

Effectiveness of Energy Security Policies



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Promoting the evaluation of public programmes and policies, developing transparency and improving the use of resources and quality of services to citizens are government priorities. Every year, the Council of Ministers approves a number of programmes and public policies to be evaluated by the National Agency for the Evaluation of Public Policies and the Quality of Services, within the scope of the functions outlined in its action plan.

On the proposal of the Minister of Public Administrations, the Council of Ministers, in its meeting of 30 March 2007, decided on the public programmes and policies to be evaluated in 2007. These included: The National Reform Programme of Spain; the administrative procedures for the creation of enterprises; the national register of greenhouse gas emission rights and the quality of services in state museums.

The evaluation of The National Reform Programme of Spain was to focus on: the effect of measures adopted for the rationalisation of pharmaceutical expenditure, the effectiveness of energy security policies, programmes to foster research, development and innovation, and the financial facilities to boost entrepreneurial activity.

Please note that the English-language version of this text is a translation of the original Spanish-language document and is for informative purposes only. The Spanish text shall be regarded as official in all cases.

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CONTENTS

1. MAIN CONCLUSIONS AND RECOMMENDATIONS	4
2. INTRODUCTION.....	9
3. THE INTERNATIONAL CONTEXT, REGULATION AND THE SPANISH ENERGY SECTOR.....	11
4. ENERGY SECURITY AS A STRATEGIC OBJECTIVE OF SPANISH ENERGY POLICY.....	14
5. ANALYSIS OF ENERGY POLICY FRAMEWORK ELEMENTS WITH RESPECT TO SUPPLY RISK MANAGEMENT.....	15
5.1. Regulatory responsibility.....	15
5.2. Planning.....	16
5.2.1. Delays in the execution of the energy plan.....	17
5.2.2. A long-term energy plan.....	18
5.3. Supervision.....	19
6. ANALYSIS OF CRITICAL ELEMENTS OF ELECTRICITY SECURITY OF SUPPLY POLICY.....	22
6.1. Sufficiency of investment in electricity generation and the electricity mix.....	22
6.2. Development, quality and efficiency in the electricity transmission grid.....	24
6.3. The drive towards interconnection with neighbouring countries.....	26
6.4. Development, quality and efficiency in the distribution grid.....	26
6.5. Electricity system management to guarantee short-term security of supply	28
7. ANALYSIS OF CRITICAL ELEMENTS OF GAS SECURITY OF SUPPLY POLICY.....	30
7.1. Raw material dependency.....	30
7.2. Sufficiency of investment in gas infrastructure.....	32
7.3. Gas system management to guarantee short-term supply.....	33
8. CONCLUSIONS AND RECOMMENDATIONS.....	36
Annexes.....	42
Annex I. Most notable characteristics of energy supply and demand in Spain.....	43
Annex II. Measures contained in the NRP with respect to supply reliability.....	45
Annex III. Duration and frequency of system interruptions and their causes.....	46
Annex IV. Reform of the distribution tariff system.....	47

1. Main conclusions and recommendations

Energy security of supply is essential to the well being of citizens and the economy. The new international energy context of rising prices and lower security of supply, coupled with cases of serious supply interruptions both nationally and internationally, confirm the need to review principal risk factors and the effectiveness of both European and national energy security policies.

Security of supply is a central strategic element of Spanish and European energy policies, along with the objectives of competitive and sustainable energy. This is reflected in the Spanish National Reform Programme (NRP), which puts forward a series of objectives and specific reform measures with respect to security of supply. These are aimed at: improving certain aspects of planning and coordination, reform of regulated tariffs and improving infrastructure and interconnections. As commissioned by the Council of Ministers, this evaluation focuses on the analysis of measures to improve gas and electricity security of supply in mainland Spain, whilst not losing sight of the close relationship between security, competitiveness and sustainability.

In line with the European drive towards liberalisation and free competition, Spanish gas and electricity sector laws have been geared to the unbundling of regulated activities (transmission system operators (TSOs) and distribution system operators (DSOs), regasification, basic storage of gas) and deregulated activities (electricity generation, gas and electricity marketing). It has also established an independent regulatory body, the National Energy Commission (*Comisión Nacional de Energía*, CNE in its Spanish initials). The principle of free third-party access to networks subject to the payment of a tariff is applied. Environmental regulation has, to a large extent, imposed limitations on coal plants and given rise to an increase in wind power generation and a growing number of combined cycle gas turbine plants. Increasing gas and electricity interdependence means that electricity supply, especially at peak demand, is increasingly dependent on gas plant availability.

As a result of market transformation and regulatory change, gas and electricity companies are diversifying and participating in different ways in the later stages of the added value chain. This ranges from gas extraction to the use of gas in electricity production and its subsequent marketing and can have implications in terms of market dominance and security of supply.

In addition to these context elements, energy system reliability also depends on framework elements, the individual reliability of each element of the chain (generation/storage, transmission and distribution grids), and its integrated management, planning and supervision. From the detailed analysis of each of these factors in relation to supply risk management in the Spanish gas and electricity markets, it can be observed that, on the whole, Spanish policy is in line with that of Europe and has an acceptable degree of effectiveness. Diversification of gas supplies,

projected investment in electricity generation and energy mix flexibility provide security. However, network infrastructure could be improved, particularly with respect to electricity transmission, and weaknesses include underground gas storage facilities and interconnection with France.

The main conclusions and recommendations are:

The current 10-year plan for gas and electricity sectors is a pillar of Spain's energy policy. Its main objective is to satisfy demand and plan electricity transmission networks and certain gas infrastructure elements. The fact that the plan is conceived as an implementation plan, excludes any analysis and debate with respect to key strategic questions, such as technology selection and overall system planning within a timetable more in line with infrastructure lifespan (20-30 years).

Gas and renewables play a role of growing importance in the technology mix of Spanish electricity production. There are technical production limitations on the quantity of unmanageable (high volatility) renewables that can be accommodated by the system in given time periods and limits on bonus payments affecting the cost of energy. From a security of supply perspective, this means there is a need to complement unmanageable renewables with energies that can be stored and enable rapid start up and these are generally expensive.

Recommendation 1

The current 10-year plan should be complemented by a long-term (20-25 year) strategy document enjoying both political and regional consensus. Taking the work of *Prospectiva 2030* as a starting point, the strategy should take an integrated overview of the system. This would include analysis of regulatory matters and the energy mix to help those implementing policy and players operating in the sector. It would clearly establish monitoring objectives, measures and indicators. Study of the technology mix should be based on a cost/benefit analysis of all currently available technologies, both with respect to reliability and their contribution to competition and sustainable environmental objectives. The increasing use of renewables means there should be continued monitoring and reporting of system reliability mechanisms. The Committee for the Monitoring of The Technical Management of the System (*Comité de Seguimiento de la Gestión Técnica del Sistema Energético*) contemplated in the revised law of the hydrocarbons sector could include this matter in its reports.

Red Eléctrica Española (REE) and Enagas are companies with a central role in the electricity and gas systems. By law, they are the guarantors of security of supply and continuity. Regulations safeguarding the independence of the REE and Enagas units acting as system operators reflect the legislator's concerns about potential conflicts of interest.

In the past, the plans did not provide for sufficient alarm signals in the face of supply risks. Indeed, the Ministry of Industry, Tourism and Trade (MITT) does not have sufficient technical capacity to fully draw up, respond to or supervise the plans of electricity and gas system operators. As a result, part of the political responsibility for planning actually resides with the limited liability companies Enagas and REE.

Recommendation 2

There should be continued progress in the design of institutional coordination mechanisms for gas and electricity system management and their information and transparency systems should be reinforced.

The MITT should consolidate its planning function on a technical level and have access to human and material resources necessary to carry out its duties independently and more extensively.

Given the central role of Enagas and REE in the system and their multiple responsibilities, they should have mechanisms of public accountability in line with their political and social responsibilities. After a period, the effectiveness of safeguard regulations to deal with conflicts of interest should be assessed.

Although there was a problem of insufficient electricity generation capacity at the beginning of the decade, a look at current installed capacity and projected new installations suggests that this problem has been overcome. Nevertheless, the power guarantee mechanism which should have given rise to investment did not work sufficiently well.

Infrastructure development and network development in particular suffers from considerable delays due to long administrative procedures, uncoordinated action of different government levels and public opposition to building new transmission lines. Also, little progress has been made in interconnection projects with France, despite the efforts of the Spanish authorities and the European Commission.

There are imbalances between electricity generation and demand in different zones. If new generation facilities are not installed in such deficit zones, network investment costs increase due to transmission costs between zones, losses during energy transmission and congestion.

Recommendation 3

Progress must be made with respect to the function of price as a signal for suppliers and users. Using the proposals for the reform of the power guarantee mechanism as a starting point, the new system of payment by capacity, currently under development, should provide clear, transparent methodologies and produce sufficient incentives for energy availability and investment, if it is to avoid the failings of the previous system.

Introduce a regulation (a request to prepare a proposal already exists) to provide zonal signals, incentives and disincentives to producers in order to promote the efficient location of generating installations.

Study ways to speed up administrative procedures and to facilitate the setting up of appropriate coordination mechanisms with the Autonomous Regions. This implies also the need of greater involvement of local authorities. Also, study measures to bring about greater public awareness of the necessity for electricity transmission lines.

Gas and electricity interconnection projects, particularly with France, should continue to receive the necessary political support. All cooperation possibilities with companies operating in France should be explored.

Transmission network quality, as measured by the System Average Interruption Duration Index (SAIDI) is acceptable and, broadly speaking, the grid has a high level of interconnection. That said, analysis of interruption causes shows that supervision, maintenance and updating of installations could be improved.

Most supply interruptions have their origins in the distribution grid. There is a shortage of published information on this matter but it would seem that there is insufficient grid investment. This is partly due to a tariff system which, perceived to be insufficient by distributors, fails to offer investment incentives to meet growing demand. Nor does it offer incentives to improve quality or reduce losses during transmission. The tariff system is currently being reformed to include network quality and efficiency incentives. In addition, and in order to fill an existing void, the CNE will have new tools to regulate tariffs and supervise investment in transmission grids.

Recommendation 4

Maintain the high level of transparency on questions related to the transmission grid density and supplement it with maintenance indicators. Speed up, as much as possible, improvements to transmission grid protection systems. Push for the supervision of REE's performance by the CNE in line with the responsibilities assigned

to the latter by the recent reform of the electricity sector law (LSE in its Spanish initials)

Reform the distribution tariff system (currently in progress), so that proper incentives are introduced for transmission grid investment, quality and efficiency. Similarly, the CNE should carry out the supervision duties assigned to it by the LSE and promote the transparency of indicators to measure the robustness and maintenance of the distribution network.

Frequent changes in regulations have given rise to regulatory uncertainty, while there has also been a considerable delay in necessary regulatory reforms. Corrective action has been taken in this respect since 2004.

Recommendation 5

To consolidate liberalisation and competitive markets, the regulatory framework should contribute to make investor's behaviour more predictable, and incentives and price signals more stable. Any measure geared towards regulatory risk reduction will improve the business environment and will facilitate investment decisions.

An ongoing public policy accountability calls for a transparent setting up of its goals and continuing monitoring of its outcomes. This can be done by properly implementing the energy policy rationale put forward in the NRP and completing the current list of indicators to ensure proper monitoring.

2. Introduction

Security of supply is essential to the well being of citizens and a well functioning economy. Recent supply interruptions, both national and international, confirm the need to review the main risk factors and the effectiveness of policies to deal with such risk. This evaluation sets out to examine this matter¹.

When can supply be said to be secure or reliable? In the long term, sufficient investment in infrastructure must be guaranteed, and the long gestation period taken into account in order to meet growing demand. In the short term, system management should guarantee a very low risk of unforeseen supply cuts. The level of risk reduction sought will depend on social willingness to pay for such reduced risk.

This simplified approach cannot avoid the analysis of a number of key aspects directly related to security of supply: demand-side management, environmental impact and the cost of energy.

Society's environmental concerns, international commitments and responsibility to future generations all mean that the reduction of environmental impact must form part of the supply security objective.

Though short-term demand is very inelastic, consumers must be made aware of the true cost of energy. This is linked to demand-side control policies, especially peak demand, and the promotion of energy efficiency.

Supply security at what cost? Recent trends in international prices and a competitively imperfect electricity market raise questions about the cost of generation technologies, the efficiency of transmission and distribution systems and the competition needed to bring about price reductions.

All these aspects have been incorporated into both European and Spanish policy and three strategic pillars are identified: sustainable, competitive and secure energy. Whilst acknowledging that these are clearly interrelated, this report will concentrate on the latter².

The energy sector is comprised of multiple sources of "primary" energy: oil, natural gas, nuclear energy, coal, and renewables (mainly hydro, wind and solar energy) whose end use is electricity generation or direct consumption. As set out in the NRP, this evaluation concentrates on the electricity and gas sectors, which represent the main action areas of the government's energy policy. That said, all sources of energy related to electricity generation will be discussed.

¹ The analysis refers to mainland Spain due to the special characteristics of non-mainland territories.

² In line with the 2007 Progress Report which includes demand-side control and the promotion of renewable energy within the framework of sustainability.

Adding to the complexity of the situation is that electricity cannot be stored. It must be produced on demand, so the seasonal nature of such demand (summer and winter peaks) has a direct and total effect on production.

Following a brief analysis of the context and current security of supply policy, this report will analyse the most important factors in supply risk management. The analysis will be structured in three parts:

- Joint analysis of regulatory responsibility, planning and supervision for electricity and gas sectors.
- Critical elements of electricity security of supply policy including: sufficiency of investment in generation, technology mix, development, quality and efficiency of transmission and distribution grids, interconnection and system management to guarantee short-term supply.
- Critical elements of gas security of supply policy including: sufficiency of investment in infrastructure, raw materials dependency, and system management to guarantee short-term supply.

Finally, conclusions and recommendations will be presented.

In the drawing up of this report, document analysis was supplemented by individual interviews with policy managers at the MITT, members of the CNE, system operators, independent experts and players in different areas of the sector.

3. The international context, regulation and the Spanish energy sector

The international energy context has changed substantially in recent years. The great increase in the demand of emerging economies, especially China, and the instability of many producing countries has resulted in a growing trend of rising prices and lower security of supply. Environmental commitments condition the technologies used, encouraging the use of gas and renewables. From an energy security perspective, liberalisation processes and market opening have meant a great transformation of mechanisms to guarantee sufficient investment to meet demand and the recovery of that investment.

EU liberalisation and regulation have resulted in homogenous schemes for gas and electricity markets. They have given rise to substantial changes to regulations governing freedom of entry, network access and contracts. However, the advance towards a single market is not happening at the pace desired by the Commission and the policy of national champions is still predominant. There are even greater difficulties in achieving a single European voice in negotiations with energy suppliers.

En 2007, the EU in its "energy package"³, set out new guidelines to promote more secure, competitive and sustainable energy. Priority objectives include: a well functioning internal market, strategic security of supply, a specified reduction in greenhouse gas emissions caused by energy production or consumption and a single European voice in the international context. In March, The European Council adopted a global action plan for energy for the period 2007-2009. Commitments set out in this plan are a reduction in internal EU greenhouse gas emissions of at least 20%, a 20% reduction in energy consumption and an increase in renewable energies to 20% of the energy mix, all before 2020. Along these lines, in September of this year, The European Commission proposed a third package of measures with the declared objective of a true market with security of supply in the energy sectors.

Regulation of the Spanish gas and electricity sectors has followed the European line of liberalisation and market opening, though experts agree that electricity market prices do not yet provide a true signal to suppliers and demanders. There has also been progress in integration with Portugal with the setting up of the Hispano-Portuguese electricity market (MIBEL in its Spanish initials).

In response to this new context, electricity companies have developed strategies to protect them from competition and ensure their gas supply needs are met with respect to quantity and price. In practice, this has resulted in vertical integration between electricity generation and gas supplies. For their part, the gas companies have attempted to enter the electricity market with a view to participating directly in the final price of the raw material they market. In both cases, in addition to reducing

³ This and subsequent EU documents can be consulted at:
http://ec.europa.eu/energy/energy_policy/index_en.htm

supply and marketing risks, the companies seek to diversify their activities and perhaps achieve economies of scope⁴.

Both primary energy consumption and electricity demand in Spain have been increasing at a rate higher than GDP, with the exception of the last two years. Primary energy intensity fell by 0.9% in 2005 and 4.7% in 2006 and electricity intensity improved its performance⁵.

Spain's external dependence - percentage of energy imported in relation to energy consumption – is 80%, well above the already high EU figure of 50%. Oil accounted for almost half primary energy consumption⁶ in 2006 and recent years have seen a spectacular increase in gas consumption, which now represents 21% of total consumption.

In electricity production, the vast majority of energy consumed has its origins in fossil fuels (oil, coal and natural gas). There is a growing participation of gas (which now accounts for almost 30% of electricity production) and renewable energies, which, hydro-energy included, now represent 20% of electricity production.

Combined cycle gas turbine power stations are increasingly used due to technological efficiency, low emissions, lower investment costs and start up speed. Renewable energy, and wind energy in particular have been boosted by active policies to encourage their use⁷.

Growing interdependence between gas and electricity means that electricity prices and supply, particularly at peak, are determined by the price of gas⁸ and gas plant availability. Therefore, the interrelationship between electricity security of supply and gas security of supply must be taken into account.

To meet the growing demand for gas, which could not be satisfied exclusively by Algerian gas transported by pipeline, there has been an expansion of unloading installations for liquefied natural gas transported by methane tankers⁹, construction of regasification plants and cryogenic tanks and extensions to the national pipeline networks and pipelines connecting Spain with Portugal and France.

⁴ This vertical integration often takes the form of long-term gas supply contracts, minority participation in international pipelines, minority shareholdings in companies operating in the gas value chain (exploration, extraction, liquefaction, marketing) and integration of gas and electricity activities within the same group of companies.

⁵ In 2005 and 2006, corrected growth of electricity demand was practically the same as economic growth. Plan 2007 MITT.

⁶ See Annex I for a more complete overview of energy supply and demand in Spain.

⁷ In both cases, environmental conditions and the nuclear moratorium limit alternative options.

⁸ The price of gas, in turn, tends to be linked to oil prices.

⁹ The proportion of liquefied natural gas transported in tankers is continually increasing with respect to natural gas transported by pipelines.

4. Energy security as a strategic objective of Spanish energy policy

The latest Spanish National Reform Programme progress report identifies competition¹⁰, security of supply and sustainability¹¹ as the three pillars of energy policy¹².

According to The Secretary General of Energy¹³, the “ultimate objective” of electricity regulatory policy is to “guarantee the electricity supply in an efficient manner and with the least possible environmental impact.” Security of supply seeks to “guarantee continuous electricity supply and quality in the short, medium and long term throughout the country”. Both infrastructure planning, because of its long gestation period, and greater interconnection capacity, especially with France, are identified as priority action areas with respect to security. Furthermore, interconnection is of great relevance in achieving competition and sustainability objectives.

The NRP and its progress reports present a series of objectives and specific reform measures with respect to security of supply¹⁴. These are aimed at improving planning and coordination, reforming regulated prices and boosting infrastructure development and interconnection. Details on the extent to which regulations and measures have been implemented are given in the annexes to the NRP Progress Report.

The important regulatory developments of recent years have a dual purpose: to correct regulatory faults and to transpose European directives¹⁵.

A pillar of energy security policy is the ten-year infrastructure plan drawn up by the MITT with the participation of the regional authorities¹⁶. The plan is wholly reviewed

¹⁰ Although its evaluation is outside the scope of this report, the value of price as a signal for correct decision-making on the part of suppliers and demanders affects security of supply.

¹¹ Within this third element, it is worth mentioning the *Estrategia Española de Ahorro y Eficiencia Energética* (E4) (Spanish Strategy for Energy Saving and Efficiency) and the *Plan de Energías Renovables* (Renewable Energies Plan) 2005-2010. In Spain, there is a commitment to cover at least 12% of total primary energy consumption with renewable energies by 2010 (the figure for 2006 was 6.8%) and at least 29.4% of gross electricity consumption.

¹² It must be pointed out that there is no global energy strategy document encompassing all strategic objectives and operational objectives and measures.

¹³ Nieto. I., *La política energética del gobierno, Cuadernos de Energía nº 17*, June 2007.

¹⁴ See Annex for details of the measures put forward in the NRP.

¹⁵ Amendments have been made to Law 54/1997, 27 November, governing the electricity sector, and Law 38/1998, governing hydrocarbons, by LSE 17/2007 and LH 12/2007, in order to adapt them to European Directives 2003/54/EC and 2003/55/EC.

¹⁶ Planning, which began with the Plan 2002 – 2011 was revised in 2006 (Plan 2005 – 2011). The latest revision is contained in the preliminary planning document for electricity and gas sectors 2007-2016, July 2007, the final approval of which is expected before the end of the

every four years and partially reviewed on a two-year basis. Electricity generation is a free activity; consequently the plan is not fully mandatory for private investors, just indicative. However, in the case of transmission grid development, the plan is legally binding. Distribution grids are not addressed. For gas, there is a legally binding plan for primary network pipelines, total liquefied natural gas regasification capacity, and the storage of strategic reserves of hydrocarbons. All other gas plans consist of guidelines.

Monitoring and supervision are supported by a number of indicators, chiefly:

- The Average Service Availability Index (ASAI), which indicates, under certain hypotheses, the extent to which the system's available capacity would enable it to meet peak demand. A value of 1.10 is considered to offer a suitable margin.
- The System Average Interruption Duration Index (SAIDI) and System Average Interruption Frequency Index (SAIFI), as security indicators to measure the duration and number of interruptions equivalent to installed capacity at medium voltage.

Later, we shall include an analysis of these values in recent years.

year, pending the incorporation of the environmental strategy assessment (*evaluación ambiental estratégica*) and the CNE's mandatory report.

5. Analysis of energy policy framework elements with respect to supply risk management

The security of the system depends on framework elements, the individual reliability of each element of the chain (generation/storage, transmission and distribution grids), and their integrated management, planning and supervision. Regulation, planning and supervision affecting both electricity and gas sectors are examined in this section.

5.1. Regulatory responsibility

A regulation seeking to consolidate liberalisation and market opening initiatives must be within a regulatory framework offering stability in patterns of behaviour, incentives and price signals. The European Commission has criticised price setting in Spain. "Regulatory risk" reduction would give incentives to private decision-making involving long-term commitments. This is particularly important in this sector due to high infrastructure investment costs, long investment recovery periods, technological uncertainty (possible appearance of new, more efficient technologies) and strategic uncertainty (price evolution and competitor behaviour).

The cost of regulatory risk is clear with respect to electricity distribution tariffs, where the distorted implementation of a regulatory model by incentives and frequently changing and non-transparent coefficients have adversely affected distribution grid investment and led to the current situation where most system interruptions are due to problems in the distribution network (see 5.4.).

This regulatory risk is also caused by delays in adopting necessary reforms, such as the correction of the distribution tariff and the reform of the capacity payment for generators. Recent regulatory reforms have not only responded to the need to transpose new Directives but have also tackled existing problems.

The NRP makes an important contribution to the setting and monitoring of objectives. The liability mechanism and its transparent objectives and accountability should be maintained and strengthened. There is margin for improvement in NRP objectives and measures but it is very positive to have this guide to assess compliance with commitments. A review of these measure shows that they have been complied with to a reasonable degree.

A review of the measures proposed by the June 2005 White paper on the reform of the regulatory framework of electricity generation in Spain underlines the impact of the NRP. Many of its recommendations were incorporated. Where this is not the case, the White paper continues to be a reference document.

Finally, a third facet of regulatory responsibility, change management, must be added to regulatory risk reduction and accountability.

Technical regulatory faults have also taken too long to be corrected, despite almost unanimous consensus of the CNE and economic agents. In addition, the need for change was supported by international experience. Without going into specific details¹⁷, it is clear that there was a problem with the management mechanism for regulatory change. Most of these problems have been solved but it still seems that rapid regulatory changes depends on indirect mechanisms. The growing number of Operational Procedures initiated by REE are a cause of concern. The regulation should clearly set out application procedures regulatory changes and responsibility for their promotion could reside with the CNE.

5.2. Planning

The current ten-year plan for the electricity and gas sectors is a pillar of energy policy. It is legally binding for transmission networks and acts as a guideline in other areas and this authority has been strengthened in recent plans. A recent requirement lays down that for electricity or gas network infrastructure to be recognised for tariff purposes, it must previously be included in the plan. This contributes to optimising the use of resources.

Electricity grid efficiency has been reinforced by giving REE, as the transmission system operator, the authority to, “for reasons of security of supply”, “establish zonal connection capacity limits to transmission and distribution installations”, subject to prior notification to the Secretary General of Energy of the MITT¹⁸. In this way, freedom to install generators is made compatible with grid efficiency criteria.

However, there are certain limitations in the current planning model. Some are related to strategic matters not dealt with in the current plan, which is an implementation plan. There should be another document for strategic planning to complement the current plan and consider a longer time period. Another aspect of current electricity planning to be considered is whether, in the light of the increasingly important role of “uncontrollable renewables”, it would be better for the purposes of long-term forecasts to extend the stochastic approach to other variables, apart from hydraulicity, rather than limiting the analysis to certain aspects and scenarios.

The MITT’s capacity to supervise the work of REE and Enagas should also be examined. At present,, the MITT delegates the responsibility of forecasting infrastructure needs rather than supervising them. Finally, there are a number of factors causing important delays in the execution of the plan.

¹⁷ The White Paper itself cites the example of the special treatment for capacity guarantee in bilateral contracts, the exclusion of energy bought on the intraday market in the payment of technical restrictions management or in the mechanism for assigning capacity to the international connection with France.

¹⁸ Fifteenth additional provision of Royal Decree 1634/2006.

5.2.1. Delays in the execution of the energy plan

Developments to both electricity and gas transmission networks should be carried out in the time periods specified in the plan. There are three main causes of delay in infrastructure development: lack of coordination with autonomous regions, administrative problems regarding authorisation and public opposition to the installation of power lines.

Electricity Law 54/1997 and hydrocarbons Law 34/1998 stipulate that electricity and gas planning be carried out by the state with the participation of the autonomous regions. Consultancy mechanisms are being implemented to this effect but in practice, there are coordination problems. These are related to the territorial plans drawn up by the autonomous regions and local councils and the problem has been highlighted in the White Paper on reform of the regulatory framework of electricity generation and by the CNE. The White paper points out that "it would be conflictive to use the authority associated with territorial policy for ends other than purely territorial ones, and, to express it in a simplified manner, use this authority to take decisions related to industrial policy". Given the difficulties in carrying out the construction of new installations, there should be formal and flexible coordination procedures above and beyond the mandatory consultations and these could be created by means of the cooperation agreements set out in the LSE.

Secondly, there is unanimous agreement among market agents regarding the excessively long authorisation procedures for electricity generation, transmission and distribution installations. REE estimates that the administrative approval for a line project takes about three years. Such delays adversely affect competition and the security of the system. They are caused by procedural complexity and the number of applications processed.

The CNE drew attention to this matter both in the conclusions of the 2001 framework report on electricity and natural gas demand and availability and in the recommendations of its last framework report of 2006.

The MITT has made a substantial contribution to the reduction of procedural periods by incorporating environmental considerations from the outset through the strategic environmental assessment. This should speed up the environmental impact stages, which cause the longest delays. Furthermore, guarantees are required to avoid speculative authorisation applications which cause saturation of the procedural system. Nonetheless, the process is still excessively long and must be speeded up, perhaps through a one-stop type system allowing different stages of the process to be carried out simultaneously. This would also achieve greater coordination among the agencies involved.

The benefits of an electricity line are not clearly perceived by the general public, while there is fear of the possible effect of electromagnetic fields and visual and

environmental impact. This opposition paralyses projects which would contribute to greater supply reliability. An oft-cited example is Girona, which currently relies on just one very high voltage line. A Royal Decree establishing a fund to compensate for damage and inconvenience caused by the installation of power lines has helped. Initiatives to promote public awareness would also be useful. It would be of interest to promote understanding with ecological associations and to explain energy policy in general terms with special emphasis on energy saving and efficiency policies and the drive towards renewable energies.

5.2.2. A long-term energy strategy

Given the long gestation period of energy infrastructure and the fact that it forms part of state policy, there should be a long-term strategic plan to complement the current ten-year plan. This new strategic plan (20-30 years) would solve problems in the current ten-year plan and allow for a deeper analysis of technology selection and "overall" system planning.

The MITT Prospectiva 2030 energy study might well be a good starting point. The working group set up is divided into a Management Committee, an Operational Group, an Advisory Council, a Social Participation Council and sectoral experts. This group will publish a report prior to the end of this term of office.

This initiative and its participatory approach are praiseworthy and useful. Available information suggests that the group will carry out the study and analysis of scenarios. This group should continue its work and define a long-term strategy. It would be best if parliamentary political parties did not participate in order to achieve the political consensus necessary for a policy to extend over several terms of office.

Some of the forecasts in the current plan have proved to be unfeasible. This may be due to the interest of different autonomous regions in including what they consider to be priority infrastructure, without giving sufficient thought to whether this is viable within the ten-year period of the plan. A longer-term plan would be the place to include investment applications from the autonomous regions. Though they may be of priority, they should not be included in the MITT plan if it is not feasible to carry them out within the ten-year period.

The main objective of the current ten-year plan for the electricity and gas sectors is to meet demand and to plan electricity transmission grids and certain gas infrastructure. To go into all aspects of it would require a broader forum of dialogue and negotiation and a different timescale.

Currently, there is no strategic energy document clearly aimed at market agents to outline strategic and operational objectives and measures in response to explicit problems. A global strategy should be drawn up along these lines.

In addition, this should deal with matters related to the “technology mix” and assess the different technologies with respect to security of supply and economic and environmental implications. Clearly, in a context of rising demand and increasing energy prices, unstable hydrocarbon supplies and greater environmental awareness, it is necessary to encourage technological diversification of supply sources and the use of competitive indigenous and renewable energy. This would seem to be the line adopted by the government but there has been no real debate on the matter. Here, the reopening of the nuclear debate should be assessed (particularly bearing in mind that in the decade of 2020 most power stations will reach the end of their lifespan and the environmental impact of their closure and decommissioning costs will have to be faced). Mechanisms should be created to manage the supply volatility of renewable energies, so as not to compromise the security of the system, and also to evaluate their cost. Likewise, the pros and cons of coal should be assessed, including the extent to which it reduces foreign dependency at the cost of increased emissions, unless new carbon capture technologies are employed. Finally, there should be awareness of a growing dependence on gas due to the increase in the number of combined cycle power plants. An open debate on the energy mix would contribute to a broader perception of the strengths and weaknesses of the chosen option and an acknowledgement of its costs, thereby enabling the regulator and the TSO to better manage risk and reduce uncertainty for private investment.

5.3. Supervision

Monitoring has improved substantially in recent years, and the projected Technical Management Committee (*Comité de Gestión Técnico*) will provide strategic monitoring to supplement the more operational monitoring carried out at present. There is, however, considerable margin for improvement in the supervision of the REE and Enagas System operators/managers.

Appropriate transparency is to be observed in the evolution of network infrastructure¹⁹ and there is greater coordination between technical operators and the Ministry of The Environment, in the form of high-level informal monitoring meetings. Another positive point is the fact that this year has finally seen the publication in the electricity sector of the annual extraordinary installations and actions programme²⁰. This, despite being set out in Royal Decree 1955/2000, and demanded by the sector, had not previously been published.

The CNE carries out periodic security of supply studies on electricity and gas. A central theme of these studies is the monitoring of infrastructure development²¹.

¹⁹ Monthly reports to monitor infrastructure development carried out by the Ministry based on monthly reports by REE and Enagas.

²⁰ Order ITC/1549/2007, 18 May.

²¹ The latest available annual report on meeting demand is the *Informe marco sobre la demanda de energía eléctrica y gas natural y su cobertura. 2006* (Framework report on demand satisfaction of electrical energy and natural gas 2006).

The hydrocarbons Law 12/2007 drawn up by the Committee for the Monitoring of the Technical Management of the Energy System²² is also a step in the right direction. It is designed to permanently monitor energy supplies. This law has a more “strategic” perspective, as against the operational monitoring carried out in other spheres.

There is also internal monitoring of operators in the respective gas and electricity sectors:

REE has a committee to monitor plans and another for system operation monitoring. These committees have the participation of sector agents and are conceived as technical forums for debate and the presentation of budgets. Generally they work efficiently and represent an important contribution to transparency.

The Gas Monitoring Committee (*Comité de Seguimiento del Sistema*)²³ has met on as many as eleven occasions and has reviewed regulatory progress, supply and demand evolution, behaviour forecasts for the main parameters of the system, infrastructure development and winter action plans.

Both REE and Enagas play a central role in the electricity and gas systems. By law they are the guarantors of continuity and security of supply. Both are limited liability companies listed on the stock exchange whose shares are held by a large number of private investors. Both have two main missions: that of principal transporters, through the use of their networks and that of technical managers of their respective systems. This dual function gives rise to possible conflicts of interest.

Firstly, there is the danger that electricity companies (or undesirable third parties) might acquire a significant shareholding and this could have a negative influence on the neutrality of the technical system manager or on the operation of the transmission grid. Secondly, there could be a conflict of interest for the management teams of the companies, given that the interests of the shareholders (to whom the managers owe their loyalty) and the exploitation of transmission networks might not coincide with the objectives of the system operator.

²² Although pending regulatory approval, the Committee will comprise representatives of the MITT Secretariat general of energy, the Natural Gas Technical System Manager, the Electricity TSO, the Corporation for Strategic Oil Reserves (CORES in its Spanish initials) and the CNE.

²³ The Gas System Monitoring Committee, created by ORDER ITC/3126/2005, 5 October 2005, whereby the regulations for the technical management of the gas system are approved, has responsibility for system operation monitoring. This includes coordination, presentation of information and any other matter of interest for the monitoring of the system. In general, it must hold bimonthly meetings to be attended by representatives of all those subject to the system, MITT and CNE representatives and the electricity TSO if the agenda so requires. The results of its work are can be consulted on the Enagas website.

To deal with the first problem, there is a legal limit on private investor shareholdings. This protects the company and its directors from undesirable investors and reduces the influence that shareholders can exert over them. To deal with the second problem, the law provides for the creation of an organic unit, independent in functional and accounting terms, within each company. This unit would carry out the function of system operator and the CEO chosen by its board of directors would require the approval of the relevant minister. These measures enable conflicts of interest to be managed but not to be completely eliminated.

The social importance and interest to the state of their functions, makes it imperative that these companies be accountable for their public responsibilities and have a degree of transparency in line with the impact of their performance.

6. Analysis of critical elements of electricity security of supply policy

6.1. Sufficiency of investment in electricity generation and electricity mix

Generators have freedom with respect to installation decisions. Therefore, it may be asked if investment and projected investment in generating plants offer guarantees that there will not be supply interruptions due to insufficient electricity production. In addition, it can be asked if the technology mix is appropriate from the perspective of security of supply and if the principal mechanism to encourage investment and guarantee availability - payment by capacity – is working adequately. Certainly, energy prices offering a genuine signal for investment decision-making would be a good starting point.

Latest CNE estimates show that the projected availability index is over 1.10 and Ministry forecasts are approximately the same. The MITT considers that, based on applications for access to the network, it seems unlikely that there will be problems of installed capacity in 2016. Nonetheless, there is no guarantee that installations will come into operation and this depends on a number of factors, such as those outlined in point 4.2.1.

The different technological alternatives for electricity production have differences with respect to construction and operational costs, environmental impact, operational flexibility, degree of foreign dependence, etc. The current mix of Spanish electricity generation immediately gives rise to two questions: the management of renewables and the increasing use of gas. Also, the need for wider strategic reflection must again be stressed.

How can increased production volatility due to the growing participation of intermittent renewables be managed? Current policy revolves around the objective of the greatest possible use of renewables, with two limitations: affordable prices and security. With respect to technical security, in the 2007-2016 plan, it is considered ideal to supplement them with gas turbines and pure pumping resources, which combine fast start up and storage capacity.²⁴ In this way, the increase in renewables complicates system management but it does not compromise reliability. That said, it must have sufficient “supplementary” capacity and appropriate system management mechanisms. It is also of primary importance to solve the problems of massive outages for technical reasons²⁵ and wind energy response to the instructions of the system operator. This is currently in the process of being solved as such obligations have been linked to the receipt of payments and bonuses²⁶. Also, increased interconnection with France would help to improve reliability. With respect to the

²⁴ Hydraulic energies can also carry out this function to a certain extent (there is a risk of “leakage”). The high cost of pumping must be taken into account.

²⁵ The so-called “voltage dips”, a technical problem whereby small variations in wind energy can cause massive outages leading to a considerable loss of system capacity.

²⁶ Royal Decree 661/2007 25 Mayo.

effects of bonuses on energy cost, Royal Decree 661/2007, 25 May establishes some objectives with respect to installed capacity. These serve as a reference for those affected by the tariff system outlined in the Royal Decree and references are introduced with respect to maximum duration of bonus rights. This more rational approach to incentive management is welcomed.

With respect to the growing importance of gas, taking into account foreign dependency and price trends, the Ministry feels that because renewables have priority in respect of entry to the energy market, the market itself will give adequate signals to prevent excessive installation of combined cycle plants. Later, the analysis of the gas sector will include an analysis and assessment of gas security of supply.

Finally, with respect to the mechanism to provide incentives to investment and guarantee availability in times of scarcity²⁷, the capacity guarantee mechanism currently in place does not provide such incentives because:

- It is not linked to the reserve margin, i.e., the value the new capacity would contribute to the system.
- It does not encourage real availability as it does not penalise failure to comply.
- There is a perception that it can be modified without consultation.

Its main effect seems to have been to delay the closure of some installations at the end of their lifespan, but which could make a contribution at times of high demand.

The MITT has not been deaf to this criticism and has passed a reform of the mechanism in ORDER ITC/2794/2007, 27 September, whereby electricity prices will be reviewed from 1 October 2007, although the current system will be applied while the new one is being developed. The new regulation has been criticised by the CNE who have described it as a step backwards²⁸.

From the proposed alternatives²⁹ to reform the capacity guarantee mechanism, a new system of payment by capacity has been adopted and this includes two types of service: an availability service and an incentive to investment in capacity in the long

²⁷ The justification for this type of mechanism is based on the fact that the marginal profit to the electricity producer of a kilowatt of new capacity is lower than the marginal profit to society. This is because the latter includes the benefits of security of supply. Furthermore, there are implicit or explicit price limits and delegation of responsibilities to the regulator in order to cover supply risk.

²⁸ By law 17/2007 the Ministry is authorised to carry out regulatory reform in this area by ministerial order, rather than by Royal Decree as was previously required. Such orders will respond to system operator proposals or to the regulation on operating procedures.

²⁹ Amongst the proposed alternatives are those issued in the White Paper and those offered by the *Consejo de Reguladores del MIBEL* (Council of Regulators of the Iberian Electricity Market (MIBEL in its Spanish initials)).

term. The basic aspects of payment by capacity mechanisms will be subject to future proposals of the system operator. To avoid the failings of the previous system, special attention will have to be paid to the methodology developed for the calculation of tariffs, so that they are sufficiently clear and transparent. Furthermore, the mechanism must provide sufficient incentives to investment in generation capacity and availability at times of scarcity.

The payment by capacity system constitutes an additional incentive to the incentive implicit in the short-term signal provided by the price of energy in the market. The fewer the distortions to this price, the better it will function as a signal of scarcity and a guide to investment.

6.2. Development, quality and efficiency in the electricity transmission grid

REE's transmission activities are regulated because the transmission grid gives rise to a natural monopoly situation. Tariffs are fixed at government level in accordance with investment carried out and put into operation. The procedure for investment considers the cost/benefit relationship of the measures and identifies grids whose improvement would lead to greater efficiency, thereby coordinating transmission and distribution grids.

Given that regulatory risk of failure to recover investment is practically non-existent with the current tariff system for REE activities, the first question is whether there is a problem or potential problem due to insufficient grid development and quality (design, maintenance, and mesh) or lack of network efficiency (losses in the transmission grid, extra cost of grid restrictions).

With respect to grid quality, the evolution of the system average interruption duration index (SAIDI) suggests that quality is at an acceptable level. Since 1985, the reference value (15 minutes on the Spanish mainland) has only been exceeded on four occasions and the value for the period 2002-2006 was between 1 and 3 minutes³⁰. Furthermore, the value of this indicator is in line with the European average of five transmission companies selected from Italy, The United Kingdom, Portugal, Sweden and France. In addition, of the interruptions and their duration, as measured by the SAIFI and SAIDI indicators, only 3% of the interruptions and 2% of the duration are due to problems in the transmission grid.

A more detailed examination of the cause of interruptions reveals that, in general, there are two main causes of interruptions: technological factors, including improvement and maintenance, and network redundancy (mesh).

With respect to technological issues, the REE grid is the result of multiple legacies which have differing protection systems to combat distortion. There is a renewal and enhancement plan and another for updating installations to tackle the potential

³⁰ The average 2006 transmission grid interruption time was 1.73 minutes.

problems arising from insufficient protection systems. At present, there does not seem to be sufficient supervision of these matters, apart from REE's internal supervision. Analysis of interruption causes shows that there is margin for improvement in the supervision of installation maintenance and enhancement, particularly with respect to protection systems. The Ministry, in its Plan for the electricity and gas sectors 2007-2016, draws attention to the fact that 87% of installed capacity foreseen in applications for access to the transmission grid will be connected at nodes with insufficient mesh. This may be admissible, given certain conditions, but it is still a cause for concern.

With respect to grid development, delay concerns must be reiterated (aspects referred to in point 4.2.1 of planning). At present, the laying of electricity lines takes more time than the construction of combined cycle power plants.

The network restriction (congestion) and losses indicators suggest a problem of inefficient transmission. This reduces the energy supply and consequently security of supply is also lower. 2004 transmission grid losses represented 1.68% of all electrical energy entering the network. Extra costs incurred in the system due to grid restrictions³¹ amounted to 2.97% of the total cost of energy in the wholesale market in 2004³².

Imbalances between generation and demand in different parts of the mainland result in the need to transport energy from surplus zones to deficit zones. Appropriate location of new generating plants could provide important economic benefits, such as: the reduction of transmission losses, the elimination of technical restrictions and the avoidance of inter-zonal transmission expenses. Hence, the importance of providing generators with sufficient signals (informative and economic) for the establishment of location priorities.

The 2007-2016 plan makes progress in this sense. It identifies priority locations such as Madrid, the autonomous region of Valencia (provinces of Alicante and Valencia), Catalonia (provinces of Girona y Barcelona), Andalusia (provinces of Granada, Almería and Málaga), and includes details of connection points capacity limits of different access points. This is welcomed and should be completed with economic signals. In this respect, the twelfth additional provision of Royal Decree 1634/2006 gives the CNE a mandate to propose a regulation to provide signals to producers in order to allow for efficient location of generating plants. This regulation should incorporate zonal incentives or disincentives for new electrical energy production facilities, taking account of losses. This mandate refers to that which had already been set out in Royal Decree 1955/2000, in which the need to apply loss signals is provided for. Since 1999, there has been a REE generic operational procedure enabling market agents to assume individual responsibility for transmission grid

³¹ These are grid limitations on the injection and withdrawal of system capacity, be it due to lack of capacity, congestion or stability requirements of the system.

³² White Paper

losses. However, it has not been put into practice because a detailed implementation procedure has not yet been approved.

6.3 The drive towards interconnection with neighbouring countries

Current interconnection capacity with France is insignificant in relation to the aggregate volume of the Spanish and Portuguese markets. It barely accounts for 3% of peak system capacity.

Increasing the interconnection capacity of very important because:

- It would increase competition.
- It would improve energy supply.
- It would increase the secure participation of intermittent renewables due to the greater support if such energy sources were unavailable.

According to the current Secretary General of Energy, "it is perhaps the government's number one priority in terms of energy infrastructure and security of supply at this point in time".

The difficulties in increasing the interconnection with France are political in nature. Electricity interconnection between Spain and France was declared a priority in the European Council Presidency Conclusions of March 2007. Subsequent to the bilateral summit of November 2006 it was agreed to select a coordinator for the project, and former Commissioner Mario Monti was appointed last summer.

Apart from confirming the importance of the interconnection³³, it should be pointed out that its effects are those that might be expected from an expansion of the market and the functioning of a single market, in particular with respect to a trend towards price convergence and an increase in international exchanges. It should also be taken into account that at present, European legislation allows for the interruption of international exchanges in the case of risk to national demand. Therefore, security at national level must continue to be assessed. Indeed, in the current energy plan, the interconnection capacity is not taken into account when estimating availability.

6.4. Development, quality and efficiency in the distribution network

Distribution is an activity carried out by private agencies with tariffs and quality control mechanisms regulated by the government. Problems can arise for the following reasons:

³³ There is a certain paradox in the fact that cheap nuclear energy is primarily imported from France while at the same time the national nuclear moratorium is maintained.

- Incentives (tariffs and bonuses/penalties) and control (supervision) mechanisms to guarantee grid quality (robustness and maintenance) and grid efficiency (energy losses) do not work.
- Regulated tariffs do not provide adequate incentives to investment.

Although the SAIDI and SAIFI quality indicators have registered continuous improvement³⁴ in recent years, the fact that more than three quarters of supply interruptions arise in the distribution grid³⁵ is a cause of concern. Furthermore, additional quality requirements in different autonomous regions³⁶ show unsatisfactory results.

The National State Administration does not seem to have specific information with respect to possible robustness and maintenance problems in the autonomous regions. This is due to decentralised supervision responsibilities. The scarcity of published information on the matter, apart from internal information, is also striking. The transmission grid is far more transparent, as details of it are included in the MITT's Plan for the gas and electricity sectors. The proposed Royal Decree to regulate the distribution of electrical energy, which will be discussed later, deals with this matter. It imposes obligations on distribution companies to provide information necessary to update tariffs, in order to facilitate the supervision and control of the regulating authorities. It is not clear if this information will be publicly available, but it would be desirable.

It is reasonable to demand a certain degree of robustness so that in cases of transmission grid faults, support could be given from certain neighbouring points of the distribution grid. Currently, this is not common.

With respect to grid efficiency, losses in distribution and transmission amounted to 9% of total 2006 consumption. The vast majority of these losses were in the distribution grid. The above mentioned Royal Decree also deals with this question, as we shall see later.

There is a perception that as a result of insufficient tariffs, companies have postponed non-essential investment. This argument is consistent with data indicating that most supply interruptions are due to problems in the distribution grid.

How does the current tariff mechanism work and what effects has it had?

³⁴ The national SAIDI in 2006 was 2.04 hours; in 2005, 2.18; and in 2004, 2.42.

³⁵ See annexes.

³⁶ There is a problem because compensation does not exist for failure to comply with such additional obligations, given that government regulation of distribution is established in a general manner by the National State Administration. The projected tariff reform would solve this.

The current distribution tariff system³⁷ has received criticism for the following reasons:

- Regulatory uncertainty exists with respect to criteria used to share out the total tariff fund to the different companies.
- There are no incentives to invest in installation improvements. There is a prevalent perception that tariffs are insufficient. A revenue limitation formula is applied using conservative estimates of demand and CPI, without subsequent adjustments to reflect real values. Nor is the formula reviewed periodically to avoid imbalances between revenues and expenses. The cost of capital is not taken into account. This is particularly relevant in an asset-intensive activity such as distribution, whose profitability is supposedly regulated at government level. Differences between companies are not taken into account either and this is especially relevant in that they are faced with different demand growth rates³⁸.

The regulator has recognised the need for a new tariff model and there is a new draft Royal Decree in the pipeline to regulate distribution. The main change will be the application of a formula on an individual basis for each company with incentives according to supply quality and loss reduction, and the establishment of instruments to increase information to the regulator.³⁹

The CNE has issued a preview report on the draft of the Royal Decree.⁴⁰ It very much welcomes the proposed law as a substantial improvement in the tariff system. Nonetheless, it outlines a number of considerations for improvement (see annexes).

Whilst recognising the great step forward of the new draft law, it is hoped that advantage will be taken of the opportunity to correct all distortions caused by the current legislation as these substantially affect investment levels and supply reliability.

6.5. Electricity system management to guarantee short-term security of supply

The system operation facilitates a balance between supply and demand at all times. To this end, REE, in its role of system operator can take action and request certain

³⁷ The current tariff formula consists of a joint revenue limitation for the five big distribution companies (single fund) which is indexed-linked to annual inflation, a 1% productivity factor and an adjustment for the increase in total demand met. There are share-out factors but the calculation of the coefficients applied each year by the National State Administration cannot be considered transparent.

³⁸ For instance, tariff increases are produced by the market growth of competitors.

³⁹ See summary of new measures in the annexes.

⁴⁰ Report 23/2007 on the Royal Decree Proposal to regulate electricity distribution of 26 July 2007.

services of other agents. In general, it is considered that the operational procedures of the Spanish market have functioned reasonably well, despite some minor problems.

Apart from capacity availability which should be guaranteed by the payment by capacity mechanism, the system operator has primary, secondary and tertiary reserves⁴¹ at his disposal, in addition to other mechanisms to provide capacity⁴². The system operator can also interrupt the demand of certain consumers and issue orders directly.

In a system like the Spanish one, where there is growing use of renewable energies with a high degree of volatility, system operation is more complex and the system operator's capacity to react more important. Certain problems related to wind energy management, such as "voltage dips"⁴³ or the absence of efficient control and communication elements are in the process of being solved with new wind farms being obliged to withstand voltage dips. Existing wind farms must adapt within a certain time limit. Wind farms must also be registered with control centres. However, some plants fail to comply with these obligations. Other problems, such as incentives to bring hydroelectric dam management into line with security of supply objectives and gas management which ignores supply security in favour of other more profitable business alternatives, may be solved by means of the new payment by capacity system.

In summary, it is important to emphasise the growing complexity of system operation due to the increasing participation of volatile renewables. This makes it necessary to be vigilant in the face of possible problems in the functioning of the mechanisms at the disposal of REE, especially those designed to ensure that their decisions are complied with.

The balance between giving sufficient authority to REE for flexible system management and controlling its powers would be favoured if functional and accounting separation of the transmission system operator and the transmission grid manager were supplemented by adequate supervision of its activity.

⁴¹ The first consists of the automatic response of generators to demand changes in short time periods (15-30 seconds). The second enables instructions to be given to groups and responses to be obtained at short intervals (100 seconds approx.). The third is a reserve of energy with a response time of about 15 minutes. Hydraulic energy is best-placed to provide secondary and tertiary reserves.

⁴² Interruptability is a mechanism whereby certain large consumers pay lower prices in return for a willingness to interrupt their demand if the operator so requests. The conditions of power provision have recently been extended by means of Order ITC/1673/2007, 6 June.

⁴³ Technical problem, whereby small disturbances cause massive disconnections of wind energy, leading to a considerable loss of system capacity.

7. Analysis of critical elements of gas security of supply policy

7.1. Raw material dependency

Spain receives one third of its gas supplies by pipeline and two thirds by means of tankers transporting liquefied gas (LNG). This policy of diversifying gas transport is welcomed. The use of LNG provides flexibility and security of supply for several reasons: it can be unloaded in several ports, it can be purchased in several countries and Spanish actors can participate in the multilateral world gas market that is in the development stage.

On the other hand, receiving supplies by pipeline is more economical when the distance from origin is less than 2,000 km. It is also a good instrument for connecting with the gas systems of neighbouring countries.

The supply contracts signed are sufficient to satisfy high percentages of demand. These range from 84% to 102% depending on the scenario considered. It is therefore important to monitor demand evolution in order to know when to increase supply contracts.

The legal basis for the diversification of supplies policy is set out in article 99 of the hydrocarbons law. This stipulates that those dealing in natural gas and certain direct consumers identified by the MITT must diversify their supplies when more than 60% of their total supplies comes from a single country. The MITT has the authority to modify this figure depending on international gas markets but it has yet to exercise such authority.

This policy of diversification has proved a good one. Spain receives supplies from ten different countries and the percentage of Algerian gas is not higher than 35%.

The diversification of supplies policy has focused attention on gas transmission connections with Algeria, France and Portugal and there are more actions and projects in progress.

The MEDGAZ project consists of the construction of an underwater pipeline from Beni Saf on the Algerian coast to Almería on the Spanish coast. MEDGAZ comprises five international companies: Sonatrach, Cepsa, Iberdrola, Endesa and Gaz de France. Transmission operations are expected to begin in mid- 2009. Although, according to the CNE, infrastructure shows slight delays with respect to the underwater pipeline, Enagas maintains that delays are not foreseen with respect to the availability of the auxiliary infrastructure in Spain. There are doubts with respect to the feasibility of the finishing dates for work on the MEDAGAZ project. In any case, the gas to be provided by this pipeline is not considered essential at this point in time, though its availability will improve security of supply.

Interconnections with the rest of Europe through France are being developed within the framework of the South Gas Regional Initiative. This consists of connecting the Enagas infrastructures, on the Spanish side, and those of TIGF and GRTgaz, on the French side and it should be finished sometime between 2013 and 2015. These interconnections will enable: the transport of Algerian gas to France and subsequently to the rest of Europe; the transport of Norwegian and Russian gas to Spain; Spain's abundant LNG to be stored, taking advantage of France's high storage capacity; the connection of LNG plants on both sides of the border so that mutual support services can be provided in order to secure supplies.

Progress in interconnection projects with France is difficult. France, has a supply oligopoly made up of vertically integrated companies and the territory is divided amongst them. It is being subjected to EU pressure to change its monopolistic systems and to lend its weight to the interconnection project.

The connection capacity with Portugal is sufficient. In order to take full advantage of this connection, it is necessary to make progress towards making the regulatory frameworks of the two countries compatible, thereby avoiding differences in technical specifications and requirements for market agents.

The NRP establishes that the government must set the tariffs for international transit. To this end and with the objective of favouring the development of a European market, ORDER ITC/4100/2005, 27 December establishes tariffs and rates for third-party access to gas installations and tariffs for international transmission. For the first time, it establishes a tariff for the transmission of gas to and from third countries, in accordance with Regulation (EU) no. 1775/2005.

7.2. Sufficiency of investment in gas infrastructures

Until 2004, due to the high increase in demand caused by the growing number of combined cycle plants, the system was overloaded at times and there were some winters in which it was necessary to cut the supply. In the last two winters no problems were registered due to the fact that demand has not increased (favourable weather conditions in terms of temperature and hydraulicity) and infrastructure has improved. Tank capacity has doubled and pipeline capacity has grown considerably.

Gas entry capacity is more than sufficient. Transmission capacity is not as great, although it appears to be sufficient for the moment and is being developed. The current problem is underground storage. Here the situation is precarious (8% withdrawal capacity as compared to the 25% and 50% of neighbouring countries). This situation has arisen because Spain does not have old depleted fields in addition to the ones currently being used for storage, and new storage facilities will have to be created.

Given that the system has greater entry capacity than transmission capacity, planning will have to address this imbalance. Infrastructure under construction is slightly behind schedule. Indeed, the vulnerability criteria N-1⁴⁴ is still in place.

The predicted strong growth in demand for gas needs to be complemented with an equivalent development in storage capacity. Failure to invest in underground storage facilities, due to the long time periods needed for the development of this type of infrastructure, could lead to very tight availability situations from 2010. The CNE feels that, in addition to the conversion of the Poseidón and Marismas fields, priority should be given to the building of the extension to Gaviota and the new storage facilities in Castor and Yela.

For a system such as the Spanish one, which imports almost all the gas it consumes, underground stores have a special importance as a strategic reserve. There are two risks associated with low stocks: a) Operational risk: not having stocks makes it more difficult to modulate winter demand; b) Long-term risk with respect to strategic stocks. In addition, having storage facilities, apart from mitigating or eliminating these risks, enables gas to be bought when prices are low.

Underground stocks also help in the regulation of the electricity supply, which could be affected by the strong presence of wind energy in the generation mix (when wind energy is unavailable, the combined cycle plants, i.e. gas, enter the fray).

The creation of new storage facilities in places where there has never been gas is very risky (leaks may occur on injecting the gas, rendering the storage facility unusable and the investment is lost). The tariff system, which does not take account of the risk of project failure, does not provide incentives to investment in new storage facilities.

The 2007 – 2016 plan, now at the consultancy stage, establishes that given the differences in costs for each storage facility project, the tariffs for each facility should be set in accordance with its technical characteristics in order to guarantee a minimum profit for its promoters. This is a reasonable measure.

In December, the tariff system for underground storage facilities was modified in order to create a stable framework⁴⁵.

The following concessions have been awarded:

⁴⁴ Capacity to meet demand in the case of a fault in one of the system entry points. In the case of Catalonia, this requisite is not complied with.

⁴⁵ Order ITC/3995/2006, 29 December, which establishes the tariffs for underground natural gas storage facilities in the primary network.

- Castor (Castellón), to the company Escal. The concession for exploitation has been awarded though the project has not been completed (there were location problems).
- Yela (Guadalajara), to the company Enagas.
- Capacity expansion of Gaviota (Basque Country).

Other locations included in the plan are being studied. If all foreseen locations are put into operation, this should be sufficient in principle, given the geological limitations of the land in peninsular Spain.

The development of the distribution network largely depends on the tariffs received by promoters. The tariff system in place until now has not provided sufficient incentives to the construction of this type of network. This is because tariffs for the use of the distribution network were standard and based only on pressure levels and consumption characteristics. For this reason, one of the NRP measures is to review natural gas distribution tariffs in order to secure the quality of supply and the efficient deployment of new infrastructure.

Order ITC/3993/2006, 29 December, was drafted for this purpose. It establishes prices for certain regulated gas sector activities. It regulates distribution tariffs and sets out that these will be established for all the installations of each distribution company according to criteria that take account of real investment costs and the contribution of the network to the security and quality of the supply.

7.3. Gas system management to guarantee short-term supply

In keeping with the NRP objective to develop secondary gas markets and reserve capacity in gas installations, a number of provisions have been published relating to this⁴⁶. Of notable importance is RDL 7/2006 whereby urgent energy sector measures are adopted and there is a change to the criteria for assigning underground storage capacity to agents. This goes from being chronological (first come first served), to taking account of total market share of the agent in the previous year and the reserve capacity needed for the national market. In this way, it is hoped to optimise storage facility use.

A basic security of supply tool is the legal obligation on agents to maintain security reserves equivalent to their volume of operation for a period of a certain number of

⁴⁶ Order ITC/4100/2005 which establishes tariffs and rates for third-party access to gas installations; RDL 7/2006 whereby urgent energy sector measures are adopted; DGPEM Resolution of 18 April 2007, which establishes operational regulations for the development of an auction for operational and minimum reserve gas for the period 1 July 2007 to 30 June 2008; SGE Resolution of 12 April 2007, whereby an auction system is established for operational natural gas and the minimum level of gas required for transport, regasification, and underground storage facilities; and SGE Resolution modifying assignation of underground storage capacity.

days. In Spain, the hydrocarbons law of 1998, in its initial version, establishes that transporters, dealers and certain consumers are obliged to maintain minimum security stocks⁴⁷ equivalent to thirty five days of sales or consumption. Given the shortage of storage facilities, compliance with the holding of stocks, which must legally remain immobilised⁴⁸, means that the agents do not have available space to devote to the operation of their business and this creates management system rigidity.

The modification to the hydrocarbons law does not establish an obligatory number of days and allows this to be determined by regulatory development so that system management needs are taken into account. Once the pending regulatory reform has taken place, not only will a common sector practice be legalised, but the exchange of gas among operators, i.e, the secondary gas market, will also be boosted.

Given the ever increasing relevance of gas in electricity generation, the NRP establishes the aim of improving the coordination mechanisms of gas system management and electricity system operation.

Order ITC/3126/2005 seeks to achieve this objective. It approves the rules for gas system management and lays down that the Technical Manager of the Electricity System (*Gestor Técnico del Sistema Eléctrico*) and the Technical Manager of the Gas System (*Gestor Técnico del Sistema Gasista*) act in coordination on the basis of procedures already in place or those being developed for the purposes of guaranteeing that electricity generation gas needs are met insofar as possible.

The text of the revised hydrocarbons law reinforces the independence of the System Manager and separates this function from those of regasification, transmission and storage. To this end, it is established firstly, that Enagas will create a specific organic unit, the director of which shall be appointed by its board of directors, with the approval of the Minister of Industry Trade and Tourism and secondly, that no private company can have a shareholding of more than 5% of its share capital or have voting rights of more than 3% (this limit is fixed at 1% for gas sector companies).

The functional separation of transmission activities and system management should be completed by the demand for greater transparency requirements, such as the publication of operational procedures and internal regulations. Of special relevance is the work to improve the Technical Management Rules of the System. The NRP has the priority of developing rules for the technical management of the gas system in order to improve management procedures, equilibrium and gas supply by introducing mechanisms necessary for greater security of supply and more efficient system management.

⁴⁷ These stocks are kept in underground storage facilities, tanks or pipelines.

⁴⁸ It seems that companies maintain reserves of fewer days than legally required.

The gas system management rules⁴⁹ have the objective of establishing procedures and mechanisms to coordinate the activity of all agents to guarantee that the system functions well and also to guarantee the continuity, quality and security of the supplies of natural and manufactured gas, in an environment which respects the principles of objectivity, transparency and impartiality.

These rules are relevant to security of supply as they deal with such matters as: maintenance plans; communication of balances; operational stocks and security minimums of the agents involved; general requirements for the use of underground storage facilities; programming of transmission networks, underground storage facilities and LNG regasification plants; and system operation in normal and exceptional circumstances.

The existence of regulated tariffs, which act as signals to operators and condition their behaviour, but which are not the result of market forces, makes it necessary for the regulator to modify more frequently than may be desirable, the amount and manner of determining these elements of the system. With the objective of bringing regulated prices closer to the needs of the market, the NRP proposed a review of tariff methodology and structure in order to solve problems of congestion and improve efficiency in network use, through the creation of an interruptible tariff.

Interruptibility is short-term demand-side management tool which has proved to be extremely useful. It makes the system more flexible and enables rapid and efficient response to faults through the option of interrupting supply to consumers who have signed agreements to this effect. In order to make flexible use of this instrument, and building on Order ITC/4100/2005, which establishes tariffs and rates for third-party access to gas installations, Resolution 25 July 2006, of the Directorate General of Energy Policy and Mines (DGPEM in its Spanish initials), regulates the conditions of assignment and the implementation of gas system interruptibility procedures. The resolution sets out two types of interruptibility: a) Commercial interruptibility by means of contracts freely entered into by the final consumer and the distributor; and b) Interruptible tariff which is based on an agreement entered into by the final consumer, the distributor and the Technical Manager of the Gas System for situations where there is a shortage of gas due to infrastructure problems.

⁴⁹ Order ITC/3126/2005 by which the regulations for the technical management of the gas system are established. This is complemented by the Resolution of 13 March 2006 by which detailed protocols for these regulations are established. The SGE Resolution of 28 July 2006 modifies paragraph 3.6.3 «Viability of schedules for the unloading of ships» of the Rules for the Technical Management of the Gas System «NGTS-3»; the DGPEM Resolution 20 April 2007 which modifies certain Rules for the Technical Management of the Gas System and establishes certain detailed protocols; the DGPEM Resolution of 25 October 2006, which approves the Winter Action Plan 2006-2007 for gas system operation.

8. Conclusions and recommendations

Conclusion 1

The current ten-year plan for the gas and electricity sectors is a fundamental energy policy document. It is legally binding for transmission grids and provides guidelines in other matters. The recent requirement that infrastructure must be included in the plan to qualify for tariffs contributes to optimising the use of resources.

Energy planning has become more sensitive to the needs of the environment, both in objectives and analysis tools. The greater weight of environmental matters in the plan should have the positive result of speeding up questions of environmental impact in installation authorisation processes.

The plan has the main objective of meeting demand. It does not propose modification to existing policy because it is an implementation plan rather than a strategic plan. In the electricity sector it concentrates on the the transmission grid, offers some guidelines with respect to generation and does not consider distribution. Because it is an implementation plan, it should not include infrastructure with a longer gestation period than the period of the plan. Some forecasts may not be viable, possibly due to the interests of different autonomous regions in including what they consider to be priority infrastructure, without sufficiently considering the feasibility of this within the ten-year period of the plan.

Recommendation 1

Whilst maintaining the current 10-year plan, it would be useful to have a long-term strategy document (20-25 year) with political consensus and the agreement of the autonomous regions. This is because the implementation period would run over several terms of office and be beyond the competence of the National State Administration. The analysis carried out with respect to Prospectiva 2030 would be a good starting point. Its work should be continued by defining a long-term consensual strategy incorporating an integrated vision of the system with clear objectives, measures and monitoring indicators. There should also be some regulatory reflection on the energy mix to serve as references to policy managers and agents within the sector.

Conclusion 2

The technology mix for electricity production in Spain has an important and growing participation of gas and renewable energy. Environmental factors, the nuclear moratorium and bonus policies have promoted these options.

There are technical production limits on uncontrollable (high volatility) renewable energies and the system can only accommodate them in determined periods. There are also limits on bonuses because they affect energy costs. From the security of supply perspective, there is a need to complement uncontrollable renewables with energies that allow for storage and rapid start up and these are generally expensive. In addition, it is necessary to have appropriate mechanisms for short-term system management to guarantee the supply of energy.

Electricity production is more and more dependent on the availability of natural gas. The viability of wind generation is largely conditioned by the existence of combined cycle plants that can start functioning when the availability of wind is scarce.

Because of the regulatory framework and the interrelationship between gas and electricity, electricity and gas companies are attempting to participate upstream and downstream in their respective business areas. Hence, they participate, in different guises, in successive stages of the added value chain. This may have implications with respect to market dominance and security of supply.

Recommendation 2

Incorporate an estimate of the social cost of the energy mix chosen and its alternatives, taking account of sustainability, security and competitiveness. The analysis of the Prospectiva 2030 working group could make a very worthwhile contribution to a merit-based evaluation of the different energy sources.

Continue monitoring the functioning of mechanisms to promote system reliability in the face of the growing participation of renewables. This would include the monitoring of the conditions imposed on renewables with respect to technical adaptation to withstand normal system disturbances and offer appropriate response to the instructions of the system operator. The Committee for the Monitoring of the Technical Management of the Energy System, foreseen in reformed laws for the electricity and hydrocarbon sectors, could include this matter in its reports.

Make further progress in the design of coordination measures for gas and electricity system management. Transparency mechanisms should be in line with the resulting concentration of responsibilities.

Conclusion 3

In the past, the plan did not provide sufficient alarm signals in the face of availability risk. Furthermore, the MITT does not have the operational capacity to draw up, respond to or supervise planning work carried out by gas and electricity system managers. In consequence, part of the responsibility for planning resides with the limited liability companies Enagas and REE.

Recommendation 3

The MITT should strengthen its planning function and dispose of the human and material resources necessary to carry out its responsibilities in an independent and more extensive way. In the electricity sector, there should be assessment of the current REE forecasting system to see if it should be complemented by the use of probabilistic techniques and more elaborate fault risk analysis.

Conclusion 4

There are considerable delays in infrastructure development, particularly grid infrastructure, due to prolonged administrative procedures, lack of coordination in different government areas and public opposition to the installation of power lines.

Recommendation 4

Study ways to speed up administrative procedures and facilitate the setting up of appropriate coordination mechanisms with the Autonomous Regions. This implies greater involvement of local authorities through agreements of the type set out in RD 1955/200. Also, study measures to bring about greater public awareness about the necessity for electricity transmission lines and study the possible need to increase resources for financial compensation.

Conclusion 5

Although there was a problem of insufficient electricity generation capacity at the beginning of the decade, a look at current installed capacity and existing applications for new installations indicate that this problem has been overcome. Nonetheless, the mechanism to guarantee capacity which should have acted as an incentive to investment did not work well. After considering and discarding most MIBEL proposals, the MITT has substituted the existing mechanism for a new system of payment by capacity, though the previous system is still in operation for the time being.

Recommendation 5

Progress must be made with respect to the function of prices as signals for suppliers and demanders. This is linked to the strategic objectives of competitiveness (prices set by competition) and sustainability (energy saving and efficiency).

The new payment by capacity system should provide clear and transparent methodologies and sufficient incentives to availability and investment in situations of shortage, if it is to avoid the defects of the previous system.

Conclusion 6

There are imbalances between electricity generation and demand in different zones. If new generation installations are not located in deficit zones, the result is an

increase in grid investment costs due to the cost of transmission between zones, losses in transmission and congestion. Given that the activity of electricity generation has been liberalised, the importance of such costs means that the MITT plan should incorporate informative signals on preferential locations for new generation installations. Economic signals are equally important but regulation on this matter, pending since 2000, has yet to be drawn up.

Recommendation 6

Introduce a regulation to provide zonal signals, incentives and disincentives to producers in order to promote efficient location of generation installations, once a mandate has been given to the CNE to draw up a proposal for such regulation (by means of RD 1634/2006).

Conclusion 7

In general, the electricity transmission grid has a high network density. Nonetheless, there are specific mesh and maintenance problems in places, particularly with respect to protection systems. These have been identified by REE and they are working to gradually correcting them.

Recommendation 7

Maintain the high level of transparency on transmission grid mesh and supplement it with maintenance indicators. Speed up, insofar as possible, improvements to transmission grid protection systems. Push for the supervision of REE's performance by the CNE, in line with the supervision responsibilities acknowledged in the recent reform of the electricity sector law (LSE in its Spanish initials)

Conclusion 8

Most supply interruptions have their origins in the distribution grid. There is a shortage of published information, but there seems to be a lack of network investment. This is partly due to a tariff system which, perceived as insufficient by distributors, does not provide investment incentives to meet growing demand. Nor does it offer incentives to improve quality or reduce transmission grid losses.

Recommendation 8

Reform the distribution tariff system (currently in progress), so that appropriate incentives are introduced for distribution grid investment, quality and efficiency. The CNE should carry out the supervision duties assigned to it by the LSE and promote the transparency of indicators to measure the robustness and maintenance of the network.

Conclusion 9

Activity segregation throughout the gas added value chain implies the need to coordinate the work of the different agents. In the absence of efficient market

mechanisms, this should be done by the regulator. The publication of the Rules for the Technical Management of the Gas System (*Normas de Gestión Técnica del Sistema*) clarifies the functions and responsibilities of sector agents. Monitoring by the CNE, the Committee for the Monitoring of the Gas System and by the recently created Committee for the Monitoring of the Energy System (Comité de Seguimiento de la Gestión Técnica del Sistema Energético) contributes to the coordination, efficiency and transparency of the system.

Conclusion 10

Laws governing the diversification of gas suppliers have proved to be efficient. Spain buys gas from ten countries and Algerian gas does not represent more than 35% of total gas imported.

Conclusion 11

The gas system has greater entry capacity than transmission capacity. The main problem is the lack of sufficient underground storage capacity. It is hoped that the recent modification to the tariff system for storage facilities will help to correct this situation.

Conclusion 12

The change to the distribution network tariff system is a positive step towards facilitating network development.

Conclusion 13

Recent legal reform reducing the number of days of minimum stock that must be held by agents seeks to give flexibility to system operation and foster the development of a secondary gas market.

Recommendation 13

To the extent that the change to the law governing minimum stocks favours exchange between agents, it should be availed of to foster platforms for gas contracting, exchange and compensation.

Conclusion 14

Progress has not been made in interconnection with France, despite the interest and renewed efforts of the Spanish authorities and the European Commission.

Recommendation 14

Electricity and gas interconnection projects, particularly with France, should continue to receive the necessary political support. All cooperation possibilities with companies operating in France should be explored.

Conclusion 15

REE and Enagas play a central role in the electricity and gas systems and by law they are the guarantors of security of supply and continuity.

Recommendation 15

Given the central role of Enagas and REE in the system and their multiple responsibilities, they should have accountability mechanisms in line with their social and political responsibilities.

Conclusion 16

Regulations to safeguard the independence of the organic units of REE and Enagas that act as system managers, reflect the legislator's concerns with respect to potential conflicts of interest.

Recommendation 16

After a period of time, an assessment should be made of the effectiveness of regulations to safeguard against conflicts of interest.

Conclusion 17

Without entering into a judgement of the improvements sought by the legislator with each reform of the regulations, there has been abundant regulatory reform recently. Provisions have a short lifespan. Regulatory uncertainty does not favour investment decisions and the efficient functioning of the market, and therefore the public sector must intervene.

At the same time, there have at times been considerable delays in the passing of necessary legal reforms. Since 2004, action has been taken to correct this. The planning by objectives and monitoring of results promoted by the NRP has favoured transparency and accountability.

Recommendation 17

A regulation seeking to consolidate liberalisation and market opening initiatives must be within a regulatory framework that offers stability in behaviour patterns, price incentives and signals and also one that takes into account the possible cost, in terms of regulatory risk, of the measures adopted.

There should be continued and consolidated political responsibility in the form of the transparent implementation of objectives and results monitoring. This can be done by properly implementing the energy policy rationale put forward in the NRP and completing the indicators to ensure proper monitoring.

ANNEXES

Annex I. Main characteristics of energy supply and demand in Spain

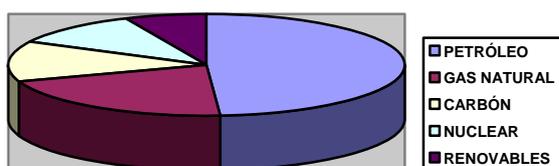
Primary energy consumption in Spain increased at an average rate of 3.4% between 2000 and 2005⁵⁰. However, in 2006, there was a 1.1% decrease in primary energy consumption. MITT forecasts estimate an annual growth of 1.3% in primary energy consumption between 2006 and 2016 and a 1.6% annual increase in final energy consumption for the same period.

Primary energy intensity⁵¹ grew at an average rate of 0.62% from 1990 to 2004. This was in contrast to the majority of developed countries, where the figure has tended to decrease. However, in 2005 and 2006 there was a significant change in trend, which saw a reduction in energy intensity of 0.9% and 4.7% respectively.

The demand for electrical energy grew at an average interannual rate of 4.5% in the period 2000-2006⁵². This is in line with economic growth, population growth and increased income. Furthermore, the growing market for air conditioning equipment increased demand. Summer peak demand has shown an average increase of 5% in the last 7 years. Nonetheless, the MITT foresees a moderation in the growth of end-user demand for electricity, which it forecasts at 2.9% annually for the period 2006-2011 and 2.1% between 2011 and 2016. This is due to market saturation and energy efficiency strategies.

With respect to the distribution of primary energy consumption by energy type, in 2006 oil accounts for almost half the total (49%), followed by natural gas (21%), coal (12.6%), nuclear energy (10.8%) and renewables (6.8%). In recent years there has been a great structural change, with a spectacular increase in the participation of gas and, to a lesser extent, renewables.

**DISTRIBUCIÓN DEL CONSUMO DE ENERGÍA
PRIMARIA 2006**



Prepared by author with data provided by MITT.

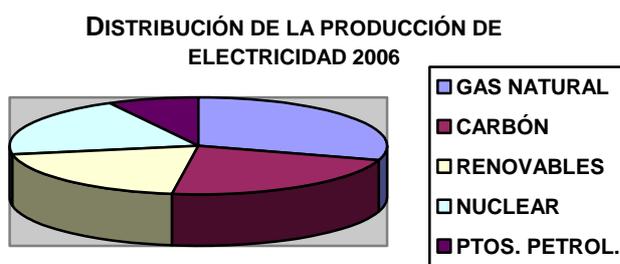
⁵⁰ Hydrocarbons statistics bullet-in. Corporation for Strategic Oil Reserves (CORES).

⁵¹ This is the measure of energy efficiency expressed as primary energy consumption per GDP unit.

⁵² MITT Plan 2007.

To meet this demand, Spain relies primarily on imports. Foreign dependency – percentage of energy imported with respect to energy consumed – stands at 80%, well above the already high EU figure of approximately 50%.

With respect to the structure of Spanish electricity production, the Spanish electricity system might be described as a hydrothermal system, with a high penetration of intermittent energy. The vast majority of energy consumed has its origin in fossil fuels (oil, coal and natural gas), but there has been a significant change from coal and nuclear energy to natural gas and renewable energies. With respect to new investment, combined cycle plants and renewables have substantially increased their share of the investment in recent years; the former due to their technological efficiency, low emissions, lower investment cost and short gestation time and the latter because of active policies to foster renewables, especially wind energy. The current electricity production mix⁵³ is dominated by natural gas (29.8%), followed by coal (22.4%), renewable energies, including hydro-energy (20.1%), nuclear energy (19.8%) and oil products (7.9%). Forecasts indicate that the participation of renewables will reach 34.9% en 2016.⁵⁴



Prepared by author with data provided by MITT.

⁵³ Percentage of total gross generation.

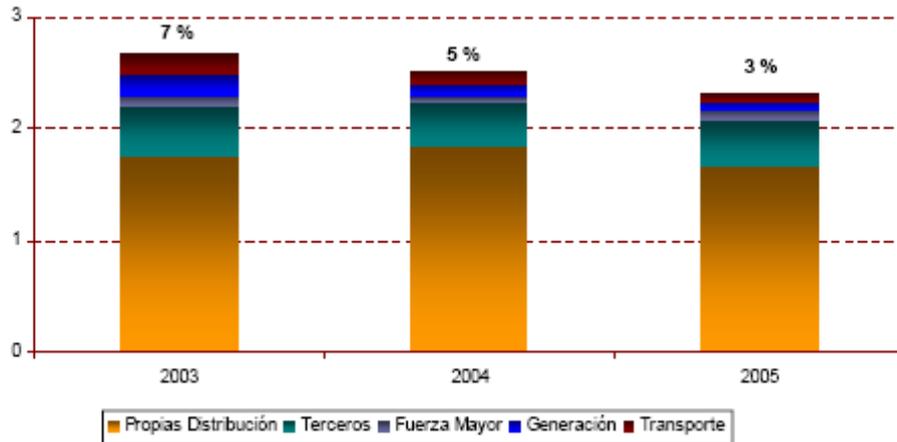
⁵⁴ To reach the commitment of renewables accounting for 12% of primary energy in 2010, it is considered that 29.4 of electricity will come from renewables (see E4 Plan of Action).

Annex II. Measures contained in the NRP with respect to energy supply reliability

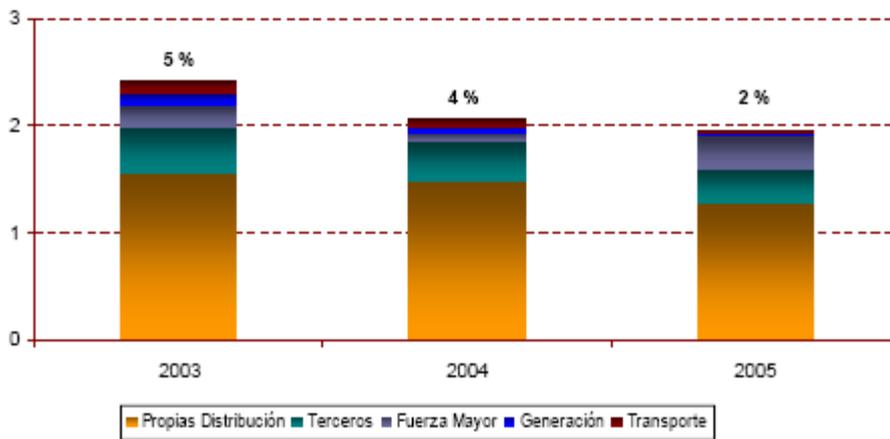
Listed below are the reform measures with the most direct effects on security of supply contained in the NRP and its progress reports. It is acknowledged that other measures related to competitiveness and sustainability also affect security and that energy security policy goes beyond the measures outlined in the NRP. Most of these measures have been or are being implemented.

- Drawing up of the *Prospectiva energética 2030* as a long-term strategy.
- Creation of a new Committee for the Monitoring of the Technical Management of the Energy System made up of representatives of the gas and electricity system operators, CNE, CORES and the MITT, with the objective of permanent and coordinated monitoring of supply guarantee.
- Development of information and awareness campaigns to transmit to society the necessity to construct electricity power lines and review administrative procedures to speed up such construction.
- Extension of electricity interconnection.
- Optimisation and incentives for the development of new infrastructure.
- Development of new tariff system to guarantee capacity.
- Implementation of the new methodology for electricity distribution tariffs and a review of quality indices.
- Development of a new tariff framework for regasification and underground storage facilities and the development of mechanisms for the assignation of these facilities.
- Improvement of coordination mechanisms between gas system management and electricity system management.
- Increase the efficiency of mechanisms for planning, construction and exploitation of transmission networks.
- Revision of the structure of natural gas distribution tariffs.
- Development of the Rules for the Technical Management of the Gas System.

Annex III. Duration and Frequency of system interruptions and their causes



Graph 1. SAIFI unforeseen: total number of unforeseen system interruptions. Source : Plan 2007-2016 MITT. (the number indicated refers to transmission).



Graph 2. Unforeseen SAIDI: total duration of unforeseen system interruptions. Source: Plan 2007-2016 MITT. (the number indicated refers to transmission).

Annex IV. Reform of distribution tariff system

IV.I. Summary of main changes in the proposal for the new distribution tariff model

- The tariffs for each distribution company are set on an individual basis, in accordance with the common formula of revenue limitation. Thus, distortions arising from the single fund model are eliminated.
- The formula will be based on a tariff base which will be updated for four-year periods. Each year, the MITT will establish the tariff for each distributor.
- The tariff base of each company will take account of investment costs, installation, operational and maintenance costs and other necessary costs to carry out the activity of distribution. A clear calculation tool will be used for the reference network model.
- The annual tariff paid to each distribution company will be updated in accordance with a formula including the following elements:
 - An explicit acknowledgement of cost increases associated with new investments.
 - An adjustment factor for gains in efficiency required by the regulator.
 - Incentives for improving the quality of the service and the reduction of transmission losses.
- In addition, the regulator will have two regulatory tools at his disposal to deal with the failure of distributors to provide information in order to carry out annual tariff reviews. The first of these is the presentation of regulatory accounts, which obliges companies to present a breakdown of their costs so that efficiency comparisons of companies can be carried out. The second consists of the reference network models, which calculate a "reference" network for each service area and this is used to determine the relevant efficient distribution costs.
- The Ministry will approve a method to calculate the variation in the tariff of each distributor with respect to increased distribution activity in particular zones.

IV.II. Main CNE suggestions to improve the proposal to modify the distribution tariff framework

- The CNE wants to include some references to the ordering of distribution tariffs. This would facilitate the establishment of a proportional relationship between assigned tariffs and established obligations, i.e., between revenues and costs.
- It proposes greater transparency and prior consultation with distributors on the specific values proposed for the basic tariff parameters.
- It proposes modification to the parameters for the formula for updating tariffs, chiefly:

- A single average-scale factor for the entire sector should be applied for increased activity and it should be applied on an individual basis for each company”.
- With respect to quality incentives, the upper and lower limits of the compliance indices should be modified. “As the formula stands, quality levels equal to those established as minimum levels in the regulation, would result in distribution companies being paid for quality improvement”.
- With respect to the reduction of losses, the wording should be changed. “The current wording does provide companies with an incentive to reduce losses” “Furthermore, the proposal does not mention the possibility of imposing penalties on the different distribution companies in accordance with the size of the difference between real losses and target losses”.