Training Manual

Regulating our energy supply: "a prime objective in serving our people"
INOGATE Training Booklet

Regulating our energy supply: a prime objective in serving our people

Textbook developed for the INOGATE Programme by the Regional Centre for Energy Policy Research

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This publication has been produced with the assistance of the European Union. The content of this publication is the sole responsibility of the consortium implementing the "INOGATE Technical Secretariat and INOGATE Coordinators' Network" project and can in no way be taken to reflect the views of the European Union.
Objective of Textbook

The objective of this textbook is to foster a working knowledge of key regulatory principles. Develop a common language and educational background in the field of energy regulation between regulators and policy-makers, this can lead to more informed regulatory and policy decisions. This provides benefits to consumers, governments and companies. The textbook will help readers:

- Understand the objectives of regulation, the concepts and organizational structures needed for an independent Regulator;
- Learn monitoring tasks of regulatory institutions
- Develop tariff designs that suit the needs of consumers and energy companies
- Learn from the restructuring experience of the European energy sector. This includes how past policies of promoting competition have changed the role of regulators and energy companies, and how unbundling energy companies and independent regulation can increase competition.
Outline

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Objective of Textbook

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<td>Administrative and General</td>
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<td>CPI</td>
<td>Consumer Price Index</td>
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<tr>
<td>DSO</td>
<td>Distribution System Operator</td>
</tr>
<tr>
<td>ERGEG</td>
<td>European Regulators Group for Electricity and Gas</td>
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<td>ERO</td>
<td>Reliability Organization</td>
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<tr>
<td>FERC</td>
<td>Federal Energy Regulatory Commission</td>
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<td>IPP</td>
<td>Independent Power Producers</td>
</tr>
<tr>
<td>ISO</td>
<td>Independent System Operators</td>
</tr>
<tr>
<td>NERC</td>
<td>North American Electric Reliability Council</td>
</tr>
<tr>
<td>O&amp;M</td>
<td>Operations and Maintenance</td>
</tr>
<tr>
<td>PCR</td>
<td>Price Cap Regulation</td>
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<td>RoR</td>
<td>Rate of Return</td>
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<td>RoRR</td>
<td>Rate-of-Return Regulation</td>
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<td>RTO</td>
<td>Regional Transmission Organizations</td>
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<td>rTPA</td>
<td>Regulated Third Party Access</td>
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<tr>
<td>TSO</td>
<td>Transmission System Operator</td>
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<td>WACC</td>
<td>Weighted Average Cost of Capital</td>
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1 Regulatory Responsibilities

The functioning of competitive energy markets with sufficient protection for consumers relies on an independent regulatory institution. This section outlines the benefits provided by a regulator who has sufficient authority and the support of the law to balance the needs of investors, governments and consumers. A regulator with qualified staff, proper organizational structure and sufficient independence has the ability to provide long-term stability benefiting both consumers and investors alike. Through the Regulators monitoring and licensing activities, information can be collected to ensure that companies are in compliance with relevant laws and are contributing to a secure and stable energy system.

1.1 The aims of ‘Good’ Regulation

The global trend of utility privatisation and energy market liberalization has created a new era for regulatory agencies. In the United States where there exists a long history of private utilities and government oversight, regulatory agencies have a strong independent hand. The European Union has also come to favour independent regulatory institutions. An independent Regulator is seen as the best institution to ensure a competitive market and provide balanced protection for consumers and investors.

Guiding Principles

European organizations and international institutions commonly agree on the purpose of independent regulatory institutions, namely:

- To protect energy consumers
- To protect private investment

The regulator should be independent in order to satisfy this role.

The regulator should be an independent decision making body, or individual, with limited political involvement, and “regulatory policies should not generally depend on short-term political circumstances”


In order to make sure that these guiding principles are honoured there must be independence for the regulatory institution, or agency, and its Regulator. Thus it is recommended that “The regulatory authority should be a distinct administrative institution from the executive branch, and independent or interdependent from the executive branch in its procedures and decision-making process.” Independence from the presidential or parliamentary branches of government allows greater room for independence and long-term decision making to occur.

The adoption and respect of these three guiding elements in the law can allow the spirit of European Union law and international agreements to be effectively enforced (Electricity Directive 2003/54/EC and the Energy Charter Treaty). Putting these elements into law is
important so that national and international agreements are properly respected over time. In addition, this offers protection for both consumers and investors by allowing long-term planning in infrastructure and market operations to occur. For example, lowering uncertainty for investors on an investment project can result in a lower financing rate. This could translate into a lowered amount to be charged to end customers when the project is completed.

### Theoretical Concepts

The term 'regulation' is when the state uses its power to limit the behaviour of firms or individuals, mostly in the name of public good (Viscusi et al, 2000). Regulation takes the form of a legal text (international treaty, directive, act, decree, license, guideline, etc).

In a market economy, the basic principle that underlies the myriad transactions among the members of society is free choice. Free choice is driven by the recognized self interest of people and organisations. The state is supposed to limit free choices and decisions by means of regulatory intervention only if markets (the place where voluntary transactions take place) fail to produce enough of the possible social welfare for the community. It is important to understand, however, that most of the time regulation runs against the pure self-interest of private agents: if left alone, they would set prices, produce quantities or qualities other than the one that is prescribed by a particular regulation.

The specific purpose of energy sector regulation is to mimic what perfect competition could bring for sector participants. It should ensure that (a) consumers pay for the justified costs of energy services, (b) efficient companies earn a fair rate of return, and (c) consumers receive a quality of service that is in accordance to the tariffs they pay for these services. The common areas of economic regulation of energy companies are price and tariff regulation, service quality regulation, the regulation of entry from and exit to the industry through licensing and energy market regulation. In subsequent chapters, we will briefly discuss the specific monitoring activities associated with these regulatory tasks.


### 1.2 Objectives of Regulation

At a general level, the objective of economic regulation has two strategies:

- Maintaining **affordable prices** for consumers
- Provide **incentives** for investment and economic stability for investments.

Traditionally, the interest of the consumer and utility company was provided by granting one company a monopoly over the production, transmission and distribution of electricity. This was viewed as providing greater efficiency than multiple companies. However, the thinking behind monopolies has changed. Now the distribution and transmission portion of the
Regulatory Responsibilities

electricity industry is the only portion considered a monopoly (see Section 3.1.1). **Generation is seen as a competitive** industry that can provide lower costs in a competitive environment. As the energy industry has become more complex, so have regulations and the information requirements of regulators. These demands require a greater effort to develop professional regulatory agencies with specific expertise. **Qualified staff** must consider the economic and social impacts of decisions and how best to manage competing interests.

Regulation needs to provide energy companies with proper incentives for firms to meet the objectives of long-term consumer needs through efficient investment and operations. Companies will have proper incentives if regulators can demonstrate commitment to planning and price continuity thereby fostering market stability. Commitment and market stability are demonstrated through **openness, transparency, consistency and accountability**.

### 1.2.1 Legal Framework

There are different approaches that a regulator might take to balance different interests. Practical experience suggests that customers’ interests are normally given priority; profits which are judged “excessive” may lead to renegotiation of prices by regulators and governments. However, there are important laws and regulations (**statutory provisions**), which should guide regulatory decision making and the State’s policy objectives.

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**Tasks of the Regulator**

- Encourage the establishment and the operation of competitive markets to the maximum feasible extent;
- Encourage sufficient investments in the energy sector to provide adequate, reliable service to consumers;
- Maintain the financial integrity of the energy sector;
- Create a transparent regulatory agency with open forums that allows broad public participation. Allow the press into the decision making process to foster greater transparency and trust in decisions.

Energy Regulators Regional Association; Licensing/Competition Committee (1999, Dec.). The Most Important Legal/Statutory Elements for Regulation of the Energy Sector. pg 1

Regulations also must be **flexible** enough to account for market changes. Highly specific rules may not be able to quickly respond to changes in markets or technology. This may negatively impact both the utilities and the State. In general, the more the utility and its market are in a period of flux, the greater the degree of flexibility shown by the regulator. The law should allow independence in tariff setting. **The regulator should have the legal authority to establish the methodology for determining tariffs (consistent with the principles established by law) and to set and/or approve energy tariffs.**

In tariff setting it is important that the law gives the Regulator overall guidance, but does not predetermine specific methods, for establishing prices since this is a matter best left to regulatory expertise and good judgement over time (see Section 2, Tariff Design). In order to promote energy sector investment, it is important that the law give recognition to the general
principle that prices should be adequate to permit an efficient operator to recover all “just and reasonable” costs, including a return on invested capital in consideration of market risks.\textsuperscript{ii}

The incentives for \textbf{reducing the operational cost} of utilities, which leads to both higher profits for the utilities and lower costs to consumers, rests on good regulation (see Section 2). Delivering incentives for cost reduction also rests on the understanding that the incentives will remain in place for a sufficient period of time to allow both the utility and the consumers to benefit. The interaction between regulation and long-term investments only works properly if short-term regulatory decisions reflect \textbf{long-term objectives}.

\section*{1.3 The Independent Regulator}

Regulatory independence consists of three elements:

- Arm’s length relationship with regulated companies, consumers and other private interests
- Arm’s length relationship with political authorities
- The attributes of organizational autonomy necessary to foster the requisite expertise and to underpin those arm’s-length relationships.

It is important that regulated prices are not politicized. Independence and professionalism displayed by a regulatory agency can result in \textbf{lower risk} for investors including lower cost for financing new projects. Weaker \textbf{regulatory credibility} may result in higher costs and thus higher tariffs.\textsuperscript{iii} It is also important that the regulator has flexibility in setting the rules for companies and consumers. Other agencies should be limited in their influence over the decision making within the regulatory agency.

\subsection*{1.3.1 Formal Safeguards:}

There is strong consensus on the \textbf{formal safeguards} that should be legally defined for regulators and their agencies:

- Provide the regulator with a distinct legal mandate, free of ministerial control.
- Prescribe professional criteria for appointments.
- Involve both the executive and the legislative branches in the appointment process.
- Appoint regulators for fixed terms and protect them from arbitrary removal.
- Stagger terms so they do not coincide with the election cycle, and staggering the terms of the members.
- Exempt the agency from civil service salary rules that make it difficult to attract and retain well-qualified staff.
- Provide the agency with a reliable source of funding, usually earmarked levies on regulated firms or consumers.

Formal safeguards of this kind are especially important in countries with a limited tradition of independent public institutions. However, in any system, the goal can only be to satisfy the three guiding principles of protection for consumers and investors while reducing the risk of improper political interference. More specifically, key recommendations include:
Agency directors are appointed for **fixed and relatively long terms** of office with legitimate reasons for **removal** only being incapacity (health), failure to perform duties, criminal conviction, ethical conflicts and the like, not because decisions are unpopular or are opposed by the State;

- Administrative body composed of an **odd number of directors**;
- Agency budget subject to State revision and appropriate oversight but organizational structure and administration left to the Agency;
- The decisions and resolutions of the Regulator can be **appealed only in court**, and no ministry or state agency has any authority to reconsider or reverse the decisions of the Regulator.

### 1.4 Regulatory Institutional Structures

This section will look at the two dominant structures of regulatory institutions in the EU. This will provide a snapshot of how institutions are commonly set up and how they balance their independence with the common interactions that occur with other state institutions.

#### 1.4.1 Single head regulator

The least common regulatory institution structure is the ‘single head’ Regulator, that is one person ultimately makes the final regulatory decisions. Only 6 countries in the EU-27 have created this type of structure (Figure 1-1) The Regulator is usually **nominated by** the Minister who is in charge of the energy industry, and **appointed by** the Government or by a member of the Government. Usually, the length of each term of office is either for 5 or 6 years and it is renewable; sometimes they are appointed for an indefinite period of time.

The **removal power** is usually in the hands of those who have appointed the Regulator. In the case of Sweden the Regulator cannot be removed. Reasons for **removal** are always stated in the laws and regulations.

![Figure 1-1 Single Head Regulatory Structure](image-url)

#### 1.4.2 Regulatory Council
In 21 EU member countries a **Regulatory Council** exists. The **number of members** of the regulatory councils varies from three to thirteen. The appointment of council members may be at the ministerial level or by another government unit, like the president or Senate.

The length of each member’s **term** in the Regulatory Council varies from 1 to 7 years. In most cases the term is renewable. The only country where there is no possibility of term renewal is Italy. In six countries the terms of council members are **staggered**. Removing a regulator before the term expires is possible in most member states if it conforms to the stated law.

![Regulatory Council Structure](image)

### 1.5 Characteristics of Regulatory Independence

Part of the key characteristic of regulatory institutions\(^vi\) is the independence it is given to balance the interests of energy companies, consumers and politicians. Discussed within this section is how the characteristics, which are important for the functioning of an independent regulator, are prescribed in national laws. A comparison is conducted of these characteristics and a determination is made as to the level of independence that each national regulator holds. Of course, there are many other variables that affect the independence of a regulator, and many of these entail non-prescribed arrangements and local political culture. However, a detailed legal baseline that prescribes the role of the regulatory institution provides a basis from which greater independence can, over time, be developed.

Described briefly below are the four different characteristics, or categories, used to determine the different levels of independence for regulatory institutions (the fifth area, monitoring and licensing, is discussed in more detail in the Section 1.6). The first three characteristics reflect the three key activities with which a regulatory agency can demonstrate most clearly
regulatory independence: price setting, budgetary authority and appeals process. These areas have a strong impact. They are considered important in order for the Regulator to be able to remain relatively free from political influence and to retain the ability to foster a stable regulatory environment. The appointment and removal powers address the overall integrity of the regulatory board, or in some cases, the head regulator, by considering the appointment and removal process of members. At the end of this, in exercise 1, you will be asked to assess your own regulatory institution.

### Areas of Regulatory Power:

- Pricing authority: transmission, distribution networks and balancing market
- Budgetary authority: control over size and collection of agency budget
- Appeals process: state institutions which are also involved in reviewing Regulators decisions
- Appointment and removal power of regulatory board members
- Monitoring and Licensing

#### 1.5.1 Price Setting

Pricing authority over transmission, distribution networks and in balancing the market in the EU, overwhelming lies in the hands of national regulatory institution. These separate components often comprise the regulated portion of the tariffs. The price of commodities (e.g. coal, gas) used to generate electricity is generally not regulated. In the EU, 23 Regulators hold the power to decide tariff rates. In only four countries does a ministry decide the tariff levels. For example, Slovenia has established the Energy Agency which is composed of members of the Ministry of Economy, thereby not making it an independent regulator, but rather part of a ministry.

#### 1.5.2 Budgetary Authority

The independence of a regulator can be better assured if it has control over setting the amount of its own budget. That is, how much it needs to operate and generally receiving the required amount. Within the EU, 18 regulatory agencies have control over their budget. In these cases where the regulatory authority sets its own budget level it would normally rely on fees collected by the regulated sectors. However, there are 9 states where the budget is controlled by either a ministry (3) or is stipulated in the state budget (6), which goes through the normal parliamentary approval process.

#### 1.5.3 Appeals Process

Appealing the decisions made by Regulators is an essential part of the regulatory process. The involvement of different state institutions in the appeals process is important to consider in determining the level of regulatory independence. In the cases where the Regulator has absolute authority or the Courts (also a highly independent state institution) it can be considered that there is a large degree of independence. The most common appeals structure in the EU includes only Courts or other institutions (e.g. ministries or regulators themselves). This is the case in 23 of the EU’s 27 states. In none of these cases is the parliament involved. Courts are generally viewed as isolated from short-term political considerations (thus conforming to good regulatory practices).
1.5.4 Appointment and Removal Powers

The appointment and removal powers also reflect the political independence required for independent regulatory bodies. The President and Courts are generally considered the ‘most politically independent’ state institutions which can appoint regulatory Council members. Although it is recognized that these institutions are not totally free of political motivations. Political institutions like the government, Parliament or ministries are obviously considered to be more political and thus may be more likely to appoint individuals less politically independent to a Regulatory Council or head regulatory positions. However, this is not to say that this is a ‘bad’ practice, but rather that greater independence may be fostered by involving more neutral state institutions in the appointment and removals process.

It is also important to determine whether each countries’ removal causes match those recommended by an international organization like ERRA. These recommendations are effective for this task as they comply with both the theoretical and practical experience (discussed above) of establishing and maintaining an independent regulatory institution. These recommendations as previously addressed are: Agency directors are named for fixed and relatively long terms of office with removal only for incapacity (health), failure to perform duties, criminal conviction, ethical conflicts and the like, not because decisions reached are unpopular or are opposed by the State.viii Regulatory institutions with sufficient independence and authority offer governments, energy companies and consumers long term stability. This independence needs to be protected by law and the structure of the regulator needs to be effective at supporting an independent decision making process.

1.6 Monitoring and Licensing

The primary objective of monitoring activities is to provide the necessary information and support for the Regulatory Institutions to perform both its regulatory and enforcement functions. A key means of data collection and ensuring companies comply with the required regulations is through their power to issue licenses. This section will look at both issues and how they are the basis for Regulatory Institutions to complete their regulatory mission.

1.6.1 Monitoring

The importance of monitoring comes from the fact that information needed to design and enforce various regulatory policies is not easily available; the regulator does not have an absolute knowledge about the market. Instead of perfect information there is an information asymmetry where market participants have better information about cost and/or demand conditions than their regulators.

The more information the regulatory authority has about characteristics of the industry, the better it can perform its duties to advance the interests of society. To be better informed, the regulatory institution has to spend increased amounts of money and time on data collection, analysis and reporting, in other words: monitoring. The resources of money and time are restricted thus the Regulator has to find a way to be fully informed within the limits of its resources.
In general an energy act should empower the regulatory institution with executive powers to support its critical regulatory and enforcement functions. The law requests the regulatory institution to carry out monitoring activities on all relevant aspects of regulated energy companies. It also empowers the Regulator to apply different sorts of penalties in cases when non-compliance is detected.

We can classify regulatory monitoring activities by their purpose and by their subject. Table 1-1 provides an overview and examples of monitoring based on such a classification.

**Table 1-1 Monitoring Activities of Energy Regulatory Commissions**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Purpose</th>
<th>Support for new or amended regulation</th>
<th>Enforcement of existing rules</th>
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<tr>
<td>Economic performance of licensed companies</td>
<td>Starting price for price cap</td>
<td>Compliance with deposit requirements</td>
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<tr>
<td>Availability of generation</td>
<td>Fuel reserve regulation</td>
<td>Supply security for winter</td>
<td></td>
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<tr>
<td>Service quality and consumer satisfaction</td>
<td>Setting SQ standards for DisCos</td>
<td>Compliance with minimum service requirements</td>
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<tr>
<td>Environmental performance of companies</td>
<td>Preparing CO2 allocation rules for generators</td>
<td></td>
<td></td>
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<tr>
<td>Electricity markets</td>
<td>Rules to limit dominant company behaviour</td>
<td>Compliance with cross border trade regulations</td>
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<tr>
<td>Network access</td>
<td>Developing information provision rules for TSO</td>
<td>Detecting discriminatory practice towards network users</td>
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</table>

First, monitoring can serve either the **enforcement** of a particular rule, or can provide **information** for establishing new or amending existing regulation. Second, monitoring can concentrate on licensed activities of individual companies or on assessing the operation of complex electricity markets. Licensee monitoring activities can be further grouped into the following:

- Management and operations audits;
- Financial and regulatory audits; and
- Technical audits.
The purpose of a particular monitoring activity will mainly define the mode thereby indicating which activity should be carried out.

Monitoring that aims to develop or refine a particular regulation should be based on a well designed system of regular and longer term data collection, which is carefully analyzed. Data should be collected from both the regulated companies and independent sources. Often, continued cooperation and dialogue with licensed companies is necessary to ensure that the regulatory institution and the companies interpret the data and results in the same way. For example, a systematic collection and analysis of data on operating and maintenance costs or on service interruptions are respectively necessary to set regulated prices or to create a service quality regulation.

In this case much of the monitoring work can be done in-house. Casual on-site audits carried out by regulatory staff or by independent auditing firms can complete in-house analyses.

Monitoring that aims at the enforcement of existing rules and regulations might rely much more on on-site inspection and on non-routine casual audits. On-site inspections can be pre-announced or unannounced. Unannounced inspection is advisable when the regulated company is suspected of seriously misbehaving and may adjust its financial data or other documents in the case of a pre-announced visit. In order to improve the transparency of regulatory behaviour, it is encouraged that a Code for inspection and auditing activities with relevant protocols be set up. In the Code one could distinguish between regular visits on site, that are announced in advance and that follow a clear checklist on one hand, and unannounced on site inspections on the other hand. The latter could concur with inspections of the Competition Authority, and should therefore be part of a cooperation protocol between the two Authorities.

<table>
<thead>
<tr>
<th>Minimum Activities of Regulatory Monitoring</th>
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<tr>
<td>• Problem definition</td>
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<td>• Data collection</td>
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<td>• Data processing and storage</td>
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<tr>
<td>• Analyses</td>
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<td>• Inspection and auditing</td>
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<tr>
<td>• Reporting</td>
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<tr>
<td>• Decision making</td>
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<tr>
<td>• Communication</td>
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### 1.6.2 Licensing

Licensing is one of the principal tools that a regulatory authority uses to carry out its function. The power to issue or revoke the license of a sector participant is a major – although not the only – tool for getting the necessary data and information from regulated sector participants. This information is valuable to check whether a participant’s performance is in compliance with applicable energy laws and regulations.
The legal basis of regulatory institution’s licensing power is provided by a relevant Energy Act. It is common that the Act lists the activities to be licensed separately (electricity generation, transmission, distribution, etc.). The Act might define those conditions under which licenses can be modified and / or revoked by the Regulator. In order to issue a license, the regulatory institution requests specific information from the applicant in order to examine its professional and financial abilities.

It is important to understand that the conditions for entry into and exit from the industry, embodied in a license, will have a lasting impact on the market structure, the number and kind of companies that will make up the regulated industry. Constraints on fuel choice, required operating efficiency standards or pollutant emission standards for generators, or minimum financial requirements for traders will affect the number of companies that will be allowed to enter the industry. To develop market competition, low cost entry and exit opportunities for new generators and suppliers are a must. On the other hand, as recent corporate and market failures in newly established energy markets show, too easy entry and too loose enforcement of regulation might lead to tragic outcomes on these special new markets.

In the process of unbundling of the industry, the regulatory conditions set forth in the operational licenses for transmission and distribution companies as opposed to generation and supply companies differ somewhat in purpose.

Transmission and distribution companies remain fully regulated monopolies. In their case licensing requirements intend to regulate service quality or terms, or to serve as a basis for rate regulation.

In case of generation or supply companies the licensing requirements try to assure that these companies have adequate financial strength, operational and other expertise to provide supply services and are registered in a particular State, thereby facilitating customer lawsuits if disputes arise.

Common elements of licenses are the ones that require data provision and reporting from the licensees. The rights and responsibilities included in the license serve as the basis for monitoring and supervising the activities of the energy companies and also create the basis for action from the side of the Regulator to enforce rules and regulations.

1.6.3 Licensing and corporate structure

Modern electricity utilities are organized as complex corporate structures or holdings. Often such holdings include companies that carry out regulated activities as well as ones that provide competitive services to customers. The Regulator has to understand the ownership
Regulatory Responsibilities

structure and the corporate environment in which its licensee is operating for at least two reasons:

**Cross-financing:** First, if the licensee is under administrative price regulation, there is an incentive for the holding to book some of the costs of competitive activities at the regulated company. In this way those holding companies operating under competitive conditions can be cross-financed by regulated parts of the holding. Such a development will result in high prices for the consumers of regulated services and will at the same time distort competition on the free market.

**Asset restructuring.** It might be in the interest of a holding company to move assets necessary for providing regulated services into a non-licensed company, thus leaving the licensed company ‘empty’, while providing regulated services under a contract with the asset-owning company. In this way the regulator is unable to monitor the licensee’s behaviour related to maintaining, developing and operating the assets in question. Such a situation will leave the regulator without the power to monitor, or even visit the asset owning company and thus to enforce service quality regulation or other (minimum) technical standards.

### 1.6.4 Licensing and investor security

Depending on the aim of regulation, the term of a license can vary from a few years to an undefined time horizon. An argument for a fixed term license arises when a monopoly supply provision is granted through a license (e.g. an exclusive right for service in a geographic region for a distribution company). When the license term expires, the license can be put on an auction again. The term of the license will have a decisive impact on the bids for getting the license.

While licensing might be a time consuming and costly exercise for energy companies to get through, the provision of a license also provides fixed terms and conditions for company operations. Such a certainty is highly appreciated by investors under newly developing energy market conditions.
1.7 Case study

1.7.1 Exercise 1: Assessing regulatory independence

Quantifying the independence of Regulatory Authorities and their agencies can be done by assigning values to the different key characteristics. While this does not account for ‘real world’ political and social pressures, it does provide a baseline to measure the institutional ability of regulators to be independent. To do this categories are created for these characteristics which are developed into a scoring system to rank the independence. This ‘Regulatory Independence Score’ gives a lower value to more independent institutions and a higher score to less independent institutions – where greater political involvement could take place.

1= high independence (limited political influence)
2= medium independence (moderate level of political influence)
3= low independence (heavy political influence)

Using this ‘independence ranking’ it is possible to compare all the European Union Member States and identify those with a greater level of independence. The range of scores is from a low of ‘6’ in Belgium and Italy to a high of ‘12’ in Hungary and Slovenia. The average EU score is ‘9’.

It will be your task to rank your national regulator and how independent it is from other state institutions. This will allow you to compare your national regulator against European regulatory institutions. In Table 1-2 answer each question by circling the correct number that matches the specific operational and organizational structure of your national regulator. For example, in the case of who can appoint council members, the Prime Minister may nominate 3 candidates, but the President must approve these candidates. In this case, the President has the final power, and therefore would receive the point. In general, whoever has the final decision making power receives the points.
### Table 1-2 Regulatory Independence Scores

<table>
<thead>
<tr>
<th>Question</th>
<th>Institution(s)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Which Institution(s) has authority in price setting and methodology?</strong></td>
<td>Regulator and Ministry in Consultation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Government, ministry, parliament</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><strong>Who controls the regulatory agency’s budget?</strong></td>
<td>Regulator</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Government/Ministry/ Consultation with different institutions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>State budget (parliament)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><strong>Who is involved in the appeals process?</strong></td>
<td>Regulator/Court</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Administration tribunal/joint institutional body</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Government/ ministry/parliament</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><strong>Who appoints the regulatory council members</strong></td>
<td>President/royalty/</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Government/ Parliament/ Ministry/ others</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><strong>Who can remove regulatory council members?</strong></td>
<td>President/court/ no removal possible</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Government/ Parliament/ ministry/ other</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><strong>Is there a pre-established, written in law, removal cause (serious health problems, failure to perform duties, crime, and ethical conflict)?</strong></td>
<td>Yes/ no removal possible</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
</tr>
</tbody>
</table>
1.8 Case Study

1.8.1 Exercise 2: Opinion: Role for a Regional Regulatory Roundtable?

Read the below opinion piece that calls for greater coordination between regulators at the regional level and answer the following questions:

When electrical failures in Europe happen, like in Germany in 2006, who is responsible? A company for not making sure the right buttons were pressed? The Transmission System Operator for not making sure the infrastructure was up to speed? The regulators, for not ensuring standards were met? Or the politicians? The answer: everyone. Each of these entities ultimately works for the public and whenever the electrical system breaks down it is equally important to not only determine who is responsible for that one event, but to examine the overall operations of the system.

One of the ways seen preventing electricity blackouts is to establish a European Union level regulatory agency to ensure minimum technical standards are met. However, it is proposed here that regional roundtables composed of national regulators may be able to create more extensive solutions for technical operations and importantly ensure competitive market conditions. This type of forum and decision making body would provide more extensive assurance that Europe’s grid is operating at both high technical standards and providing the right environment for efficient market operations.

National regulators can help set conditions and incentives that boost regional cooperation and building the necessary infrastructure. Regional cooperation between regulators can boost market efficiency through greater coordination of a region’s generation mix. Importantly, a regulators roundtable could result in joint rulings to punish companies causing regional instability through lack of investment. Current regulatory practices are focused on national markets; regulators need the authority to consider the regional impact of market actors.

Politicians may loath refocusing the regulator away from their domestic market, but as numerous European blackouts demonstrates, national markets are not isolated. Regional cooperation and coordination between regulators with joint decision making authority needs to occur to boost network security and effective competitive markets. There are two specific examples of where cooperation can be seen as benefiting both the national and regional interest.

First, the cross-border Coordinated Auction Office established in 2005 in Prague coordinates the capacity between the Czech Republic, Germany, Poland and Slovakia. This is an example of regional cooperation. There are flaws with the current auction, particularly the behaviour of national transmission system operators working in their own (and national) interests to increase profits from the auction. They can be said to be maintaining system stability, but not at the most efficient cost to end-users. Artificially high auction prices mean higher prices for all.

Greater coordination by the national regulators could result in all cross-border capacity being placed on the auction thus fostering the common market that is supposed to exist. In addition, greater agreement by regulators could result in more countries, such as Hungary, entering the auction, thereby opening up more national markets to greater transparency.

Second, mergers and acquisitions of electricity companies should be fostering cross-border operations by companies particularly those with contiguous service territories. The application of different national rules to the different subsidiaries along with the limited interconnection between many countries, particular in Central and Eastern Europe prevent companies from operating their business units more efficiently. For example, local distribution lines which cross-over borders could come under joint regulatory supervision.

Greater coordination between regulators can result in both more effective oversight of a company’s subsidiaries while also benefiting consumers. Consumers win from lower prices (or at least limited price rises) resulting from greater efficiency achieved by greater coordination within a company and by national regulators.
Reaching the point where there is a high level of cooperation and overall strong working relationships between national regulators requires a common forum and with regular meetings. The development of a regional roundtable where issues and specific cases can be discussed and solutions agreed upon can go far in promoting regional solutions that benefit all parties. In particular, the two examples given above, could be tackled by increasing the cooperation between regulators who can demand increased transparency which could result in a better functioning regional market.

The Florence mini-forum which is composed of regulators, transmission system operators, exchanges and EU commission members is a good example of how to begin the process of increasing regional cooperation and coordination. The establishment of the Coordinated Auction Office, was a result of this forum. However, what needs to be established is a forum where regulatory decisions are made that are enforced in each country. This will take changes on the part of national legislation, but as examined, the pay off for national and regional stability is large.

Establishing common EU technical standards is a good step at ensuring the technical aspects of Europe’s electricity grid are operating. However, creating a more efficient market that will improve both security of supply and promote a more efficient marketplace calls for regional cooperation. Creating grid stability goes hand-in-hand with market stability. A stable regulatory environment where there exists close working relationships between all national regulators can foster greater investment and increase economic efficiencies. In the end, it is the consumer that will benefit from an efficient and stable regional and European market place. Regulators, transmission system operators, companies and politicians all work for the public. They have a responsibility to ensure that there exists a stable and efficient electricity system. Greater regional cooperation, with common EU standards, can help everyone fulfill their responsibilities.

Questions:

a. Do you agree with the author’s call for the establishment of regional roundtables?

b. Would regional roundtables provide effective solutions to regional problems? Why or why not?

c. Will greater coordination between regulators increase the security of supply in regional markets?

d. Can greater competition be fostered by regulators cooperating together at a regional level?

e. Would regional roundtable of regulators improve the level of competition within the European Union?
2 Tariff Design

2.1 Tariff setting and price regulation

One of the most important tasks of a regulatory authority is setting the tariffs for products or services that are provided by companies acting as monopolies in an industry. We will start this chapter by stating the main principles that should govern a regulatory agency’s actions in tariff regulation. Without any particular ordering, these principles are the following:

Prices should not endanger the financial viability of regulated companies. Prices should allow for the coverage of production costs with collected revenues (the “revenue requirement”), i.e. prices should be set in a way that the regulated service provider remains in business. Justified costs must include the (opportunity) cost of capital assets as well, meaning that the financial results shown in the company’s income statement should provide a “fair rate of return” on investment.

Prices should direct operation towards efficient production levels and efficiency improvements over time. This criterion means that prices should aim to approach the social optimum in resource allocation, which requires cost based tariff setting as a rule of thumb. Moreover, the regulatory regime should motivate the companies towards cost reduction over the course of several years.

Prices should be fair from a social point of view. This means that basic goods and services, such as electricity, should be accessible for all consumers, and access should be non-discriminatory, i.e. everyone should pay the same price for the same good/service.

Regulatory proceedings should be transparent, stable and reliable. Price structures should be kept simple and the design of rules should be transparent. It is important that consumers can understand them easily. This principle often leads to the substitution of complex price structures by a simpler model. Investors should also be able to predict and rely on the Regulator’s actions, which leads to less uncertainty and lower expected cost of capital in the industry.

Regulatory intervention should be kept at the minimum. Industry regulation is always carried out from an imperfectly informed position, and government agencies have their own failures as well. It is therefore recommended to keep the intervention of Regulators to a necessary minimum, before the Regulators’ own actions start to needlessly overburden the industry.

It is easy to suspect that these principles can conflict with each other in certain cases. We will elaborate on the rationale of each principle in the chapter, suggest regulatory policies that satisfy them to various extents, and point out the contradictions and trade-offs that regulators should resolve.
2.2 Calculating the revenue requirement

Setting the revenue requirement for the utilities is one of the most contentious aspects of tariff design because it can substantially affect the profitability of the firm as well as the costs to consumers. One of the basic methods for setting the revenue requirement for utilities (the way public utilities have been traditionally regulated) is the so-called rate of return (RoR) methodology, also known as cost of service or cost plus regulation. Although different forms of incentive regulation have gained ground in many countries recently (such as Price Cap Regulation to be discussed a little later), the establishment of those systems also requires a reasonable initial revenue level to be set.

Under the RoR method, utilities are allowed to recover their operating expenses, taxes and depreciation, plus are provided the opportunity to earn a fair rate of return on the assets utilized (i.e. rate base) in providing service to their customers. The typical formula is displayed in the box.

\[
RR = O + D + T + r \cdot B
\]

where
- \(RR\) = revenue requirement
- \(O\) = operating expenditures
- \(D\) = depreciation and amortization expense
- \(T\) = taxes (income and other taxes)
- \(r\) = allowed rate of return
- \(B\) = rate base

The revenue requirement should basically provide a fair rate of return on the investment in exchange for investment risk. In case of a single business utility, almost all of the data required for getting a rough picture of the revenue requirement should be readily available from the financial statements. However, many important details regarding future operations and likely costs might not be obvious from those data. Also, because the interests of the regulator and the regulated company are not aligned, and there is a significant information asymmetry between them, company figures need to be checked and – when needed – adjusted by the authority (see section 2.7.1).

In this section we describe the different items composing the revenue requirement formula, and also draw attention to some of those problematic issues that might cause disagreements between the regulatory agency and the utilities.

2.2.1 Operating expenses

Operating expenses are related to operating and maintaining the utility plant and providing the utility services to customers. These consist mainly of the costs of purchased power, fuel, wages, maintenance, supplies, and other necessary expenditures. There are two main groups within these costs:

- **O&M** (“Operations and Maintenance”) costs are those expenses that can be directly assigned to particular operating functions (e.g. generation, transmission or
distribution), such as fuel, maintenance related to specific equipment or direct labor costs.

- **A&G** (“Administrative and General”) costs (e.g. administrative costs and salaries), however, cannot be easily distributed among operating activities.

Operating expenses also include technical and non-technical losses, and a provision for uncollectible accounts.

### 2.2.2 Depreciation and amortization expenses

Depreciation and amortization are related to a decline in the service capacity of tangible and intangible assets, respectively. **Depreciation** is a non-cash expense recorded in financial statements that reduces the value of a **tangible asset** as a result of wear and obsolescence. The often considerable investment costs related to assets serving the company for longer periods are not deductible as a lump sum from the revenues. Instead, the company must allocate the cost over the useful life of the asset so as huge negative values in reported net income can be avoided, and tax deductions might be obtained for a part of the cost each year. Because assets such as utilities’ plants, transmission and distribution lines, and other equipments used in production must be replaced at the end of their useful life, through depreciation the decline in the property’s original cost can be recovered for replacement purposes over its service life. **Amortization** means the same thing for investments in **intangible assets** (e.g. a brand, trademark or patent).

#### Depreciation & Revenue

Depreciation is one of the most important items in the revenue requirement. This usually represents a considerable fraction of the expenses to be recovered by the utilities, and as such largely determining the rate base influencing the expected profit component as well.

In case of public utilities, equipment and plants might have service lives as long as 30 or 40 years. The depreciation policy of the company is of major importance from the regulator’s point of view, as the depreciation figure might affect revenue requirement to an extent as much as 30%. It is important that the authority evaluates depreciation with scrutiny and adjusts its value when necessary.

Because depreciation is not a “real” cost but a write-off of the initial investment costs by allocating its value over the service life of the property, different approaches are used for setting its yearly values. **Service life** is technically the period of time between the installation of the unit and its retirement for accounting purposes. The **service value** of property is the difference between the original cost of plant and the estimated net salvage to be recovered when the plant retires. **Net salvage** is the difference between the so called gross salvage (the remaining value to be received upon disposal) and the costs incurred in retiring the plant. In case of **straight line depreciation**, an equal amount of depreciation expense is allocated to each year of the service life. For state income tax purposes the government might also allow **accelerated depreciation** (relatively higher proportions written off in the earlier periods) in
order to promote investment. The depreciation method to be used varies across countries. For the purpose of rate setting straight line depreciation is preferred in order to avoid variation in tariffs over time. Therefore, different depreciation policies may co-exist at the company, i.e. for tax and regulatory purposes.

### 2.2.3 Taxes

When determining taxes in the revenue requirement formula, different kinds of taxes have to be considered. Sometimes the formula distinguishes between income and non-income based taxes (such as municipal tax or Value Added Tax).

The income tax expense is a function of the before tax income, which in turn is influenced by the allowed rate of return for the company. Income taxes related to non-utility-related activities are not allowed to be included in the RR sum.

### 2.2.4 Rate Base

The rate base represents the value of investments on which a utility is given an opportunity to earn a reasonable rate of return. The valuation of the utility’s physical assets (plant and equipment) is by far the largest component of rate base, which in part explains why the determination of rate base has historically been one of the most important and most difficult problems that regulatory bodies face. The principal method for valuing plant and equipment is original cost minus accumulated depreciation. Generally, the utility’s rate base covers the value of the different assets used in providing the utility service to customers, such as plants, transmission lines, buildings, fuel, etc. The regulator would allow the utility, through its rates, to collect profit on the value of its rate base.

The main components of the rate base are the following:

- **Gross Plant in Service** includes equipment such as turbines, generators, lines, transformers, land, buildings, meters, vehicles, software development, etc. These items are recorded in the utility’s books at their original purchase cost. Only those items can be included in the rate base, which contribute to the provision of safe and reliable utility service.

- **Accumulated Depreciation** is the cumulative depreciation expense that has been reckoned since the different assets were placed into service. By deducting its value from Gross Plant in Service we receive the value of Net Plant in Service.

- **Working Capital** is the average amount of financial capital provided by investors above what is required to purchase physical plant and equipment. It is usually determined as the difference between current assets and current liabilities. This amount can be turned to bridge the gap between the time expenditures are required and the time revenue is collected.

The rate base is one of the most important factors of the revenue requirement formula. The more items and the higher values included in the rate base, the higher the profit of the utility will be. To determine the rate base, the regulator starts from the amount of total assets indicated in the Balance Sheet, however, some of them might not directly contribute to
providing the utility service (e.g. the value of sports and recreation facilities for employees, assets used in other business areas, cars provided for managers, etc.). It is also a question whether assets financed from different subsidies should be included in the rate base or not. The main principle is that the rate of return should compensate the utility for risking its own capital.

Because some assets used by utilities might serve the company for quite long periods, an important question is whether the book value or other valuation method of assets (such as replacement costs) should be used. The valuation method proposed by the accountants of the company might be subject to debate between the utility company and the regulator if the latter does not consider the asset values to reflect a reasonable level.

### 2.2.5 Rate of Return

Investors in utility companies require that the tariffs set for their services result in revenues covering not only operating expenses but also the costs of financing the business. The cost of borrowed capital (debt) is the interest expense, while the return to the equity owners (either in form of dividends or gain from share price increase) should be commensurate with the returns on investments in other enterprises with similar risks (the opportunity cost). This way the utility can continuously acquire credits and attract capital for financing purposes.

<table>
<thead>
<tr>
<th>Establishing a Fair Rate of Return</th>
</tr>
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<tbody>
<tr>
<td>Regulation acts as a substitute for competition in utility markets, therefore it is the duty of regulatory agencies to establish a <em>fair rate of return</em>. Because the required rate of return varies from company to company, the concept of fair rate of return represents a “zone of reasonableness” rather than a specific percentage.</td>
</tr>
</tbody>
</table>

The cost of capital is usually measured as the weighted average cost of capital (WACC). This is basically the proportion of equity times the cost of equity, plus the proportion of debt times the after tax cost of debt. To apply this formula to determine the required rate of return, it is necessary to estimate future expectation of:

- the expected share of debt and equity in financing the utility,
- the cost of debt,
- the tax rate,
- the “risk-free” interest rate (e.g. the return on treasury bills), and
- the risk premium on equity.

### 2.2.6 Additional issues related to setting the revenue requirement

As emphasized earlier, financial statements by themselves are insufficient for calculating the revenue requirement. Even though firms are required to submit separate statements for the utility-service-related activities, some items might need further revision. Also, information on future changes (e.g. investment or divestment plans) can be obtained only from additional
sources (e.g. appendices of financial statements or other sources). In many cases authorized
experts are mandated by the regulatory agency to screen the activities of the firm and judge
whether the various cost items are justified or not.

After the revision of expenses, the regulatory agency decides whether to consider the various
costs in the rate calculation. In principle only those items should be included that were
prudently incurred and are related to the provision of safe and reliable service to customers.
Disallowed expenses should not be covered by the regulated prices.

2.3 Setting cost-reflective tariffs

Once the revenue requirement has been determined, the regulatory authority must design the
price structure of the services provided by the utility in such a way that actual revenues come
close to the required level. It is certain that the regulator will face considerable difficulties
during this task. The following few points provide some guidance to setting economically
efficient tariffs.

- In general, apply the principle of cost causality: people should pay for the cost of
  service that can directly be attributed to their consumption.
- Try to account for the effect of price changes on overall consumption levels, if
  possible.
- Use at least two different tariff categories: fixed and variable charges.
- Set the variable charge close to the average unit costs of service provision.
- Set the fixed charge so that fixed costs of the utility can be recovered as well.
- The point of price discrimination, if applied, should be to switch some of the burden
  of fixed charges from low-demand (low-income) consumers to high-demand (high-
  income) users.
- Use well-designed optional tariffs to help consumers finance their consumption from
  the most advantageous price plan.

2.3.1 Incentive regulation

In many regulated industries, it is usually the case that regulators are not well informed about
many aspects of the sector (e.g. costs, demand conditions, or efficiency improvement
opportunities), which makes rate-of-return regulation (RoRR) a rather ineffective tool to
improve the well-being of society. For this reason, regulatory authorities may be better-off in
the long run by taking a motivational, instead of a command-and-control, approach. This is
exactly what regulatory policies commonly termed as “incentive regulation” try to achieve. In
the following section, we will describe the possibly most prevalent of these incentive policies,
price cap regulation, and contrast its characteristics with the more traditional rate-of-return
approach.
2.3.2 Price cap regulation

Price cap regulation (PCR) is a popular form of incentive regulation that was first suggested in the United Kingdom at the beginning of the 1980’s under the name of RPI – X regulation. Its main features are the following.

- **Starting price levels are set following a cost review that determines the revenue requirement of the regulated utility**, just as we have seen in the beginning of this chapter. Remember, the aim is to cover the costs of the utility’s operation and to provide a fair rate of return on its assets.

- **Cost reviews do not occur for another 3-5 years.** Instead, average price levels are indexed by the rate of inflation (usually the consumer – or “retail” – price index) less an adjustment factor (“X”) that accounts for expected productivity improvements in the company’s operations. The time of the next cost review is fixed.

- **Only average price levels are regulated.** The firm is given (some) freedom to set the prices of individual services as it wishes, as long as the overall price cap is satisfied.

Rate-of-return regulation has a common starting point with PCR, namely the establishment of the revenue requirement. Current (and justified) company costs (including capital costs) are acknowledged in both regimes. Under RoRR, however, cost reviews are much more frequent, and can occur at the request of both parties. Moreover, prices are usually fixed individually, giving the firm no room for relative price adjustments. The rest of this section will elaborate on the advantages and disadvantages of each regulatory regime in several important dimensions.

2.3.2.1 Regulatory lag

The timing of cost reviews (“rate cases”) is an essential feature that distinguishes PCR from traditional RoRR schemes. Several factors are at play in setting the time interval between two consecutive cost reviews, i.e. the length of the regulatory lag. First, the most obvious one is that cost reviews are costly themselves, requiring a substantial amount of work from regulators (data collection, analysis, and argumentation) and utilities (data provision and other forms of compliance) alike. Outside consultants or auditors may also be hired by the regulator to verify the received information and to support the decision-making process. Firms may be unwilling to accept the proposed tariffs, in which case the courts may also be drawn into the rate case, increasing the social costs of the proceedings further. Thus, cost savings can be achieved simply by increasing the regulatory lag from one year to several years.

<table>
<thead>
<tr>
<th>Retaining Credibility</th>
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<tbody>
<tr>
<td>Regulatory commissions choosing to apply a PCR scheme will have to accept the possibility of above-average returns for the firm for an extended period of time. Even though this fact may create strong political pressure to revise the price cap ahead of time, regulators must resist this urge if they intend to retain the credibility of the institution and the incentive properties of the PCR in the future.</td>
</tr>
</tbody>
</table>

2-23
A second, and more significant, effect is the **incentive property** of a pre-determined price schedule. Since cost reviews under RoRR can be initiated at any time when the actual income of the utility differs from the intended level (in other words, when its rate of return is “too high”), the regime basically works like a cost-plus regulatory scheme. **If the utility manages to reduce its operating costs and increase its profits, regulators are likely to launch a cost review** (stating that “the firm’s returns are out of line”) and channel the benefits of more efficient operation to the consumers right away. Knowing this, the company will have no incentive to undertake any efficiency improvement efforts at all, since it will not be able to reap the benefits of its actions. Likewise, little attention will be paid to avoid cost overruns on the company’s side, since it will always be able to initiate a cost review and get compensation for higher costs.

**If prices are pre-set for several years to come, the utility will be able to keep any cost savings until the next rate case.** This will give it a stronger incentive to operate in a more efficient manner. This feature is the main reason why PCR is believed to be a good regulatory policy in industries where the regulatory commission has a serious information deficiency regarding the possibilities for technological improvement.

### 2.3.2.2 Price structure

Even though the average level of prices is determined at the rate case and the subsequent Consumer Price Index (CPI) – X adjustments, the **relative structure of prices does not always have to be controlled** by the regulator. It may actually prove beneficial to delegate relative price setting decisions to the regulated companies subject to an overall cap on weighted average prices. Some forms of weighting in the price cap will induce the firms to choose an economically more efficient price structure than the one that regulators could possibly achieve – given their lack of accurate information in many cases. Particularly, **chained Laspeyres weighting schemes**, where the weights assigned to individual prices are equal to the quantity demanded from the given product in the previous year, have this feature.

### 2.3.2.3 Adjustments for changes in input prices

It is obvious that industry conditions (e.g. input prices, demand, technology) have a temporal feature. They may not be changing all the time, but some of these factors do change occasionally. Certain cost elements (such as O&M costs) are to a considerable extent within the control of the regulated company, while other input costs are determined independently from the company’s actions – sometimes on regional or on world markets (such as the cost of fuel). Although incentive regulation is usually equated with holding the regulated firms responsible for their cost levels, this view must be refined the following way. It is only **efficient to hold companies responsible for costs that are within their control** to a large extent, and let uncontrollable (by the company) costs “pass through” into the regulated prices. According to this rule, for example, a regulated electricity utility should receive no price adjustments until the next cost review if its O&M staff increases, but should be compensated for changes in natural gas prices.

Since RoRR entails frequent cost reviews, allows complete pass-through of all costs into final prices. With PCR, on the other hand, cost reviews are infrequent, which necessitates some explicit pass-through of uncontrollable cost changes into regulated prices even between rate cases. This is the objective of the CPI adjustment. As long as the utility’s input costs increase
in line with the general price level, automatically indexing the regulated price cap with the CPI will leave the company in the same net position. Other indices may also be used (such as an industrial price index) but the CPI has three main advantages: (i) it is easy to understand for consumers, (ii) it is easily and unambiguously observed by all parties, and (iii) it cannot be manipulated by the firm. Whatever index is chosen, it should meet at least the second and third conditions.

### 2.3.2.4 Service quality

One obvious way for regulated firms to save on operating costs is to reduce the quality of the service that they provide to the consumers. Therefore, incentives that motivate cost reduction and more efficient operation will also motivate the degrading of service quality. This is an unfortunate side effect of incentive regulation, and one that should not be disregarded by regulators. In contrast, RoRR makes quality provision costless to the utility in the sense that the extra costs of a higher quality of service will always be recognized in the upcoming cost review.

In order to neutralize the disincentives for quality provision under PCR, the regulatory authority should introduce strict quality regulation and service quality monitoring at the same time as the price cap scheme takes effect.

### 2.3.2.5 Sharing the benefits

Another feature of regulatory arrangements is the manner in which productivity improvements (cost decreases) are shared with consumers in the form of lower prices. Re-phrasing the statement: the average level of prices should move in line with the level of costs over time so as to maintain economic efficiency in the market and to limit the economic rent that firms manage to keep. Naturally, cost reviews provide a good occasion to bring prices back into line with costs. Since cost reviews are frequent in RoRR, economic inefficiency poses less of a problem there. But of course we can also expect less productivity gains to be shared with the consumers.

In the case of PCR cost reviews are infrequent, which provides strong incentives for cost reduction but also creates extended periods of economic inefficiency and unequal benefit distribution. This is the main issue that the so-called X-factors in the price cap adjustment formula are supposed to mitigate.

### Role of X-factors

| The X-factors – when they are positive – decrease the rate at which the average nominal price level can increase between two consecutive cost reviews. In other words, X-factors determine the rate at which real prices must decrease during the given PCR period. This way, some productivity gains will be channeled to the consumers in the form of lower prices even before the next rate case commences. |
It is obvious that X-factors embody an estimate (by the regulator) of attainable productivity improvements for the upcoming years. It is only natural that this forecast is imperfect and will tend to underestimate the true possibilities for cost reduction. (It is for the simple reason that firms would not accept an X-factor that is higher than their own future expectations as they would not want to risk running into losses.) Nevertheless, X-factors are thought to signal a minimum expected level of efficiency improvements at the regulated companies.

### 2.3.3 Rate-of-return versus price cap regulation

Based on the preceding discussion, the following table summarizes the conditions under which one form of regulation is preferred over the other.

<table>
<thead>
<tr>
<th>Preferred regulation: Industry condition:</th>
<th>Rate-of-return</th>
<th>Price cap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technological change</td>
<td>slow; easy to calculate</td>
<td>rapid; unpredictable</td>
</tr>
<tr>
<td>Demand information</td>
<td>extensive</td>
<td>scarce</td>
</tr>
<tr>
<td>Efficiency of operation</td>
<td>adequate</td>
<td>inadequate</td>
</tr>
<tr>
<td>Distributive concerns</td>
<td>strong</td>
<td>weak or moderate</td>
</tr>
<tr>
<td>Service quality</td>
<td>important; hard to observe</td>
<td>observable</td>
</tr>
<tr>
<td>Capital investment</td>
<td>inadequate</td>
<td>adequate</td>
</tr>
<tr>
<td>Cost of rate cases</td>
<td>moderate</td>
<td>high</td>
</tr>
</tbody>
</table>

The table clearly shows that regulators have to make trade-offs between conflicting goals.

### 2.4 Managing the social impacts of tariff regulation

So far, the focus has been with the economic issues underlying the provision of utility services to consumers. The desirable objective of economic efficiency, have been pursued, implying that no consumer or company can be made better off without harming someone else in the process. Efficiency in a dynamic context also meant improvements and cost savings in utility operation, which savings could later be passed on to consumers in the form of lower prices.

The single focus on economic efficiency did not mean, however, that distributional concerns have been totally neglected. Economic profits themselves signal the presence of inefficiencies in tariff setting, since the aggregate benefit (to consumers) of lowering prices towards costs usually exceeds the lost profit of the utility company. Therefore, cost reflective prices and efficiency improving incentive schemes do have a positive social impact as well.

In this final section, a closer look will be taken of consumers while acknowledging that for a worryingly large share of the population, even cost reflective prices are too high to live with. These people have to spend a relatively large proportion of their income on energy supplies, leaving little money for other necessary goods, such as food and clothing. In modern societies, it is among the primary responsibilities of the government to assist low-income households to help them avoid poverty or to alleviate their already desperate situation.
Addressing Vulnerable Consumers

There are three approaches to address the situation of vulnerable consumers:

- Social subsidy schemes (direct support),
- Social tariff design (indirect support), and
- Energy efficiency improvement.

We will discuss each of the three approaches to vulnerable consumers in turn, concentrating on the following important qualities of the support schemes:

- how well the group in need can be targeted,
- implementation cost,
- danger of adverse effects (corruption, “free-riding”, energy waste), and
- political feasibility.

### 2.4.1 Social subsidies

In case of direct subsidies the **poor and needy receive direct compensation**. This money can be granted either by local governments or the central government and can be in the form of cash or in-kind. The latter can be realized by settling the invoice for the qualified households at the company or providing the households with special cards that contain a certain amount of energy consumption credits. This latter method, however, requires special investment and can be too costly.

The advantage of direct subsidies is that they can be targeted more effectively than other forms of support, provided that the criteria for eligibility are easily verifiable for the authorities and participation does not impose considerable costs (like travel or administrative fees) or social stigma on the beneficiaries. One important factor in this respect is the **speed and simplicity with which the subsidy arrives**: since poor households have very limited access to credit, belated compensation may do little to help their situation.

**Adverse effects may be limited with effective design of the subsidy mechanism.** For example, a certain level of detachment between applicants and officials supervising the subsidy allocation is needed to minimize the risk of corruption (in the form of officials extorting payment in return for putting consumers into the subsidy scheme or for handing out the subsidies themselves). This is best accomplished by centralizing decision-making about participation and subsidy allocation to the state level. Although valuable information about true neediness may be lost by centralization, it may still be worth the trade-off, if corruption concerns are strong.

The political feasibility of a direct subsidy scheme is also not evident. It is easy to predict that there will always be groups in society that will lobby for eligibility in the system. **Such claims are politically hard to resist**, especially before elections. There is a danger that lobby
groups will not necessarily be organized according to need for support, which may undermine the effectiveness of the subsidy by putting pressure on the overall budget.

2.4.2 Social tariffs
Indirect support might be realized by means of designing social tariffs. One possibility is to use inclining block rates. Assuming that members of poorer households consume proportionally less energy, increasing prices can be charged for increasing consumption. However, since the unit costs associated with increasing consumption are usually lower, and not higher, this price structure is actually rather inefficient in an economic sense.

Another argument against the application of normative social tariffs without further eligibility checks is that they may prove rather ineffective in targeting vulnerable consumers. After all, it isn’t only poor people, who consume little, and it isn’t only wealthy households who need to consume a lot of energy.

The advantages of indirect subsidies are their simplicity and low implementation cost. The cross-financing of vulnerable consumers by other consumer classes may also be less visible, especially if all households are entitled to the discounts of the first tariff blocks. There is no free lunch, however: this comes at the expense of above-cost tariffs in later blocks. Since the true cost of energy supply is unobservable to the average citizen, this may bother him less than a directly visible cash subsidy to the poor. As a consequence, social tariffs are likely to be less contested politically, and also give less room for adverse effects, such as corruption.

To sum up, indirect support schemes, such as those working through social tariffs, are generally considered a less desirable approach, and should only be used if other, more direct forms of support cannot be implemented due to a lack of political feasibility or institutional background. In this case, tariffs should be designed carefully to minimize the economic distortions.

2.4.3 Improving energy efficiency
Another form of support is aimed at improving the often poor energy efficiency of households and other customer classes. Introducing energy saving methods usually implies some form of investment (ideally) with positive long-term returns. The range of such investments starts with the changing of traditional light bulbs to (more expensive) energy saving ones, and ends with the complete refurbishment of the heating system. Even though these may be sensible measures to take on an individual basis, nevertheless, low-income households often lack the financial and informational means for such an undertaking.

Support Schemes
Advanced support schemes may include low-interest loans for energy saving investments, the free provision of energy saving light bulbs, installment of more accurate metering devices, or non-refundable subsidies for larger expenditures (such as the better insulation of homes).
Tariff Design

Thus, at the minimum, it is recommended that regulatory authorities put into place an effective information system that conveys the benefits of energy saving measures to all classes of consumers in an easily accessible way (e.g. through leaflets arriving with the energy bill).

It is obvious, that each form of support has its own advantages and drawbacks. However, none of them excludes the other, opening up the possibility of a coordinated, systematic approach to help vulnerable consumer groups pay their energy bills. Although general recommendations can be applied, support systems should still be developed on a case-by-case basis taking into consideration the institutional, economic and political constraints of the given country.
2.5 Case study:

2.5.1 Price cap regulation in practice

In Hungary, the principle of price cap regulation appears in the regulation of both the energy and the telecommunication sectors.

In the energy supply industries, the price cap is an ex ante regulation, which means that the price changes are allowed to take place according to the expected future price factor. The inflation factor equals the forecasted yearly consumer price index of the Hungarian National Bank, whereas the X-factor is subject to negotiations, but falls between 0.6-0.7% in the case of electricity, for example. If, for instance, the central bank forecasts a 5% inflation rate and X is 0.7%, then the rate of average price increase cannot exceed 4.3%. Moreover, the rise in the individual prices is also determined by a decree of the regulatory authority in the following way. The authority “divides” the average price increase among the 100+ different tariffs, so that the Laspeyres-index of these prices weighted by the values of the previous year adds up to the average rate of price increase fixed by the regulation.

Regulation in the telecommunication sector, on the other hand, has an ex post feature. The inflation factor is also the forecasted one, but the actual value taken into account is the rate officially used for planning the next year’s state budget. If the consumer price index measured by the Central Statistical Office deviates from previous year’s forecast, the inflation factor must be corrected by two-thirds of the deviation. The X-factor equals 3% according to the current regulation, which means that the ministerial decree fixed a relatively significant productivity improvement factor. If the forecast was 6% for the base year, 5% for the current year, and CSO measured a rate of 8% for the base year, then the price factor in the current year will be 5 + 1.33 – 3 = 3.33%.

The price cap in the telecommunication sector only determines the average rate of price increase. The regulatory authority verifies the actual increase in the average price level after the end of the year. If a company has increased its overall prices faster than allowed, then the permitted rate of price increase will fall by twice the difference for the following year.
2.5.2 Exercise 1: Summing up steps in regulated rate setting

The simplified balance sheet of an electric utility company can be seen below. All sums in the table are expressed in US dollars (Thousands).

Table 2-2 Balance sheet of a hypothetical distribution company in 1000 dollars (December 31, 2006)

<table>
<thead>
<tr>
<th>ASSETS</th>
<th>('000 USD)</th>
<th>LIABILITIES</th>
<th>('000 USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Assets</td>
<td>25,400</td>
<td>Current Liabilities</td>
<td>16,300</td>
</tr>
<tr>
<td>Cash and cash equivalents</td>
<td>5,600</td>
<td>Accounts payable</td>
<td>5,400</td>
</tr>
<tr>
<td>Accounts receivable</td>
<td>9,800</td>
<td>Deferred taxes</td>
<td>3,800</td>
</tr>
<tr>
<td>Inventory</td>
<td>6,300</td>
<td>Short-term borrowings</td>
<td>7,100</td>
</tr>
<tr>
<td>Other</td>
<td>3,700</td>
<td>Long-term Liabilities</td>
<td>173,100</td>
</tr>
<tr>
<td>Fixed Assets</td>
<td>320,000</td>
<td>Long-term debt</td>
<td>173,100</td>
</tr>
<tr>
<td>Network and machinery</td>
<td>400,000</td>
<td>Shareholders’ equity</td>
<td>156,000</td>
</tr>
<tr>
<td>Accumulated depreciation</td>
<td>-80,000</td>
<td>Common stock</td>
<td>86,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Retained earnings</td>
<td>70,000</td>
</tr>
<tr>
<td>Total Assets</td>
<td>345,400</td>
<td>Total Liabilities</td>
<td>345,400</td>
</tr>
</tbody>
</table>

The fixed part of operating and maintenance expenses amounts to 24.5 million dollars, including personnel expenses, network maintenance costs and overhead. The utility can purchase electricity at an average wholesale price of 30 USD/MWh and pass on the energy to consumers at the same price. Distribution network loss, on average, is around 9.5% of energy entering the network. Expected service life of network elements and machinery is 20 years, with a net salvage value of zero. Current depreciation policy is linear (whole life) and corresponds to expected service life. Weighted average cost of capital is 9 percent.\(^1\) The utility forecasts a demand of 10 TWh of electric energy for the upcoming year (assumed to be independent of price, for simplicity).

Questions:

a. Calculate the rate base.

**Hint:** working capital refers to the difference between current assets and current liabilities

b. Calculate the Revenue Requirement.

c. Calculate the single price of electricity distribution service in the area.

**Hint:** You know the RR and also the amount of electricity supplied.

d. How would be the financial position of the utility company if it managed to reduce network loss to 8% (of energy entering the network). All other conditions are unchanged.

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\(^1\) Here we assume that this is a before taxes rate of return, thus when calculating the revenue requirement you do not have to include taxes.
Tariff Design

e. How would be the financial position of the utility company if the real demand (final consumption) were 11 TWh instead of the estimated 10 TWh? All other conditions are unchanged.

f. How would be the financial position of the utility company if the average wholesale price increased up to 32 USD/MWh (instead of 30 USD/MWh) and there were not possibility to raise retail prices? All other conditions are unchanged.
3 European Energy Policy and Restructuring

3.1 Towards a European Energy Policy

Since its establishment, the EU has never had a coherent, common, community level energy policy. The authority over relevant energy policy decisions has remained with member states’ governments.

The need for a common approach to energy was however reflected early in the Coal and Steel Treaty (1951) and the Euratom Treaty (1957) by the founding member states. This need was later enhanced by at least three major developments:

1. The wish to 
   complete the internal market and to introduce competition 
   in network industries, including electricity and gas. The rationale of this policy is to increase the economic efficiency of these basic services thus contributing to the competitiveness of the European industry and social welfare.

2. An increasing dependence of the EU’s economy on imported primary fuels called for common measures to provide energy security of supply for European customers. The oil crisis of the early 1970s clearly illustrated the importance of this issue.

3. The increasing threat by the environmental pollution of the energy sector called for a need for a sustainable operation of the European energy industry. The increasing risk of global climate change and the dedication of the EU to combat greenhouse gas emissions has a direct relevance for energy sector operations in Europe. For example, non-renewable electricity generation falls, in Europe, completely under the so called greenhouse gas trading scheme that was put into operation in January 2005.

These three points are how sustainability, security of supply and competitiveness became the three principles on which a future European energy policy is to be established, according to a recent proposal by the European Commission.¹

The emphasis put on these three aspects in terms of European energy sector has varied significantly over time. Supply security was in the forefront of the disputes during the oil crises and is once again gaining importance with the prospect of a sharply increasing European dependency on gas imports. During the 1980s environmental awareness rose in Europe, today it is the prospect of disastrous global warming that keeps environmental sustainability high on the political agenda. Finally, in the last two decades European policy made continuous and consistent efforts to introduce competition into energy services and to accomplish the creation of the internal energy market.

We can conclude that European market competition and environmental policies have long inspired the development of a European energy policy. What follows is an overview of the major structural elements of the developing European electricity and gas markets. Security of supply related proposals are briefly considered at the end of this section. The interrelation of energy policy and sustainability will be covered in a separate training course.
3.1.1 Competition

The Treaty of Rome (1957), the founding document of the EU envisioned the creation of a common internal market for people, goods and services within the Union. By removing trade barriers (tariffs and quotas) and establishing and enforcing clear rules for competition, the EU has accomplished the common market for the rest of industries by now.

However, market creation and integration have turned out to be more difficult for certain public utility and services sectors like the telecommunications, railroads or the electricity and gas industries. This is why the EU 1985 White Paper on completing the internal market [Note: Please put full reference in footnote.] listed a number of sectors, including gas and electricity, eligible for further action, followed by a White Paper on energy in 1988. Part of the difficulty was that much of these services had formerly been provided by large, national, vertically integrated and often publicly owned companies. These companies traditionally had a service monopoly over their national markets and/or service territories and were isolated from international competition. The traditional, vertically integrated industry structure is illustrated for the electricity industry in Figure 3-1. These monopolies used to have service obligations and provided European customers with reliable, but increasingly costly energy services.

Figure 3-1 Vertically Integrated Monopoly

![Figure 3-1 Vertically Integrated Monopoly](source: Energy Futures Australia Pty Ltd, 2004, pg2)
Network industries have a specific feature, that is in order to provide network services a physical facility is needed. Fibre optic cables, electric and gas transmission grids or rail tracks are examples of such essential facilities. Two characteristics of these facilities are important to recognise:

- Access to and the use of those facilities are essential to get the product from the producers to the customers, that is, to provide the service;
- The facilities are, as a rule, natural monopolies. This means that there is no economic rationale in duplicating these assets.\textsuperscript{xiii}

Note that the rest of the European electricity and gas networks have historically been developed, owned, operated and used exclusively by monopoly providers of those services. These integrated utilities had the right to exclude any third party from using their networks. This automatically meant blocking new producers or suppliers from entering the market and thus preventing significant competition. This is why to develop competitive energy markets non-discriminatory access is essential.\textsuperscript{xiv}

### 3.1.2 Regulated third party access to the network

In order to accomplish regulated third party access to the network, one has to cancel the exclusive right of the network owner / operator (in the followings: transmission system operator: TSO and distribution system operator: DSO) to decide who and under what condition can get access to the grid. A competitive vision is that the grid should be accessible for any interested party who wishes to trade electricity (or gas) through it. Network operations should become similar to highway operations: after paying the toll, anyone should get the right to use its capacity for shipping a product. It is only congestion that allows for the application of some rules to decide who gets the right to go first (rationing). Otherwise, no discrimination in capacity usage should be allowed.
The TSO/DSO should at the same time be properly compensated for the full cost of providing all the grid services for the users. Given that network service in the energy sector is a natural monopoly (only one network operator can provide this service to all its users in a given area), the price of the services should be regulated. The regulated price should be set so that the revenue of the network company covers the operating costs of the system and also provides a just rate of return on the invested capital for the network owner (see Section 2.1 on price regulation).xv

European practice requires that electricity and gas network access prices, or at least the methodology to determine such prices, should be decided by an energy regulatory institution that is independent from industry interests (see Chapter I on the issue of independent regulation).

We call the above conditions together as a regulated third party access (rTPA) regime. The implementation of a rTPA regime might apparently hurt the commercial interest of the network owner / operating company. A principal means of helping the successful implementation of rTPA is the unbundling of network activities.

### 3.1.3 Unbundling of network activities

Already discussed is the importance of opening up access to networks in order to allow independent generators or suppliers to enter the energy industry. This statement already contains a principal distinction between network operation and other, non-network related energy sector activities (generation, trading and supply in electricity and extraction, storage and supply in gas): while the former is a monopoly activity, the latter can in principle be provided by competing market players.

Thus, the unbundling of network operation from other activities seems critical for introducing competition to the sector for several reasons. First, being a monopoly, it should be kept under regulatory control while such a control over the remaining segments of the industry should be removed (liberalization). Second, as a precondition for fair access-price regulation, the regulator should have a clear understanding and assessment of the true costs of network operations, unbundled from the costs of other activities. Third, the neutrality of network operators towards network users should somehow be ensured.

We can distinguish at least four unbundling regimes that aim, with a different level of dedication and success, to meet the above conditions:
1. **Unbundling of TSO/DSO accounts**

In this case the only requirement to the network operator is that its costs and revenues have to be accounted for separately from the rest of the company’s activities. Often the TSO/DSO is required to produce ‘unbundled’ financial statements (balance sheet, income statement, cash flow statement). Regulators might issue guidelines on the details how to deal with certain cost and revenue items when preparing such an unbundled account.

2. **Management unbundling**

Management unbundling aims at cancelling any personal overlap between the management of the TSO/DSO and that of the other branches of an integrated company. The purpose is to clearly decouple the objectives and responsibilities of the TSO/DSO management from the rest of the company management. The independence of the TSO/DSO management might be further strengthened if, for example, the appointment and removal of the TSO management becomes independent from the Board of the integrated company. Physical restrictions on the TSO/DSO management are also part of management unbundling regulations (e.g. restriction on communications, meetings between TSO/DSO management and other executives).

3. **Legal unbundling of the TSO/DSO**

Legal unbundling requires that network operations (and presumably also the assets needed to carry out network operations) is organised into a legally separate company. Independent accounting and company operations are thus further strengthened as compared to the previous cases. However, in this case it is still allowed that the mother company of the network operator remains active in other – competitive - segments of the energy sector. Cross subsidisation between the regulated and non-regulated businesses remains a potential threat to competition in this case.

4. **Ownership unbundling of the TSO/DSO**

Ownership unbundling requires that network operation (and presumably also the assets needed to carry out network operations) is organised into a separate company. The owner of the network company should be free from having – direct or indirect – interest in the competitive segments of the industry. The implementation of ownership unbundling might require the affected companies to divest some of their assets.

The order of the above listing is increasing in the power of the unbundling regime to provide non-discriminative network services for energy market competition. The accounting unbundling regime can be corrupted by the use of ‘creative accounting’. The rules of management unbundling are very costly to enforce by a regulator. Under a legal unbundling regime, the mother company’s management can still exercise its influence on TSO/DSO management in several ways. Nevertheless, a joint application of legal and management unbundling rules can result in fairly independent TSO/DSO behaviour.

The European electricity and gas directives\textsuperscript{viii} in force define legal unbundling of the TSO/DSO as the minimum unbundling requirement with minor exceptions.\textsuperscript{vii} For example, while 11 of the 27 EU member states implemented ownership unbundling for their electricity TSO to date, the rest have the minimum of legal unbundling. However, a recent report\textsuperscript{viii} by the European Commission concluded that legal unbundling appears to be insufficient to support full fledged competition at the European level. The Commission’s arguments in favour of full ownership unbundling are fairly straightforward:
“Legal unbundling of TSOs has already led to an improvement in third party access (TPA) to networks. Basic principles of non-discrimination have been established and, for the most part, tariff structures have been developed which encourage the development of competition. Cross subsidies have been progressively removed. This process is still ongoing for distribution system operators, for which legal separation is not a requirement until July 2007.

Although progress has been made since 2004, the evidence indicates that legal and functional unbundling as currently required by the legislation is not sufficient to ensure that a real competitive European market for electricity and gas can develop. Inherently, legal unbundling does not suppress the conflict of interest that stems from vertical integration, with the risk that networks are seen as strategic assets serving the commercial interest of the integrated entity, not the overall interest of network customers. The evidence collected ... show that this leads in some cases to the following problems.

First, non discriminatory access to information cannot be guaranteed. The information barriers put in place under the current unbundling rules cannot guarantee that TSOs do not release market sensitive information to the generation or supply business of the integrated company.

Secondly, the current unbundling rules do not remove the incentives for discrimination with respect to third party access. Incumbents owning the networks may therefore use network assets to make entry of competitors more difficult. Discriminatory access conditions include connection of new power plants for new entrants, unequal access to network capacity (hoarding), maintenance of artificially small balancing zones, or not making available unused capacities.

Thirdly, investment incentives are distorted. The vertically integrated network operators have no incentive to develop the network in the overall interest of the market with the consequence of facilitating new entry at generation or supply levels. There is considerable evidence that investment decisions of vertically integrated companies are biased to the needs of supply affiliates. Such companies seem particularly disinclined to increase, for example, gas import capacity in an open process which has, in some cases, led to security of supply problems. The same applies, in some cases, to the availability of connection capacity for new generation.

The Commission has examined the unbundling issue closely and concluded that only strong unbundling provisions would be able to provide the right incentives for system operators to operate and develop the network in the interest of all users.

Provided next is a closer look at the counter-incentives of an integrated company to efficiently complying with a rTPA regime.

### 3.1.4 Incentives to distort a rTPA regime

It is extremely difficult for the TSO/DSO to remain non-discriminative towards network users when the company that owns the grid also has significant interest in other segments of the service chain. This is illustrated next with examples.
Modern electricity utilities are organized as complex corporate structures or holdings. Often such holdings include companies that carry out regulated activities as well as ones that provide competitive services to customers.

1. **Cross-financing.** If the regulated TSO is part of a holding company, which is also active in competitive activities (e.g. generation), there is an incentive for the holding company to account for some of the costs of competitive activities at the regulated company. In this way those holding companies operating under competitive conditions can be cross-financed by regulated parts of the holding. Such a development will result in high - cost reflective - prices for the consumers of regulated services and will at the same time distort competition on the free market. (see exercise one for a deeper understanding of this issue).

2. **TSO is integrated with generation.** If the TSO controls the cross border interconnection capacity, it might be advantageous for the holding to restrict access for IPPs and independent traders to those cross border capacities. Blocking of cross border trade might help prevent the integrated generator from import competition or allow it preferential access to infrastructure necessary for exporting its product (depending upon price differences across control areas). A sign of such a behaviour is a decrease of ATC (available transmission capacity) at borders published by the TSO.

3. **Distribution company is integrated with trader/supplier.** In this case it is in the interest of the holding company to have the DSO helping the integrated trader to keep the consumers in the DSO service area. A sign of such a behaviour is that the DSO offers different network contracts for the own vs. independent traders. The DSO can also provide the integrated trader preferential access to the load and other important data on its consumers.

4. **Distribution company is integrated with generation and trader.** In this case the holding company might apply accounting techniques to artificially increase network charges and reduce generation prices, accordingly. In a setting of regional network tariffs, high network tariffs will keep alternative traders away from the consumers in the DSO service area. At the same time, low generation tariffs will keep import competition and new generation investors away from the market.

It remains an open question whether Europe will finally implement ownership unbundling to prevent distortions to competition, or will continue to rely on regulatory monitoring and oversight.

**3.1.5 Full retail choice**

The point in unbundling networks and providing rTPA to them is to facilitate the free choice of producers / generators to sell their products wherever they wish and for final customers to choose their energy supplier.
European Energy Policy and Restructuring

Figure 3-2 below illustrates the possible transactions under full retail competition – that is the vision for the European internal energy market.
Figure 3-2 Retail competition – the vision of the European model

Some basic features of the vertically integrated model:

- Moves the „purchasing agency” down to low voltage level
- Multiple products sold for multiple buyers/markets
- Various contractual arrangements
- Dispatch is based primarily on (scheduled) contracts

*Scope for remaining price regulation is limited to open access to the grid*

EU member states were obligated to provide for full retail choice for electricity and gas customers by July 2007, with an intermediate step for all non-household customers by July 2004. There has been a wide variety in the way of introducing retail choice among member states. While some members introduced 100% retail choice overnight (e.g. Austria, Germany), the rest of the members opted for a gradual approach, allowing large customers to choose their suppliers first and later on smaller ones and households.
European Energy Policy and Restructuring

Full retail choice, or energy market liberalization - like the liberalization of any other market – means not only the (gradual) liberalization of customer choice but also the (gradual) removal of regulatory price controls for competitive activities (generation and supply) and for end customers.

Under liberalized conditions, there is a need for a centralised system operator that also keeps the real time balance of the system. It is the TSO who plays this prominent role, mostly by operating a balancing market. On a liberalized market, new production/generation investments are based on individual investors’ decisions. The investment plans should go through an authorisation or licensing procedure that is carried out by the regulatory agency.

The implementation of retail choice in Europe has allowed the development of transparent market places for trading with electricity and gas. Today these products can be traded for the next day or for several years ahead (visit for example http://www.eex.com).

Please note that there are other typical market models beyond vertical integration or full retail choice. Figure 3-3 depicts the so called single buyer model. Please discuss the specifics of this model as compared to the former ones. As an exercise, provide a brief, coherent argument for your minister favouring the single buyer model over full retail choice / vertical integration.

Figure 3-3 Single Buyer Model

Source: Hunt and Shuttleworth (1996)
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3.1.6 Cross border trading

The development of the internal electricity and gas markets depends critically on the installed and available physical cross border transmission capacities.

The technical conditions for full electricity market integration between all Member States are still lacking. Electricity networks are still mainly national, whereas transmission capacity between the Member States is in general insufficient. As a result, international trade is (on average) restricted to approximately 10% of all trading, by which Europe is divided into a number of different price areas. As long as the existing bottlenecks are not removed through investment, there is need for adequate congestion management in order to efficiently allocate the scarce available capacity to market parties (see Figure 3-4).

Figure 3-4 Electricity consumption and exchanges in regions in Europe in 2005.

(Source: EC)


**EU Priority Interconnection Plan sets out five priorities:**

1. Identifying the most significant missing infrastructure up to 2013 and ensuring pan-European political support to fill the gaps.
2. Appointing four European co-ordinators to pursue the four of the most important priority projects: the Power-Link between Germany, Poland and Lithuania; connections to offshore wind power in Northern Europe; electricity interconnections between France and Spain; and the Nabucco pipeline, bringing gas from the Caspian to central Europe.
3. Agreeing a maximum of 5 years within which planning and approval procedures must be completed for projects that are defined as being "of European interest" under Trans-European Energy Guidelines.
4. Examining the need to increase funding for the Energy Trans-European networks, particularly to facilitate the integration of renewable electricity into the grid.
5. Establishing a new Community mechanism and structure for Transmission System Operators (TSOs), responsible for co-ordinated network planning.


**3.1.7 Greater regional cooperation**

The European Union’s unified energy policy is still a work in progress. The result of the 1996 (electricity)\textsuperscript{xii}, 1998 (gas)\textsuperscript{xiii} and 2003\textsuperscript{xiv} (second package electricity/gas) directives was substantial in some areas, like unbundling and the passage in EU countries of legislation to promote competition. There are, however, serious gaps in the implementation of the spirit of the directive.

1. National energy markets are too concentrated and lack liquidity;
2. Absence of cross-border competition; and
3. Insufficient unbundling of network and supply activities

The result of the enquiry has been to date, a number of investigations and possible legal challenges to both EU Member States and EU energy companies. In addition there is a proposed ‘third energy package’ which would be a third directive. This third directive, the first draft of which is expected to be officially released in the fall of 2007, brings together the recommendations of the EU Commission and the Council and its possible elements are summarised as follows:
A key market development which may be given greater emphasis by the development of a third EU energy directive is the formation of **regional markets**. The development of regional markets is seen as providing a medium term step to a fully functioning European marketplace. Currently the European Regulators Group for Electricity and Gas (**ERGEG**) are involved in encouraging countries to cooperate in a regional manner. There are now 7 electricity (
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Figure 3-5) and 3 gas regional projects in the EU. These have the purpose of removing regional obstacles to trading energy; later these efforts could be combined to help fulfil the vision for the single European Internal Energy Market.xxiv

The movement towards greater independence for regulators, freer access to energy networks and the formation of regional markets are key projects that the EU is developing to aid a more competitive and stable European energy market. Cooperation by national governments for these new initiatives is key to their success.
3.1.8 Reasons for formation of US regional markets

The development of regional markets, which are technically interconnected, have a higher level of competition and have significant backing of political institutions, is more developed in the United States than Europe. Discussed below is why regional markets became important to the development of competitive and reliable electricity markets in the US. The fractured nature of the US political establishment and the decision making that involves electricity networks provides a good example of how both economic and political actors can cooperate to create competitive and reliable regional markets.

The oversight of the electricity industry in the US is split between State and federal institutions. The continued scaling up of the electricity industry over more than a century has continued to add layers of regulatory institutions as the electricity industry evolved from local to national holding companies and now, as will be examined, to regional concerns.
The first attempt to scale up and create a competitive regional marketplace in the US was in 1996 when the Federal Energy Regulatory Commission (FERC) issued Order 888, establishing regional Independent System Operators (ISOs). These were meant to be regional organizations which would coordinate the flow of electricity at a regional scale and promote the trading of electricity within their boundaries. This meant traders could more easily buy electricity generated in one state and sell it in another. However, this regional arrangement, where it did happen turned out to be not independent enough; often utilities, who owned the transmission systems, prevented independent generators from fully accessing the transmission system. Further clarification and stricter standards were laid out four years later in FERC Order 2000 which established Regional Transmission Organizations (RTOs). The basis for RTOs rest on greater independence for transmission system operators, greater authority over how generators impact the system, and appropriate geographic configurations. Through regional and State actions the formation of RTOs have resulted in a new market geography for electricity (United States Regional Markets Demonstrate):

1. How diverse political and economic actors can agree on regional markets
2. Full ownership unbundling of transmission is needed for competitive and stable regional markets
3. Lighter handed regulation, with unbundled utilities, can occur in regional markets
4. Local pricing differences can be replaced by regional pricing
5. Larger regional market of energy suppliers develops, fostering competition
6. Mergers and acquisitions increase as economies of scale are sought and companies span borders
7. Past utility investments protected and enhanced in switch to regional market
8. Competition between regional markets may develop

LaBelle, M., Powering the Deregulation of Electricity, 2005
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Figure 6).
This regional approach, with the transmission system operated by independent entities, was expected to improve both reliability and promote market efficiency through electricity trading. The purpose of regional markets and institutions are best outlined by the FERC,

Regional institutions can address the operational and reliability issues now confronting the industry, and eliminate any residual discrimination in transmission services that can occur when the operation of the transmission system remains in the control of a vertically integrated utility. Appropriate regional transmission institutions could: (1) improve efficiencies in transmission grid management; (2) improve grid reliability; (3) remove remaining opportunities for discriminatory transmission practices; (4) improve market performance; and (5) facilitate lighter handed regulation. Thus, we believe that appropriate RTOs could successfully address the existing impediments to efficient grid operation and competition and could consequently benefit consumers through lower electricity rates resulting from a wider choice of services and service providers. In addition, substantial cost savings are likely to result from the formation of RTOs.\textsuperscript{xv}

Support for regional markets and institutions extends to the State level where the National Governors Association felt that regional efforts could benefit all States.\textsuperscript{xxvi} However, holding back on regional cooperation and still gaining benefits was viewed negatively. The Association stated they needed to “evaluate ways to bar states that do not participate [in a regional organization] or that block important regional projects from obtaining benefits otherwise available through regional efforts”.\textsuperscript{xxvii}
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The movement towards regional markets is also wrapped up with the movement towards mergers and acquisitions by energy companies and the creation of competitive markets.

The consolidation of electric companies since the early 1990s has impacted almost all of the fifty US States. However, looking more specifically within some States and regions it is apparent that in some there is more consolidation between electric firms than others. For example the Midwest, New England and the Central Southern United States are above average in the amount of mergers and acquisitions between companies and have more retail competition.

Further results show clustering of competitive markets in the old industrial belt of the Midwest and Northeast – the rustbelt. This may also indicate that market competition is regionally contained between neighbors and tied to their particular RTO, or ISO.

The increased geographic area of a single market may favor differently structured participants like Independent Power Producers (IPPs) and merged utilities who can take advantage of an increasing amount of buyers and sellers within regional markets. Traditional vertically integrated utilities were geared to serve only their customers within each State. Merged utilities, on the other hand, may be able to take advantage from economies of scale by reshaping their generation units into a regional system, through a holding company, thus making themselves a regional company in terms of unified generation and united customer base.

Historically, regulatory institutions expanded to meet the new geographic arrangements of electricity companies from local to State and then to the federal scale, most recently this has been expanded to the regional scale. A regional regulator is a possibility within the Energy Policy Act of 2005. While past federal and State actions have focused on establishing new regional spaces for electric firms, how to effectively regulate regional markets has been neglected due limited authority on the part of State and federal institutions. However, the new legislation now affords this possibility that a national organization, an Electric Reliability Organization (ERO), with regional entities can enforce reliability standards. This organization is considered to be the existing industry based North American Electric Reliability Council (NERC). After organization readjustments, this could use its existing regional institutions to ensure reliability standards are met at the regional scale.

**Competition may be driven at a higher geographic scale by the state supporting new types of company and market structures.** This in turn may result in more equalized spatial pricing by accepting, and even encouraging, the contiguous inter-State geographic growth of utilities, thus reducing price variability, and providing a regional common good. This scaling up of markets, protects past utility investment by allowing them to territorially expand into a competitive multi-State marketplace. Thus two types of market players develop: flexible generators (like IPPs) and multi-State utilities whose past investments combined with large established customer base rely on economies of scale to increase efficiency and profits. For both players, their reliance on local economies is reduced, as their reliance on regional economies increases.

Changes must occur to the older monopolistic infrastructure and its management to meet the demands of the newer economic regime. In outlining the case for the establishment for RTOs,
the **FERC found the limits** being reached for both the management and infrastructure of the electrical network.

*The Commission reviewed evidence that traditional management of the transmission grid by vertically integrated electric utilities was inadequate to support the efficient and reliable operation that is needed for the continued development of competitive electricity markets.*

In short, vertical integration of utilities and competitive markets did not mix. The federal government therefore, began to favor a different organizational structure for the management of the transmission grid and thus an institutional favoring of new “specialist capitals,” which are organized in regionally interconnected manner.

### 3.1.9 Security of supply

According to the International Energy Agency, energy security is defined as the availability of a regular supply of energy at an affordable price. In the case of electricity we can further specify this concept by using a definition provided by EURELECTRIC:

“Security of electricity supply is the ability of the electrical power system to provide electricity to end-users with a specified level of continuity and quality in a sustainable manner, relating to the existing standards and contractual agreements at the point of delivery.”

The delivery of supply security requires a complex interaction of several factors (Figure 3-7).

**Figure 3-7 Delivering Security of Supply**

Security of supply depends on the accessibility to primary energy sources, on system adequacy and on market adequacy. In turn, system adequacy includes both production and network adequacy. In this respect, security of supply considerations overlap with market...
development issues, to the extent that new investments that provide supply security depend in the longer term on the existence of an adequate market and regulatory structure.

Europe faces several issues in respect of supply security. The continent is becoming increasingly dependent on imported hydrocarbons. With "business as usual" the EU's energy import dependence will jump from 50% of total EU energy consumption today to 65% in 2030. Reliance on imports of gas is expected to increase from 57% to 84% by 2030, of oil from 82% to 93%. These figures indicate a clear fuel supply risk for Europe.

In addition, the mechanisms to ensure solidarity between Member States in the event of an energy crisis are not yet in place and several Member States are largely or completely dependent on one single gas supplier (Russia).

At the same time, EU electricity demand is, on a business as usual scenario, rising by some 1.5% per year. Even with an effective energy efficiency policy, investment in generation alone over the next 25 years will be necessary in the order of € 900 billion. Predictability and effective internal gas and electricity markets are essential to enable the necessary long term investments to take place and for user prices to be competitive. These are not yet in place.

At present the EU wishes to improve its energy security in the following ways:

- Assist Member States that are overwhelmingly dependent on one gas supplier to diversify. The Commission will monitor implementation of the Gas Security Directive and assess its effectiveness. Projects should be developed to bring gas from new regions, to set up new gas hubs in central Europe and the Baltic countries, to take better use of strategic storage possibilities, and to facilitate the construction of new liquid natural gas terminals.
- The EU's strategic oil stocks mechanism, effectively co-ordinated with stocks of other OECD countries through the IEA, has worked well and should be maintained. The manner in which the EU manages its contribution to this mechanism could however be improved.
- Electricity interconnections and binding, enforceable reliability standards will form a third element of this approach. This will in particular help to address concerns about security of electricity supply.
3.2 Case Study

3.2.1 Exercise 1 Holding companies

Study the diagram in Figure 3-8, Transmission is regulated, while generation is a non-regulated activity.

1. Discuss how cross-financing within an integrated holding company can prevent new entrance of efficient generation on this market.
2. Collect techniques by which holding companies can manage cross-financing.
3. How can a regulator overcome such a potential problem?
4. How do you evaluate the powers of the energy regulator of your country to handle such an issue?

Figure 3-8 Holding Company Structure
3.2.2 Exercise 2: Barriers to the CEE regional market

Regulators have an essential role in regional markets. Read this article and answer the questions of how regulators can improve regional markets.

Moving Forward with a Regional Electricity Market in Central and Eastern Europe

Remove regulated prices for eligible customers; abolish exclusive supply rights and purchase obligations of competing energy companies; accomplish the ownership unbundling of the TSOs; improve the fair access to and use of cross border capacities; care about further concentration in electricity generation; enhance the antitrust oversight of the potentially anti-competitive behavior of TSOs; and finally, provide more political and institutional support for the integration process.

These are the key recommendations of a volume that is summarizing the results of a research project that has been conducted by the Regional Centre for Energy Policy Research (REKK) at the Corvinus University of Budapest on the energy markets of Austria, Croatia, Czech Republic, Hungary, Romania, Slovakia and Slovenia. The workshops and the studies of the Central and Eastern European Energy Market (C3EM) project identified the most serious impediments to regional energy market integration and suggested ways to promote regional coordination and cooperation in the energy sector.

Some of the key findings of the C3EM project are related to the amount and use of capacity of the existing electricity network. The results of a quantitative market model of the C3EM region sends a clear warning that regional integration, without further market reform and more efficient use of transmission lines could result in the exercise of strategic behavior on the part of some large firms to increase prices. However, increased power production in the East (Romania) could result in lower regional prices by making them competitive against higher priced ‘Western’ power.

Intensive cross-border trading is unquestionably present in the region; however net importing and/or major transiting countries (Austria, Croatia and Hungary) seem to use the majority of their critical interconnectors in a non-transparent manner. Import protection and non-transparent trading might serve the interest of the affiliated generating and trading arms of the relevant Transmission System Operators.

The role of TSOs emerged as essential in upgrading and building more interconnectors. It was found there is room for improvement involving policies on transparency of calculating and publishing capacity values. Positively it was found that the region does have a good generation mix and pricing differentials based on place and time. And there is well-defined mutual aid for cross-border crisis situations.

Major barriers to market integration were identified stemming from local market structures and regulations. The hybrid markets in the region provide a sheltered marketplace for customers as well as a guaranteed market for incumbent utilities, and open up the possibilities for market distorting regulatory interventions in the form of below- or above-cost price regulation. Another overlooked area is competition in the national balancing markets. Electricity for the balancing market is often provided by the ‘national champion.’ The competitiveness of this market is hindered by restrictions on international bids and administrative price controls.

A key study of the project was examining the legal frameworks in each of the seven countries. It was determined that, in legal terms, there is nothing serious standing in the way of greater coordination and cooperation. The existence of the overarching legal framework has influenced the formation and implementation of laws. However, as made clear in the 2006 EU Preliminary Sector Inquiry into the electricity and gas industries there is widespread failure to implement the spirit of the laws. If greater integration and competition is to occur then national institutions must begin to enforce existing laws.

Most of the C3EM project focused on the electricity sector but a study did examine the level of competition in the gas industry. The barriers that are in the electricity sector are also present in the gas sector. There is a high level of market concentration in addition to barriers for new entrants wanting to participate in the market. The lack of an effective gas exchange further complicates the movement towards a more competitive gas market. As shown in the study, there exists a need to extensively expand the storage capacity of the industry and to diversify both
supply sources and reinforce the region’s gas pipeline network.

Part of the C3EM project consisted of examining different regulatory approaches for renewable energy. The region’s approaches are diverse, but often done through large support schemes. The study suggests ways where investors may be able to buy renewable energy when government subsidies or other support may be running out. Moving the renewable energy sector from one supported by governments to one supported by markets may be possible in the long-term but the groundwork should be laid today.

Assessing the region’s ability to increase cooperation and coordination was also assessed through a survey and interviews with key industry professionals and government representatives. The purpose of this was to have a cross-section of industry experts state their own opinion on the barriers preventing greater coordination and cooperation. Their views can be grouped into three barriers: 1) lack of accessible cross-border capacity, 2) the need for common rules and regulations, and 3) a need for greater political support for regional action. The findings in this study supports the C3EM projects overall findings that to increase regional cooperation and coordination market transparency needs to be increased, the capacity of infrastructure needs to be increased and current rules need to be enforced. Creating a level playing field for all market participants in Central and Eastern Europe rests on greater effort at the regional level.


Questions:

a. How can regulators remove some of these regional barriers?

b. What role can regulators play in improving cross-border trade?

c. How can regulators improve regional cooperation amongst themselves?

d. Can regulators improve the legal conditions in each country?
4 Literature


http://www.dauphine.fr/cgemp/Publications/CahiersCGEMP/MemoireVassilopoulos.pdf


5 Endnotes

2 Energy Regulators Regional Association; Licensing/Competition Committee (1999, Dec.). The Most Important Legal/Statutory Elements for Regulation of the Energy Sector. Pg 3
3 Lending institutions, like banks and private finance groups, give risk ratings to investments, in an unstable, or highly politically influenced investment climate, where policies can change, a higher risk rating is given, this translates into higher project financing costs which ultimately mean higher cost for rate payers.
4 Energy Regulators Regional Association; Licensing/Competition Committee (1999, Dec.). The Most Important Legal/Statutory Elements for Regulation of the Energy Sector. Pg 2
5 Government, with a capital ‘G’ is defined as: a small group of persons holding simultaneously the principal political executive offices of a nation or other political unit and being responsible for the direction and supervision of public affairs: (1) : such a group in a parliamentary system constituted by the cabinet or by the ministry (2); source: Merriam-Webster online dictionary, www.m-w.com
vi A common definition of ‘Regulatory Authority’ will be given to those councils or head regulators who hold the regulatory making power. For example, when there is no council, the head regulator, will be considered the ‘Regulatory Authority’. In the rest of the cases the ‘Regulatory Authority’ refers to the regulatory council.
vi i In France tariff decisions are reached in cooperation with the relevant ministry.
vi ii Energy Regulators Regional Association; Licensing/Competition Committee (1999, Dec.). The Most Important Legal/Statutory Elements for Regulation of the Energy Sector. Pg 2
ix Consider the case of the Enron corporation.
1x Based mostly on Articles 81 and 82 of the Treaty of Rome.
1x i Internal Market and Industrial Cooperation - Statute for the European Company - Internal Market White Paper, point 137 (memorandum from the Commission to Parliament, the Council and the two sides of industry). COM (88) 320, 8 June 1988
1x ii Essential facilities are sometimes defined by a unique geographical site or location that can not physically be duplicated. Examples include certain ports or airport locations. Although the access issues to these facilities that arise in the context if introducing competition are similar to those we are discussing, these cases are beyond the interest of this text.
1x vii The principal conditions for introducing competition into the electricity and gas sectors of Europe that we are to discuss in the followings were introduced by the electricity directives of 1996 and 2003 and the gas directives of 1998 and 2003.
1x viii Note that since it is not only the price of access by which a network operator can discriminate against potential network users, the regulatory control over other, non-price type network access conditions is also necessary (e.g. the conditions set out for grid connection).
1x ix European Commission, Directive 2003/54/EC
1x x E.g. DSOs with less then 100.000 customers are exempted from this rule.
xx i European Commission, Directive 1996 96/92/EC
xx ii European Commission, Directive 98/30/EC
xx iii European Commission, Directive 2003/54/EC
xx vi (National Governors' Association 2002, July 15)
Endnotes

xxxix (National Governors' Association 2002, July 15)
xx (National Governors' Association 2002, July 15)
xxx (Federal Regulatory Energy Commission 1999, Dec. 20)