



Economics of energy systems and policy

❖ *Module Outline*

Energy policy is a set of a legislation made by the government to organize the issues related to energy development, such as production, consumption, distribution, its growth to meet the demand power all the times, and to make a balance between the growth of the energy production and their environmental effects using long and short terms plans.

It is necessary to have well-crafted energy legislation (energy policy) to manage the future of the energy in order to reduce the consumption of fossil fuel and increasing the power supply toward the renewable energy resources. Which lead to energy supply stability and lessening the environmental effect.

This Module will discuss the energy policies, the importance of them to meet the economic and environmental goals, their requirements and challenges, and how they control the energy market toward the renewable energy. Energy policies from different countries will be studied during this module to allow the students to compare and evaluate their goals and their achievements.

The Core Values of the energy policy are:

- Sustainability
- Stability
- Reliability by ensuring continued access to energy
- Efficiency in the production and consumption of all energy resources
- Diversity by using multiple sources of energy
- Maximum use of renewable energy resources
- Industrial development
- Maximum level of collaboration between the energy sectors – sector coupling
- Environmental Protection

❖ *Module Objectives*

The Economics and Energy policy module is designed:

- To understand how the energy policies are defined and implemented to achieve sustainable energy supply.
- To understand how the energy policies can make the transition to a low carbon economy and better technology system.
- To discuss the history and the future of the main energy policies.
- To understand the challenges that the energy policies have faced towards their goals.



- To study and evaluate different energy policies from different countries.

❖ *Learning outcomes*

At the end of the module, students will be able:

1. To know the main resources of the conventional energy and their intensive uses in most of world countries for industrial development and for providing people better life.
2. To understand the energy requirement, availability, resources and constraints.
3. To understand the role of energy policy to achieve low carbon environment and sustainable energy supply.
4. To understand how long term effective energy policies can improve investment of the private sector in the Renewable Energy (RE) sources.
5. To understand how energy policies can encourage the energy consumers and producers to reschedule their consumption /production to enhance the electricity market.
6. To learn about two or more of the energy policy experiments (from developed and developing countries)

❖ *Module Content*

Chapter 1: Electricity Market

To understand the nature of the electricity market, Wholesale electricity market, Retail electricity market, Electricity pricing, Electricity market regulator, Challenge of electricity market development.

Chapter 2: Electricity Production cost and Technology

Production cost, Technology cost, Environment and emission effects of all kind of energy sources.

Chapter 3: Energy for Transportation

Markets, Resources, Cost, Using, Electrified transportation, sector coupling.

Chapter 4: Electricity Market Model in Transition

Flexibility of trade in connection with smart grids, Real time pricing, Flexibility in network topology, Households' electricity use and patterns of consumption, Load adjustment, Peak curtailment, Improve reliability.

Chapter 5: Market Development Policies for Renewable Energy



Policy options of consumption/production of RE; Targets & Timetables, Powerful technology performance standards, Taxes & fees to increase market competition, Beneficial feed-in tariffs, Subsidy Reform, Venture capital provision, Technology procurement, a government guarantee for market demand.

Chapter 6: Unit commitments of power generation renewable energy and non-renewable energy sources with battery storage

Unit commitment in general, the impacts of renewable energy on unit commitment, battery storage, reliability and stability.

Chapter 7: CO₂-pricing/ Emission Markets

European Trade System ETS, carbon taxes, Cap and Trade, Carbon commitments, Emissions trading, Interaction between Emissions markets policies with renewable energy policies

Chapter 8: Cases Study

Studying and comparing between energy policies in developed and developing countries.