

## 66347 - Energy markets

### Syllabus Information

**Academic Year:** 2021/22

**Subject:** 66347 - Energy markets

**Faculty / School:** 110 - Escuela de Ingeniería y Arquitectura

**Degree:** 535 - Master's in Renewable Energies and Energy Efficiency

**ECTS:** 5.0

**Year:** 1

**Semester:** Second semester

**Subject Type:** Optional

**Module:**

## 1. General information

### 1.1. Aims of the course

1. Identify the different models of energy markets internationally applied and explain the functioning and problems of each one.
2. Optimize and negotiate the technical and economic conditions of electricity and gas supply contracts.
3. Identify international strategies to promote investments in renewable energies and apply the Spanish legal framework for the optimal management of facilities.
4. Apply different mathematical techniques to the characterization of electricity demand, calculating energy prices and the optimal dispatch of self-producers.

### 1.2. Context and importance of this course in the degree

The ENERGY MARKETS course provides an essential complement to the technical content of other Master courses, training students in the economic management of energy supply and the legal knowledge of the more practical aspects for the development of renewable energies in the context of modern energy markets.

### 1.3. Recommendations to take this course

General knowledge of energy technologies and infrastructures.  
Ability to conduct autonomous searches of technical and scientific information.  
Sufficient knowledge of English for reading documentation.

## 2. Learning goals

### 2.1. Competences

CE03: Know the Spanish and European legislation on energy efficiency and the special regime of electricity generation and its application

### 2.2. Learning goals

- Identify the different models of energy markets internationally applied and explains the operation, advantages and problems of each one
- It is able to optimize and negotiate the technical and economic conditions of electricity and gas supply contracts.
- Identify international strategies to promote investments in renewable energies and apply the legal framework in Spain for optimal management of facilities.
- Apply different mathematical techniques for calculating the energy prices and the optimal dispatch of self-producers.

### 2.3. Importance of learning goals

- To prepare students for negotiating supply contracts in modern liberalized energy markets, better understanding of the functioning of wholesale markets and optimal economic management of the sale of electricity produced in plants using renewable sources
- To initiate on research in energy markets to those students who will continue in a doctoral training program

### 3. Assessment (1st and 2nd call)

#### 3.1. Assessment tasks (description of tasks, marking system and assessment criteria)

The assessment of the course consist of two activities:

1. A coursework on a topic proposed by the teacher
2. A test of understanding of basic concepts

Weighting of the assessment activities:

Activity 1: 50%

Activity 2: 50%

### 4. Methodology, learning tasks, syllabus and resources

#### 4.1. Methodological overview

The methodology followed in this course is oriented towards achievement of the learning objectives. It is based on an interactive methodology between the teacher and the students, supported by the reading of the materials provided by the teacher in each session and practical case studies.

#### 4.2. Learning tasks

The course includes the following learning tasks:

- A01 Lectures (25 hours). Presentation of theoretical contents by a faculty or by external experts to all students enrolled in the course. Although it is not a mandatory activity, regular attendance is highly recommended.
- A02 Problem and case solving (13 hours). Solve practical problems and exercises with all the students. Although it is not a mandatory activity, regular attendance is highly recommended.
- A03 Laboratory sessions (12 hours). Students will work actively in groups to solve practical exercises.
- A06 Guided assignments (20 hours). Students will complete assignments, problems and exercises related to concepts seen in laboratory sessions and lectures.
- A07 Autonomous work (50 hours). Students are expected to spend about 50 hours to study theory, solve problems and prepare lab sessions.
- A08 Assessment (5 hours).

The indicated hours are for guidance and will be adjusted depending on the academic calendar.

#### 4.3. Syllabus

The course will address the following topics:

Topic 0. Presentation.

Topic 1. Geopolitics of energy.

Topic 2. Regulation of the energy sector.

- 2.1 Regional markets. Internal energy market of the European Union.
- 2.2. Economy of electricity sector. Wholesale markets and forward markets.
- 2.3. Emissions trading market.
- 2.4. Technical grid operation and ancillary services.
- 2.5. Regulation of electric transmission and distribution.

Topic 3. Electricity supply contracting.

- 3.1. Retail markets. Marketing of electricity. Components of the final price.
- 3.2. Contract options for consumers. Access network tariffs.
- 3.3. Negotiation of supply contracts.

Topic 4. Economic efficiency of the Spanish electricity sector.

- 4.1. Economic analysis of the efficiency of the Spanish electricity sector.
- 4.2. Economic analysis of the regulation of the Spanish electricity sector.

Topic 5. Regulation of distributed generation.

- 5.1. Models of regulation and remuneration of renewable energy.

- 5.2. Specific regime for renewable energy and cogeneration in Spain.
- 5.3. Impact of the sale of electricity from renewable sources in the Spanish wholesale market.
- 5.4. Optimal management of cogeneration plants.
- 5.5. Legal and economic regulation of electricity consumption in Spain. Examples. International experiences.

Topic 6. Oil and gas markets.

- 6.1. Regulation and operation of the Spanish gas sector.
- 6.2. Regulation and operation of the Spanish oil sector. Biofuels.

Topic 7. Research topics in energy markets.

#### 4.4. Course planning and calendar

(1 hour)	Presentation.
(2 hours)	Liberalization of energy markets (1).
(1 hour)	Liberalization of energy markets (2).
(1 hour)	Wholesale markets (1).
(2 hours)	Wholesale markets (2).
(1 hour)	Forward markets. Emissions trading markets.
(2 hours)	Technical grid operation and ancillary services.
(1 hour)	Regulation of electric transmission and distribution. International experiences.
(2 hours)	<i>Computer based session: OMIE, REE, CNMC files.</i>
(1 hour)	Network access tariffs.
(2 hours)	<i>Computer based session: Network access tariffs, contracted demand optimization.</i>
(1 hour)	Voluntary Price for the Small Consumer (PVPC). Retail markets.
(1 hour)	Negotiation of supply contracts in the liberalized market. Types of offers and contracts.
(2 hours)	Introduction to the markets regulation.
(1 hour)	Introduction to the markets regulation.
(2 hours)	Economic analysis of the regulation of the Spanish electricity sector.
(1 hour)	<i>Computer based session: two-part tariffs assessment.</i>
(2 hours)	<i>Computer based session: indexed contracts assessment.</i>

- (1 hour) Electric bills. Optimization and control. Examples.
- (2 hours) *Computer based session: Electric bills monitoring.*
- (2 hours) *Computer based session: Electric bills monitoring.*
- (1 hour) Consumer access rights. Legal and economic regulation.
- (2 hours) Models of remuneration of renewable energy. Legal and economic regulation in Spain.
- (1 hour) Case study. International experiences of policies to promote renewable energies deployment.
- (2 hours) Regulation and operation of the Spanish gas sector. Consumers options.
- (1 hour) Regulation and operation of the Spanish oil sector. Biofuels.
- (2 hours) Research topics in energy markets.

The course is taught in the second semester. At the beginning of the semester, the teacher will inform the planning of learning activities and key deadlines for courseworks and the final exam.