1. CAPITAL BUDGETING: THE NEED FOR NEW APPROACHES

1.1 Traditional approaches to capital budgeting

Financial manager of electrical companies have often considered distribution investments to be a bottomless pit: needs that are never completely satisfied reappear each year. Moreover, technicians struggle to explain the profitability of these investments, as their aims are so diverse: to enable direct and measurable savings or to fulfill agreements with distributors, the non-respect of which could be very costly.

The definition of an investment policy often came down to choosing, through speculation, investments most likely to fulfill these various obligations, rules or requests within the framework of an imposed financial constraint.

To ensure that available funds are used optimally in the case of multiple and decentralized decisions, certain companies have developed a range of capital budgeting methods integrating both technical and economic elements. This was the case of EDF in France in particular; these technical and economic approaches had a very positive effect on the quality of studies and decisions at local level.

Meanwhile, their contribution to the issue of investment prioritisation remains quite limited, as:
- they concern only certain investments (those relating to service quality)
- they rely on internal company criteria, with no direct link to the real financial impact of decisions
- therefore, they do not enlighten us on the distribution of investments between the different aims the latter remaining thus, as we have seen above, a matter of speculation

1.2 Regulation and prioritisation: a double shock

In the electrical sector, corporate developments affect the majority of countries in the world at different times. These developments often bring into question the structure of electrical companies, which lead the latter to question their choice of investments. Among the elements of this new setting, we can state the following:

- the appearance of regulators, the main concern of which is to decrease the cost of distribution thus stimulating competition between suppliers
- secondly, the implementation of quality control procedures (clarification of the requirements of local authorities, in addition to a penalty system), to ensure that this pressure on costs does not lead to a decrease in the quality of service supplied.
- A requirement formulated by the regulators requesting transparency with regard to decision-making criteria and methods applied by distributors considered to be independent (even if they remain within companies that carry out deregulated activities elsewhere)
- The privatisation of companies, which must adopt a more financial approach to their distribution investments, while qualifying their profitability.

1.3 A coherent approach is essential for a group like EDF

Within the setting outlined above, distributors must arm themselves with more objective methods for prioritising investments. In particular, the definition of investment policies must rely on the quantification, in financial terms, of the associated risks (with regard to the regulator, authorities, customers etc.). Once these choices and methods have been defined at corporate level, it is necessary to adapt the technical and economic criteria to ensure that micro-economic decisions are in line with the company policies.

Obviously, risk evaluation is specific to each company, as it depends largely on the corporate setting in which it develops. With regard to a multi-national group such as EDF however, it is essential that a common approach is implemented so that concepts are commonly understood (in particular, within the Group's Finance Division) and because sharing experience can be enriching for each member (in particular, the experience of those who have been practising regulation for a long time compared to those who are at a less advanced stage of development).
2. THE EDF GROUP: A VARIETY OF SITUATIONS, TAKING INTO CONSIDERATION COMPANY BACKGROUNDS, THE DEVELOPMENT OF REGULATION AND CAPITAL BUDGETING METHODS

The EDF Group is present in the distribution business in seven European and Latin American countries. Each company is a product of its own individual history. Currently, faced with an environment and specific issues they must each update their practices.

2.1 EDF France

As a result of its special status as an integrated company, operating at national level and with a long-term vision, EDF felt that greater coherence was required with regard to:
- decisions relating production, transport and distribution
- multiple decision-makers within the distribution structure
- short, medium and long-term spending

This concern for coherence was the driving force behind the development of an economic approach to service quality, characterised by an appraisal of the malfunction: initially with a view to "national planning" (cost of the malfunction supposed to represent the prejudice caused to the local authority through imperfections in supply quality) but moving gradually towards a simple tool aimed at coherently implementing policies agreed by the company.

In order to improve the supply quality level and to meet the increasing number of uses for electricity, distribution networks received important investments from the mid eighties to the end of the nineties. On this basis, investments could be reduced significantly from the year 2000 without having a measurable effect on service quality. In the years to come, it appears that selectivity will become an even more important issue. With this in mind, investment prioritisation methods must be adapted to this new setting.

Appointed in 2001, the French regulator began, quite naturally, by taking a look at transportation before considering distribution. Its priority is the reduction of distribution transit costs. Elements relating to service quality are still being thought through. It should be noted, that to carry out a benchmark study, the regulator is faced with a difficulty that is very specific to France. The other French distributors have neither EDF’s size nor its constraints and therefore they cannot be easily compared to each other. Outside France, the settings are too different to make useful comparisons or at least commonly accepted ones. Public authorities are likely to continue playing a decisive role in the administration of the electrical sector whether with regard to price or service quality.

2.1 EDF Energy

For approximately ten years, British distribution companies have been operating with two significant constraints: the financial demands of their shareholders and the increasingly expert demands of the Regulator, both however, moving in the same direction: reduction in investments.

Moreover, the required level of service quality was not measured during this period.

Within this context, EDF Energy learnt to make assets last and developed a drastic method for capital budgeting based on risk evaluation. The process is based on 2 movements: top down to define the strategy and identify the major risks and bottom up to bring projects corresponding to these risks to the fore. The most important projects are scored based on probability of occurrence and impact thus enabling the formation of a list of priority investments.

The British regulator is used as a model with regard to its capacity to understand and discuss in detail all aspects of the distribution business, to obtain significant gains in productivity and to establish clear rules capable of being applied during an entire rate period. However, we have observed that the level of quality has levelled off at the expense of major efforts from companies, that the average age of assets is constantly increasing and that the period of reduced investments and as a result, reduced rates is coming to a close. With the new rate period, the Regulator implemented systems to urge improvements in quality as well as encouraging the non-consumption of the totality of authorised investments. The optimisation of investment decisions with so many parameters will require the fine-tuning of selection methods.

2.2 EnBW

German distributors are reputed for having an excellent level of service quality. This stems, in the first place, from favourable geographic conditions: high population density spread over the entire country, which is relatively flat.

Secondly, it stems from rules relating to the construction of networks, established to ensure the continuity of operations with the extensive use of the guarantee n-1 concept. In a setting where economic obligations were less important than nowadays, technical divisions could plan the investments necessary to achieve high technical performance levels. Consequently, it is not surprising to note that German transit costs are among the highest in Europe.

After much debate, Germany is the last European country to be named independent Regulator; it will take up office mid way through 2005. Up until now, the rules of the rate system for transport and distribution were the result of inter-professional agreements (VV2+). The setting-up of a Regulation authority will surely herald the arrival of a new
era: several German distributors have been preparing themselves by implementing significant cost reduction programmes.

2.4 DEMASZ and SSE

Distributors in the central European countries are at different stages of development since their privatisation but have many similar characteristics. In the first place, we can observe that the quality of service there is quite bad due to lack of investment during the end communist regime and the beginning of the transition period, but also due to the fact that distributors considered the mass consumers' vision of quality was less important than that of industrial clients. The demand for electricity that significantly decreased after the change of regime is now progressing once more. However, the demand has now moved from industrial clients powered by HV and MV, towards domestic clients powered by LV, which generates constraints locally in a network that is globally over-sized. This could justify important investment programmes, however it is unlikely that customers, unused to paying electricity its true cost, can endure continued increases.

In the CEEC, the regulators became rapidly aware of the importance of their new functions. Unlike the British Regulator, they urge companies to invest, however the importance of their new functions. Unlike the British Regulator, they urge companies to invest, however the rules for establishing distribution rates and return on investments have not yet been stabilised or really clarified, which is an additional risk factor for companies. The regulators introduced service quality indicators that were cruelly lacking and that highlighted the huge gap existing between countries in central and Western Europe that will probably take many years to overcome.

2.5 EDENOR and Light

In countries with important development potential, companies have to face considerable economic difficulties in the short term. In a crisis management situation, they limit their spending as much as possible both with regard to operations and right down to the smallest investments. The level of commercial losses is the major challenge and any action in this field presents an attractive return time. Unfortunately the general economic situation of clients led to a downturn in this field.

2.6 Common Issues

The current period can be considered a transition. In all countries in which Group EDF is implanted, each rate cycle brings with it its own set of innovations, both with regard to the method of rate calculation to the required quality level and the associated penalties.

In particular, it is interesting to follow the British regulator that is more or less a model for other regulators. We observe in the UK that, following a period where few investments were made the latter have again been allowed to increase, in particular to cope with an ageing network. The British Regulator has also shown its concern with stabilizing the financial situation of the distribution companies, enabling them to benefit from a good rating from rating agencies, which by lowering their loan interest expenses, ultimately benefits the customer.

3. OVERVIEW OF A COMMON APPROACH TO INVESTMENT PRIORITISATION

A new approach to investment prioritisation based on risk evaluation

In the past, distributors were centred on resolving specific constraints for the interest of all concerned. Among these constraints, we can state the following in particular:
- Compliance with legal obligations or technical standards (obligation to connect users of the network, safety of third parties, a minimum level of voltage quality, protection of the environment etc.)
- Compliance with technical guidelines (for example, the guarantee a power supply of "n-1"), which can be enforced from outside the company, or alternatively policies on supply quality or renewal decided by the company itself, can be implemented.
- Specific requests from local authorities or states expressed in the form of contractual agreements entered into by electrical companies (In France, for example, agreement for the under-grounding of electricity lines).

Within this new setting, the focus is on optimising one's own management within a specific but less sustainable regulatory and contractual framework, which forces us to take into consideration the effects of image and public opinion. With this in mind, investment policy is the result of the optimisation of several elements:
- investment expenses (immediate or deferred)
- clearly identified expenses or income, which depend on investments carried out: tariff revenue, losses the distributor must purchase, curative or preventive maintenance costs, taxes, possible penalties, etc.
- "technical" drawbacks (with regard to safety, the supply quality or the respect of the environment, etc.) which do not necessarily have any direct financial consequences, but which nevertheless represent potential risks for the company (« corporate risks »): legal risks, risks of penalties by the regulator (which can lead to loss of license), risk of tougher regulations, risks with regard to the company's image, etc.

The approach proposed is based on:
- the identification, and if possible, the quantification of the « corporate risks » (scoring according to the probability and severity of the risk)
- the segmentation of planned investments into homogeneous groups according to nature and aim.
- the assessment of the direct financial impact of each segment
- the quantification of technical drawbacks associated with each segment and the evaluation of their impact on « corporate risks »

To illustrate this, we will in find in appendix 1, a matrix representing most of the generic investment actions of a distribution system operator, and the types of « technical » risks, of « corporate risks » and the associated financial risks.

Of course, for each generic action the choice is not usually «all or nothing» but more an estimation of the correct level, taking into account the overall risk setting and all generic actions that have an impact on the given risk.

All companies within the EDF GROUP established this matrix. Their specificity is linked in particular, to the relative importance attached to the different risks, and the fact that, according to the regulation, the same risk may be financially quantifiable in some countries and not in others.

It can therefore be said that risk evaluation is specific to each company. The existence of common approach methods, characterized in particular by this matrix or by rules of risk quantification, greatly facilitates the necessary discussions within a Group.

This risk evaluation approach is not in conflict with the technical and economic approaches evoked in section 1. They are complementary. The risk evaluation approach allows a choice of policies that are as meaningful as possible for the whole company or the group. On the basis of the choices that are carried out in this way, it is then necessary to define the technical and economic elements (in particular the appraisal of the supply quality), which will ensure the coherent implementation of these policies through a series micro-decisions.

**4. FUTURE DEVELOPMENT OF INVESTMENT PRIORITISATION APPROACH**

**4.1. Making the method more refined**

In support of the organisation’s goal to efficiently link investment to the delivery of business goals, it is essential to be able to value investment in a consistent fashion. In a large and diverse global business the opportunities and reasons for investment and the risks, which are being mitigated, will be wide ranging. Hence EDF is developing a framework to enable different and competing investment priorities to be evaluated accurately and consistently thereby ensuring that maximum business value is generated to the EDF Group by the investments made.

At the heart of achieving this is the ability to evaluate the benefits of each competing investment programme, project or project option in a meaningful way. A project that delivers pure financial benefit is relatively straightforward to evaluate. Comparisons of NPV and other financial measures will drive the prioritisation and obviously this approach is already well embedded. It becomes more difficult when evaluating projects that have non-financial benefits or risk mitigation benefits.

Firstly, the level of non-financial benefits of a project needs to be evaluated and then related to other non-financial benefit projects using an approach that results in a fair comparison and a balanced decision on the priority and hence the investment apportionment. Helpfully some non-financial measures can be related back to an economic assessment. In other cases projects will deliver a mix of a number of financial and non-financial benefits. This again adds to the complexity of arriving at the right prioritisation decision.

Secondly, there is usually a probability factor surrounding the likelihood of the risk or benefit materialising and again, this probability needs to be evaluated in a consistent manner.

In the further development of EDF’s investment prioritisation strategy a number of approaches are being evaluated to achieve this. In all cases a project is assessed for the absolute contribution to the local business goals e.g. contribution to SAIDI, reduction in potential regulatory penalty, risk to reputation. Sometimes this requires sophisticated modelling tools to be able to accurately assess this contribution and requires much of the total implementation effort associated with investment prioritisation. It truly is a fundamental valuation step carried out by the project owner and must be accurate, repeatable and auditable. From this, a ranking of competing projects against each local business goal or risk is achieved.

Prioritisation between projects addressing competing business goals / risks either locally or globally is most commonly achieved through assignment of weightings. Usually, the collective judgement of a senior management peer group is used to establish a set of weightings. This is an evaluation of the relative importance to the organisation of each risk area or benefits stream and to value them accordingly. When the weightings are applied to the individual project valuations then overall prioritisation is achieved.

Experience shows that some projects are mandatory or need to be forced through (though their absolute ranking may not justify that alone). Hence the approach must be flexible. In practice scenario comparisons also make for improved decision making and therefore the output (prioritised list of projects/programmes) for different weighting options is a very useful test of decision making.

Providing this approach is implemented in a consistent fashion, it facilitates transparency and effective investment decision-making at a local level, at a Branch level and at a Group level.
4.2. Towards computer tools to support the approach

To help with the complexity and consistency requirements for effective investment prioritisation, decision support tools are called for. Computer based tools are readily available to support global decision-making. In simple terms the tools provide structured assessment templates for project input, they allow scenario options to be considered with ease, they provide advanced graphical presentation of prioritisation output and business impact achieved and importantly provide clear audit trails of decisions.

Some tools allow weightings to be changed dynamically allowing alternative investment scenarios and impacts to be displayed real-time. This helps to achieve optimum Executive input to investment prioritisation.

THE EDF’S GROUP

The EDF’s Group is present in distribution in 3 areas:

- **Western Europe**
  - EDF France,  
    (30 025 000 customers, 2 500 HV/MV substations, 570 000 km MV, 630 000 km LV)  
  - EDF Energy in UK  
    (7 650 000 customers, 291 HV/MV substations, 84 000 km MV, 75 600 km LV)  
  - EnBW in Germany,  
    (3 000 000 customers, 347 HV/MV substations, 36 800 km MV, 66 400 km LV)

- **Central and Eastern Europe**
  - DEMASZ in Hungary  
    (750 000 customers, 36 HV/MV substations, 18 000km MV, 11 800km LV)  
  - SSE in Slovakia  
    (687 000 customers, 43 HV/MV substations, 2 600 km HV, 9 800 km MV, 19 300 km LV)

- **South America**
  - EDENOR in Argentina  
    (2 250 000 customers, HV/MV substations, 27 500 km MV, 9 500 km LV)  
  - Light in Brazil  
    (3 700 000 customers, 83 HV/MV substations, 22 000 km MV, 35 000 km LV)
### Appendix – risks and benefits matrix

<table>
<thead>
<tr>
<th>Generic action</th>
<th>Segments</th>
<th>&quot;Basic technical risks&quot;</th>
<th>&quot;Corporative risks&quot;</th>
<th>Financial gains</th>
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</thead>
<tbody>
<tr>
<td>Network reconfiguration (new delivery points)</td>
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<td>Network maintenance</td>
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<td>MV/LV transformers, park increase related to load increase</td>
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<td>Meters park increase related to new customers</td>
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<td>New meters, installation half hourly meters for non-purified customers – obligation</td>
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<td>Change of neutral setting regime</td>
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<td>Improvement MV/LV – imperative (overloading)</td>
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<td>Improvement MV/LV – technical limits close</td>
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<td>Improvement MV/LV – voltage drop and other power quality issues</td>
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<td>Construction improvement MV/LV – imperative (overloading)</td>
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<td>Construction improvement MV/LV – technical limits close</td>
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<td>Construction improvement MV/LV – network restructuring</td>
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<td>Construction improvement MV/LV – network restructuring</td>
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<td>Intermediate network installation – energy thief</td>
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<td>Replacement network components – quality environment safety – legal obligation</td>
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<td>Replacement network components – quality environment safety – (company policy or commitments)</td>
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<td>Underpinning overhead MV/LV – network, quality environment – (company policy or commitments)</td>
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<td>Automation and remote control devices MV network</td>
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<td>Replacement PCB transformers, all retention equipments</td>
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<td>Replacement meters – time-based legal obligation</td>
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<td>Replacement meters – company policy or commitments</td>
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<td>Replacement transformers – obsolescence</td>
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<td>Bus equipment (technical and others)</td>
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<td>Hardware, software, GIS</td>
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<td>Identity</td>
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<td>Remote control tariff change</td>
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<td>Capacitors</td>
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