



Module 3

Introduction to energy regulation

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1. MODULE OBJECTIVES

1.1. Module overview

This module examines the following themes:

- Regulation is primarily designed to address the failure of markets to deliver desired goods, whether these are economic, social or environmental.
- One model of regulation will not fit all energy systems. Whether a system is state-owned or privatized, monopoly or competitive, integrated or unbundled, established or developing will affect the role of the regulator and the degree to which the regulator can intervene in the system. However, various regulatory models can be adopted or adapted to encourage the development of sustainable energy technologies.
- The need to develop sustainable energy policies raises new issues for policy-makers and regulators, including how to integrate possibly conflicting policy goals.
- Regulation is carried out in a number of different ways by different institutions. Each has strengths and weaknesses.
- Similarly, there are different models of regulatory strategy employing a range of incentives and penalties. Practitioners need to be aware of the advantages and disadvantages of these in seeking to encourage the deployment of sustainable energy technologies.

1.2. Module aims

The aims of the present module are listed below:

- To introduce the concept of regulation and provide some different definitions of regulation.
- To show that there is no “ideal” way to regulate.
- To outline some bodies involved in the regulation of energy.
- To outline some basic methods of regulation.
- To outline the new issues raised by the need to develop sustainable energy.

1.3. Module learning outcomes

The present module attempts to achieve the following learning outcomes:

- To be able to define regulation.
- To understand the role of regulation in a market system.

- To understand that there are different ways to regulate and different bodies that can be involved in regulation.
- To describe some different regulation systems.
- To appreciate some of the basic issues that sustainable energy can raise in relation to regulation.

2. INTRODUCTION TO THE MODULE

This module addresses the underlying basis for regulation with regard to the energy industries, although it will focus mainly on the electricity industry rather than other energy industries such as gas. It outlines the aims, design and degree of regulation to provide a basic introduction to the main issues and to establish a foundation for the following modules.

It is worth highlighting that the module concentrates on the rationale and the role of the economic regulator, which in turn assumes a degree of liberalization in a system. In a non-liberalized or state-owned system, many of the regulator's functions will be performed by the government.

In most African countries utilities are still state owned, and although many countries have committed themselves to a programme of liberalization and privatization of the electricity sector, only Cameroon, Côte d'Ivoire, Egypt and South Africa, have made significant advances in the liberalization of their electricity sectors.

Similarly, although this paper deals with economic regulation, some of the mechanisms outlined can be employed by environmental regulators to control or limit environmental pollution. While some points may therefore not seem directly relevant, they may have a more general value for different regulators or types of system.

3. DEFINITION OF REGULATION

What is regulation? The Oxford Dictionary gives a definition for the action of regulating that illustrates well the wide-ranging activities that come under the heading of “regulation”. Regulation is to carry out these actions “in accordance with rules or conventions” or “by law”.

To regulate: to control, especially by rules, administer, conduct, direct, govern, manage, monitor, order, organize, oversee, restrict, and supervise.

Regulation: rule, in accordance with rules or conventions, by law, commandment, decree, dictate, directive, edict, law order, requirement, restriction, rule, and statute.

— Oxford Dictionary



Review questions

How would you define regulation?

What kind of actions does a regulator undertake?

Make a list, maybe using an example from your country.

4. WHY REGULATE?

In very broad terms, regulation seeks to address “market failure” and is deemed necessary to protect consumers, society and/or the environment.

The primary driver for regulation of infrastructure sectors (public service sectors) such as energy is generally to ensure proper competition and to prevent the growth of a dominant group or single utility servicing either function, essentially this is an attempt to keep prices down.

In non-liberalized markets, the degree of regulation is a direct political decision, and is explicitly connected to policy aims. In theory, the introduction of competition has often been seen as a way of reducing regulation. In a pure economic sense, regulation in competitive markets need only be applied where the benefits of doing so act to reduce the cost to the consumer to a greater degree than if the regulation did not exist—for example to limit market abuse. It is often suggested that “competition is the best regulator”, i.e. that effective competition will lead to the most efficient operation of the market as companies are given incentives to serve the needs of consumers.

However, this does not necessarily mean that where competition exists, regulation is no longer necessary. Regulation may be required to ensure effective competition is maintained—for example to prevent anti-competitive behaviour by companies with market power that can harm consumers and competitors. Regulation may also be required to ensure that certain services or goods are provided where competition alone would not secure this.

In general then, markets are regulated to ensure economic efficiency and to mitigate market failures to ensure that socially desirable goods and services are provided or protected. Briefly, the motives for regulation in competitive markets can be listed as:

- Economic efficiency (e.g. the prevention of market abuse);
- Consumer protection (e.g. to keep prices down);
- Environmental protection (e.g. to reduce emissions of carbon dioxide);
- Social justice (e.g. to ensure universal supply);
- Security of supply (to keep the lights on).

Most of these motives could also apply to regulation in non-competitive markets.

Some of these motives could be seen as contradictory—for example, keeping prices down may not be compatible with promoting renewable technologies,

which can be more expensive than conventional technologies. Policymakers and regulators will have to resolve these issues by taking into account other factors, such as the time scales for which the regulation is designed. In the short term, for example, increased renewable generation or energy efficiency activities may increase energy prices, but in the longer term they may well lead to reduced prices. Similarly, the social desirability of ensuring universal supply can increase prices, but this has to be balanced against improved quality of life for citizens.

Balancing these issues will undoubtedly be a challenge, and may more appropriately be addressed by politicians and policymakers rather than regulators. However, putting the policies into practice is the job of the regulator, and in practice many choices on measures and rules will refine the balance of the policy aims. So while regulation could be seen as institutionally separate from the political decision of how to balance policy aims, in the real world, it may well fall to regulators to decide specific issues on a case-by-case basis.

Regulators are also involved in advising policymakers on policy choices, because of their expertise in economics and in the practicalities of devising and monitoring rules to implement policies. They are therefore participants in the debate about policy choice, often with a considerable degree of influence and hence they are not just implementing policy that is made elsewhere.

5. WHAT CAN BE REGULATED: ELECTRICITY SYSTEM STRUCTURES

Electricity industry structures vary widely from country to country. The main variations are in terms of:

- Level of competition;
- The degree of integration (vertical or horizontal);
- Ownership (public or private);
- The degree to which the system is established or developing.

Whatever the electricity industry structure and its state of development, there are essentially four functions that the electricity supply industry is performing:

- Generation;
- Transmission;
- Supply (often called retail);
- Distribution.

Any or all of these functions may be privately or publicly owned. Two or more of them may be contained within the same company (as is often the case in African countries). Generation and supply may be undertaken on a monopoly basis or subject to competition. Transmission and distribution will always be provided on a monopoly basis.

5.1. Competition

In electricity industries, the primary functions where regulated competition applies are in generation and supply, though this can be broken down to create separate markets for smaller functions such as metering.

There are a number of reasons to regulate competition within these two functions, and the priority given to these functions will vary between regulatory regions. The primary driver for regulation of these functions is generally to ensure proper competition and to prevent the growth of a dominant group or single utility servicing either function, essentially this is an attempt to keep prices down.

Ensuring fair competition with regard to electricity generation requires the creation of a marketplace which is open to both existing generators and which does not induce barriers to deter newcomers. Regulation should prevent the capture of sufficient market power by a single generator or by groups of generators such that prices can be controlled by the entity.

Fair competition is also necessary in the electricity supply function (that is, the firms which buy from generators and sell to consumers). Significant regulatory issues include consolidation of companies within the function such that one or more companies can come to dominate the function, though this must be balanced with the economy-of-scale advantages that consolidation can bring and the cost reductions that can thus be passed on to the consumer.

5.2. Integration

Companies may be horizontally integrated such that one company controls a significant fraction of the market for one function, for example, all of the supply of electricity to consumers. In a privatized industry such control tends to imply significant market power and this can be undesirable with regard to consumer benefit. Generally, horizontal integration is implicit in state-owned industry.

Companies may also be vertically integrated, that is, with two or more functions under the ownership of one company or agency. Such integration may be valuable to the company but not necessarily to society. Most notably, vertical integration may lead to the company achieving sufficient market power such that other competitors can be disadvantaged, with a corresponding impact on consumer welfare.

Where market power is established, or as part of a privatization process, the separation of selected functions is often required by government or regulators in order to prevent abuse of market power. This “unbundling” of functions into separate and discrete services can take different forms.

In some cases, governments or regulators may be satisfied with a degree of internal separation—for example into separate companies with safeguards to prevent collusion. In other cases, this will not be considered adequate and companies will be required to divest one or more function.

The degree of unbundling within an industry will have significant implications for the potential of companies to exert market power across electricity industry functions. For example, vertical integration of a generation and distribution company can mean preferential treatment by one part of the company for another, to the disadvantage of competitors and to the overall welfare of consumers. For this reason, regulation often prohibits cross-ownership of some functions, or can apply strict controls over ownership to try to prevent firms with interests in multiple functions from gaining competitive advantages. Unbundling of functions can prevent this, provided that strict monitoring occurs to ensure the controls are effective and are not simply for appearance’s sake.

5.3. Ownership

In some countries, there is a mix between public and private ownership, whereas in others the whole industry will be in private hands—for example, some generators may be state owned while others are privately controlled. In such a situation, both may be subject to the competitive market, or one or both entities may not.

The shift of an industry from the public to the private sector may take place in a number of phases. Corporatization involves state-owned industries being turned into businesses (or corporate) units with rather more autonomy and may also be a precursor to privatization. If desired, privatization then occurs, usually accompanied by some change in regulation to govern the new structure. This change in regulation is often referred to as deregulation though it is often perhaps more accurate to say that it is re-regulation.

Privatization may also be accompanied by liberalization—opening up certain markets to competition, although liberalization may also be introduced in some cases even where privatization has not taken place.

5.4. System development

The age and extent of electricity systems has a direct impact on the costs and technical implications of operating and maintaining it. In many African countries, there is still a need for significant investment in order to expand and improve the electricity system. This has a huge cost implication and leads to questions over who will pay for this expansion: the state? Or the private sector? Or a combination of the two. Historically, the state has been responsible for the expansion of infrastructure, such as the electricity network but this has led to very low rates of development of the electricity system in many countries and now alternative solutions to injecting the required investment are being sought.

In a “mature” system, networks are already established and are generally geared towards shifting power from large-scale, centralized generating plants to the end user via transmission and distribution lines. In a mature system, with established rules and regulations, creating a favourable environment for sustainable energy can mean the need for many changes which can take time and a lot of industry coordination.

In contrast, less mature systems can develop to accommodate sustainable energy technologies as they retain flexibility by virtue of the fact that they are still growing. In order for an expanding system to integrate the increased use of renewable resources, the right incentives and regulations need to be provided, as well as again industry coordination.

Box 1. Some of the challenges for utility regulation in Africa

- Poor financial performance of many state-owned utilities
- Inappropriate pricing (usually as a result of political pressures)
- Managerial and technical deficiencies (regulation is a relatively new concept for many countries)
- Unsustainable subsidies
- Limited public sector finance for new infrastructure
- Limited private sector participation
- Low levels of access to services

Source: Extract from the presentation made at the 2nd AFUR annual conference by Mufor Atanga, AFUR secretary general, March 2005.

6. WHO REGULATES?

The independent or semi-independent specialist utility or energy regulator is becoming a common model for regulation of the energy industries, particularly where these industries have been transferred to the private sector. However, this is not the only model, in some countries—even where the industry has been privatized—a central government department will retain either the whole regulatory function or parts of it.

Three different models for regulation are commonly found in Africa: regulation through a government department, through a ministerial agency or a fully independent regulator. Typically, water regulation is vested in a government department (such as the Department of Water Development, under the Ministry of Water, Land and Environment in Uganda), electricity is regulated by a ministerial agency, usually under the Ministry of Energy (such as the NER in South Africa) and only in the telecommunications sector can completely independent regulators commonly be found.

Whether it is a government department or a regulator who has the primary role, there will often also be other bodies with a role in regulating the energy industry.

The following bodies can all be involved in regulating the energy industry:

- Central government departments;
- Specialist utility or energy regulatory agencies (including rural electrification and energy efficiency agencies);
- Generalist competition regulators;
- Environmental regulators;
- Local authorities;
- Courts and tribunals.

6.1. Central government departments

Where central government departments are directly involved, they make regulation answerable to elected politicians and hence can increase democratic control and legitimacy. Whether or not this is considered desirable will depend upon different views on the purpose of regulation and role of government. For example, there may be concerns that governments may be willing to compromise economic efficiency to meet other goals—for example, there may be pressures to protect companies from competition to preserve jobs.

6.2. Specialist utility or energy regulators

One of the main arguments made in the favour of specialist utility or energy regulators is that, where the agency enjoys reasonable independence from government, they provide a bulwark against “political interference” which might damage economic efficiency. The main argument against is lack of accountability to the government and parliament. Establishing an independent regulator places considerable power in the hands of an appointed individual, (or a group of individuals where a commission-type structure exists) who may pursue policies that are at odds with government policy or publicly mandated policy goals. These regulators are generally subject to a set of duties provided by legislation, although the legislation may provide for a considerable degree of discretion on the part of the regulator in applying and balancing these duties. Achieving the benefits of independence without sacrificing accountability is thus one of the key challenges.

6.3. Generalist competition regulators

The role of generalist competition regulators is to take action against activities that may hamper competition in any sector of the economy. Typically they will have a role in assessing whether certain mergers should be allowed to proceed and in taking action where companies with market power are found to be acting anti-competitively. In some countries, the specialist utility regulators may have some concurrent powers with the generalist competition regulators.

6.4. Local authorities

Local authorities may have two types of role. Firstly in planning control—e.g. in the siting of energy facilities such as power stations, wind turbines, etc. Secondly, in some countries, local authorities provide municipal electricity and/or heat (district heating) supply—these companies may be regulated by a sector regulator where one exists or they may be largely self-regulatory.

6.5. Courts and tribunals

The position of courts and tribunals can vary somewhat, depending on the particular structure. In some systems they are empowered to act as the point of last appeal on disputes between other regulatory bodies and companies. In other systems, courts and tribunals can be the first point of call concerning company behaviour.

7. TYPES OF REGULATION

Here only a brief introduction will be given to the different types of regulation. These are explored in more detail in Module 5: Regulation types and options.

7.1. Command and control

Command and control regulation is typically the imposition of standards backed up by legal sanctions if the standards are not met. The law is therefore used to define and prohibit certain types of activity or force certain types of action. Standards can be set either through legislation, or by regulators empowered by regulation to define rules.

7.2. Self-regulation

Self-regulation could be portrayed as DIY (do-it-yourself) command and control. It often takes the form of a business or a trade association developing its own rules of performance, which it also monitors and enforces. There can be some government oversight of the regulation, but as a rule self-regulation is often seen as a way of business taking pre-emptive to avoid government intervention.

7.3. Incentive-based regulation

The aim of incentive-based regimes is to induce a regulated entity to limit or stop an undesirable activity by imposing taxes or granting subsidies—in other words a “carrot and stick” approach to ensure a socially desirable end. The scheme of punishment and reward operates in a mechanical way, so reducing the scope for regulatory discretion, which in turn reduces the possibility of regulatory capture. It also allows the company a degree of flexibility in deciding whether to conform to the rule, or to accept the punishment.

7.4. Market controls

There is a range of market-based mechanisms that can be used to regulate activities. Market-based regulations (e.g. regulation by contract) can prove cost-effective, and minimize regulatory interference in the day-to-day operation of companies.

8. REGULATION ISSUES FOR SUSTAINABLE GENERATION

Energy systems are made up of interacting components (e.g. a generating plant and the transmission system). Separating the main components in this section is therefore a little artificial, and it needs to be remembered that there may be issues which cross over a number of different areas. So, for example, distributed generation obviously raises issues for regulation of transmission and distribution networks, as well as for generation. Some of these issues will be dealt with in later modules—the outline given here is intended purely as a basic introduction.

8.1. Regulation and generation

In state-owned systems the government still plays an important role in deciding which technologies are used to generate power. In liberalized systems, governments have effectively stepped away from dictating which technologies are chosen. This choice is instead left to the market. However, economic regulation, and the way that the market is designed can still influence this choice.



Review questions

For example, think about the following questions. To what degree are they true for the current system in your country?

- Do market participation rules discriminate against smaller-scale generation or independent generators because of high transaction costs, or overly punitive penalties for intermittent generation?
- Does the design of the market encourage or hinder new entry?
- Is the market so competitive that it discourages innovation and the development of new generating technologies?
- Does the design of the market encourage demand-side bidding (i.e. is there a value attached to a consumer reducing demand at certain times)?

8.2. Regulation of electricity transmission and distribution

Transmission networks

Transmission networks are the system of connections carrying high voltage electricity from the large generators to the distribution networks and to the largest of electrical consumers. Their upkeep and operation is the business of transmission system operators (TSOs). TSOs are also responsible for the balancing of consumption and generation on the system.

Distribution networks

The conduit between the transmission grid and the majority of electrical consumers is carried out by distribution network operators (DNOs). DNOs are required to ensure, through their networks, that consumers have access to a secure and reliable supply of electricity provided at a minimum feasible cost. Although it is widely acknowledged that minimization of costs can be achieved through the maximization of operational efficiency of the network, regulatory intervention, through efficiency targets and efficiency rewarding mechanisms, is often required to engage DNOs in meaningful efficiency improvement exercises. Currently, energy efficiency targets in the tariff-setting mechanism for transmission and distribution systems are used in only a few countries in sub-Saharan Africa (e.g. Ghana).

Transmission and distribution of electricity are both natural monopolies; it would be far too costly and not very efficient to have more than one transmission and distribution system. Provided there is spare power transfer capacity in the systems, the average cost of both transmitting and distributing electricity reduces as the amount of electricity distributed increases. Thus, the cost of any additional unit of electricity distributed will be both lower than the cost of previous units and lower the average cost per unit.

Natural monopolies may also result from “economies of scope”. These exist where two or more services can be provided more cheaply by one single company than if each service was provided by two separate companies. “Economies of density” play a significant part in making both transmission and distribution network operation natural monopolies. It is much cheaper on a per household basis to have one single network (and network operator) serving a neighbourhood than to have two networks, each serving half of the same neighbourhood, as this avoids duplication of large parts of a network, and thus the costs associated with this.

Both transmission and distribution networks thus need to be regulated to move towards greater efficiency so that overall prices are reduced and that these reductions are passed on to the consumer.

In this context, efficiency can refer to the costs of providing a range of services as well as tasks such as minimizing losses and acting to provide a guarantee of quality of supply to consumers. Increased efficiency can occur in a number of ways, for example:

- Through providing energy services (supplying light and heat rather than just energy);
- As the result of improved management, technical performance and utility practices;
- As the application of improved technology such as new information and communication technology (ICT).

The central incentive for improved network efficiency is the network operator's desire to improve its profits. Properly designed policy frameworks and regulatory mechanisms (i.e. efficiency rewarding tariff setting mechanisms) should be put in place to ensure that the more efficiently the network operates, from an economic and use-of-resources point of view, the greater the company's profit margins are.

To protect the consumer, the regulator can limit the amount of profit the network operator makes from improved efficiency by putting in place a mechanism that acts to pass on some of the value of improvements to the consumer. This process can be improved by the use of benchmarking (also known as comparative regulation), that is, by comparing the performances of separate companies in re-assessing the prices that the DNO is allowed to charge. Regular re-assessments of the prices that the DNOs are allowed to charge are usually used to facilitate this—typically every 4-5 years.

As the efficient operation of the network also has quality of supply implications, the regulator may also choose to introduce incentives to the TSO or DNO to maintain certain levels of quality of supply and punish the DNO should they fail to achieve these standards.

Whilst many of the basic issues relating to regulation of transmission and distribution are similar, there are important differences relating to sustainable energy that are specific to either kind of network. One issue is the connection of renewable energy generators to networks—typically, though not exclusively, to distribution networks. This requires consideration of the appropriateness of particular regulation relating to connection on either kind of grid and to the issue of equality for all competitors. Consideration must be given to regulation that gives

incentives for the reduction of energy consumption, such as demand-side management, increased energy efficiency and loss reduction.

8.3. Regulation for sustainable energy

The age and extent of electricity systems can have a direct impact on the costs and technical implications of implementing sustainable energy policies. In a “mature” system, networks are already established and are generally geared towards shifting power from large-scale, centralized generating plants to the end user via transmission and distribution lines. In contrast, less mature systems can develop to accommodate sustainable energy technologies as they retain flexibility by virtue of the fact that they are still growing. New technologies can be designed in to the expanding system, and new consumers can be offered services rather than just energy supply.

Regulation can have a direct impact on changes and developments in the system through the provision and regulation of incentives such as support mechanisms (e.g. investment subsidies, tax credits) for renewable power technologies or the operation of demand-side management programmes.

Regulation can also play a less overt role in the technological choices within energy systems by addressing rules and practices which favour the dominant technologies in the system. For example, companies have developed to sell kWh, rather than to provide energy services; regulators can take action to encourage the emergence of energy service supply companies, which will in turn improve the energy efficiency of consumers. Similarly, the rules governing connection and performance have developed to support the large-scale, centralized nature of many electricity systems and have therefore tended to exclude the possibility of connecting smaller-scale generation to distribution networks. Regulators can address these imbalances and so provide greater incentives to implement smaller scale, often renewable, generation.

9. CONCLUSIONS

Regulation is primarily designed to address the failure of markets to deliver desired goods—whether economic, social or environmental. Regulation is the primary tool to address those market distortions and is, when carefully designed, capable of serving a range of policy goals related to energy supply, including improved market functioning, poverty reduction and sustainable development.

LEARNING RESOURCES

Key points covered

Here are the most important points covered in this module:

- The concept of regulation and its main aim: to address the failure of markets to deliver desired goods and services, whether economic, social or environmental.
- There is no “ideal” way to regulate and every country has different circumstances which require their own individual solutions. The type of regulation of the energy industry will depend on the level of maturity of the system, the degree of competition, the degree of integration of the market actors, etc.
- There are a number of bodies involved in regulation of energy. The most common actors are government departments, Agencies linked to the Ministry of Energy of a country (usually semi-independent) and fully independent regulators.
- An introduction to some of the basic methods of regulation: command and control, incentive-based regulation, self-regulation and market controls.
- An outline of the issues raised by the need to develop sustainable energy and the role of the regulator to change and adapt the electricity system across its four main functions: generation, transmission, distribution and supply.



Answers to review questions

Question: What kind of actions does a regulator undertake?

Answer: Actions a regulator may undertake: Set and revise electricity prices, grant generation, transmission, supply and distribution licences, manage energy efficiency programmes, monitor performance of utilities, ensure that the laws regarding energy are being abided by, set rules to maintain quality of supply, set grid codes, set safety standards, promote effective competition.



Presentation/suggested discussion topics

Presentation:
ENERGY REGULATION – Module 3: Introduction to energy regulation

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- Ferrey S. (2000), *New Rules: A Guide to Electric Market Regulation*, Pennwell Publishing.
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INTERNET RESOURCES

SERN: www.reeep.org/groups/sern

Regulatory Assistance Project (RAP): www.raonline.org

About regulated industry: www.utilityregulation.com

National Association of Regulatory Utility Commissioners—NARUC: www.naruc.org

Public Utility Research Center: www.purc.org

Department of Water Development, Uganda: www.dwd.co.ug

African Forum of Utility Regulators: www.afurnet.org

Centre of Regulation and Competition: www.competition-regulation.org.uk

GLOSSARY/DEFINITION OF KEY CONCEPTS

Demand-side management

The planning, implementation and monitoring of utility activities designed to encourage consumers to modify patterns of electricity usage, including the timing and level of electricity demand.

Distribution	The transport of low voltage electricity. This connects the transmission network with the majority of electricity consumers. Management of distribution is a natural monopoly due to the economies of scale inherent to it.
Distributed generation	Essentially any generator which connects directly to the distribution (low voltage) electricity grid rather than the transmission (high voltage) grid.
Distribution network operator	The owner of the physical network providing electricity at low voltages. Generally connects the transmission grid to the majority of consumers, though some larger consumers may connect directly to the transmission grid.
Economies of scope	Economies of scope are conceptually similar to economies of scale, primarily referring to efficiencies associated with demand-side changes, such as increasing or decreasing the scope of distribution of different types of products. In the context of this module they refer to the potential for distribution and transmission system operators to provide two or more services more cheaply than if either was provided by a single company.
Economies of density	Economies of density in the context of this module imply that one single transmission and distribution system as a natural monopoly is the cheapest option for the community that the system covers
Energy services	The provision of energy supply and measures concerned with end-use in a single package.
Generation	Generation of electricity (power) from energy sources. These can be oil, gas, coal, fission, wind, waste, biomass, etc.
Horizontal integration	One company controls a significant fraction of the market for one function, for example, all of the supply of electricity to consumers.
Monopoly	The situation wherein one company has the market power to control the price or availability of a good or service. If this is unregulated, the company is likely to produce fewer goods or to sell goods more expensively than would be the case in a competitive environment. In practice, a monopoly may refer to an industry where one company has power to control the sector regardless of other companies or it may refer to a sector where only one company exists. It should be noted that outside natural monopolies, few monopolies are absolute and that even dominant companies may be subject to pressures

on their price setting or limiting of supply. The effects of monopoly, including natural monopoly, on welfare can be limited by appropriate regulation.

Regulation	Controlling or directing in accordance to rules, conventions or law.
Supply	The selling of electricity to consumers (also called retail).
Sustainable energy	The term sustainable energy usually encompasses two parts: Renewable energy and energy efficiency.
Transmission	The system of connections carrying high voltage electricity, i.e., transport of high voltage electricity.
Vertical integration	Two or more functions are under the ownership of one company or agency, for example, generation and transmission.



SUSTAINABLE ENERGY REGULATION AND POLICY-MAKING FOR AFRICA

Energy Regulation

Module 3: INTRODUCTION TO ENERGY REGULATION

Module 3



SUSTAINABLE ENERGY REGULATION AND POLICY-MAKING FOR AFRICA

Module overview

- Regulation is designed to address market failures
- There are many models of regulation:
 - Command and control
 - Self-regulation
 - Incentive-based regulation, etc.
- Regulation can be carried out by different institutions
- Sustainable Energy raises new issues for policy-makers and regulatory bodies

Module 3



renewable
energy
& energy
efficiency
partnership

SUSTAINABLE ENERGY REGULATION AND POLICY-MAKING FOR AFRICA

Module aims

- To introduce the concept of regulation
- To show that there is no 'ideal' way to regulate
- To outline some bodies involved in regulation of energy
- To outline some basic methods of regulation
- To outline the new issues raised by the development of sustainable energy

Module 3



renewable
energy
& energy
efficiency
partnership

SUSTAINABLE ENERGY REGULATION AND POLICY-MAKING FOR AFRICA

Module learning outcomes

- To be able to define regulation
- To understand the role of regulation in a market system
- To understand that there are different ways to regulate and different bodies that can be involved in regulation
- To describe some different regulation systems
- To appreciate some of the basic issues that sustainable energy can raise in relation to regulation

Module 3



SUSTAINABLE ENERGY REGULATION AND POLICY-MAKING FOR AFRICA

Reminder!

- Aim of this module is to provide general background and information – and to provoke discussion
- No two countries are the same, so there is no single ‘ideal’ solution for energy regulation

Module 3



SUSTAINABLE ENERGY REGULATION AND POLICY-MAKING FOR AFRICA

Why regulate?

- To address market failure
- To ensure most efficient allocation of resources
- To ensure proper competition
- To prevent the growth of a dominant group (monopoly)
- To keep prices down (protect the consumer)

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Why regulate? (2)

- Motives for regulation in competitive markets:
 - Economic efficiency
 - Consumer protection
 - Environmental protection
 - Social justice
 - Security of supply
- Most of these could also apply to non-competitive markets

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SUSTAINABLE ENERGY REGULATION AND POLICY-MAKING FOR AFRICA

What can be regulated?

- The design and degree of regulation depends on the structure of the industry:
 - Public or Private
 - Level of competition
 - Degree of integration
 - Ownership
 - Degree to which system is established or developing
- Functions of the electricity system which are regulated:
 - Generation
 - Transmission
 - Supply (often called retail)
 - Distribution

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What can be regulated? (2)

- Some challenges for the developing electricity structures of Africa:
 - Poor financial performance of state-owned utilities
 - Inappropriate pricing
 - Managerial & technical deficiencies
 - Unsustainable subsidies
 - Limited private sector participation
 - Limited access to investment
 - Low levels of access to services

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Who regulates?

- Government – issues of democratic control and legitimacy
- Independent body – in theory free from political interference, but can lack accountability
- Semi-independent body
- Other bodies that may be involved in regulating an industry:
 - Government departments, energy regulatory agencies, competition regulators, environmental regulators, local authorities, courts and tribunals

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Types of Regulation

- Command and control
- Self-regulation
- Incentive-based regulation
- Market controls

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Questions/Activities

‘Competition is the best regulator’

Discuss

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Regulatory Issues for Sustainable Energy

- Direct impact on developments in an energy system through the provision and regulation of incentives:
 - Support for renewable energy systems
 - Operation of demand-side management programmes
- Addressing rules and practices that favour one technology over another
- Maintain quality of supply
- Change rules governing connection and performance

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Regulatory Issues for Sustainable Energy (2)

- Generation
 - Market rules for trading electricity
 - New entry
 - Adoption of new technologies, etc.
- Transmission and distribution
 - Ensure efficient operation
 - Connections and costs, etc.
- Supply
 - kWh versus energy services
 - Demand-side management (DMS)

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SUSTAINABLE ENERGY REGULATION AND POLICY-MAKING FOR AFRICA

CONCLUSIONS

- Main aim of regulation is to address failure of markets to delivery desired goods and services – whether economic, social or environmental
- Regulation needs careful design to achieve a more sustainable energy system

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