

The IEC standard gives two solutions:

A) protect the service lines with level IV SPD (equipotential bonding), reducing the PEB factor from 1 to 0.05 so PU and PV - and, consequently, RU and RV - are reduced to 1/20 of their initial value.

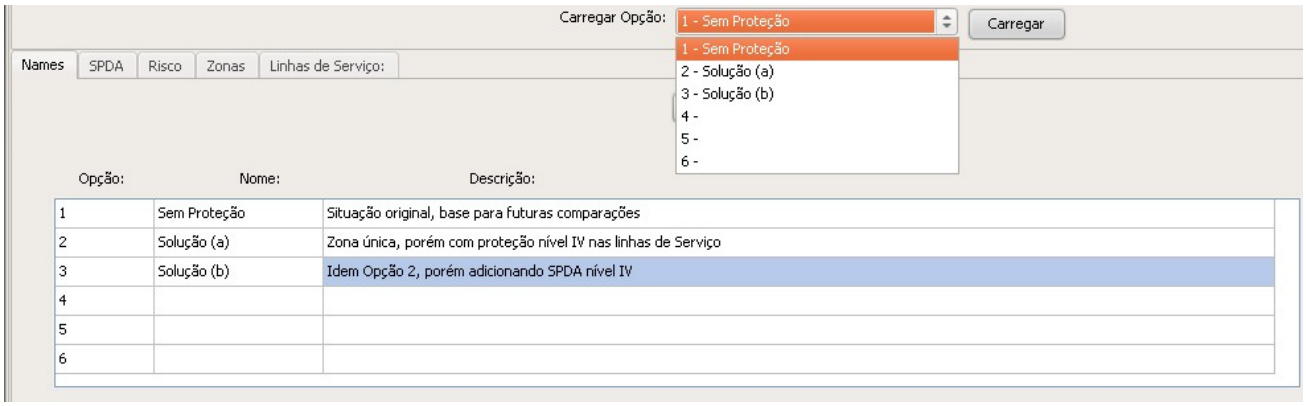
B) install an external LPS level IV, reducing the PB factor from 1 to 0.2, then RA and RB are reduced to 1/5 their original value - but this LPS also mandates the equipotential bonding of the service lines, that is, the same as proposed on solution (A), so this solution will have a smaller risk than the previous, at a higher cost.

On Atmos, if you're in a hurry, you can just click here and there at the Zones and Service Lines parameters until you get a satisfactory result; on the other side, using the Options (see bellow), you can compare different solutions side by side and adequately document your project, justifying the decision in more solid arguments.

7. Options

Atmos Plus X1 allows you to compare up to 6 different Options for a given Location; Option number 1 is the original house with no protections (with high R1 risk), so let's see how it compares with the two proposed solutions (A) and (B).

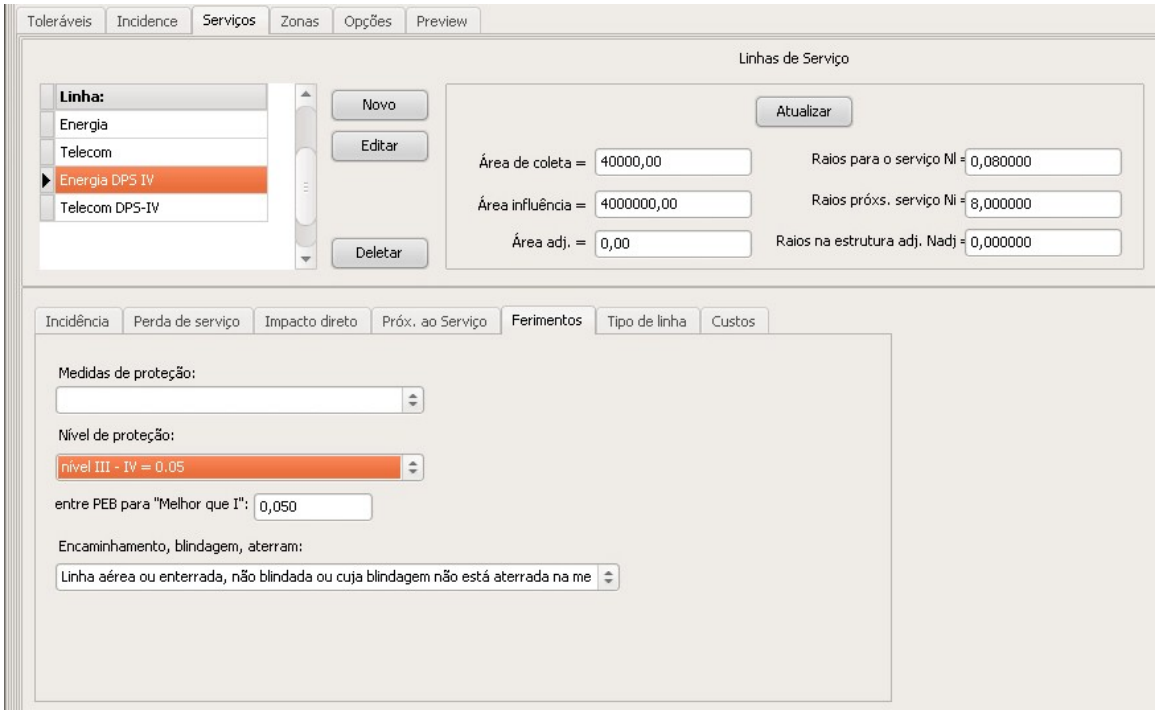
At Project / Options, let's enter the name and description for these two new Options:



7.1 Service Lines

Back to Project / Risk (complete), we'll create two new Service Lines like the original ones, but altering the

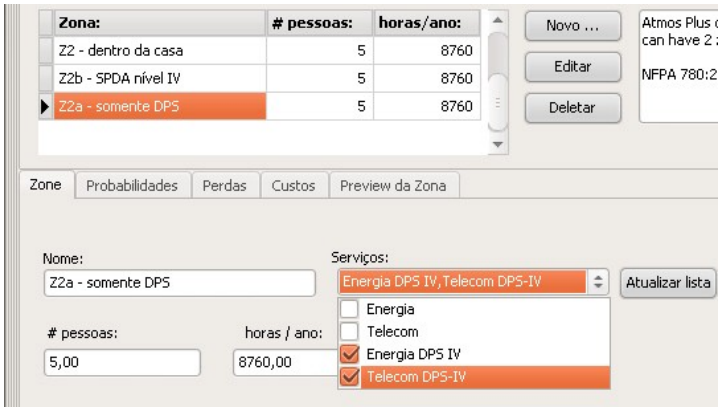
relevant parameters to include the Level IV protection:



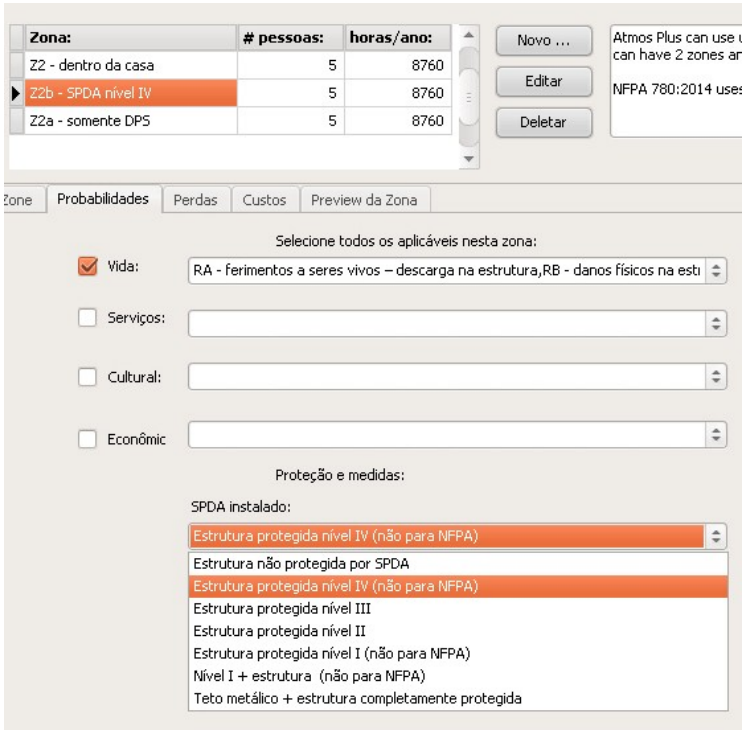
Note: when altering parameters, click on button Update to save the new values before click on another item of the table.

7.2 Zones

Now let's create two new Zones: Z2a and Z2b; both will use the new Service Lines from 7.1 and Z2b will also have the LPS level IV:



To compare also the cost of both Options, let's add to all Zones the risk R4, also with components RA, RB, RU, RV; Z2b will get also the level IV LPS:

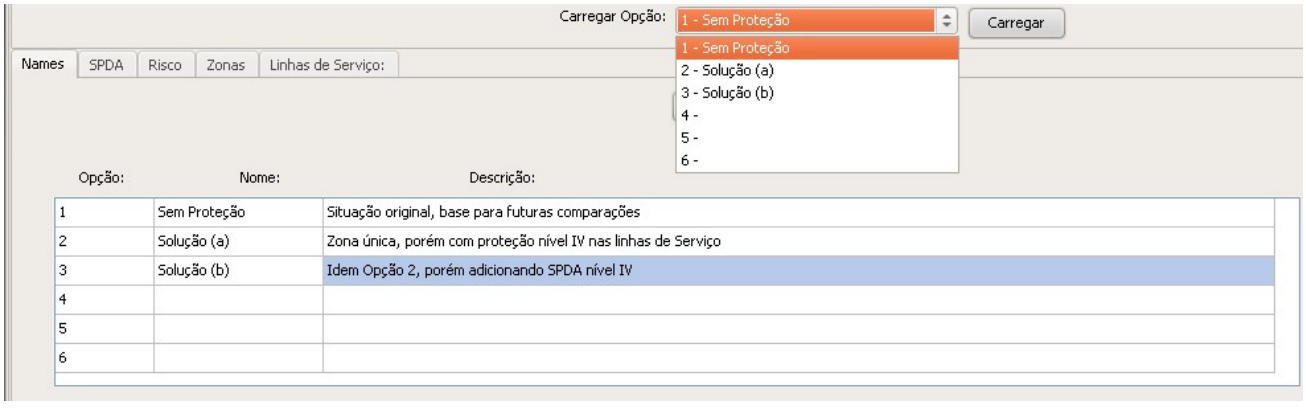


The procedure now consists of:

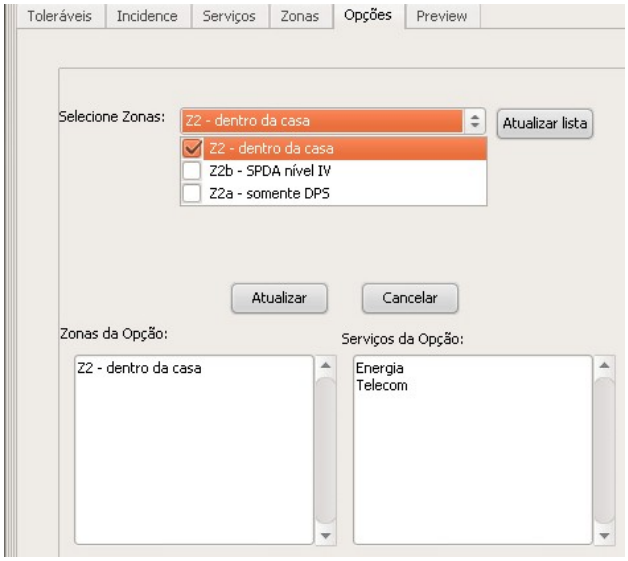
- Load each Option to memory
- Select the Zones of this Option
- Execute the Preview of this Option
- Calculate and generate the reports for Risk Complete
- For the Option with LPS, select its Components e calculate the external protection
- Do the comparative analysis of all Options
- Generate the final report

(It seems a lot of work, but with Atmos it's very fast to do)

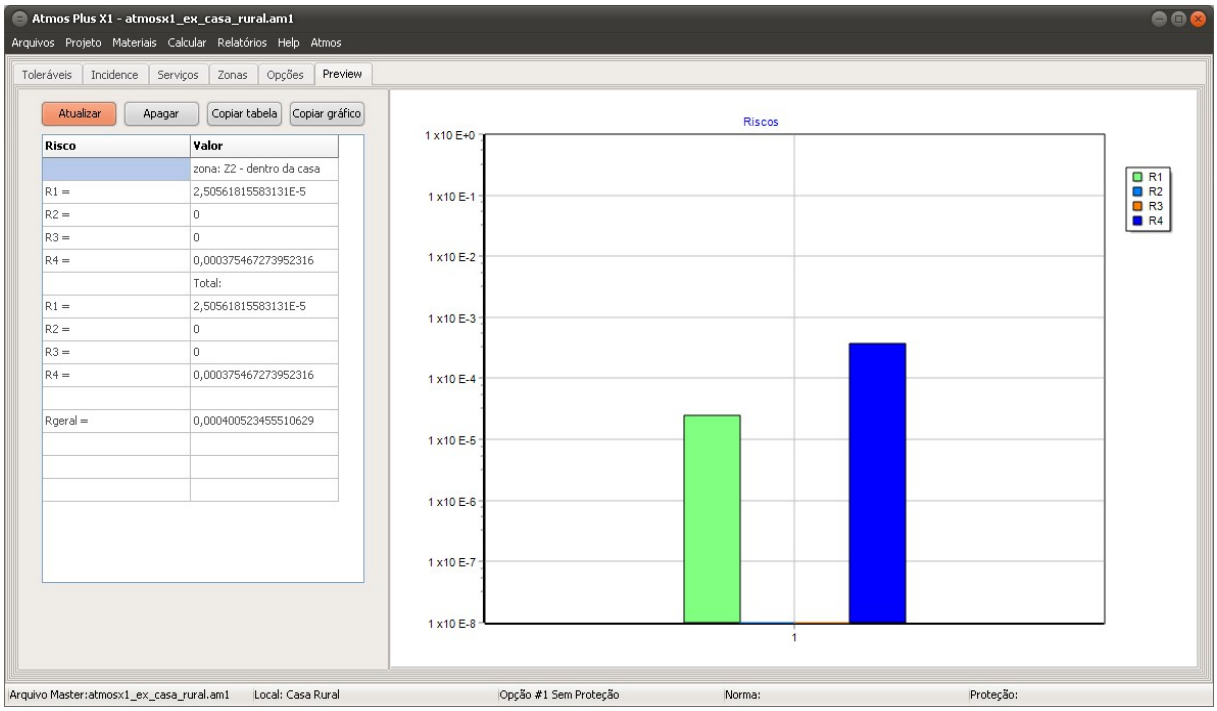
To load each Option, access Project / Options, select the desired Option at the upper box and click on Load button - note that the current Option will appears at the program bottom bar:



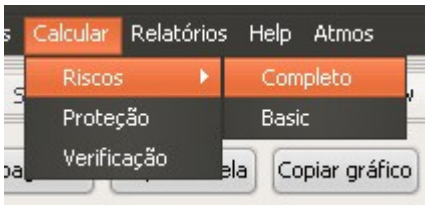
To select the Zone(s) of each Option, go to Project / Risk (complete), access the Options tab, click on button Update List, chose the desired Zone(s) and click on Update button to check the Zone(s) and Service Line(s) of this Option:



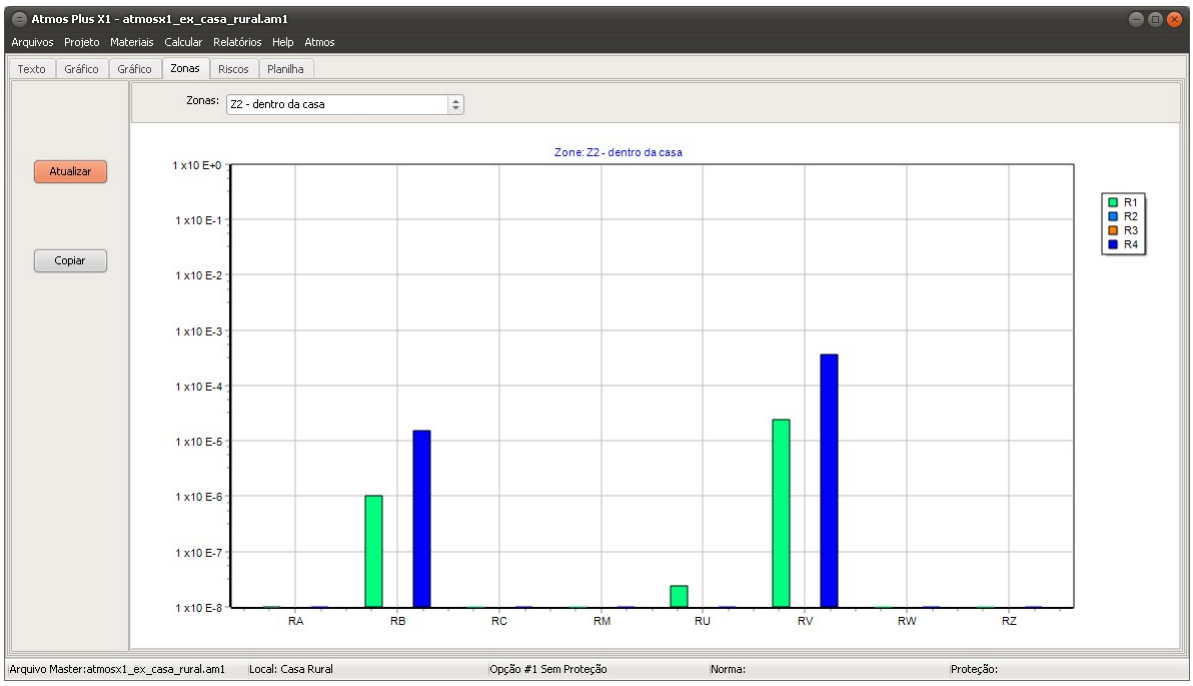
Access the "Preview" tab and click the Update button to generate the consolidated table of Risks by zone and the Zones total and also the total Risks chart; as this is a simple case, the chart will have only R1 and R4 values for the only Zone but, for more complex projects ,this chart will be really useful (see other examples available on our site):



Now we can get the final Risk results and reports: for each Option loaded to memory, click on Calculate / Risks / Complete:

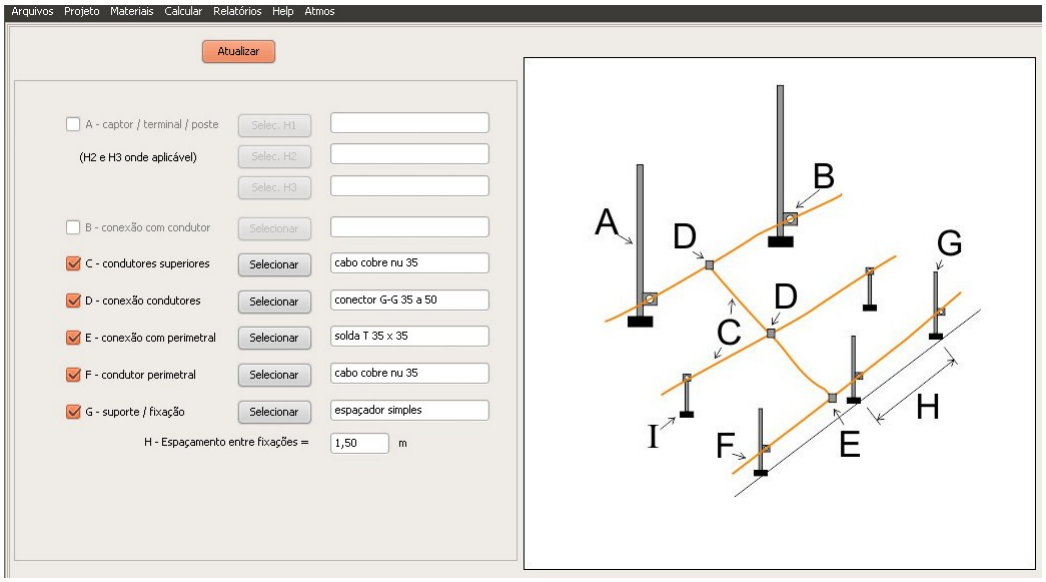


When receiving the message confirming the calculation, access Reports / Risks / Complete:



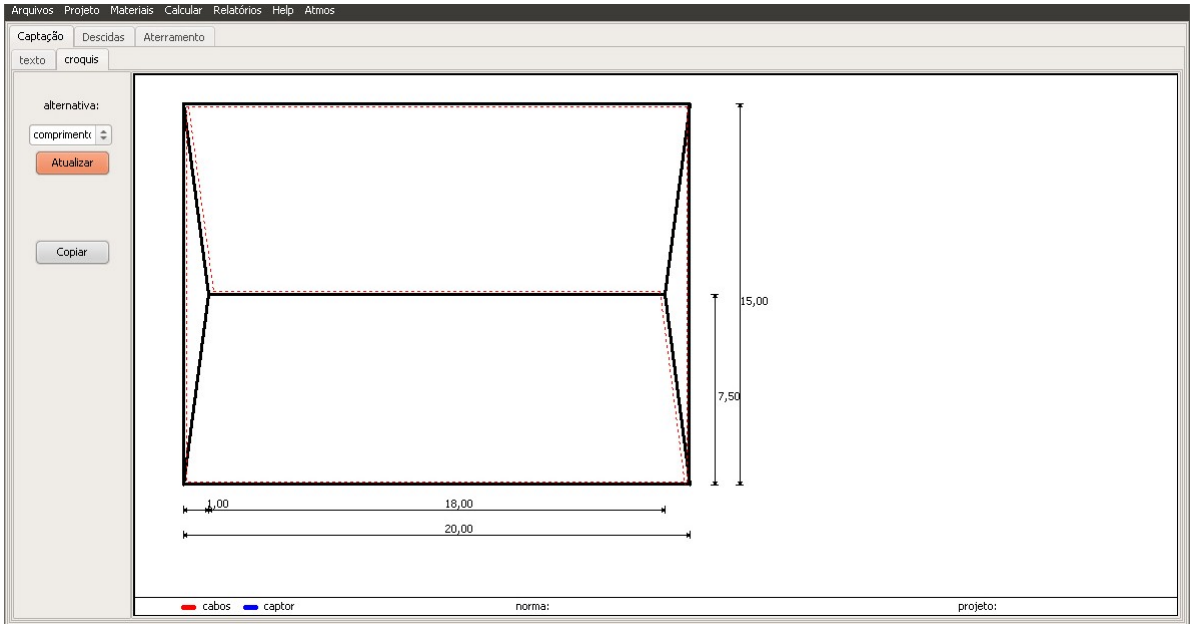
Note that, to be able to generate the cost comparison between the Options you must load each Option, run the Preview of its Risks and, for the Option with LPS, you also need to select its Components and click on Calculate / Protection, so Atmos can add the corresponding quantity of air terminals, cables, connectors and so on, with the total cost for materials and installation labor.

To select the Components - for the House model, Atmos don't use lightning rods (only the cables for the cage):



Menu Calculate / Protection:

Now, on menu Reports / LPS / Air terminals, we get the descriptive (text) report and a plan of the structure roof (analogous reports are available for Down conductors and Grounding):



Comparing the Options - Materials report and alternative selection:

If the model was an Industrial building (block), we'd have several alternatives but, for a simple House, we just need the cage (house owners don't like lightning rods over their homes); select the desired alternative (for IEC and NBR they are the same):

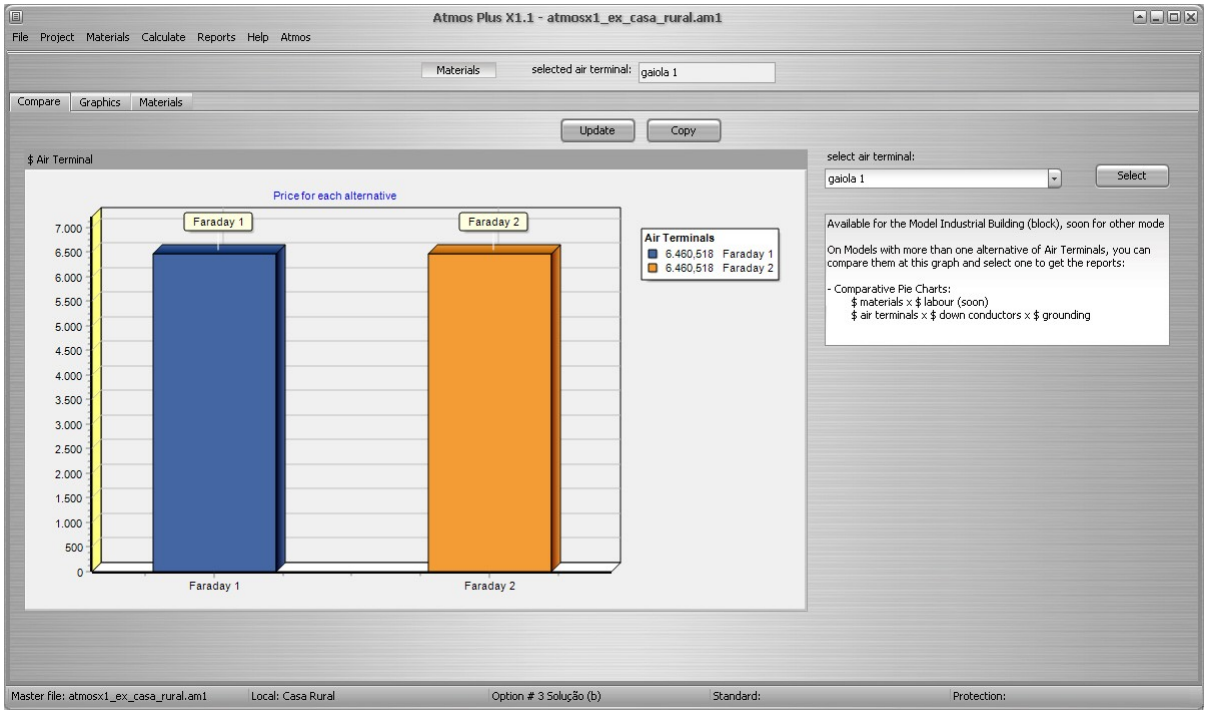
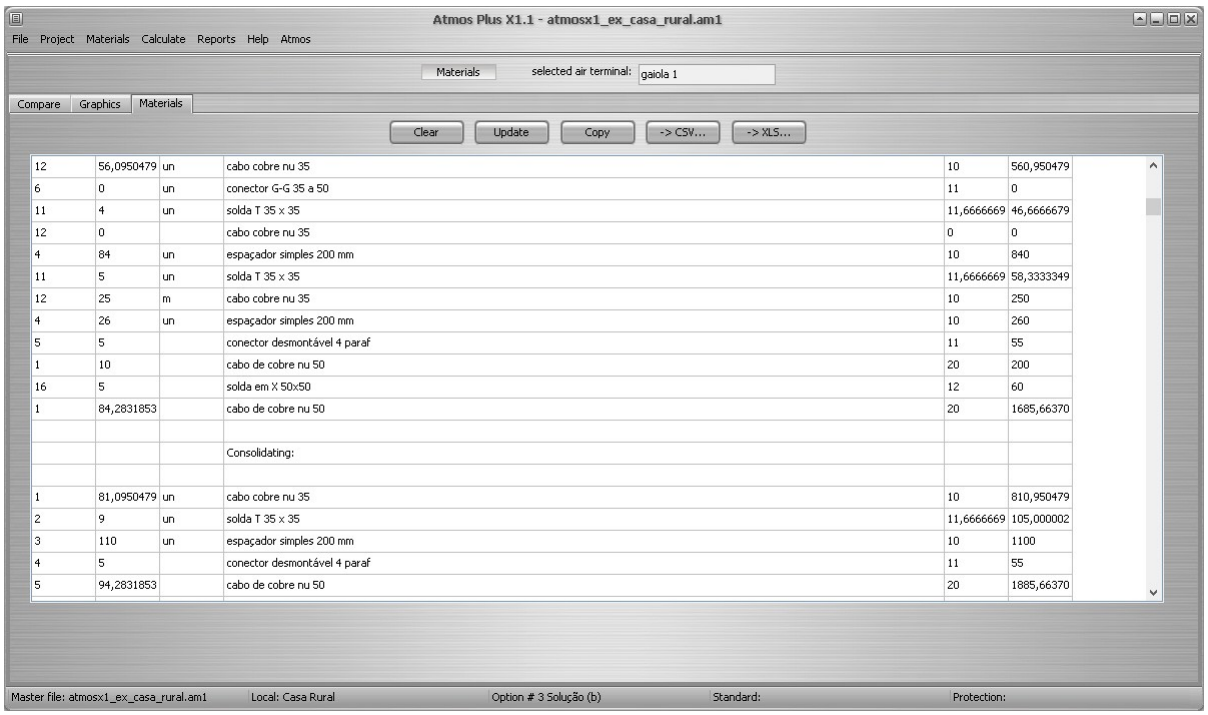
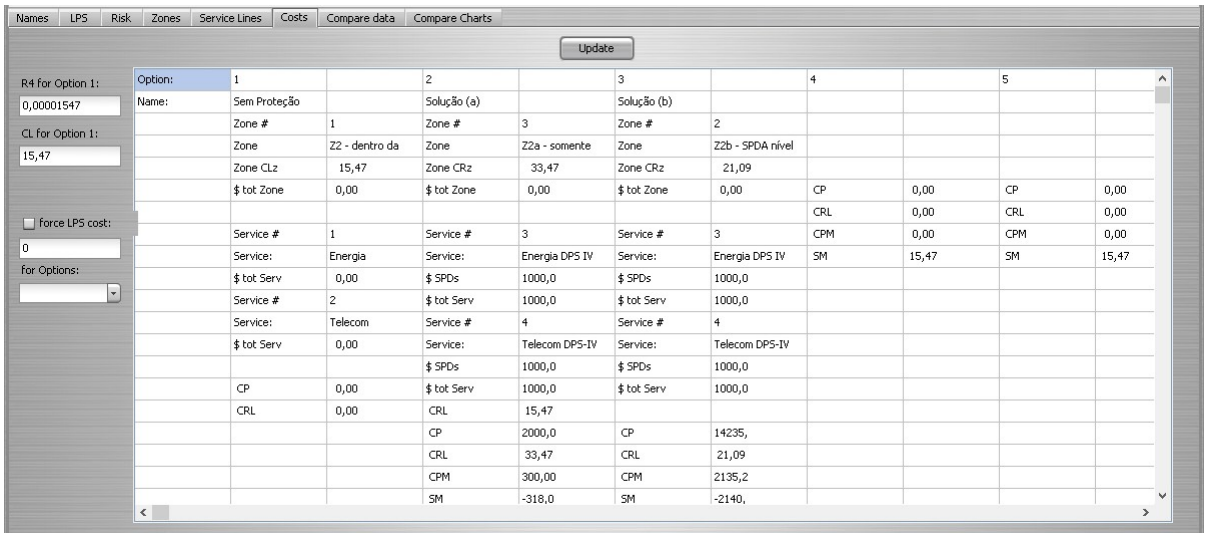


Chart comparing costs of components, to see how the cost is distributed over Air terminals, Down conductors and Grounding:

Components table and "shopping list" of materials, that is, if the project has 35 mm² cable at two or three different places, Atmos will add up to get the total 35 mm² cable used:



There are two tables comparing costs between Options. The first comparative table, at tab Costs, is very complete for the designer use, listing every cost of safety measures for every Service Line and Zone of each Option, but can get a bit messy for your customer, so it's not included on the final report:



At the next tab, Cost comparing, we get the consolidated table:

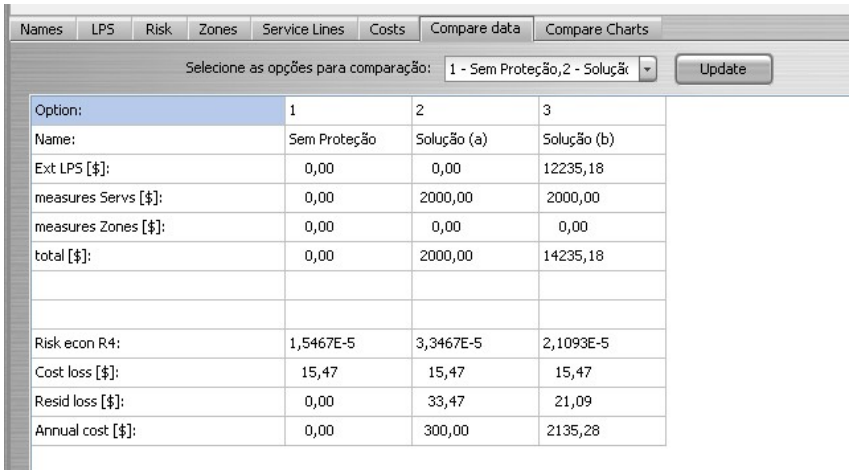
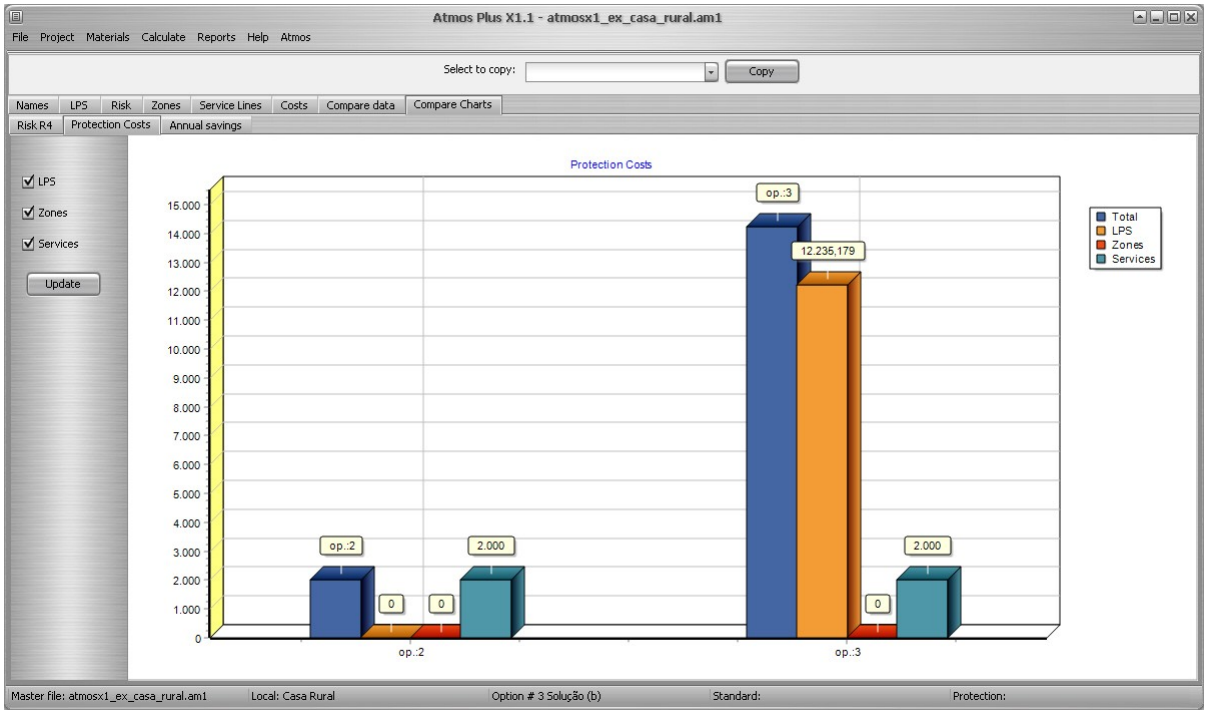
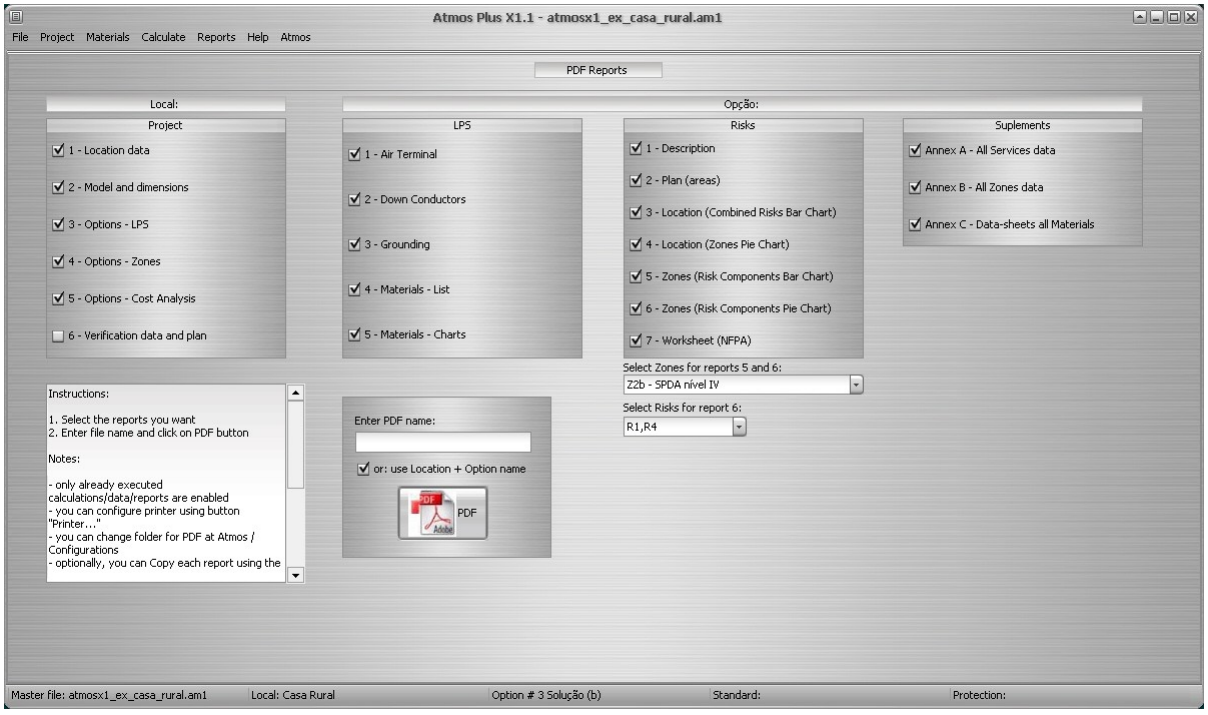


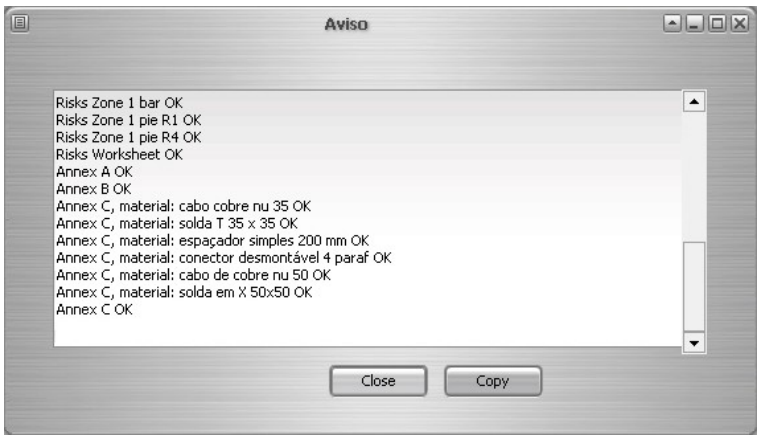
Chart comparing the costs of Options: at the last tab, we have some charts comparing the Options; bellow we show the chart with the partial and total costs of each Option:



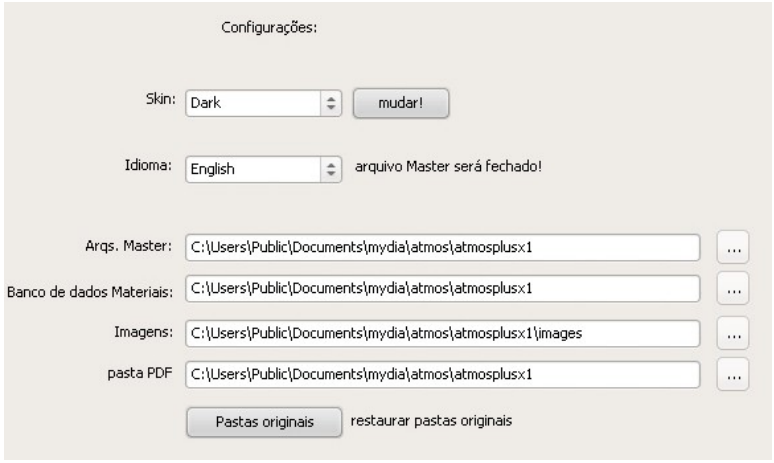
Final Report: access the Reports / PDF screen and select the Reports you want included on the final PDF:



Click at the PDF button and, if everything goes well, you get a dialog box with the Reports successfully included on the PDF:



Notes:
- Select ONLY the reports that already have been generated at the previous screens, or you can get empty tables and charts
- To get a printed copy, open the PDF with Adobe Reader (or Sumatra, or Foxit) and chose printer pages, etc.
- Atmos will save the PDF at the folder listed on the screen Atmos / Configure:



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Revision: 25 / 02 / 2016