

The SEA in the Transmission Network Development

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1. Introduction

REN - Rede Eléctrica Nacional, SA, the Portuguese Transmission System Operator accomplished for the second time a SEA for Network Development and Investment Plan (NDP) of the National Electric Transmission Grid (NTG) [2].

In Portugal, according to the Portuguese Decree-Law 232/2007 of 15 June, energy sector plans require an Environmental Assessment (EA), as they set the framework for the licensing of individual projects which must be submitted to Environmental Impact Assessment (EIA). The NTG 10 year Plan, issued each 2 years by REN, sets the required development for that grid for the same period.

The 2012-2022 NTG Plan [1], which was completed in 2011, was the second to be submitted to an EA procedure in REN. The EA procedure was carried out according to a Strategic Environmental Assessment (SEA) methodology based on a strategic approach, as described in the SEA guide published by the Portuguese Environment Agency (Partidário, 2007)[4].

This paper will explain the associated SEA process carried out and the approach and methodology followed to integrate the major drivers for long term network development, mainly load supply, market expansion and integration of new renewable energy sources (RES), thus conciliating the energy national goals with the uncertainty of new RES amount / technology / location. It will be revealed the innovative approach of common development of the SEA and the NDP itself, which proved to be very proficiently.

2. Trends and Drivers for long term network reinforcement

As said before, investment decisions made by REN in the NDP are essentially based on the following three drivers:

- Safety and quality of supply;
- Integration of renewable;
- Development of energy markets.

Among these a very relevant and special component is related with RES integration, taking into consideration both national guidelines and the energy policy for the EU member states. This means undertaking equally the objective of short-term "20-20-20" goal, and the 2050 strategy for low-carbon, where it is estimated that the EU has to reduce greenhouse emissions by 80-95% (relative to 1990 emissions).

For Portugal, these guidelines are defined in the national strategy for energy, which in practical terms, defines that in 2020 Portugal must accomplish at least 31% penetration of renewables in final energy consumption (which represents a 60% share of electricity produced from RES in the overall electrical needs of the country).

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Most of RES (wind, solar and the large hydro) sit far in zones where generation largely exceeds the consumption and, therefore, their production need to be transmitted through the network, which, consequently, must be reinforced. For instance, most of the wind and hydro resources are located on the inner northern half of the country, and the solar potential is basically on the interior south, causing important flows from these areas towards load areas and international interconnections.

Significant changes are also expected in the European energy network development, by setting strategic corridors to facilitate large flows of renewable energy and support security among regions, and also to an increasing integration of the potential of end-users in technical management of electricity networks.

Security of supply driver aims to reach the adequate continuity and quality conditions on load supply, in what transmission network concerns.

Market integration involves the ability of the grid to be able to properly connect producers and consumers, including international connections, avoiding or minimizing technical constraints and restrictions associated to network operation, and so facilitating bilateral contracts and energy exchanges.

The above drivers determine the need to strengthen the NTG, by reinforcing many of the existing lines and substations, as well as creating important and significant new extensions of the NTG. During this process a balance between ensuring security of supply and renewable integration, environmental protection and competitiveness must be accomplished [3].

The map on Figures 1 gives an idea of the extension of the main projects to be carried out in the NDP in new lines and new substations for the period 2012-2022 (marked in yellow and orange) [1].

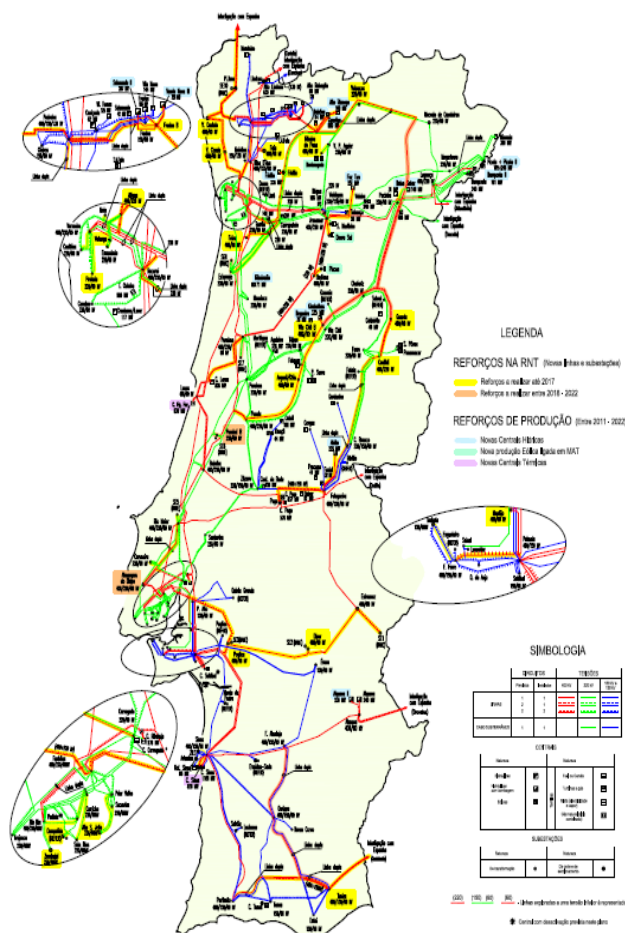


Figure 1 - New main lines and substations 2012-2022 [1]

3. The SEA in the NTG Development Planning

The objectives of the SEA of the Portuguese NDP were to identify, describe and evaluate, from an environmental and sustainability point of view, strategic options for the expansion of the NTG achieved and described in the previous section. The leading drive force is to anticipate and influence the NDP based on the major strategic options that are formulated within the technical decision process.

To that purpose the SEA considered the environmental and sustainability relevant and contextual factors that helped the planning of the required expansion of the grid to get focused on wider issues and not only on purely technical objectives and criteria. The SEA methodology has taken a strategic approach in the assessment, considering alternative strategic options of development as the object of assessment. The strategic options correspond to different possible scenarios for expansion of the NTG and will give shape and substance to the NDP.

The adopted SEA methodology was supported by the identification and justification of critical factors for decision (CFD) that structured the SEA. The three CFD selected were: Energy, Fauna and Spatial Planning, the same used in previous SEA [2][4]. An analysis of the required expansion of the NTG was done, discussing and comparing alternative strategic options according to each CFD and considering current trends and expected consequences. This leads to the assessment of strategic opportunities and risks of the different strategic options and the establishment of guidelines for the implementation of the NDP. Subsequently SEA defines and implements follow-up measures and programs.

The review and assessment of strategic options for expanding the NTG considered four strategic options (focused at the 2018-2022 time horizon) that were geographically analyzed and discussed, taking into account the requirements for load supply, RES integration and market integration.

The iteration established between the planning process and the SEA process resulted in the adoption of a fifth strategic choice - the Strategy F - which sought to improve the NDP beyond the four options initially under review and assessment. Strategy F proved to be a better option when integrating environment and sustainability, while still keeping the NDP driver objectives [2].

The NDP establishes a long lead time frame for planning and a framework for short term actions, assuming the necessary flexibility in strategic processes, allowing better uncertainty management. Also, through its public participation component, created a platform that enabled strengthened dialogue between REN and its planning process stakeholders: private companies, sectorial administration, environmental authorities, NGO's and the public.

4. The two SEA's in REN

For the second time (July 2011) REN accomplished the SEA for its NDP for the time horizon 2012-2022. The first SEA was completed in July 2008 for the 2009-2019 time horizon [3]. In 2010, REN published the first follow-up report [5] showing the current status of the implementation of the measures of evaluation and monitoring, structured in guidelines that had been set in the strategic environmental assessment report of the first SEA.

The cyclical nature of the NDP offered the strategic support to SEA by the identification of the opportunities and risks that will be revisited in the short term, both in relation to its technical adequacy, response to evolving national energy demands as well as national environmental and energy priorities.

This means, that the second cycle is a continuance of the first one especially in the long-term development drivers of the grid, and it regards and decodes the opportunities and risks achieved in the first cycle into the new one. This also allows working with the uncertainty context that is inherent to the planning and development of an electrical network process.

5. Conclusions

During the NDP and respective SEA process a balance between ensuring security of supply and renewable integration, environmental protection and competitiveness must be accomplished. One important achievement that SEA brought with was a more active dialogue with stakeholders, allowing the identification with anticipation of the “best” and more “adequate” long term strategy for NDP. Another important accomplishment was the flexibility to accommodate in a more efficient process the new RES locations and complementarities. With the identification of the best strategy to be pursued, SEA facilitated the planning process in reaching both technical and environmental goals.

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