

## IMPLEMENTING NEW OVERHEAD LINES ECO-DESIGN USING GEOENVIRONMENTAL INFORMATION SYSTEM

Luciano AZPIAZU

Iberdrola Distribución Eléctrica – Spain

[luciano.azpiazu@iberdrola.es](mailto:luciano.azpiazu@iberdrola.es)

Javier GOITIA

Iberdrola Distribución Eléctrica –Spain

[javier.goitia@iberdrola.es](mailto:javier.goitia@iberdrola.es)

### SUMMARY

*Now is very difficult to design and construct new overhead lines, because we the society considere not only technical aspects, but other related directly or not with the electricity, like electromagnetic fields, land uses, vegetation management, aesthetic impacts, bird convivency, ...*

*To prevent future problems it is necessary to act in several directions: new material, new design criteria, new information systems, improving communications with the stakeholders.*

*We will detail all the actions Iberdrola Distribución Eléctrica, S.A.U. has developed in Spain.*

*a) Integrate different information systems to generate a new system, GeoEnvironmental Information System (GADIS).*

*b) Develop new ecological materials equipment and designs.*

### INTRODUCTION

The Environmental Politics of Iberdrola Group, includes among its basic principles of action, the integration of the environmental Dimension in the Strategy of the Group and into to the processes of decision in investments, planning, maintenance and construction.

To give space to this new “Knowledge Body”, it has been considered convenient to create a "New Environment of Work" that selects, classify and promote the initiatives according their environmental impact.

The elected denomination for this environment, is "Masverde" (Greenplus) and its more outstanding characteristic is that all the technical, juridical, economics and social components, are agglutinated by a philosophy that considers to the environmental target as the indicator.

### THE ENVIRONMENTAL INCIDENTS. A PRIVILEGED AND NECESSARY SOURCE OF INFORMATION.

There are 3 basic pillars to guarantee the profitability of a regulated business as Distribution: method, organization and discipline, and the only way to mix them and generate synergies is to develop a system including data, procedures, criteria and decision tools.

It has been considered as of the maximum value and indispensable, to develop an Integral System (GADIS) that makes possible to record and contrast environmental "Inferences" and "Incidents" and their analysis in terms of technical-geographical-environmental in a temporary horizon. The important and varied information in a that underlies in each one of these situations that normally escape to the "Control", has to be available for several functions, to serve as indicator of environmental level, to detect lacks in designs or materials, to design improvements in methods and work field Team efficiency, and to foresee and prevent possible risks in advance, and finally to edit periodical reports.

### GADIS. STRUCTURE, PROCESSES AND INTERFACES.

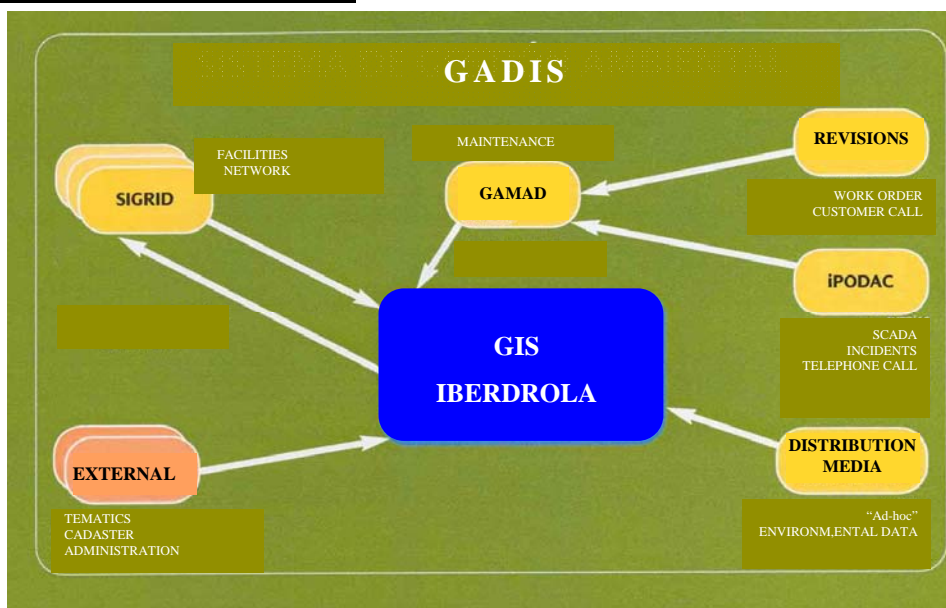
The system must be "intelligent". It exist a selective classification of data that makes it easy at the organization related with the decision, manage not mountains of data, but the fair ones, and added with an important value of "Significance" to be used in the different applications.

They are specially important the data referred to Incidents, because their genesis usually is related with events non-wished and the origin of environmental or economic losses and frequently social alarms.

#### What GADIS is

GADIS, that means Geo Environmental Management Information System of Distribution, is the integration of environmental data and specific corporative program, including the GIS of Distribution (SIGRID).

**Structures functional and process in GADIS**



GADIS is the integration of different Systems already existent and a new environmental data base generated "ad-hoc", using visualization tools upgrade and graphic three-dimensional process; it is based on attributes that help to manage an integral, global and centralized way and with different information levels and training.

There is a series of basic pillars in GADIS.

- The electric (network and facilities) assets with their graphic alphanumeric attributes, including connectivity with the Customer Information System integrated with cartographic publics, layers, cadaster, ortofotos, constituting the System SIGRID.
- Preventive and predictive maintenance data, the identified anomalies and revisions and those related with the electric service and the environment, recorded in the system GAMAD.
- The Database IPODAC recording breakdowns interruptions, incidents, scheduled works, etc., and with interfaces with SCADA and Telephone Call Customer System.
- The documentation about external and official legislation, as well as internal standards of materials, equipments, assemblies, projects type and construction and maintenance procedures.
- The collection of specific data of GADIS introduced manually or for interface, and whose basic structure is:

BIOGEOGRAPHY, CLIMATE, ORGANIZATIVE, GROUND

MANAGEMENT, ENVIRONMENTAL INCIDENTS, URBAN AND RURAL FRAMEWORKS, GROUND PHYSICAL CHARACTERISTICS, SOCIOLOGY DATA.

One of the keys factor for the profitability of GADIS, is the adoption of a specific GIS (Geographical System of Information) oriented to visualize all this information and easy to mix levels. GEOMEDIA of Intergraph has been our election.

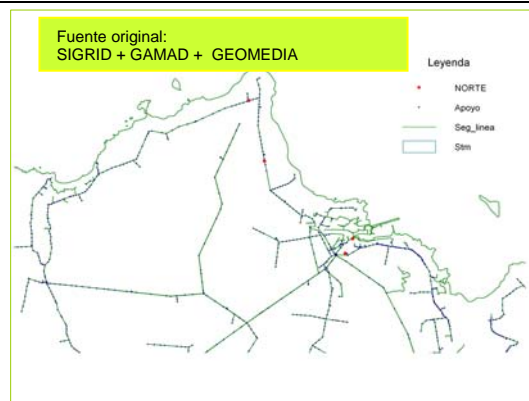
**Specialized users**

They are personal of Central Departments that generate simulations of planning and maintenance in different horizons.

**Users of character general (not specialized)**

Using preformed consultations and processes.

*Example: Function of mixing data maintenance GAMAD, with inventory -SIGRID.*



## SUCCESS KEY FACTORS AND IDENTIFIED OBSTACLES

As keys of the success, we can mention:

- The support of the GEO, influenced by the every time bigger difficulty of designing and constructing electric lines.
- The mentalization in the staff and in their employees.
- The existence of data in a very important percentage already necessary for other proyect.
- The choice of a system agile and effective tool.
- The organization of the Project.
- The subcontratation of the maintenance and actualization of the specific environmental data by layers.

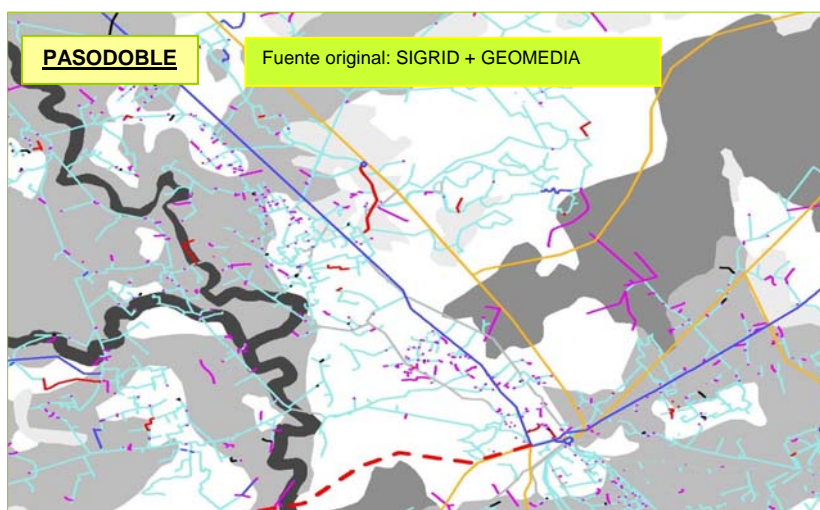
They have not been significant the obstacles or problems, because technically the data processing problems have been

solved to satisfaction and the users have adopted it with illusion and readiness, because it allows them to simulate alternative and to elaborate reports with accuracy and diligency.

### THE PASODOBLE PROJECT (ECODESIGN).

The most important application for construction and oriented to guarantee a correct and real management of new overhead lines is the PASODOBLE project to modelize, simulate and design new ecological corridors where all the eco constraints would be considered.

The project is used by Iberdrola workers and subcontractors and generates automatically maps and documents with graphical and economical information for different construction alternatives.



Before the implementation we have studied the state-of-the-art of the spatial analysis tools, adding the experience of the designers in order to prioritize the relations among the technical, territorial and environmental factors related with and efficient convivency between electricity and vegetation and ground uses.

### How to Pasodoble acts?

- A first selection of the territorial area where the line has to be designed.
- Based in the experience, a wide corridor (or several) is introduced manually.
- Selection and characterization of the different factors (economic, eco, laws, ...) specific for such a corridor.
- Automatic identification and assessment of all the land use, parcels..., affected with a clear identification of all the constraints and their value.
- Summary eco-technical documents including the first pre-design official project.

### Risk assumed

- The transmission of the experience real to the system.
- The choice of the tool, easy to be used and of general use.
- The data updating, establishing formal relations with the Administration to be interchanged periodically.
- The user training, for our own personnel and subcontractors.
- The natural scepticism of all new development.

### Scheduling

The project is being developed during 29 months (16 months developing and 13 testing in field and adequating the software).

A pilot project will be operative in January 2007 and implemented in all the company (more than 8 million customers) during 2007.

**Potential users**

Directly in other electrical utilities, but we have prepared the libraries of data and constraints for other services like water, gas, communications or railways. Definitely is an open system, able to mix different data sources and decision criteria.

**OTHER NEW MATERIALS, AND EQUIPMENTS DEVELOPED**

**A) Active components.**

New crossarm design to avoid stork rest and nesting and consequent faults.



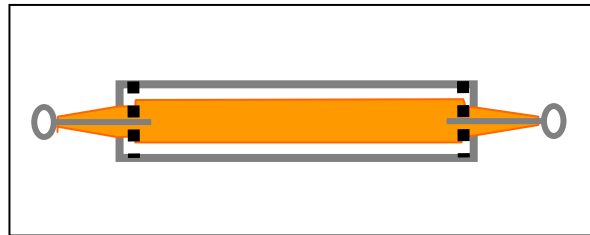
New mixed (wood and steel) crossarm, designed to avoid raptors electrocutions in protected areas.



Another crossarm design to avoid nesting of big birds.



Safety insulator to avoid big raptors electrocution.

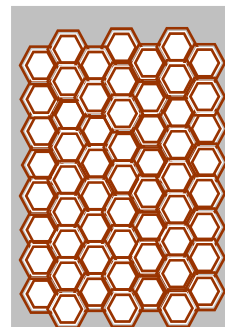


**B) Pasive components.**

Light and reliable “Resting device” designed to let big raptors staying safely at poles and towers



Nesting structure designed to offer little birds a safe location for nesting in stead of nesting on substation danger devices and areas.



**CONCLUSIONS**

In Iberdrola we continue searching and developing systems and procedures, trying to guarantee the convivency between vegetation and overhead lines, and profiting our experience for serving the community issues and targets.