



# 能源经济管理与可持续发展

Management of Energy Systems for a  
Sustainable Development

#1. 课程背景及简介



能源经济学是一门整合经济学、管理学、资源环境等优势学科推出的前沿性、交叉性的新学科，研究能源生产、交换、分配、消费过程的经济关系和经济规律的学科。能源经济学算是政治经济学、工程经济学的一个分支。

能源经济的范围其实是很广泛的，像现在比较流行的低碳经济、绿色环保、生态经济等等这类的涉及到能源问题，节能环保的都可以囊括在能源经济里面。能源问题现在在全世界范围的问题，国家层面上对能源经济是非常关注的，在将来以后的时间能源将成为制约经济发展的主要因素，更多的是国家的大力支持。能源可持续发展是指各种能源在当代得到有效的开发与利用，同时又能够为后代创造持续利用各种能源条件的一种发展过程。“可持续发展”究其本质，就是要统筹人与自然和谐发展，处理好经济建设、人口增长与资源利用、生态环境保护的关系，推动整个社会走上生产发展、生活富裕、生态良好的文明发展道路。具体到能源可持续发展，要求能源安全供给、经济竞争力和环境可持续性三者统筹兼顾，其中能源安全供给是能源可持续发展的核心内容；经济竞争力为可持续能源提供有力保障；环境可持续性是可持久能源的基本前提。

本课程的主要目的是使学生在从化石燃料向可再生能源的过渡过程中，在 Covid-19 新冠疫情的影响下更好地为能源行业在实际工作中的应用实践做准备。

#2. 学习目标



本课程将解决许多挑战，如：

- ★ 学习能量转换过程在公司生产链各环节中的应用
- ★ 学习用于火力发电、热核能、水力发电、太阳能和风能、地热能、氢能以及相关环境和经济事项的化石燃料的能源供求
- ★ 了解能源系统在过渡过程中减少二氧化碳排放量以实现可持续发展的相关性
- ★ Covid-19 新冠疫情对能源过渡过程和公司商业模式的影响

#3. 任课教师信息



Dr. E D P

老师目前是莱斯大学琼斯商学院的讲师，曾在迈阿密大学工程学院，圣保罗大学和麦肯齐大学任教。他在美洲的电力和石油行业服务了 30 年，任职过多家公司的高级经理和董事会成员，并发表了多部关于拉丁美洲能源与可持续发展的著作，曾在非洲、亚洲、大洋洲、美洲和欧洲的多次能源会议上担任特邀发



言人。

#4.课程设置

PBL

周期	时间	课程设置内容	课时
第一周 学习指南 教授及助教辅导	7 月 18 日 周一	什么是 PBL 教学方法	1
	7 月 19 日 周二	PBL 教学的常见形式	1
	7 月 20 日 周三	教授课-1 交叉学科 PBL 课程设计及知识点学习 学习目标：能源对可持续发展的影响 描述：通过本模块，学生将学习能源对可持续发展的影响，重点将介绍能源指标，指由能源目标产生的，为实现能源目标所需规定的具体要求，可以适用于整个组织或者其局部。	3
	7 月 22 日 周五	助教课-1 知识点查漏补缺	2
	7 月 23 日 周六	教授课-2 制定小组项目方向 学习目标：环境和气候变化方面及其与能源的关系 描述：通过本模块，学生将学习环境 and 气候变化方面及其与能源的关系，包括环境政策与气候变化机器人制造。	3
	7 月 25 日 周一	助教课-2 知识点查漏补缺	2
	7 月 26 日 周二	教授课-3 交叉学科课程知识点学习 学习目标：了解当前的全球能源组合 描述：通过本模块，学生将学习当前的全球能源组合方式，包括在全球能源组合中化石燃料的主要地位。	3
	7 月 27 日	助教课-3	2



第二周 教授及助教辅导	周三	知识点查漏补缺&跟进小组项目调研进度	
	7月29日 周五	教授课-4 互动与项目设计跟进答疑	1.5
	7月30日 周六	助教课-4 跟进小组项目调研进度	2
	7月31日 周日	教授课-5 交叉学科课程知识点学习 学习目标：风能与太阳能的供应潜力 描述：通过本模块，学生将学习风能与太阳能的供应潜力，突出介绍这些替代能源的迫在眉睫和急需。	2
第三周 教授及助教辅导 未来展望	8月2日 周二	助教课-5 跟进小组项目调研进度	2
	8月3日 周三	教授课-6 交叉学科课程知识点学习 学习目标：其他能源介绍 描述：通过本模块，学生将学习其他能源的相关内容，包括水能、核能、地热能、氢能、能源储存/电池、生物燃料等。	2
	8月5日 周五	助教课-6 知识点查漏补缺&指导小组项目成果展示	2
	8月6日 周六	教授课-7 教授点评小组项目成果	1.5
	8月7日 周日	升学与就业方向展望	1
		个人规划及发展建议	1
	总课时	32	

#5. 阅读材料



- ★ Energy systems engineering : Evaluation and implementation/Francis M. Vanek, etal.
- ★ Sustainable energy : Choosing among options / Jefferson W. Tester, et al.
- ★ Renewable Energy : Power for a Sustainable Future. Third Edition. Edited by G. Boyle.

#6.项目主题



本课程使用 PBL 教学法，PBL 即项目式学习，是一种以学生为中心的教学方法，教师提供关键素材构建学习环境，学生组建团队通过在此环境里解决一个开放式项目的经历来学习。以下为本课程可选的项目主题：

- 能源指标
- 环境政策与气候变化
- 不可再生能源：石油、天然气或煤炭
- 可再生能源：风能、太阳能、电池/储能、生物燃料、氢能、地热能，水能、核能

英文版教学大纲



Course Title	Management of Energy Systems for a Sustainable Development
Credit Hours	32 (one credit hour is 45 minutes)
Course Objectives	It is designed to teach students the applications of energy conversion processes in the segments of the production chain. It includes energy supply and demand of fossil fuels for thermal power generation, thermo-nuclear power, hydropower, solar and wind energy, geothermal power, hydrogen energy, and the related environmental and economic matters. The relevance of energy systems in its transition process to reducing CO2 emissions towards a sustainable development. The impact of the covid-19 pandemic in the energy transition process and in the business model of corporations.
Course Description	The main objective of this course is to better prepare the student for the real world of the energy sector under the impact of the covid19 pandemic in the process of its transitioning from fossil fuels to renewables sources of energy. The course will cover:

	<ul style="list-style-type: none"><li>- Energy Indexes. Environmental Policy and Climate Change.</li><li>- Application of energy conversion and the energy-environment-economy system.</li><li>- Present and projected supply and demand of energy: Fossil fuels, Hydroelectric and Thermoelectric power generation, Hydrogen, Nuclear, Solar, Wind, and electrical energy from biomass.</li></ul>
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**Brief introduction of the course**

Energy Economics is a cutting-edge and interdisciplinary new discipline that integrates economics, management, resources and environment and other advantageous disciplines. It studies the economic relations and economic laws of energy production, exchange, distribution, and consumption processes. Energy economics is a branch of political economy and engineering economics.

The scope of the energy economy is actually very broad. For example, the popular low-carbon economy, green environmental protection, ecological economy, etc. involve energy issues, and energy conservation and environmental protection can be included in the energy economy. The energy problem is now a worldwide problem, and the national level is very concerned about the energy economy. In the future, energy will become the main factor restricting economic development, and more of it will be the strong support of the state. Sustainable development of energy refers to a development process in which various energy sources are effectively developed and utilized in the contemporary era, and at the same time, the conditions for sustainable utilization of various energy sources can be created for future generations. The essence of "sustainable development" is to coordinate the harmonious development of man and nature, properly handle the relationship between economic construction, population growth and resource utilization, and ecological environmental protection, and promote the entire society to embark on a civilization of production development, affluent life, and good ecology. development route. Specific to the sustainable development of energy, energy security supply, economic competitiveness and environmental sustainability are required to be taken into consideration in an overall manner. Energy security supply is the core content of sustainable energy development; Sustainability is a fundamental prerequisite for sustainable energy.

	Topics
Module 1	Objective: Relate the impact of energy in sustainable development Description: Energy indexes
Module 2	Objective: The environmental and climate change aspects and its relation with energy sources Description: Environmental Policy and Climate Change
Module 3	Objective: Knowledge of current global energy portfolio Description: the major participation of fossil fuels
Module 4	Objective: Potential Supply of Wind energy and Solar Energy Description: the looming alternative source
Module 5	Objective: Overview of other sources of energy Description: Hydropower, nuclear, geothermal, hydrogen, energy storage/batteries, biofuels
Module 6	Q&A

Required Readings

1. Energy systems engineering : evaluation and implementation / Francis M. Vanek, et al.

2. Sustainable energy : choosing among options / Jefferson W. Tester, et al.

3. Renewable Energy : Power for a Sustainable Future. Third Edition. Edited by G. Boyle.

4. Energy, Environment and Sustainable Development. Dincer, I.; Rosen, M. A.

5. Energy. Production, Conversion, Storage, Conservation. Y. Demirel. Springer Course.

6. ISBN - 9783030280765 - Palgrave Handbook of Managing Fossil Fuels and Energy Transitions.

7. ISBN - 9780262026048 - Solar Revolution: The Economic Transformation of the Global Energy Industry (The MIT Press) 1st Edition.

8. ISBN - 9781440853241- Energy Transitions: Global and National Perspectives, 2nd Edition.

9. ISBN - 9783848739561 - The German Energy Transition and the Nuclear Phase-Out.

10. ISBN - 9780367194185 - Wind and Solar Energy Transition in China - by Marius Korsnes.

**Suggested list of the topics for the final project**

1. Energy Indexes
2. Environmental Policy & Climate Change
3. Non-renewables sources of energy: oil, natural gas or coal
4. Renewables sources of energy: wind, solar, battery/energy storage, biofuels, hydrogen, geothermal, hydropower, nuclear

**Criteria**

Final Project Team Paper Term of 10 pages. Formatting following the Chicago Manual of Style with Figures, Tables, Graphs, Appendices , Abstract, Table of Contents, Bibliography, footnotes, endnotes.

**Class Expectation**

1. An ability to apply knowledge of mathematics, science, engineering business and technology.
2. An ability to design and conduct experiments, as well as analyze and interpret data.
3. An ability to design a system, component, or process to meet desired needs.
4. An understanding of professional and ethical responsibility.
5. An ability to communicate effectively.
6. A knowledge of contemporary energy issues.
7. An ability to use the techniques, skills and modern tools necessary for professional practice.
8. A knowledge of the sources and uses of energy towards its transition process for a sustainable development.